

# Journal of EMERGENCY NURSING

OFFICIAL PUBLICATION OF THE EMERGENCY NURSES ASSOCIATION

- The Acute Incident Response Program: A Framework Guiding Multidisciplinary Responses to Acutely Traumatic or Stress-Inducing Incidents in the ED Setting
- Mental Health Impacts of Climate Change: Perspectives for the ED Clinician
- Exploring National Nursing Readiness for a Radiological or Nuclear Incident: A Cross Sectional Study
- Telenursing in Incidents and Disasters: A Systematic Review of the Literature
- Development and Psychometric Testing of a Tool Measuring Nurses' Competence for Disaster Response
- Disaster Knowledge, Skills, and Preparedness Among Nurses in Bengkulu, Indonesia: A Descriptive Correlational Survey Study
- Attitudes Toward Influenza Vaccination Administration in the Emergency Department Among Health Care Providers: A Cross-Sectional Survey
- Increasing Disaster Preparedness in Emergency Nurses: A Quality Improvement Initiative
- Do No Harm: A Multifactorial Approach to Preventing Emergency Department Falls—A Quality Improvement Project
- Emergency Nurse Perceptions of Naloxone Distribution in the Emergency Department
- The Impact of Bed Traffic Control and Improved Flow Process on Throughput Measures in a Metropolitan Emergency Department





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## SEARCH STRATEGY

Set No.	Searched for	Databases	Results
S1	Journal of Emergency Nursing: JEN	Ebook Central, Public Health Database, Publicly Available Content Database	3455°

° Duplicates are removed from your search and from your result count.

# Assessment of Rabies Prophylaxis Cases in an Emergency Service: JEN

[ProQuest document link](#)

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## ABSTRACT (ENGLISH)

### Introduction

The aim of the present study was to evaluate the demographic characteristics, exposure features, and prophylactic care aspects of cases that presented to the emergency department of 1 state hospital in Turkey between 2013 and 2017 because of the risk of rabies contact.

### Methods

Data from the retrospective cohort study were obtained from ED records of Erzurum Palandöken State Hospital between August 2013 and June 2017 regarding patients presenting to emergency service after the risk of rabies contact. Evaluation forms included demographic characteristics of the patients, contact type, contacted animal, exposure features, and the status of prophylaxis. Descriptive analysis, with frequency and percentage, was used.

### Results

A total of 691 records were analyzed. The mean age of the patients was 29.2 years (SD = 0.65). Of those, 547 (79%) were male, and 144 (21%) were female. Regarding location, 506 (73%) of the 691 cases were from urban areas, and 185 (27%) from rural settings. Of the cases, 515 (74%) were bite injuries, 159 (23%) were scratches, and 22 (3%) were contact. Of the contacted animals, 483 (70%) were dogs, 171 (25%) were cats, 11 (2%) were foxes, 14 (2%) were horses, 2 (< 1%) were sheep, and 10 (1%) were cattle. A total of 16 animals were vaccinated, however the vaccination status of 675 cases were not known by the patients.

### Discussion

It would be beneficial to increase the number of studies regarding animal control, make correct and complete mandatory reporting, properly maintain the risky contact record, and create better pet vaccination cards in Turkey. The training deficiencies of related personnel at risk for contact with rabies are a major public health problem.

## FULL TEXT

### Contribution to Emergency Nursing Practice

- The current state of scientific knowledge on rabies and its implications with appropriate prophylaxis indicate a continuing need for increased knowledge regarding this disease and a thorough understanding of proper use of prophylactic interventions.
- The main finding of this research is that most individuals having risky contact with potential rabies infection occurs in urban areas are men with superficial bites to the upper extremities who did not receive proper prophylaxis according to guidelines for the geographic location.
- Key implications for emergency nursing practice from this research are that health professionals, especially nurses, should be adequately informed and educated about rabies, both for their safety and for the correct treatment of the patient.

### Introduction

Rabies is an acute, progressive, zoonotic disease of the *Rhabdoviridae* family characterized by encephalomyelitis

that occurs within the RNA virus.<sup>1</sup> Rabies is known as one of the oldest infectious diseases, which is transferred from an animal or human bite, scratch, or saliva contact with an open wound or mucosal structures or through inhalation or transplantation. After infection, the subcutaneous and muscular tissues are involved. At the end of the incubation period (20-90 days), the rabies virus reaches the dorsal root ganglion, spinal cord, and central nervous system (CNS) by way of the peripheral nerves. After proliferation occurs in this location, it spreads to all tissues and organs through the peripheral nerves. Rabies has 5 stages: incubation period, prodromal, acute neurological, coma and death, and recovery periods. The incubation period varies depending on the virulence of the organism, the number of viruses, the distance from the place where the bite or transmission occurred to the CNS, and the neural density of the wound.<sup>2-4</sup> Rabies transmission occurs most commonly through pets, especially cats and dogs. Rabies transmission rarely takes place with bites of wild animals, such as wolves, foxes, jackals, and sheep.<sup>5</sup> Rabies has the highest mortality rate among infectious diseases.<sup>6,7</sup> Turkey's Ministry of Health guide suggests rabies prophylaxis for people thinking of traveling to countries where the prevalence of rabies cases exists. However, there are no specified risk areas in the territory of Turkey. Risks are present all over the world for those who practice extreme sports, researchers, and anyone camping in wildlife areas. According to the WHO data, approximately 59,000 people who are mostly from Asian and African countries die because of rabies each year. More than 95% of the rabies deaths in humans are caused by rabid dog bites.<sup>8</sup> In Turkey, 93% of rabies-infected animals are domestic, with 59% of them being dogs.<sup>9</sup> Approximately 175,000 potential rabies risk cases are reported to the Ministry of Health in Turkey each year, and 1-2 cases of rabies are emerging.<sup>10</sup> It is highly important to vaccinate domestic animals and to apply rabies prophylaxis to at-risk contacts.

The purpose of this study was to evaluate the demographic characteristics, exposure features, and prophylactic interventions of patients who presented to the emergency department of Erzurum Palandöken State Hospital because of potential rabies exposure.

### **Methods Study Design**

This study was carried out as a retrospective cohort study of possible rabies animal contact case records of patients who presented to 1 hospital emergency service.

### **Setting**

This study was carried out at the Erzurum Palandöken State Hospital Emergency Service located in northeast Turkey. This hospital maintains 250 inpatient beds and 10 emergency care beds.

### **Participants**

All patient records for those who presented to the emergency department for possible rabies exposure from August 2013 to June 2017 were included. Those who were veterinarians by occupation were excluded because these individuals received rabies prophylaxis routinely outside of the ED setting. We excluded records with missing data, as described in the Data Access and Cleaning Methods section.

### **Variables**

Information about age, sex, area bitten or otherwise contacted body region, geographic location, when the bite or contact occurred, contact type and depth, genus of the animal, vaccination status of the animal, previous vaccination status, the time from the moment of contact to the time of presentation to the health facility, the dose of rabies vaccine administered to the patient, and information as to whether immunoglobulin was also administered or not were recorded.

An evaluation was carried out regarding whether or not the principles stated in the Rabies Protection and Control Instruction of Republic of Turkey Directorate General of Basic Health Services of the Ministry of Health Care were applied. (Patient records before 2014 were evaluated according to the Rabies Protection and Control Regulations



published in 2001. Others were evaluated according to the Rabies Field Guide published in 2014).<sup>9</sup>

### **Data Sources**

The ED patient record book and hospital database, where rabies risky contacts were recorded, were used as data sources.

### **Analysis Methods**

SPSS version 22.0 package program was used to calculate descriptive statistics.

### **Data Access and Cleaning Methods**

Cases with incomplete information in the hospital database and in the ED patient follow-up and those without rabies risk were excluded from this study.

### **Ethical Considerations**

As a single-site, deidentified administrative database review, the study was deemed exempt from institutional review board review according to policy at the study site. This study was not within the scope of clinical research (ie, no samples were taken from the patient, no medication was administered, and no questions were asked of the patient). Only recorded data were examined. Necessary permissions were obtained from the hospital management.<sup>10</sup>

### **Results**

During the study period, 737 cases of potential rabies referred to emergency services for animal bites and contact between August 2013 and June 2017 were evaluated. Of these, 691 were evaluated. A total of 27 veterinarians and 19 cases with missing data were excluded.

Of the possible rabies exposure cases, 547 (79.2%) were male, and 144 (20.8%) were female. The mean age of the patients was 29.2 years (SD = 0.65) with a range of 19-36 years. Most (73.2%, n = 506) were from urban areas (Table 1). Of the contact cases, 483 (69.9%) occurred after an interaction with dogs, 171 (24.7%) with cats, 14 (2%) with horses, 11 (1.6%) with foxes, 10 (1.4%) with cattle, and 2 (0.3%) with sheep. Interactions with animals were recorded as 510 (73.8%) bites, 159 (23%) scratches, and 22 (3.2%) contacts. A total of 350 (50.7%) of the bites and scratches were superficial, and 341 (49.3%) were deep injuries (Table 2). The seasons in which cases occurred were as follows: 161 (23.3%) winter, 194 (28.1%) spring, 168 (24.3%) summer, and 168 (24.3%) autumn. The body regions of those injured were 23 (3.3%) head, 385 (55.7%) arms, 90 (13%) body, and 193 (27.9%) legs. Of the animals contacted, 16 (2.7%) were owned and vaccinated; however, 675 (97.3%) had no record of ownership or vaccination status (Table 3).

Administration of 1 dose of human diploid cell vaccine occurred for 114 (16.5%) cases, 2 doses for 71 (10.3%), 3 doses for 150 (21.7%), 4 doses for 128 (18.5%), and 5 doses for 227 (32.9%) cases. In addition, human rabies immunoglobulin was applied to 540 (78.1%) cases in the prophylaxis program. When asked whether they were exposed to a similar situation in the past (bite, scratch, or contact), 37 (5.4%) people responded yes, and 654 (94.6%) responded no (Table 4). No cases of actual rabies infection were detected within the prophylaxis schedule.

### **Discussion**

Aligned with WHO's recommendations, the regulations created by the Ministry of Health should be taken into consideration in the control of an infectious disease such as rabies, while city administrators should take the necessary precautions for vaccination of stray animals. This study demonstrated that we are far from WHO's plans and measures in implementation in Turkey. In addition, the results obtained in this study were consistent with the literature in sex, animal source, and type of wound parameters but were different from the literature in age and seasonal parameters.

### **Sex**

In this study, 79.2% of suspected rabies contact cases were men. In similar studies conducted in Turkey and around

in the world, it has been reported that the proportion of men exposed to suspected rabies contact is between 67.0% and 78.6%. As reported in other studies, the number of males were higher, attributed to the fact that mostly males were working in rural areas, spending more time outside, or interacting with dogs as pet owners.<sup>6,11-13</sup> Dogs carry an important place in the lives of people in Asia and the Middle East, especially farmers, shepherds, and rural residents. Most of the individuals in these regions do not have enough information about proper vaccination of their pets and on obtaining health care.

### **Age**

Rabies is a risk for all age groups. In this study, the age range for rabies risky contacts was 19-36 years with a substantial number of notifications in the age range of 0-18 years. According to the WHO 2010 report, 40% of risky contacts were seen in children under the age of 15 years.<sup>14</sup> This could be caused by children coming into contact with animals for the purpose of playing and the overall vulnerability of this age group.<sup>5,14</sup> In most of the studies in the literature, the highest risk of potential rabies contacts occurred between the ages of 19 and 60 years.<sup>11-13</sup> We used an age grouping to evaluate the similarities and differences among age groups descriptively. Other articles in the literature reported that cases were more common in the age range of 19-36 years. We found that 33.5% of cases were between the ages of 0 and 18 years. These data from this study were similar to WHO's data, within 7%.

### **Season**

Aker et al,<sup>12</sup> Karadağ et al,<sup>15</sup> and Balin et al<sup>16</sup> reported that rabies risk occurred most commonly during the summer season, whereas Kadioğlu et al<sup>6</sup> reported that most occurred in the autumn and winter. Gülaçtı et al<sup>17</sup> reported that contact cases increased in the spring and summer seasons. On the contrary, in our study, rabies risk occurred most frequently in the autumn or fall months (28.1%). When the data from the available literature were evaluated, the differences in numbers between the seasons in which rabies risk occurred were not substantial. As seen in recent studies conducted in Turkey, this situation may have risen from the fact that most contacts occurred in urban areas, in contrast to expectations. In countries with established economic infrastructure, potential rabies contacts are taking place in the urban areas owing to wild animal attacks, whereas in countries with emerging or nonexistent economic infrastructure, they are due to the lack of control of stray dogs.<sup>8</sup> This explains why rabies risky contacts in Turkey have mostly occurred in urban areas.<sup>6,12,17,18</sup> In this study, 73.2% of the contacts, which occurred in the urban areas, were in accordance with the literature.

### **Animal Source**

According to WHO data, rabies cases by dog bites accounted for approximately 95% of human rabies cases. A collaborative approach with the Food and Agriculture Organization of the United Nations, the Global Alliance for Rabies Control, WHO, and the World Organization for Animal Health created a global conference, titled "Global elimination of dog-mediated human rabies," was organized in Geneva, Switzerland, on December 10-11, 2015.<sup>14,19,20</sup> In this conference, the partners stated that their aim was to eradicate rabies caused by dogs by 2030. This will be possible with political will, adequate resources, and rigorous program management. Furthermore, they drew attention to the importance of rabies notification, requiring successful follow-up and data evaluation; therefore, it was emphasized that rabies was a compulsory notification disease category.<sup>20-22</sup> Similar to our work, studies have shown that most of the rabies risky contacts originated from dogs, especially by Aydın et al<sup>13</sup> (84.7%), Taşdemir et al<sup>21</sup> (71.5%), Aker and Şahin (75.4%),<sup>12</sup> Balin and Denk (58.3%),<sup>16</sup> and Derinöz and Akar (73.4%).<sup>2</sup> Following the dog as the most common vector were cats (24.7%), cattle (1.4%), and other animals.<sup>17,22</sup> In our study, 483 (69.9%) of the cases were of dog-origin followed by 171 (24.7%) of cat, 11 (1.6%) of fox, 14 (2%) of horse, 2 (0.3%) of sheep, and 10 (1.4%) of cattle. The immunization status of animals in most of rabies-risk contacts being unknown is also a serious problem. As stated earlier, the forms examined in our study indicated that most animals had no owner or

vaccination status. Aker and Sahin<sup>12</sup> reported that 180 (41.38%) of their cases were owned and nonvaccinated, and Taşdemir et al<sup>21</sup> reported that 89 (45.2%) of the cases were ownerless in that study. It was noted that 16 of the animals involved were vaccinated, but the vaccination status of the remaining 675 were not known. When our data were evaluated, including records from before 2013, animal ownership status in our records was not specified well, and all cases had been vaccinated. To avoid unnecessary vaccination, the detailed anamnesis should be received for all cases.

### **Practice Improvement**

Whereas appropriate vaccine administration occurs with the bites and exposures as previously discussed, most studies carried out in Turkey demonstrated that rabies prophylaxis had been administered after mouse bites.<sup>2,15,20</sup> Contrary to common belief, rodents are not carriers of rabies. In the Rabies Prevention and Control Directive of the Ministry of Health, bites from animals such as mice, rats, squirrels, hamsters, and contacts with cold-blooded animals such as snakes, lizards, and tortoises are defined as conditions that do not require prophylaxis. Despite many training classes, emergency doctors and nurses continue the inappropriate practice of treating rodents, such as mice and rats, as carriers of rabies. Therefore, the rabies vaccine is often administered to patients who are bitten by one of these members of the rodent family.

Unnecessary vaccination practices increase the health expenditures of the country.<sup>17</sup> This is a serious loss in health spending. The knowledge deficit that mouse and rat rodent bites generally do not require rabies prophylaxis creates excessive and unnecessary expenditures.<sup>13</sup> In Turkey, the cost of prophylaxis after suspected rabies contact is higher than the cost of rabies vaccine and rabies immunoglobulin application after exposure. Approximately, 1 million euros are spent per year for rabies vaccine and rabies immunoglobulin.

We also found that incomplete records were another area for practice improvement at the study site. We excluded 19 cases with incomplete records. Every patient who is treated for rabies exposure in the emergency department is directed to the infectious disease outpatient clinic for control purposes and follow-up. When the specialist compared the emergency logbook with the patient data system, we discovered that there was an incompatibility. On the basis of our findings, training sessions were provided at the site. Ongoing training is also important as physician and nursing staff in the emergency department change frequently.

### **Wound**

Most rabies risky contacts in this study were caused by biting (510 cases, 73.8%), with scratching (159 cases, 23%), and contact (22 cases, 3.2%). A total of 350 (50.7%) of the bite and scratch cases were superficial, and 341 (49.3%) were deeply injured. In studies carried out by WHO and other researchers, notifications usually came in the form of biting. In other studies, the most injured body regions were generally extremities. Yilmaz et al<sup>22</sup> have reported that 44.9% of the cases were in the lower extremities and 42.3% in the upper extremities; Ostanello et al<sup>23</sup> have reported that 36.1% of the cases were in the lower extremities with 30.4% in the upper extremities and 9.5% in the head and neck region; Balin and Denk<sup>16</sup> have also reported that 53% of the cases were in the upper and lower extremities, 44.4% in other body locations, and 2.6% in the head and neck regions.<sup>16,23</sup> Similarly, in this work, the injured body regions were found to be 193 (27.9%) in the lower extremities. 38 (55.7%) in the upper extremities, and 90 (13%) in other body regions. Unlike adults, studies carried out with children indicated that most injuries were in the head and neck regions because of their small size. Head and neck region exposure, owing to the proximity to the CNS, caused these rabies risky contacts to be more fatal, especially in children.<sup>5</sup>

### **Adherence to Rabies Protection and Control Instruction**

When the vaccination programs were evaluated, all the animals were taken into 4 and 5 vaccination schedules as stated in the Directorate General of Primary Health Care of the Ministry of Health in the direction of Rabies

Protection and Control. Of the cases determined to require prophylaxis with human diploid cell culture rabies vaccine, 114 (16.5%) received 1 dose, 71 (10.3%) received 2 doses, 150 (21.7%) received 3 doses, 128 (18.5%) received 4 doses, and 540 (78.1%) people were vaccinated in total. In cases in which the animals could be monitored, patient vaccination was interrupted at the third dose; and in cases in which the animals could not be followed, the fourth and fifth doses of the vaccine were completed. It was thought that people who had received 1 and 2 doses of the vaccine might have continued to follow-up in different hospitals or had a continuation problem (Table 4). Regarding the 540 (78.1%) vaccinated cases, human rabies immunoglobulin and the vaccine were administered. It is important that record keeping of both the patients seen in emergency departments and animal immunizations by veterinarians are kept up to date and that they are easily accessible for patient tracking. Future research should also be employed in the area of rabies prophylaxis and postexposure care.

### **Limitations**

The most important limitations that we encountered in this study were not keeping patient records regularly, not being able to follow stray animals, and lack of patient follow-up as directed. The 19 records that did not meet criteria or had missing data were excluded from the study.

Patients were often unaware of the vaccine status of the animals. Apart from this, patients did not follow their vaccines regularly. Another potential problem was vaccination in cases that did not require a vaccine, for example, mouse and rat bites. We examined the registry kept in the emergency department and decided that the records before 2013 were not reliable. Again, while creating the data set, we excluded patient records that were illegible or incompatible with the online system. The number presented in the article is the number of patients who have data in the parameters evaluated.

### **Implications for Emergency Nurses**

Health professionals, especially nurses, should be adequately informed and educated about rabies, both for their safety and for the correct treatment of the patient. Nurses should follow the protocols for their respective countries and institutions.

No rabies cases have been reported after rat, mice, squirrel, hamster, or rabbit contacts. It should be well-known whether the type of animal contact carries the risk of rabies. Ownership of animals with risky contact with patients and other conditions of the animal should be questioned correctly by the nurses during triage or the primary assessment.

The first step in prophylaxis of rabies risky contact is wound care, and this is the most effective way to reduce the transmission of the rabies virus. Emergency nurses are often the first clinicians to care for patients in response to rabies risky contacts. In all injuries, the wound should be washed thoroughly with copious amounts of soap and water. Protective equipment must be used at this time. Necessary notifications should be made after this first intervention. In all cases in this study, emergency nurses performed these procedures on the first application, and then immunization was performed.

Patients should be educated as to possible untoward effects of rabies immunization such as local reaction at the site (redness, swelling, or itching). Other potential systemic effects are headache, abdominal pain, nausea, dizziness, and the eruption of hives, fever, and joint pain. Rarely, Guillain-Barré syndrome and anaphylactic reactions can occur. Patients should be well aware of these potential adverse effects and reactions so that the proper care can be initiated as soon as possible.<sup>24</sup>

### **Conclusions**

Risky rabies contact in Turkey remains a major public health problem. Although there were no actual cases of rabies in our region during this study, there were a large number of contacts owing to derelict animals, which could not be

monitored for the prescribed protocol of 10 days. Patients were evaluated in the emergency department, and because wound category distinction could not be well determined, this impacted the number of vaccines and immunoglobulins administered. This study assisted in enumerating specific facets of rabies risky contact in our area and brought to light the need for more organized records in this fight, registration of animal ownership and vaccination status, training of health workers in this field, public awareness, and liaison between the necessary institutions.

**Author Disclosures**

Conflict of interest: none to report.

Demographic characteristics	Number	%
Sex		
Male	547	79.2
Female	144	20.8
Age groups		
0–18	232	33.5
19–36	261	37.6
37–54	113	16.3
55–72	85	12.3
Location		
Rural	185	26.8
Urban	506	73.2
Total	691	100

Animal type and wound features	Number	%
Animal		

Dog	483	69.9
Cat	171	24.7
Fox	11	1.6
Horse	14	2
Sheep	2	0.3
Cow	10	1.4
Contact type		
Bite	510	73.8
Scratch	159	23.0
Contact	22	3.2
Wound skin thickness		
Superficial*	350	50.7
Partial thickness to deep*	341	49.3
Total	691	100

Parameter	Count	%
Season		
Winter	161	23.3
Spring	194	28.1
Summer	168	24.3
Autumn	168	24.3
Bite area		

Head	23	3.3
Arm	385	55.7
Body	90	13.0
Leg	193	27.9
Animal vaccine status		
Unknown	675	97.7
Available	16	2.3
Total	691	100

Vaccine dose and prebite states	Count	%
Vaccine dose		
1	114	16.5
2	72	10.3
3	150	21.7
4	128	18.5
5	227	32.9
Previous potential exposure		
Unavailable	654	94.6
Available	37	5.4
Total	691	100

## DETAILS

<b>Subject:</b>	Infections; Infectious diseases; Emergency medical care; Vaccines; Public health; Horses; Urban areas; Animals; Health problems; Hospitals; Cohort analysis; Immunization; Foxes; Drug dosages; Age; Dogs; Sheep; Rabies; Rural communities; Nervous system; Immunoglobulins; Mandatory reporting; Males; Animal bites; Emergency services; Demography
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# A Pivot to Palliative: An Interdisciplinary Program Development in Preparation for a Coronavirus Patient Surge in the Emergency Department: JEN

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## ABSTRACT (ENGLISH)

While numbers are still emerging, the demographics of patients with COVID-19 in Massachusetts are overrepresented by patients from nursing homes, those older than 70 years, and those with racial and ethnic minority identities.<sup>1</sup> Because elderly patients with multiple comorbidities are at an increased risk of death,<sup>2,3</sup> an extreme demand on our local health care system was anticipated with this influx of patients potentially needing end-of-life (EOL) care. The program, program tools, and program development process are provided here to serve as a guide for emergency clinicians, palliative nurses, nurse practitioners (NPs), and nursing leadership looking to establish similar programs within their institutions. Background Palliative care is specialized health care for people with serious illnesses. Despite this shared goal, a knowledge gap exists regarding the optimal delivery of palliative care in the emergency department.<sup>6</sup> Models of palliative care delivery differ between institutions depending on department size and volume, and currently, optimal models of department-based palliative care have not been rigorously studied.<sup>6</sup> The priority focus of emergency nursing has traditionally been geared toward lifesaving and life-sustaining interventions. An integrative program has been developed called The Improving Palliative Care in Emergency Medicine (IPAL-EM) project, which guides ED providers to incorporate palliative care into standard practice.<sup>12</sup> Aligning with the IPAL-EM basic and advanced integration categories, we sought out ways through our program to connect emergency and palliative care clinicians with shared a common goal by means of novel processes and protocols.<sup>12</sup> Our work group's overarching goal was to support emergency nurses during a surge in the number of patients with COVID-19 in providing compassionate patient care (both palliative and EOL) through the development and implementation of educational and clinical support tools. Methods In anticipation of a surge in the number of patients with COVID-19, ED and palliative care leaders (nurses, NPs, physicians, and social workers) identified the need for swift collaboration between the 2 departments.

## FULL TEXT

### Contribution to Emergency Nursing Practice

- The current literature on palliative care in the emergency department indicates the prominent need for emergency nurses and palliative care clinicians to better understand their respective roles and responsibilities to improve palliative care for ED patients.
- This article contributes a program template, process and educational and support resources for emergency nurses focused on improving palliative care in the emergency department during the coronavirus disease pandemic.

••Key implications for emergency nursing practice found in this article are the potential to tailor, replicate, and test our program to improve palliative care in other ED settings.

## Introduction

As the coronavirus disease (COVID-19) pandemic continues to unfold in the United States, the health care sector faces harrowing challenges of overloaded systems, unknown viral impact, and considerable mortality. American health care institutions must tailor a swift and strategic response at their local facilities to ensure high quality and compassionate patient care. In the pandemic timeline, Massachusetts was several weeks behind the patient surges that occurred in Seattle and New York City. Witnessing the severe system strain from these cities, Massachusetts hospitals' disaster plans included deploying resources and clinicians in novel ways. One of our hospital's strategies involved an increased focus on the role of palliative care in the ED setting.

While numbers are still emerging, the demographics of patients with COVID-19 in Massachusetts are overrepresented by patients from nursing homes, those older than 70 years, and those with racial and ethnic minority identities.<sup>1</sup> Because elderly patients with multiple comorbidities are at an increased risk of death,<sup>2,3</sup> an extreme demand on our local health care system was anticipated with this influx of patients potentially needing end-of-life (EOL) care.

Brigham and Women's Hospital is a 793-bed, Harvard-affiliated, magnet-recognized hospital located in the Longwood medical area of Boston. Its 60-bed, level 1, emergency department sees 63,000 patient visits annually and services patients from metro Boston, throughout the nation, and from 120 countries. As a leader in the Boston health care network and a care provider for a dense, urban setting, measures needed to be taken quickly as the COVID-19 pandemic evolved. In response to a potential patient surge and as part of pandemic disaster planning, we projected that rapid collaboration between palliative care and ED staff was needed to meet the needs of critically ill patients who are COVID-19 positive presenting to the emergency department. We developed a multipronged program designed to provide optimal care for patients who are COVID-19 positive in our large, metropolitan emergency department. The program, program tools, and program development process are provided here to serve as a guide for emergency clinicians, palliative nurses, nurse practitioners (NPs), and nursing leadership looking to establish similar programs within their institutions.

## Background

Palliative care is specialized health care for people with serious illnesses. Palliative care focuses on providing symptom relief, communication, and psychosocial/spiritual support with the goal of improving quality of life for patients and their families.<sup>4</sup> Although EOL care is 1 element of this specialty, palliative care and EOL care are not synonymous. Palliative care involvement is appropriate at any stage of serious illness, providing an extra layer of support in conjunction with treatment provided by other medical teams.<sup>5</sup> Palliative care aims to alleviate suffering, a shared goal of ED clinicians. Despite this shared goal, a knowledge gap exists regarding the optimal delivery of palliative care in the emergency department.<sup>6</sup> Models of palliative care delivery differ between institutions depending on department size and volume, and currently, optimal models of department-based palliative care have not been rigorously studied.<sup>6</sup>

The priority focus of emergency nursing has traditionally been geared toward lifesaving and life-sustaining interventions. A fast-paced setting, the emergency department is characterized by rapid throughput processes, which can hinder the necessary nurse-patient empathic bonding that enables effective palliative care.<sup>7</sup> In addition to these obstacles, the perception of palliative care in the emergency department presents a challenge to collaboration among the specialties. Although emergency nurses may recognize the palliative care needs of their patients, they

identify lack of time and lack of palliative care education/training as challenges to meeting those needs.<sup>8</sup> ED clinicians have also expressed the cognitive dissonance that palliative care is somehow a means of giving up on a patient or failure to provide appropriate care.<sup>7</sup>

Seeking to standardize palliative care involvement the Center to Advance Palliative Care published a consensus report in 2011. This report called on every hospital to develop a systematic approach for identifying patients in advance who are at a high risk for unmet palliative care needs through a palliative care screening assessment.<sup>9</sup> Many organizations, including the Emergency Nurses Association (ENA), have aligned with this call. The ENA has identified the need for additional palliative and EOL education and mentorship, calling on emergency nurses to be directly involved in quality improvement initiatives around palliative care and EOL care across the care continuum.<sup>10</sup> Similar initiatives also exist in emergency medicine. The American College of Emergency Physicians has developed online resources and tools for their members, seeking to support ED physicians in providing palliative care.<sup>11</sup> In addition to professional calls to action, formal work has been done in the interest of greater collaboration between emergency care and palliative care. An integrative program has been developed called The Improving Palliative Care in Emergency Medicine (IPAL-EM) project, which guides ED providers to incorporate palliative care into standard practice.<sup>12</sup> Aligning with the IPAL-EM basic and advanced integration categories, we sought out ways through our program to connect emergency and palliative care clinicians with shared a common goal by means of novel processes and protocols.<sup>12</sup> Our work group's overarching goal was to support emergency nurses during a surge in the number of patients with COVID-19 in providing compassionate patient care (both palliative and EOL) through the development and implementation of educational and clinical support tools.

## Methods

In anticipation of a surge in the number of patients with COVID-19, ED and palliative care leaders (nurses, NPs, physicians, and social workers) identified the need for swift collaboration between the 2 departments. Our interdisciplinary group worked to understand the workflow of both the ED and palliative care consult services and to identify and address knowledge and practice gaps. The initial work group included physician leaders from both the emergency department and palliative care, a staff nurse from the emergency department, and a palliative care NP. Our collaborative strategy embraced 2 of the 4 tenets recommended by the IPAL-EM toolkit including (1) launching a palliative care initiative addressing department-specific palliative care needs and deficiencies and (2) recruiting ED palliative care champions to participate in the work.<sup>12</sup>

The emergency nurse and the palliative care NP worked together to identify ED-specific nursing concerns. To better understand these concerns, the palliative care NP and the emergency nurse conducted informal interviews at several different time points. Questions were asked regarding emergency nurses' concerns relevant to the commonly accepted domains of palliative care (goals of care, EOL symptom management, patient and family support). Interviews were conducted over a 1-week period and occurred during day and evening shifts.

Approximately 40 nurses' input was collected, and discussions lasted from 5 to 10 minutes. The emergency and palliative care nurses compiled a list of questions that the emergency nurses had related to facilitating or executing palliative and/or EOL care. These questions were reviewed collaboratively, and interventions were developed to address what the program planners perceived were the most salient themes. Our iterative process best aligned with the PLAN-DO-STUDY-ACT/ADJUST improvement model used in health care to improve process and carry out change.<sup>13</sup> The <sup>Figure</sup> depicts our specific cycle with discovered needs and subsequent interventions, which occurred over a 4-week development period from March 24 to April 17, 2020.

To meet the needs of emergency nurses, we curated a portfolio of easily accessible educational and support tools in both tangible and digital formats. The aims of these tools were to provide in-the-moment clinical decision-making

support as well as access to direct support from palliative care clinicians. The broadcasting of these tools was through word of mouth, e-mail distribution from the emergency department's Professional Development Manager software and printed fliers.

As each tool was developed and deployed, we sought real-time verbal feedback from users regarding the accessibility, helpfulness, and clarity of content. Most feedback was received informally during ED rounding and through the emergency nurse collaborator. The emergency and palliative care nursing team recognized that a cycle of rapid assessment and implementation was needed to continuously evaluate evolving emergency nursing needs in a rapidly changing care landscape.

## Results

To date there has been no surge of EOL-specific care in our emergency department as had been anticipated during the disaster planning. The specific deliverables from our process included a template for improving palliative care access in the emergency department and the educational/clinical support tools. <sup>Table 1</sup> highlights each educational and support tool, its description, and access method. Our digital resources can be accessed online at [www.pallicovid.app](http://www.pallicovid.app). The <sup>Supplementary Appendix</sup> provides an example of one of our clinical support tools to assist emergency nurses with EOL symptom management. <sup>Table 2</sup> provides a logic model for the reader to guide in the replication of our program. Our program has included the development and implementation of tools and support mechanisms as indicated but has yet to execute evaluation metrics at this time.

## Discussion

Our program presents an opportunity to connect emergency care and palliative care. As this was new territory in our institution, clinicians needed to effectively communicate and develop a mutual understanding of roles and a unified patient-centered focus. This close collaboration resulted in a suite of resources and support mechanisms for emergency nurses through interdisciplinary contribution.

Through our development and implementation process, we rapidly created a program to support emergency nurses in providing palliative and EOL care in anticipation of a surge in the number of patients with COVID-19. This process was noted by the program developers to be most productive as an interdisciplinary, interprofessional effort requiring the understanding of roles and responsibilities of emergency and palliative clinicians to produce a patient-centered and clinically supportive program. Our collaborative work group experience aligns with current evidence showing that new health care initiatives can be clinically effective and rewarding when they are interprofessional and strategically focused.<sup>16</sup> Our work process further aligns with professional calls from the ENA and the Center to Advance Palliative Care.<sup>9,10</sup> The recruitment of our ED palliative care champions for the project proved extremely productive supporting the IPAL-EM toolkit recommendations.<sup>12</sup> The nursing staff contribution to the integration of palliative care into ED patient care, as accomplished in our program, is also supported in the literature.<sup>17</sup>

The strengths of our program included our rapid cycle learning and adaption process, the comprehensive support provided through our 24-7 palliative nurse coverage, and the development of educational and clinical support tools available to nurses in hard copy or digital format. A rapid cycle learning process, accomplished in our program through our in-person clinician rounding and biweekly team meetings, is identified in the literature as the process that may be best suited for quickly developing new interventions in uncertain and changing times.<sup>18,19</sup> The 24-7 palliative support model was also used in New York with positive outcomes as our program also experienced.<sup>20</sup> Educational and clinical support tools to address symptom management are a shared focus of other institutions working to support emergency nurses.<sup>21</sup>

Challenges and barriers to collaboration and implementation of this program included factors that are commonplace, for example, clinician time and availability to contribute to the program. The challenge of launching a program in the

emergency department was threatened by a lack of initial emergency nursing leadership focus owing to competing concerns in the department related to COVID-19. Leadership buy-in is recognized as a critical component of success<sup>19</sup> and was ultimately provided to our program throughout our process. In addition to time and attention, space and physical access to the emergency department presented a problem as work-group meetings were hindered by physical distancing, and concerns around infection control and personal protective equipment use. Space and distancing practices have been a challenge for many in the health care and technology has been used to address these concerns.<sup>22</sup> A virtual meeting platform was easily used for our ED/palliative care work-group sessions. Evaluation metrics for our program have not been formally executed at this time owing to limitations related to COVID-19. We found that evaluation of rapidly implemented initiatives and interventions is a shortcoming for many during COVID-19 times and is an area of increased study.<sup>18,19,23,24</sup> Our shared logic model presents a list of recommended metrics that could be used to evaluate this program. These are currently under consideration by our team for future evaluation of our program. A literature review executed by Thiel et al<sup>25</sup> identified the lack of evaluation tools to assess changes in clinicians' knowledge, skills, and attitudes related to palliative care after participating in interdisciplinary learning experiences. An evaluation of the frequency of use of our education and clinical support tools by our emergency staff is proposed as a starting point. Our team noted that education and clinical support for emergency nurses related specifically to EOL care was not as necessary as other palliative care support owing to the limited EOL care provided in our emergency department as the surge progressed. As the COVID-19 pandemic persists, we believe our program serves as a template for others to guide them in developing programs to support their emergency nurses in providing comprehensive and effective palliative and EOL care in rapidly changing times. We recommend that programs are interdisciplinary and interprofessional and use a rapid learning cycle to develop tailored education and clinical support tools specific to their clinical demands.

### **Future Collaboration**

Although this program was propelled by necessity in a challenging and unpredictable time, its development marks a new chapter in our emergency department and palliative care's working relationship. Our future collaborations will likely focus on options to evaluate our program's impact. As we better understand how our program influences nursing practice and patient care, we can strategize how to carry such a program beyond disaster planning and into standard practice. Educating and supporting staff with an accessible and digital presence has the potential to leave a lasting impression on emergency nurses and how they can proactively facilitate and execute palliative care for their patients.

Considerations for future collaboration also include the development of interventions to support ED clinicians in recognizing their patients' palliative care needs and responding to those needs. For example, it has been established that many patients arrive to the emergency department with paperwork that is outdated, incomplete, or missing medical orders for life-sustaining treatments, leading to potentially invasive and unnecessary interventions.<sup>26</sup> This issue is made worse during COVID-19 times as patients and their loved ones/advocates are often physically separated because of visitation restrictions. Training can be developed for emergency nurses to identify patients without these forms to facilitate connection to palliative care clinicians. Together the emergency department and palliative care can work toward facilitating goals-of-care conversations before critical patient events occur.

### **Implications for Emergency Clinical Practice**

Our program demonstrates that interprofessional (registered nurse, physician, social worker, NP), interdisciplinary (emergency department, palliative care) planning and implementation can bring about a novel program for a need that had been recognized previously, but not fully addressed. The need for collaborative efforts was especially true as the landscape of emergency care was changing rapidly and potentially significantly as a result of COVID-19. Our

program highlights several implications for emergency nurses. These include (1) the clarification of palliative care's contribution to ED patient care, (2) the identification of the efficacy of a truly collaborative emergency palliative care process, (3) the potential to make evaluating a patient's palliative care needs part of emergency nurses' standard assessments, and (4) providing a template for others to evaluate our program in their own institutions.

Our program provides an opportunity to become better acquainted with the role of palliative care in emergency care. Better understanding opens the door to facilitating greater palliative care involvement. Emergency nurses can experience the focus of palliative care on aligning interventions with a patient's care preferences and goals. A deeper understanding of palliative care is made possible through the contribution of palliative care earlier in a patient's journeys. We look forward to and encourage others to use our shared program and welcome their evaluation in their own clinical settings.

### Conclusion

During a time of unprecedented insecurity brought about by the COVID-19 pandemic, ED clinicians were called on to identify patients' goals and care preferences with a lack of patient family/support presence and with limited training regarding palliative care principles. As the role of palliative care in the emergency department has been explored, yet not well defined, palliative care clinicians were also challenged to learn the workflow and practices of the emergency department to best serve this patient population. In this publication, we have provided a template of our process aimed to improve palliative care delivery in the emergency department through educational and support resources. Rapid learning processes and communication between nurse representatives from the 2 specialties allowed for the development of both in-the-moment support and educational tools. The implementation of this program demonstrates that an interdisciplinary and collaborative approach to addressing these challenges can yield a supportive program during a surge in the number of patients testing positive for COVID-19, while developing a working relationship between emergency nursing and palliative care. By working together in a crisis, nurses within these 2 specialties found a path to supporting patient care that will last beyond the pandemic itself.

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### Author Disclosures

Conflicts of interest: none to report.

### Supplementary Appendix

#### End-of-life care clinical reference tool to guide emergency nurses in symptom management

#### Supplementary Data

Supplementary data related to this article can be found at <https://doi.org/10.1016/j.jen.2020.08.003>.

Tool	Description	Access
Pocket cards	Guidelines designed for nurses and providers regarding symptom management in the imminently dying patient; communication tools and links to institution-specific resources	Hand distributed Online at <a href="https://pallivoid.app">pallivoid.app</a>

ED rounding	In-person, informal rounds 2–4 times weekly by palliative care clinicians, including NP, in the emergency department Provided opportunity for rapport building, gathering feedback on resource use, and distributing pocket cards	In-person
COVID-19 nurse resource line	Pager covered 24-7 by palliative care NPs for nursing advice on planning care, communication, and symptom management for patients with COVID-19 and families	Hospital pager system
Palliative care office hours	Weekly 1-hr office hours held by 2 palliative care NPs intended to provide a drop-in style forum for emergency nurses to ask palliative care specific questions	Zoom line, e-mail notifications
BWH nursing resources and FAQs	Used themes identified by emergency nurses to collate resources for nurses in the form of “Frequently Asked Questions.” These included original resources made by emergency nurse palliative care champion, links to institution-specific resources for symptom management and other consulting services, as well as links to external palliative care resources such as Fast Facts and Vital Talk	Online at pallicovid.app

Inputs	Activities	Measures/Outputs	Outcomes	Impacts
Palliative care physician and nurse practitioner	Site toolkit development	No. patient health care proxies identified and contacted	Increased knowledge, skill, and attitudes about palliative care in the emergency department by emergency nurses	Optimal care for patients with previously established goals of care
ED physician and nurse	1. Palliative care rounding in the emergency department	No. incomplete or missing MOLST forms	Improved EOL care in the emergency department	Service delivery with full integration of palliative care in the emergency department

ED professional development manager	2. Pocket card resources	No. new palliative care consults	Decreased time to palliative care referrals from the emergency department	Prevention of unwanted use of life-prolonging care or resuscitation procedures in patients with MOLST forms, or other predetermined goals
Fast facts <sup>14</sup>	3. Initiate 24-7 palliative care nurse resource pager	No. palliative care rounds completed	Collaborative workflow processes for palliative care in the emergency department established	
Vital talk <sup>15</sup>	4. Initiate palliative care office hours	No. pocket card resources downloaded/used by emergency nurses	Improved symptom management for patients requiring palliative and/or EOL care	
Center to advance palliative care consensus report	Tailored professional development education for emergency nurses	No. palliative care nurse office hour visits	Increased engagement of emergency nurses in identifying health care proxies and MOLST forms	
ACEP palliative care toolkit	Facilitate conversations regarding patient goals of care	No. patients assessed for palliative care goals		
ENA position statement	Interdisciplinary collaborative team building	Time to palliative care referral		
Hospital information technology platforms to share information and professional development educational materials		No. interdisciplinary work group meetings		

## DETAILS



<b>Subject:</b>	Emergency medical care; Health care; Collaboration; Minority groups; Nursing homes; Patients; COVID-19; End of life decisions; Ethnic groups; Older people; Nurse led services; Social workers; Sympathy; Interdisciplinary aspects; Palliative care; Nurse practitioners; Coronaviruses; Leadership; Emergency services; Objectives
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# Attitudes Toward Influenza Vaccination Administration in the Emergency Department Among Patients: A Cross-Sectional Survey: JEN

[ProQuest document link](#)

## ABSTRACT (ENGLISH)

### Introduction

Influenza is a serious, vaccine-preventable illness. The current vaccination rates in Canada are below target rates, highlighting the potential need for more convenient ways to receive vaccinations. Wait times to be seen in Canadian emergency departments are escalating, and using the time spent waiting to offer and administer an influenza vaccine could potentially improve ease of access to immunization for some Canadians.

### Methods

The aim of this cross-sectional study was to gauge public interest and identify perceived barriers and facilitators to influenza vaccine availability in a Canadian emergency and trauma center. Anonymous questionnaires were completed by a convenience sample of adult patients classified as low acuity ( $n = 151$ ) as 1 arm of a 2-arm study.

### Results

Of the unvaccinated patients, 34.6% expressed willingness to be vaccinated in the emergency department. The patients who had received a vaccine in the previous year were significantly more willing to accept the vaccine in the emergency department ( $\chi^2 [1] = 23.78, P < 0.001$ ). The 3 top factors associated with having received vaccination in the previous year include trust in vaccine information ( $\chi^2 [2] = 27.34, P < 0.001$ ), immunity preferences ( $\chi^2 [2] = 32.25, P < 0.001$ ), and beliefs about efficacy ( $\chi^2 [2] = 44.90, P < 0.001$ ).

### Discussion

Patients classified as low acuity were supportive of ED influenza vaccination. In addition, some of the unvaccinated participants had unmet education needs (ie, regarding trustworthy sources of vaccine information, immunity, and vaccine efficacy) that would require addressing before they would likely consider receiving influenza vaccination in future during their ED visit.

## FULL TEXT

### Contribution to Emergency Nursing Practice

- The current literature on ED influenza vaccination indicates that some patients are willing to receive influenza vaccines in the emergency department, but lacks detail on what may or may not be motivating these patients in their decision.
- This article contributes evidence that some patients classified as low acuity are willing to receive ED influenza vaccinations, whereas others have vaccine knowledge deficits. This highlights an educational opportunity that, once addressed, may improve vaccination rates.

••Key implications for emergency nursing practice found in this article are the readiness of some ED patients classified as low acuity to receive influenza vaccination if available during their visit, as well as topics to include in patient influenza education material, most notably information regarding the efficacy of influenza vaccination.

## Introduction

Influenza is one of several viral illnesses known to cause upper respiratory symptoms, commonly transmitted during the fall and winter seasons.<sup>1</sup> The 2017-2018 Canadian influenza season involved 5,176 influenza-associated hospitalizations.<sup>2</sup> Influenza risk is lowered by vaccination,<sup>3</sup> yet the overall effectiveness of any vaccine is dependent on the uptake at a population level. Canada's annual population-level goal is immunization of 80% of adults aged 65 years or above, 80% of adults aged 18 years to 65 years with chronic health conditions, and 80% of the health care providers (HCPs).<sup>4</sup> In the 2016-2017 influenza season, only 35.8% of Canadians reported receiving the influenza vaccine.<sup>5</sup> Among adults aged 18 years to 64 years with comorbidities, the rate was 37.0%; of those aged 65 years or above, 69.5% were immunized.<sup>5</sup> During that same season, 15% of Canadians who did not get the influenza vaccine reported that it was because they did not have the time,<sup>5</sup> which suggests the need for additional points of access of vaccine delivery that address time constraints. Many ED patients are waiting for longer time periods than those indicated in national recommended guidelines<sup>6,7</sup> because of multiple system-wide issues contributing to increasing ED wait time.<sup>8</sup> The time spent by patients waiting for ED care may represent an opportunity to capture their attention with regard to immunization.

Previous Canadian ED influenza vaccination studies conducted over the past 24 years resulted in successful vaccination of 43% to 65% of eligible unvaccinated patients.<sup>9-11</sup> Surveys of Canadian ED patients report 20% to 59.3% of eligible, unvaccinated patients expressing the willingness to be vaccinated.<sup>12,13</sup> The most recent study, entitled "HaliVax," was completed at the Queen Elizabeth II Health Sciences Centre emergency department in Halifax, Nova Scotia, in 2016-2017 among a convenience sample of patients in contact with the ED pharmacy team.

<sup>11</sup> Of the ED patients approached, 64% (n = 18) of unvaccinated patients were subsequently vaccinated by the pharmacist.<sup>11</sup> Although the patients' acuity levels were not reported in the study, the ED pharmacy technicians typically only had contact with patients who were classified as higher acuity (Canadian Triage and Acuity Score [CTAS] 1, 2, and 3).

## Research Objectives

The primary objective of this study was to gauge the interest of ED patients classified as low acuity in a potential ED influenza vaccination program at the study site. More specifically, we asked: Would making the influenza vaccine available at the study site to adult ED patients triaged as CTAS 4 or 5 (low acuity) change their planned influenza vaccination behavior? A secondary objective was to determine the perceived barriers and facilitators to influenza immunization.

## Methods Design

The study involved a prospective, cross-sectional survey design. It was 1 part of a larger study; the other part explored HCPs' opinions.<sup>14</sup> The Health Belief Model (HBM) provided the theoretical basis, namely guidance on which factors related to vaccine behavior merited inclusion in the survey and analysis. The HBM is a theory that attempts to explain individual reasoning behind behaviors related to the uptake of health services, in this case, receiving the influenza vaccine. In its original form, the HBM has 6 major components: (1) perceived seriousness, (2) perceived susceptibility, (3) perceived benefits, (4) perceived barriers, (5) sociodemographic factors, and (6) cues to action.<sup>15</sup> Perceived susceptibility to influenza and perceived barriers to vaccination have been found to be the most predictive aspects of the HBM regarding influenza vaccine behavior.<sup>16</sup>

## Data Collection

Data were collected through an anonymous self-administered questionnaire, developed for this study and divided into 3 sections (Figure). The first section collected sociodemographic information similar to previous Canadian ED influenza vaccine studies.<sup>9-13</sup> Question 1, which inquires about current gender identity, was modified from the Multidimensional Sex/Gender Measure, a trans-inclusive measure of capturing gender on population questionnaires.<sup>17</sup> The response options for question 3, which asked participants to identify their chronic medical conditions, were based on the conditions that increase the risk of influenza complications identified by the National Advisory Committee on Immunization (eg, lung disorders, heart disorders, metabolic disorders, and so on).<sup>1</sup> The second section of the questionnaire aimed to discern if vaccine mistrust, a commonly cited barrier to influenza vaccination,<sup>18</sup> was also a barrier for participants. The participants were asked to rate their agreement with several statements (eg, "Adults get more vaccines than they need") on a 5-point Likert-type scale. The statements were modified from the Parental Attitudes About Childhood Vaccinations short scale, a validated measure of vaccine hesitancy in parents.<sup>19</sup> This short scale was chosen because it has been used in past pediatric ED influenza surveys,<sup>20</sup> and no validated adult scale with constructs overlapping the HBM was available at the time the study design was finalized. The final section collected information on the participants' vaccine behavior from the previous year and the rationale for their decision. Multiple choices were provided that were based on HBM concepts,<sup>15</sup> the responses given in past ED vaccination<sup>9-13</sup> and general influenza vaccine questionnaires.<sup>5,18,21-23</sup> The participants were able to select more than 1 answer regarding their decision-making rationale. The final question was related to the primary objective of assessing patients' interest in ED influenza vaccination. Specifically, the question asked the participants to indicate their willingness to receive the influenza vaccine had it been offered during their ED visit. The questionnaire was kept short to limit recall bias, and data collection was anonymous to limit social desirability bias.

## Setting and Participants

The participants were recruited from a convenience sample of patients who registered at the Queen Elizabeth II Health Sciences Centre emergency department from October 28 to December 12, 2018, between the hours of 9 AM and 5 PM by a research assistant (RA); the study site is a large urban teaching hospital in Halifax, Nova Scotia. No data were collected on December 10 or 11 because of a technical issue. The inclusion criteria consisted of the following: presenting to the emergency department within the study period with a low-acuity concern, as defined by a CTAS score of 4 or 5; aged 18 years or older; and able to communicate in English. Patients with scores of CTAS 4 ("Less urgent") and 5 ("Nonurgent") needed to have stable vital signs and only minor concerns, such as urinary tract infections or simple lacerations.<sup>6</sup> Patients who were returning for a second low-acuity presentation within the study period were excluded. Registration staff and, from day 31 onwards, paramedics working in a low-acuity/high-turnover area ("Pod 5") introduced the study and provided participants with a colored card to identify them to the RA. The RA then approached only those with a card with an iPad on which they could complete the survey independently while waiting for care or reassessment. The iPad was set up to directly input data into REDCap, a secure online survey tool.<sup>24</sup>

## Ethical Considerations

Ethics approval was obtained through the Nova Scotia Health Authority Research Ethics Board before the initiation of the study (Romeo file No. 1023927).

## Data Analysis

Questionnaires were exported from REDCap for analysis to SPSS version 24. The a priori plan for data analysis was a chi-square test to compare the proportion of unvaccinated participants who would accept influenza vaccination in the emergency department with those who would not, as well as descriptive statistics. On the basis of this plan, and

the sample size calculation approach described by Taylor et al<sup>12</sup> in a previous Canadian influenza vaccination study, G\*Power software version 3.1.9.220<sup>1</sup> was used to determine that the required sample size was 151 patients. Additional chi-square tests were performed after data collection to compare the association between 2017-2018 vaccination status and the patients' risk factors, access to primary care, and level of agreement with the vaccine hesitancy statements. Bonferroni correction was used to adjust the alpha value (**Results Demographics**)

Of the 666 patients who were eligible during the study period (October 28, 2018, to December 12, 2018), 151 completed the survey (23% response rate). Twenty-five patients were excluded because of age (ie, age below 18 years [based on ED Information System data]). The participants were mostly female (n = 80, 53.0%), had access to a primary care provider (n = 114, 75.5%), and no high-risk medical concerns (77.5%). The most common age group was 20 years to 44 years (n = 62, 41.1%). See <sup>Table 1</sup> for full summary of the patients' demographics.

### **Public Interest in ED Influenza Vaccination**

The primary objective of the patients' survey was to gauge the interest of ED patients classified as low acuity (CTAS 4 or 5) in ED influenza vaccination. Participants who were vaccinated in 2017-2018 (the season previous to the study period) will be referred to as "vaccinated" within this paper; those not vaccinated in 2017-2018 will be referred to as "unvaccinated." Overall, 46.4% of the participants were vaccinated (n = 70). Most participants who reported willingness to receive ED influenza vaccinations were vaccinated (n = 52, 65.0%). A chi-square test was done to compare the proportion of participants who would and would not accept the vaccination if it were available during their ED visit, by their vaccination status (<sup>Table 2</sup>). There was a significant association between previous year vaccination status and willingness to receive the vaccination in the emergency department ( $\chi^2 [1] = 23.78, P < 0.01$ ).

### **Barriers and Facilitators to Influenza Vaccination**

The 2 main sociodemographic factors of interest in relation to influenza vaccination status were risk factors for influenza complications and access to primary care. Most of the patients who had been vaccinated (n = 40, 58.0%) and unvaccinated (n = 61, 77.2%) had no risk factors and had regular access to a primary care provider (vaccinated, n = 60, 85.7%; unvaccinated, n = 54, 66.7%). A chi-square analysis was done to explore each of these relationships (<sup>Table 3</sup>). Overall, there was no significant association between risk factors (aged 65 years or older and/or 1 or more high-risk chronic medical concerns) and 2017-2018 vaccination status,  $\chi^2 (1) = 6.3, P = 0.01$ . Nor was there a significant association between primary care provider access and 2017-2018 vaccination status,  $\chi^2 (2) = 7.4, P = 0.01$ .

Determining the perceived barriers and facilitators to ED influenza vaccination was a secondary objective of this survey, and the HBM was used as a theoretical basis. As described previously, the participants were asked to rate their level of agreement with several statements related to vaccines (<sup>Table 4</sup>). Most vaccinated participants agreed that the vaccine is effective (perceived benefit, n = 55, 78.6%), disagreed that immunity conferred through infectious processes was preferable (perceived seriousness, n = 57, 81.4%), trusted vaccine information (potential perceived barrier, n = 61, 87.1%), agreed that the vaccine is safe (perceived benefit, n = 61, 87.1%), and disagreed with the idea that adults received an unnecessary number of vaccines (potential perceived barrier, n = 41, 58.6%). There was a wider variety of opinions among the unvaccinated participants who were neutral to the statement that the influenza vaccine is effective (n = 38, 46.9%), agreed that immunity conferred through infectious processes was preferable (n = 30, 37.0%), trusted vaccine information (n = 38, 46.9%), agreed that the vaccine is safe (n = 45, 55.6%), and were neutral to the statement that adults received an unnecessary number of vaccines (n = 35, 43.2%). A series of chi-square tests were run to compare responses between the participants who were vaccinated and those who were not. The association between level of agreement and vaccination status was significant for all statements: beliefs about efficacy ( $\chi^2 [2] = 44.90, P < 0.01$ ), perceived seriousness ( $\chi^2 [2] = 32.25, P < 0.01$ ), trust in vaccine information ( $\chi^2 [2] = 27.34, P < 0.01$ ), perceived safety ( $\chi^2 [2] = 17.98, P < 0.01$ ), and perceived barrier ( $\chi^2 [2] = 11.38, P < 0.01$ ).

= 0.003). Most notably, if a patient agreed that the influenza vaccine was effective, on the basis of the odds ratio they were 57.6 times more likely to have been vaccinated in the previous year than the participants who disagreed. For the 70 participants (46.4%) who did receive the influenza vaccine, the most common reasons provided were to prevent influenza (perceived seriousness,  $n = 32$ , 45.7%) and because they received the vaccine annually (cue to action,  $n = 32$ , 45.7%). The participants most commonly received the influenza vaccine at the office of their family physician or nurse practitioner ( $n = 33$ , 47.1%). A full summary of the patients' motivations for the vaccination, as well as additional locations where they received the vaccination, is provided in <sup>Table 5</sup>. For the 78 participants who were unvaccinated, the most common reason was the perception that they did not need the influenza vaccine (lack of perceived seriousness,  $n = 24$ , 30.8%). A full summary of the patients' reasons for not getting vaccinated is provided in <sup>Table 6</sup>. When the barriers and facilitators are summarized through the lens of the HBM, perceiving influenza as a serious infection, perceived benefits of vaccination, and perceived barriers to accepting vaccination were the factors significantly associated with vaccine status for participants, as summarized in <sup>Table 7</sup>. Perceptions of seriousness (self-report that an individual did not "need" vaccine), susceptibility (self-reported desire to prevent infection) and barriers (self-reported belief that vaccine is not effective) were also reported by patients in this study in their explanations of their motivations.

### **Discussion Demographics**

The participants in this study were fairly similar to the overall population of patients classified as low acuity who presented during the study period in terms of age, gender, and primary care access. Only 31.8% of the participants in this study were considered high-risk, at the low end of the range found in past ED influenza vaccination, from 27.6% to 100%.<sup>9-13</sup> The lower proportion of high-risk participants in this study may be because the study did not include National Advisory Committee on Immunization risk factors beyond age and chronic medical concerns. Alternatively, it may be because the patient population classified as low acuity was generally young and healthy or may represent nonresponse bias from patients with more chronic health concerns. The vaccination rate of the patient population (46.4%) was higher than the Nova Scotia vaccination rate (36.8%) for 2017-2018,<sup>25</sup> but within the range found in past studies of ED influenza vaccination,<sup>9-13</sup> from 35% to 67%.

### **Public Interest in ED Influenza Vaccination**

A primary objective of this research was to gauge public interest in ED influenza vaccination. There were 28 previously unvaccinated participants who were willing to be vaccinated in the emergency department, which accounts for 35.0% of the unvaccinated participants. Similar past Canadian ED surveys and implementation studies of ED influenza vaccination found that 20% to 64% of eligible patients were willing to be vaccinated<sup>9-13</sup>; the results of this survey were therefore on the lower end of this range. However, this survey differed from past influenza vaccination studies in that only patients classified as low acuity were surveyed, and most participants did not have chronic medical concerns/age-related risk factors for influenza, and the results may have been different had the influenza vaccine actually been made available to the patients. Ultimately, the 35.0% of the unvaccinated participants willing to accept ED influenza vaccination represented a group who would not otherwise have been vaccinated. When combined with the 64% of patients willing to be vaccinated in the HaliVax PIIE project,<sup>11</sup> this presents a strong case for the willingness of the study site's patients to be vaccinated in the emergency department.

### **Barriers and Facilitators to ED Influenza Vaccination**

The secondary objective of this study was to determine perceived barriers and facilitators to influenza immunization as expressed by patients classified as low acuity. Perceived seriousness, perceived benefits, and perceived barriers were the HBM constructs significantly associated with vaccine status for participants. Sociodemographic factors (age above 65 years/presence of chronic medical conditions) were not found to be significantly associated with

vaccination status, nor were cues to action (presence of primary care provider). However, this was partly because the very conservative Bonferroni correction was applied to account for family-wise error, which lowered the threshold for what was considered significant. These findings are consistent with past research.<sup>16,18,21,22</sup> As discussed in the results, the participants also had the opportunity to express the reasoning they used to guide their vaccine choices. The top 3 reported reasons motivating vaccination (preventing infection, habitual yearly vaccination, and preventing transmission) and the top 2 barriers to vaccination (belief that the vaccination is unnecessary and belief that the vaccine is ineffective) were the same as those reported in the 2017-2018 Seasonal Influenza Vaccine Coverage in Canada Survey.<sup>26</sup>

### **Limitations**

The main limitation of this study was that we were only able to capture 23% of potential participants. We were not able to record refusals for ethical reasons, but if we assume that all other patients would have refused to participate in the study, this study's response rate was much lower than the 71% to 76% response rates in past ED influenza vaccination surveys.<sup>12,13</sup> A potential reason for poor recruitment was the limited buy-in from registration staff with respect to approaching potential participants. The response rate when just the registration staff were involved (days 1 to 30) was 19%, whereas the response rate once paramedics also recruited clients was 33% (days 31 to 44). Ideally, the recruitment of patients in future replications of this study should be entirely the responsibility of the RA to avoid adding additional duties to the already busy ED staff schedule; however, this was not permitted by the research ethics board that reviewed our study. This study was further limited by being conducted at only 1 site. An additional limitation was the anonymous nature of data collection because there was a small risk that a participant may have filled out a questionnaire twice. However, the strength of maintaining anonymity of the questionnaires outweighs the very small risk of duplicate responses.

In general, the chi-square tests were adequately powered (ie,  $1-\beta \geq 0.80$ ) to find an effect,<sup>27</sup> with the exception of the chi-square tests comparing risk factors for complications of influenza and regular access to a primary care provider with vaccination status. If this study were to be replicated, the minimum sample size required to achieve adequate power for all tests is 314 patients, as calculated using G\*Power software version 3.1.9.220.<sup>28</sup>

### **Implications for Emergency Nurses**

In summary, the factors associated with patients' vaccination status and patients' self-reported reasoning represent essential information adding to our understanding of the health education needs of the patient population classified as low acuity. Most Canadian ED studies only asked patients why they would refuse ED influenza vaccination specifically rather than influenza vaccination in general. No other Canadian ED influenza vaccination studies discussed the reasons that motivated people to be vaccinated. For nurse executives and managers, the results of this study identify separate subpopulations of ED patients who must be considered before creating any ED influenza vaccination policy: those who are already willing to be vaccinated in the emergency department and those who could potentially be vaccinated if they could be convinced of the safety, efficacy, and so on of the influenza vaccine. For advanced practice and staff nurses, this study highlights the need for future research/quality improvement projects to determine the best approach for the health education of ED patients, and the need for an evaluation of whether the currently available education modules for influenza vaccination prepare clinicians to discuss topics of concern for ED patients.

### **Conclusions**

Influenza is a preventable and expensive burden on the health of Canadians. Vaccination is a generally cost-effective<sup>3</sup> prevention method, available for free to Nova Scotians<sup>29</sup> and within the skillset of the ED HCPs at the study site. Moving forward from the results of this study toward implementing an ED influenza vaccination protocol at

the study site's emergency department that meets the needs of patients is 1 step toward increased vaccination uptake, and, ultimately, improving the health of Canadians.

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### Author Disclosures

Conflicts of interest: none to report.

Response	Participants		Presenting population	
	n	%	N	%
				Gender
				Female
80	53.0	321	48.2	Male
68	45.0	343	51.5	Other (eg, gender fluid, nonbinary)
3	2.0	2	0.3	Total (N = 151)
151		666		Age (y)*
				16-17
Ineligible		25	3.8	18-19
13	8.6	30	4.5	20-44
62	41.1	316	47.4	45-64



51	33.8	204	30.6	65+
22	14.6	91	13.7	Prefer not to answer
3	2.0	0		Total (N = 151)
151		666		Do you have a main doctor or nurse practitioner you see regularly?
		Yes	114	75.5
502	75.3	No	36	23.8
165	24.7	I do not know	1	0.7
0	0.0	Total (N = 151)	151	
667 <sup>†</sup>		Chronic medical concerns		
		No NACI high-risk medical concerns	117	77.5
No data		Lung disorders	14	9.3

Metabolic disorders	7	4.6	Immun e- compro mising conditi ons	5
3.3	Anemia	4	2.6	Heart disor ders
4	2.6	Morbid obesity	4	2.6
Brain/neurodevelopment conditions	3	2.0	Hemog lobinop athy	2
1.3	Kidney disease	0	0	Total (N = 151)

2017-2018 vaccination status		ED influenza vaccine opinion									
Willing to receive		Not willing		Total	Test statistics			Effect size		n	
%	n	%	n	df	$\chi^2$	P valu e	V	P valu e	Vacc inate d		
65.0*	18	25.4	70						Unv acci nate d	28	
35.0*	53	74.6	81	1	23.7 8	<0. 001	0.40	< 0.00 1	Total s	80	

Response	Vaccinated	Unvaccinated	Total	Test statistics	Effect size
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n	%	n	%	n	df	$\chi^2$	P value	V	P value	Risk factors for complications of influenza
										Risk factors
29	42.0*	18	22.8*	47						None
40	58.0*	61	77.2*	101						Total
69 <sup>†</sup>		79 <sup>†</sup>		148 <sup>†</sup>	1	6.29	0.01	0.21	0.01	Regular access to a primary care provider
							Yes	60	85.7*	54
66.7*	114						No	10	14.3*	27
33.3*	37						Total	70		81

Response	Vaccinated		Unvaccinated		Total	Test statistics			Effect size	
	%	n	%	n		df	$\chi^2$	P value	V	P value
Disagreement	1	1.4 <sup>†</sup>	22	27.2 <sup>†</sup>	23					
Neutral	14	20.0 <sup>*</sup>	38	46.9 <sup>*</sup>	52					
Agreement	55	78.6 <sup>†</sup>	21	25.9 <sup>†</sup>	76					
Total	70		81		151	2	44.90	< 0.001	0.55	< 0.001

Statement: "It is better to develop immunity by getting sick with the flu than to get a flu shot."

Disagreement	57	81.4 <sup>†</sup>	29	35.8 <sup>†</sup>	86					
Neutral	7	10.0 <sup>*</sup>	22	27.2 <sup>*</sup>	29					
Agreement	6	8.6 <sup>†</sup>	30	37.0 <sup>†</sup>	36					
Total	70		81		151	2	32.25	< 0.001	0.46	< 0.001

Statement: "I trust the information I receive about the flu shot."

Disagreement	2	2.9 <sup>*</sup>	16	19.8 <sup>*</sup>	18					
Neutral	7	10.0 <sup>*</sup>	27	33.3 <sup>*</sup>	34					

Agreement	61	87.1 <sup>†</sup>	38	46.9 <sup>†</sup>	99					
Total	70		81		151	2	27.34	< 0.001	0.43	< 0.001
Statement: "The flu shot is safe."										
Disagreement	3	4.3	10	12.3	13					
Neutral	6	8.6 <sup>†</sup>	26	32.1 <sup>†</sup>	32					
Agreement	61	87.1 <sup>†</sup>	45	55.6 <sup>†</sup>	106					
Total	70		81		151	2	17.98	< 0.001	0.35	< 0.001
Statement: "Adults get more vaccines (shots) than they need."										
Disagreement	41	58.6 <sup>*</sup>	27	33.3 <sup>*</sup>	68					
Neutral	23	32.9	35	43.2	58					
Agreement	6	8.6 <sup>*</sup>	19	23.5 <sup>*</sup>	25					
Total	70		81		151	2	11.38	0.003	0.28	0.003

Response	n	%
Motivation for vaccination		
I do not want to get the flu	32	45.7
I get the vaccine every year	32	45.7
To prevent giving other people the flu	23	32.9
My doctor/nurse/other health care professional told me to get it	16	22.9
Required by my workplace	8	11.4

I am at risk for the flu because of a chronic health condition	6	8.6
Other reason ("I don't want to get sick")	1	1.4
Total (N = 70)	118*	
Location of vaccination		
Family doctor/nurse practitioner	33	47.1
A pharmacy	15	21.4
At my workplace	13	18.6
Hospital	3	4.3
A flu shot clinic	3	4.3
At school	3	4.3
Total (N = 70)	70	

Response	N	%
Do not think they need the influenza vaccine	24	30.8
Do not think the vaccine will prevent influenza	21	26.9
Did not have time	16	20.5
Do not like needles	7	9.0
Other reason not specified	4	5.1
Ambivalence	2	2.6
Belief that it made them sick	2	2.6
Do not feel they are at risk of contracting influenza	2	2.6
Health care provider advised against vaccination	2	2.6

Do not feel they are at risk of transmitting influenza to high-risk populations	1	1.3
Do not routinely receive influenza vaccine	1	1.3
Lack of family doctor/nurse practitioner	1	1.3
Preference for “natural” immunity	1	1.3
Uncertainty regarding the vaccine	1	1.3
Past life-threatening reaction to the vaccine/part of the vaccine	0	0.0
Total (N = 78)	85*	

Construct	Significant associations	Self-reported reasoning
Perceived seriousness	Preference for natural vs vaccine-conferred immunity: $\chi^2 (2) = 32.2, P < 0.001$	Belief that they do not need vaccine: n = 22, 28.2% unvaccinated patients
Perceived susceptibility	No significant associations.	Desire to prevent influenza infection: n = 32, 45.71% vaccinated patients
Perceived benefits	Beliefs about vaccine safety: $\chi^2 (2) = 18.0, P < 0.001$ Beliefs about vaccine efficacy: $\chi^2 (2) = 44.9, P < 0.001$ Beliefs about necessity of all adult vaccines: $\chi^2 (2) = 11.4, P = 0.003$ Level of trust in vaccine information: $\chi^2 (2) = 27.3, P < 0.001$	Belief that vaccine is not effective: n = 21, 26.9% unvaccinated patients
Sociodemographic factors	No significant associations.	No notable self-reported reasoning.
Cues to action	No significant associations.	Habitual yearly vaccination: n = 32, 45.71%

## DETAILS

<b>Subject:</b>	Health care access; Emergency medical care; Vaccines; Waiting times; Facilitators; Seasons; Questionnaires; Influenza; Data analysis; Efficacy; Health sciences; Immunization; Unmet needs; Pharmacy; Immunity; Decision making; Sociodemographics; Data collection; Public interest; Gender identity; Adults; Emergency services; Clinical decision making
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# Emergency Nursing Review Questions: November 2020: JEN

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## ABSTRACT (ENGLISH)

A. Intravenous (IV) dextrose 5% water with 40 mEq of potassium over 8 hours B. Calcium chloride slow IV to lower sodium level C. 3% sodium chloride IV infusion with a calculated rate D. Two liters of sodium chloride IV infusion over 4 hours. 5. Dextrose 5% water will reduce serum sodium (A). Because this sodium level demonstrates extreme hyponatremia, efforts would be focused to slowly elevate the sodium level (B). The classic history of pyloric stenosis includes the pediatrician suspecting GERD, taking reflux precautions (burp often and leave undisturbed with head elevated for 30 minutes after feeds), and changing the baby's formula to a non-milk-based option without any resolution of the symptoms.

## FULL TEXT

These review questions are based on the Emergency Nursing Core Curriculum and other pertinent resources to emergency nursing practice. They offer emergency nurses an opportunity to test their knowledge about their practice.

### Questions

1. A hypovolemic patient is on a ventilator in the emergency department. The patient is sedated, chemically paralyzed, and optimal fluid status adjustments are being maintained. An order is received to increase the positive end-expiratory pressure from 8 cm H<sub>2</sub>O to 12 cm H<sub>2</sub>O. Once the ventilator is adjusted, what would be an expected patient response?
  2. A. Blood pressure may decrease
  3. B. Respiratory rate may decrease
  4. C. Pulse may decrease
  5. D. Oxygen saturation may decrease

2.

A patient is evaluated after an ingestion of 2, 32-ounce bottles of Pepto-Bismol (bismuth subsalicylate) over a 4-hour period for diarrhea. Which of the following assessment findings would be consistent with this ingestion?

- A. Bradypnea, paralysis, and xerostomia

- B.Bradycardia, photophobia, and dysgeusia
- C.Hyperventilation, tinnitus, and hyperpyrexia
- D.Presbycusis, rhinorrhea, and hyperkalemia

3.

Fluid resuscitation is required for an 80-kg patient with burns in the emergency department. The patient has a burn injury to the entire chest, abdomen, left arm, and left leg. Using the currently recommended formula for fluid management, how much fluid should be given in the first 8 hours?

- A.7,200 mL
- B.3,600 mL
- C.2,900 mL
- D.1,800 mL

4.

An unresponsive patient is being evaluated for a stroke, and a laboratory analysis reveals a sodium level of 112 mEq/L. The administration of which of the following would be an anticipated order for the correction of the sodium level?

- A.Intravenous (IV) dextrose 5% water with 40 mEq of potassium over 8 hours
- B.Calcium chloride slow IV to lower sodium level
- C.3% sodium chloride IV infusion with a calculated rate
- D.Two liters of sodium chloride IV infusion over 4 hours.

5.

A 28-day-old full-term infant patient is brought for treatment to the emergency department. The initial evaluation demonstrates a dehydrated infant with a sunken fontanel and delayed central capillary refill. The mother describes progressive worsening of projectile vomiting over the past week. Projectile vomiting is noted in triage after a feeding. The vomitus is nonbloody and nonbilious. The infant seems hungry after vomiting. A negative history of illness or sick siblings is obtained, and the infant was full-term. What is the likely cause of the presenting symptoms?

- A.Gastroesophageal reflux disease (GERD)
- B.Pyloric stenosis
- C.Malrotation with volvulus
- D.Gastroenteritis

## Answers

1. **Correct answer: A**

Positive pressure ventilation increases intrathoracic pressure and subsequently decreases venous return and cardiac output. In patients with low-volume status, the decrease in venous return will cause hypotension. The more

pressure added, the more profound the hypotensive response. Positive end-expiratory pressures greater than 10 cm H<sub>2</sub>O frequently demonstrate hypotension (A). The respiratory rate would be controlled in a paralyzed and sedated patient (B). As the blood pressure decreases, the pulse rate may increase (C). Oxygen saturation may increase or remain the same, depending on the body's response to the positive end-expiratory pressure (D).<sup>1</sup>

**2. Correct answer: C**

Pepto-Bismol or bismuth subsalicylate is a common over-the-counter medication used for diarrhea. The product contains salicylate or aspirin. An excessive amount of Pepto-Bismol would cause salicylate toxicity. Hyperventilation, tinnitus or ringing in the ears, and hyperpyrexia or high fever are common symptoms associated with salicylate toxicity (C). In addition, respiratory alkalosis and increased bleeding tendencies are common. Tachypnea is frequently seen, paralysis is not common, and xerostomia or dry mouth is not reported (A). Tachycardia is a common finding. Photophobia or light sensitivity and dysgeusia or loss of taste are not reported (B). Hypokalemia or low potassium can be observed due to alkaline diuresis. Presbycusis or loss of hearing owing to age and rhinorrhea or runny nose have not been described (D).<sup>2</sup>

**3. Correct answer: B**

This patient has sustained an extensive burn to 45% of the total body surface area as calculated by the rule of nines (chest/abdomen 18%, arm 9%, and leg 18%). The patient weighs 80 kg. An adult replacement formula recommended for fluid replacement is body weight (kg) × 2 mL × % total body surface area, with half of the amount being given within the first 8 hours. Using this formula, 3,600 mL of fluid should be given within the first 8 hours (B). The other responses do not follow the correct calculation (A, C, and D).<sup>3</sup>

**4. Correct answer: C**

A sodium level of 112 mEq/L is defined as dangerously low hyponatremia. The treatment involves administration of sodium and elimination of intravascular free water. An infusion of 3% sodium chloride can be used, with a calculated dosing of 4 mEq/L × the weight coefficient × the body weight in kg. The infusion is usually given over a 4-hour period (C). The sodium level is slowly raised over a period of time. Although other types of fluids may be indicated for other laboratory corrections, the main treatment for this patient would be the correction of the sodium level. Dextrose 5% water will reduce serum sodium (A). Because this sodium level demonstrates extreme hyponatremia, efforts would be focused to slowly elevate the sodium level (B). The patient should have the fluid volume monitored, and 2 liters of fluid would not be recommended (D).<sup>4</sup>

**5. Correct answer: B**

Pyloric stenosis is a disorder in which the outlet of the stomach (pylorus) becomes hypertrophic, causing a progressive obstruction (B). It is most commonly seen in babies who are aged between 3 weeks and 6 weeks. The classic signs are as follows:

- Projectile nonbloody emesis after feeds because nothing can go downstream. The volume of emesis is large.
- Dehydration and electrolyte imbalances secondary to the vomiting.
- Baby is immediately hungry after vomiting because the stomach is empty.
- Olive-like mass palpable in the right upper quadrant of the abdomen. This is the pylorus and can be difficult to feel if the abdominal muscles are tense.

The classic history of pyloric stenosis includes the pediatrician suspecting GERD, taking reflux precautions (burp often and leave undisturbed with head elevated for 30 minutes after feeds), and changing the baby's formula to a non-milk-based option without any resolution of the symptoms. Babies with GERD do not generally have projectile

emesis (A). They are not immediately hungry after vomiting because GERD is often painful, unlike pyloric stenosis. Malrotation with volvulus is a surgical emergency; the first sign of a volvulus is bilious emesis (C). Gastroenteritis usually includes vomiting and diarrhea, and patients often have contact with others who are ill (D).<sup>5</sup>

## DETAILS

<b>Subject:</b>	Laboratories; Salt; Emergency medical care; Serum; Ventilators; Milk; Calcium; Infants; Sodium; Hypotension; Precautions; Gastroesophageal reflux; Abdomen; Potassium; Core curriculum; Gastroenteritis; Oxygen saturation; Water; Vomiting; Chloride; Diarrhea; Blood pressure; Tinnitus; Pyloric stenosis; Gastro-oesophageal disease; Hyperventilation; Nursing; Babies; Emergency services; Pediatrics
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# Preparedness of Our Emergency Department During the Coronavirus Disease Outbreak from the Nurses' Perspectives: A Qualitative Research Study: JEN

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## ABSTRACT (ENGLISH)

### Introduction

This study explores the preparedness of our emergency department during the COVID-19 outbreak from the nurses' perspectives, providing a reference and basis for our emergency department's response to public health emergencies.

### Methods

Using qualitative research methods, semistructured interviews were conducted with 12 emergency nurses who met the inclusion criteria, and Colaizzi analysis was used for data analysis, summary, and induction.

### Results

A cluster of 4 themes that involved preparedness of the emergency department during the COVID-19 outbreak was extracted: organizational preparedness, personal preparedness, patient and family preparedness, and deficiencies and challenges.

### Discussion

Organizations, individuals, patients, and family members were actively prepared to respond to novel coronavirus pneumonia outbreak in the emergency department. The emergency nurses said that the trusted organization guaranteed personal preparedness, and the active cooperation from patients and families was a motivator for personal preparedness. In addition, our study showed that there were deficiencies in both multidisciplinary collaboration efforts and efforts to rapidly diagnose and treat patients with fever in critical condition.

## FULL TEXT

### Contribution to Emergency Nursing Practice

- The current study indicates that the positive preparedness of organizations and individuals contributed to epidemic prevention and control.
- This article contributes the main finding that the organization, individuals, patients, and families made efforts to be prepared in the emergency department during the coronavirus disease outbreak. The organizational preparedness guaranteed personal preparedness, and the preparedness of patients and families was a motivator for personal preparedness.

••Key implications for emergency nursing practice found in this article are that it is necessary to optimize organizational, patient, and family preparedness so that emergency departments can effectively respond to public health emergencies. Improving areas where there are shortcomings and creating effective measures to deal with challenges are urgent necessities.

## **Introduction**

Coronavirus disease (COVID-19) is an acute respiratory infectious disease caused by the novel coronavirus,<sup>1</sup> now renamed severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2).<sup>2</sup> On February 11, 2020, the World Health Organization (WHO) announced that NCP was named Coronavirus disease, abbreviated as COVID-19.<sup>3</sup> It had been listed as a public health emergency of international concern on January 30, 2020,<sup>4</sup> and on March 11, 2020, it was declared a pandemic.<sup>5</sup> COVID-19 is characterized as an acute respiratory infection with symptoms of fever, dry cough, and fatigue, although some patients have atypical symptoms.<sup>6,7</sup> In addition, a few patients with COVID-19 have nasal congestion, runny nose, sore throat, myalgia, and diarrhea.<sup>6,7</sup> In severe cases, patients can develop dyspnea and/or hypoxemia, which progress rapidly to acute respiratory distress syndrome, septic shock, metabolic acidosis that is difficult to correct, coagulopathy, multiple organ failure, and possibly death.<sup>7</sup> It is worth noting that COVID-19 is transmitted quickly and widely, and often unknowingly. Currently, the accepted transmission routes of COVID-19 are droplets and contact transmission.<sup>2,8,9</sup>

At present, therapies for COVID-19 are limited because the evidence to support a specific drug treatment or vaccine against SARS-CoV-2 is lacking.<sup>10,11</sup> According to statistics, as of May 17, 2020, COVID-19 has been spreading worldwide, causing more than 4.5 million cases and more than 300,000 deaths (an approximate fatality rate of 6.79%) across the globe.<sup>12</sup> Furthermore, in China more than 82,000 cases and more than 4,000 deaths (an approximate fatality rate of 5.59%) had been confirmed as of May 17, 2020.<sup>12</sup> In Shanxi province, 134 confirmed cases and 0 deaths were reported; 21 of the confirmed cases were in Taiyuan, a city in Shanxi province.<sup>13</sup> As a response to the COVID-19 outbreak, the National Health Commission of the People's Republic of China immediately initiated a first-level public health emergency response.

Because COVID-19 is spreading rapidly worldwide, ensuring the preparedness of public health care systems and response operations remains a key line of defense. According to the United Nations International Strategy for Disaster Reduction, preparedness is defined as "the knowledge and capacities developed by governments, professional response and recovery organizations, communities and individuals to effectively anticipate, respond to, and recover from the impacts of likely, imminent or current hazard events or conditions."<sup>14</sup> To improve the control of COVID-19, proactive and effective preparedness of organizations and individuals in public health systems are therefore required.

Emergency nurses are on the front line in the fight against COVID-19.<sup>15</sup> However, there is a question on how prepared emergency departments are in responding to COVID-19. To answer this question, this study used qualitative research for an exploration of the preparedness of the emergency department in a tertiary hospital in Taiyuan, Shanxi province, from the nurses' perspectives during the COVID-19 outbreak.

## **Methods Research Team and Reflexivity**

All 6 study researchers (YH, JW, QZ, DL, YG, and JF) were women and had received training on qualitative research. Five of the researchers were registered nurses, 4 had master's degrees (YH, JW, QZ, and YG), 1 had a bachelor's degree (JF), and 1 had a master's degree in nursing (DL). The researchers were familiar with the study setting and participants, having practiced nursing in the emergency department for more than 6 months before data collection.

The interviews were conducted by the first author (YH), who had a double master's degree (master's degree in nursing from Institute of Technology Tralee, Ireland, and Shanxi Medical University, China) and more than 10 years' experience in clinical nursing practices.

### **Theoretical Framework**

Husserl descriptive phenomenological approach<sup>16</sup> and Colaizzi method of data analysis<sup>17,18</sup> were employed in this study. Colaizzi method of data analysis is a rigorous and robust qualitative method that can be used to identify, understand, and describe the experiences of participants and reveal emergent themes and relationships. Colaizzi method aligns with the assessment of the preparedness of our emergency nurses during the COVID-19 outbreak. The method comprises 7 stages of data analysis (Table 1), providing clear, logical, and sequential steps that can be used in phenomenological research, which increases the reliability and dependability of the data obtained.<sup>17</sup>

### **Participant Selection**

Face-to-face interviews were conducted using purposive sampling. The sample size was determined by data saturation when no new themes from the participants' experiences emerged.<sup>19</sup> The inclusion criteria were as follows: (1) registered nurses, aged 18 years or older, working in the emergency department for more than 6 months, and (2) participants working more than 35 hours weekly during the COVID-19 outbreak (whether day duty or shift work). No participants dropped out of the study.

### **Setting**

The study was conducted in the emergency department of a grade A tertiary hospital in Taiyuan, a city in Shanxi province in mainland China, from February 10, 2020, to March 1, 2020. Grade A tertiary hospitals are recognized as hospitals of the highest classification level in mainland China; they can provide advanced health services and implement tertiary education and scientific research tasks for the region and surrounding areas. These hospitals have a capacity of more than 501 beds and are equipped with a baseline percentage of professionals.<sup>20</sup> The study hospital offers comprehensive health services with medical treatment, teaching, scientific research, prevention, rehabilitation, and first aid, and is one of the largest medical institutions in Shanxi province. It has almost 2,500 beds, and employs approximately 2,485 staff, including 1,300 registered nurses. The emergency department has a capacity of 50 beds, and handles an average of 120 patients per day, or 43,000 patients annually. A total of 83 nurses work in the emergency department, with an average of 48 nurses on duty per day. The ED rooms are open 24 hours.

The interviews were conducted in a comfortable and quiet conference room near the hospital, where the outside door had a sign that read "Be quiet, meeting in progress." Only the interviewer and interviewee were present during the interviews.

### **Human Subjects' Protection**

Ethical approval for the study was obtained from the research ethics committee of the hospital before the study began ([2020] Provincial Medical Kelun No. 26). Before each interview, each participant received a written informed consent form, the researcher explained the study's aim and setup, and the participant was informed that they could withdraw at any time, as described in the informed consent form. To guarantee their anonymity, each participant was given a code name (N1, N2, N3 ... N12) that was used throughout all further data processing. The consent forms and data were stored separately in a computer file accessible only with a password.

### **Data Collection**

The interview outline (Supplementary Appendix) was developed by the research team on the basis of hospital policies, literature reviews, and experts' advice on the following lines: (1) During the COVID-19 outbreak, what changes have been made in the emergency department and what are the challenges faced? (2) What personal changes have

taken place during the COVID-19 outbreak and how are you responding to COVID-19? (3) In terms of the COVID-19 response, talk about how the hospital and the department have responded, and what are the existing deficiencies? The first 2 interviews pretested the question for language clarity and cultural acceptability;<sup>21</sup> no changes were made, and the data gathered during the preinterviews were included in the analysis. Two audio recorders were prepared and used during the interviews. Each interview took approximately 40 minutes to 60 minutes and was conducted in Chinese. No repeat interview was carried out.

During the interviews, the researcher used open-ended questions, with the aim of assisting participants to express their answers in their own words rather than give answers to multiple-choice questions. Probing and prompting questions followed to clarify issues and elicit an in-depth description of the participant's experiences. In addition, counterquestioning, questioning, repetition, and summing up were used in the interviews to ensure that the information obtained was true and credible. Throughout the interviews, the researcher kept a neutral attitude and did not express personal judgments, beliefs, or understandings. Furthermore, nonverbal observations during and immediately after the interviews were recorded as part of the field notes. In addition, the researcher maintained a reflective diary throughout the study to record personal reflections, biases, and assumptions.

Data analysis was conducted concurrently with the data collection until data saturation was reached. The interviews were independently transcribed verbatim (pseudonyms were assigned) by 2 researchers (YH and ZQ) within 24 hours after the interviews. Copies of the transcript with a comments sheet were returned to the participants for validation. The feedback showed that all participants felt that their transcript accurately represented what was said during the interview and was true to their experience. The quotes given below were translated by 3 researchers (DL, YG, and JF).

### **Data Analysis**

The Colaizzi 7-step data analysis method was performed in this study (Table 1).<sup>17,18</sup> The process was carried out independently by 2 researchers (YH and QZ) using a word processing system.

### **Enhancing Rigor**

To enhance rigor, researchers applied the Lincoln and Guba 4 constructs of trustworthiness.<sup>22,23</sup> To address credibility, the following steps were taken: (1) a data analysis method that was well established was adopted for the study; (2) a detailed description of the research background was provided; (3) all researchers gained an adequate understanding of the research setting, and the first author was able to establish a relationship of trust with the participants because the author had practiced as a nurse in the emergency department for more than 2 years before data collection; (4) the open-ended questions were followed by probing and prompting questions that were used to gather comprehensive data during the interviews; (5) field notes and reflective diaries were maintained to recognize any personal biases; (6) frequent debriefing sessions involving the researchers and the research team were held to discuss developing ideas; and (7) member checks were undertaken during the course of the data collection and data analysis to enhance data accuracy.

To permit transferability, and to provide a baseline understanding for the comparison of subsequent studies, detailed descriptions of the study setting, organization, researchers, and participants relevant to the phenomenon under study were assessed. In addition, detailed methods of data collection also contributed to the transferability of the study.

To meet the criterion of dependability, researchers provided a detailed report on the research design and its implementation, data collection, and data analysis, thereby enabling reproducibility.

Finally, confirmability was enhanced by developing an audit trail, allowing other researchers to judge the conclusions. In addition, the reflective journal helped the researchers keep biases and prejudgments at bay, opening



the possibility of seeing things in a different way.

## Results

A cluster of 4 themes was extracted through the process of data analysis: organizational preparedness, personal preparedness, patient and family preparedness, and deficiencies and challenges. Eventually, 12 emergency nurses (3 men and 9 women) with an average age of 30.42 years (SD = 3.64) were included. The demographic characteristics in the study are shown in <sup>Table 2</sup>.

### Theme I: Organizational Preparedness

Organizational preparedness refers to a variety of measures taken by the organization in response to the COVID-19 outbreak. In the study, 5 subthemes related to organizational preparedness emerged from the data as follows.

#### Subtheme 1: Timely Adjustment of Departmental Functions

The first subtheme is concerned with the adjustment of departmental functions in a timely manner. In accordance with the National Diagnosis and Treatment Plan for NCP [COVID-19] and the requirements of the Shanxi Provincial Health Commission, the emergency department added a fever preexamination triage office and a transit station for patients with fever in critical condition on the basis of a quick rescue process and green channel for emergencies during the NCP [COVID-19] outbreak. The ED green channel refers to a timely and efficient rescue process of diagnosis and treatment that is provided for urgent and severe cases. This aimed to improve the success rate of the rescue process.<sup>24</sup> *At the entrance to the emergency department, all patients have to pass through my check first: make a temperature check to see if [they] have a fever and register for it, and then, follow the procedures for treatment. The fever pre-examination triage office was not available before the outbreak of NCP [COVID-19] ... (N4) Actually, the emergency department is a transit station now. The patient with no fever, no epidemiological record, would [have] been treated in the emergency department; the patient with the symptoms such as fever would go directly to the fever clinic. (N1)*

#### Subtheme 2: Strengthening of Multidisciplinary Cooperation

The second subtheme involved the strengthening of multidisciplinary cooperation. Multidisciplinary cooperation is a patient-centered therapy mode in which the emergency department, respiratory department, infection department, fever retention ward, and fever clinic cooperate to develop standardized, individualized, and comprehensive treatment plans for patients. During the COVID-19 outbreak, multidisciplinary cooperation strengthened significantly. *Patients who come with dyspnea will firstly be consulted by the doctor from the infection department, then consulted by the doctor from the respiratory department. The emergency department will synthesize all the consultation opinions, and then make the diagnosis and treatment plan ... (N2) When a patient has a cough without any other symptoms, a fever clinic doctor will be consulted or take the patient to the fever clinic directly. (N8)*

#### Subtheme 3: Timely Updating Workflows

The third subtheme concerned timely updating of workflows. In keeping with the latest Diagnosis and Treatment Plan for COVID-19 (currently in its seventh edition),<sup>7</sup> published by the National Health Commission and updated continually, the hospital updated the ED workflows in a timely manner according to the characteristics of the diagnosis and treatment in different departments and the feedback from the grassroots staff of different departments in accordance with the requirements of the Shanxi Provincial Health Commission. *Each time the country published a new version of the Diagnosis and Treatment Plan for NCP [COVID-19], our department updated the workflows in time. Some special cases or events in the course of our implementation will be improved soon. (N1) The country publishes a new version of the diagnosis and treatment plan [at] a certain time, [and] our department make[s] [timely] adjustments ... So I check my phone at every work day: is there any change in the workflows today? Is it the same as yesterday? And I come to ask my colleagues if they have a different workflow. (N11)*

#### **Subtheme 4: Timely Provision of Adequate Protective Medical Supplies**

The fourth subtheme was related to the timely and adequate provision of supplies of protective equipment and material. During the COVID-19 outbreak, there was a shortage of protective medical supplies across the country. As the front line of epidemic prevention, the emergency department was given priority when it came to protective medical supplies. In accordance with the regulations of the hospital, secondary protection was adopted for the fever preexamination triage office and the transit station for patients with fever in critical condition in the emergency department, and primary protection was adopted in other sections of the emergency department. The protective medical supplies were distributed according to the protection level. *One mask [is] distributed to us per shift. We can use a new one (mask) every day, and replace a new one immediately when it is dirty. (N5)The disposable hand sanitizer in our corridor [is] replaced in time when [it is] used up. (N6)Disinfectants are always available at the fever pre-examination triage office. And the office [is] disinfected in time after a patient leaves. (N4)*

#### **Subtheme 5: Trust in the Organization**

Trust in the organization was the fifth subtheme in the study. This is a description of the work atmosphere and is a subjective evaluation by the employees of the safety provided by and friendliness of the organization. The emergency nurses said that the hospital was trusted in both policy formulation and measure implementation during the COVID-19 outbreak. *The decisions made by the hospital whether in the level of protection or in the established workflows can stand the test afterwards. (N6)The expanded meeting of the deans (who were fully responsible for medical treatment, teaching, scientific research, and administrative management of the hospital) is held every day. No matter what thorny problems we encounter, as long as the problems are feedback to the hospital leaders, there is always a way to solve them and they could be solved very smoothly. (N2)Whether it is at the national level or at the hospital level, the organization is really very powerful and helpful in dealing with the outbreak of NCP [COVID-19]. And the organization can always implement effective measures to make us feel secure in our work. (N11)*

### **Theme II: Personal Preparedness**

Personal preparedness of the nurses referred to their ability to make changes to cope with the COVID-19 outbreak. Five subthemes associated with personal preparedness for dealing with COVID-19 were identified as follows.

#### **Subtheme 1: Self-Adjusting Psychology**

The first subtheme is concerned with self-adjusting psychology, which is a well-known necessity for nurses in responding to public health emergencies and carrying out their work. Self-adjusting psychology means that nurses can actively make psychological adjustments when they are faced with constantly updated workflows and potential COVID-19 threats. Three participants described self-adjusting psychology in the emergency department during the COVID-19 outbreak. *The workflows keep changing, and I have to adapt, because the workflows [are] designed to protect me. (N2)Every time my roommates (in another department of the same hospital) asked me: did you encounter a suspected patient with fever in the emergency department? And I answered: no. I don't want them to worry about me and put pressure on them. I'll comfort them in return ... (N7)During this period of time, I will take the initiative to communicate with others when something is unsatisfactory for the purpose of enlightening myself. (N1) Return home after work, my son [sees] me and run[s] to me ... and I will say loudly: stay away from me. (worry about infection happening to their family members)...I have to do it for the safety and health of my son, even if it hurts his heart. (N2)*

#### **Subtheme 2: Experiencing Moral Distress and Making Choices**

The second subtheme involved experiencing moral distress and making choices. Moral distress refers to a psychological disequilibrium and a state of negative feeling that is experienced when a person makes a moral decision but does not follow through by performing the moral behavior.<sup>25</sup> To rescue patients in a critical condition is

the primary function of the emergency department; however, during the COVID-19 outbreak, COVID-19 screening became the primary work because of the impact of the epidemic. Three nurses stated that a conflict between the patients' personal interests and the workflows emerged in the case of caring for patients with fever in critical condition. As a consequence of the conflict, the nurses experienced moral distress. However, they could make a positive choice immediately after weighing the advantages and disadvantages of the situation. *For example, the patient with cerebral hemorrhage should be entered into the green channel right away if you follow the previous workflows. But now, owing to his fever ... I especially felt sorry for him. But after the event, especially to think about the situation in Wuhan in the context of the national NCP [COVID-19] outbreak, my mood is getting better. (N1) I met a patient with acute exacerbation of chronic obstructive pulmonary disease. He was an elderly man with [a] problem lung, who [was] prone to pulmonary infection with fever. Now, it is necessary to screen NCP [COVID-19] firstly ... I can't help it during the special time. (N2) He will infect a lot of people if he is a patient with NCP [COVID-19], which is no longer a small matter. So, I can't judge him just according to my own feeling (he is not a patient with NCP [COVID-19]). I should set the collective interest above anything else, even if I feel sorry for the patient deep in the heart. (N11)*

### **Subtheme 3: Professional Nursing Values**

This third subtheme concerned professional nursing values. Nurses' professional values are the basis of their working attitude and motivation, which have a positive impact on their work enthusiasm and job satisfaction.<sup>26</sup> During the COVID-19 outbreak, nurses' professional values played an important role in work motivation and willingness. *When my colleagues went to support Wuhan successively, I also want[ed] to go. But a[n] inner voice arose: do your job wherever you are to make [a] contribution. It is my duty to defend the rear! (N5) It seems to be time for the medical staff to be present. And it's time for everyone to need me (laughter). (N6) I will never refuse and I will do it without any hesitation even if I am required to collect blood sample[s] and pump pleural effusion for a[n] NCP [COVID-19] patient. Because what I do is my job. (N1) It's never considered what should I do if I get infected accidentally at work. I go to work just because it's what I should do. No matter how dangerous the infection it is, you should also do it even if the NCP [COVID-19] patients are in front of you. What I feel just like the feeling! (laughs) (N2) Now, everyone says that staying at home is also a contribution to the country. But thinking of myself, as a nurse, [I] always stick to my position at the front line. It's a feeling that I am different from others. (N4)*

### **Subtheme 4: Knowledge Seeking**

The fourth subtheme was related to knowledge seeking. Physicians and nurses across the country lacked knowledge about COVID-19 owing to its sudden outbreak. As for the frontline workers, the participants expressed interest in acquiring relevant knowledge. *I work at the preexamination and triage office. And I often take the initiative to learn from experienced nurses so that I know how to deal with suspected patients. (N4) I use my phone to learn about NCP [COVID-19] every day, to learn what NCP [COVID-19] is, and how to deal with it at my work. (N6) I think some properly supplemented courses about knowledge explanation were needed to provide for everyone to learn during this outbreak of NCP [COVID-19], such as shooting some videos. (N1)*

### **Subtheme 5: Actively Communicating**

The fifth subtheme was active communicating. Good communication plays an important role in reducing and avoiding conflicts between patients and medical staff, and can improve patients' compliance and increase their satisfaction.<sup>27</sup> During the epidemic, the emergency nurses took the initiative to communicate with patients and their families in a targeted manner, which improved the understanding of the patients and their families regarding COVID-19 and subsequently improved the patients' compliance. *I saw some family members play with their phones without washing their hands after cleaning up patients' pee. At this time, I took the initiative to inform [them] that it's very*

*unhygienic, and it's really easy to get infected. Then, they washed their hands immediately and did it actively after the next pee. Furthermore, when I saw some family members take off masks frequently or wear [them] incorrectly, I explained to them the importance of wearing masks to prevent NCP [COVID-19] and how to wear masks correctly. (N6)*

### **Theme III: Patient and Family Preparedness**

The preparedness of patients and families was reflected in active cooperation. The country has made great efforts to publicize facts about COVID-19 through various channels since the outbreak, which has generally improved the understanding of COVID-19 and the importance of self-protection. Nowadays, the patients and their families who come to the hospital understand and cooperate actively with the medical staff. *Now, the families are not as anxious and impatient as before. The families are highly cooperative with our advice that [they should] go to the fever clinic for screening if they are told clearly, which differs from the past [when] was really difficult to maintain order ... But now, everyone is so conscious and [they take the] initiative to maintain a certain distance [from] each other. And the families understand very easily what I [say]... (N2) During the outbreak, everyone was very cooperative. If you ask them to fill in a form, they will do it carefully ... Sometimes when they don't know how to fill it out, they will ask us. I haven't met any uncooperative patients or families recently. (N4) I found that some families are quite good at self-protection. They used the hand sanitizer hung on the hospital walls consciously. (N6)*

### **Theme IV: Deficiencies and Challenges Subtheme 1: Cross-Department Multidisciplinary Collaboration**

Multidisciplinary collaboration across departments can be a problem. However, in responding to the COVID-19 outbreak, multidisciplinary cooperation increased significantly, although the outbreak resulted in the problems of cross-departmental collaboration gaining prominence. *Sometimes, each department only looks at its own workflow, so that when it comes to cooperation there are some situations outside its own work process [that] occur. Which still need to be solved by the management through negotiation, and the coordination between different departments needs to be improved. (N1) Before the NCP [COVID-19] outbreak, some departments had less cooperation with the emergency department, but now the cooperation is significantly increased and it is inevitable that some new problems [have] needed to be solved [for] a long time. (N3)*

### **Subtheme 2: The Deficiency in Rapid Diagnosis and Treatment of Patients With Fever in Critical Condition**

The diagnosis and treatment of patients with fever in critical condition should be improved. The emergency department has the biggest concentration of patients in critical condition, the most complex types of diseases, and the heaviest task of rescue and management. Generally speaking, patients who come for diagnosis are in severe condition and need timely treatment. During the COVID-19 outbreak, COVID-19 screening became the priority. The challenge we are facing today is how to screen rapidly and treat patients with no delay. *Previously, patients in critical condition with fever were immediately sent to the green channel for rescue, but now multidisciplinary consultation is needed to check [for] NCP [COVID-19], which will increase waiting time ... (N2)*

### **Discussion**

Emergency preparedness is key when responding to any health crisis, and it refers to the knowledge and capacity to effectively anticipate, respond to, and recover from the impacts of a likely or current crisis.<sup>28,29</sup> Recently, increasing attention has been paid to emergency preparedness because unanticipated disasters are increasing in frequency. The spate of declarations and agreements made by the global community underlines the need for all countries to be prepared to meet emerging threats to public health.<sup>30</sup> In 2007, the second edition of Veenema's *Disaster Nursing and Emergency Preparedness for Chemical, Biological, and Radiological Terrorism and Other Hazards* was published to call on nurses to advance preparedness and develop mastery of the knowledge and skills needed to respond to emergencies.<sup>31</sup> In addition, in 2010, the WHO regional office for Europe developed and revised a

standardized toolkit for assessing a health system's capacity for preparing for and managing crises.<sup>30</sup> The main objectives of the assessment were to identify gaps in the overall capacity for emergency preparedness with the aim of developing a plan of action to address these gaps and strengthen capacity. Moreover, in 2014, the US Department of Health and Human Services released a revised version of the Emergency Preparedness Checklist to help state agencies and health care providers achieve an improved level of preparedness.<sup>32</sup>

As COVID-19 continues to rapidly spread worldwide, there is no doubt that the global economy, social structure, and people's health have been threatened. Simultaneously, the COVID-19 pandemic has placed additional stress on public health care systems. It is therefore crucial to intensify the preparedness and response operations to control the COVID-19 pandemic. On February 3, 2020, the COVID-19 Strategic Preparedness and Response Plan was drafted by WHO to provide public health measures to support all countries to prepare for and respond to COVID-19.<sup>33</sup> Accordingly, each public health system was encouraged to plan its preparedness and response actions.<sup>34</sup> Health care workers—emergency nurses in particular—play an important role in controlling the spread of the COVID-19 pandemic. Therefore, understanding the individual perspectives of emergency nurses and the public health systems' experience of preparedness in responding to the COVID-19 pandemic can provide valuable additional information on the successes and challenges, which will assist in preparing these systems for current and future disasters.<sup>35</sup> In our study, a cluster of 4 themes was extracted related to emergency nurses' preparedness during the COVID-19 outbreak: organizational preparedness, personal preparedness, patient and family preparedness, and deficiencies and challenges.

Regarding organizational preparedness, the study indicated that the organization was fully prepared to respond to the COVID-19 outbreak in the emergency department, including the timely adjustment of departmental functions, strengthening of multidisciplinary cooperation, timely updating workflows, and timely provision of adequate protective medical supplies. As a consequence of these measures, the emergency nurses trusted the organization to protect them, which prompted an increased willingness to work during the COVID-19 pandemic. This finding was consistent with the study by Baduge et al,<sup>36</sup> in which the nurses believed that the organization made sufficient preparation for Ebola virus disease and protected them when they were at work. Similarly, the study also supported the work of a previous qualitative study in which positive occupational preparedness was associated with health care workers' willingness to remain on duty during an influenza pandemic.<sup>37</sup> Conversely, inadequate organizational preparedness of public health systems was related to a lower willingness to work among health care professionals and an increased loss of lives during an epidemic.<sup>38-40</sup>

This study indicated that nurses had positive personal preparedness for dealing with COVID-19, as shown by the adjustment of self-psychology, response to moral dilemmas, actively seeking knowledge, and active communication with patients and their families. It has been shown that positive personal preparedness is important when responding to public health emergencies.<sup>41</sup> The finding was in agreement with recent reports that nurses made adjustments by using psychological techniques to promote self-psychological balance when feeling stressed by the pressure of dealing with the epidemic.<sup>35,42</sup> In addition, it indicated that the professional responsibility of nurses was related to their willingness to work.<sup>37</sup> In our study, all participants were committed to work during the COVID-19 pandemic owing to their professional responsibility even when fearing infection or the transmission of the infection to their families, in line with previous studies.<sup>35,42</sup>

Moreover, the participants stated that patients and their families cooperated actively during the COVID-19 outbreak, which made emergency nurses feel understood, respected, recognized, and supported, in line with the finding in a recent study.<sup>42</sup> In turn, the support from patients and society provided encouragement for emergency nurses to actively prepare to overcome difficulties and challenges at work during the COVID-19 pandemic.<sup>35,42</sup>

In fact, there is a relationship between organizational, individual, and patient and family preparedness. The positive preparation of the organization provided ED staff with guaranteed personal preparedness during the COVID-19 outbreak, whereas the positive preparation of patients and their families was a motivator for emergency nurses to be prepared when responding to the COVID-19 outbreak, which made the nurses feel respected and recognized, leaving them feeling positive.

The participants in the study also noted that there were some deficiencies in cross-department multidisciplinary collaboration and also in the rapid diagnosis and treatment of patients with fever in critical condition during the COVID-19 outbreak, which aligned with those of earlier studies.<sup>35,43-45</sup> It has been proposed that emergency operations collaboration forms a primary capability and challenge during the response to emergencies and is the area of focus most recommended for future emergency preparedness.<sup>43</sup> In our study, the problem of multidisciplinary collaboration usually existed in the workflow connections across departments. Therefore, it is necessary for relevant organizations to actively play a role in leadership, and cross-department cooperation is necessary to improve workflow connections. In addition, clear guidelines on coordinating resources across departments could also help improve future disaster preparedness and responses.<sup>43</sup> In view of the deficiency with regard to rapid diagnosis and treatment of patients with fever in critical condition, it is recommended that the relevant departments of the hospital should strengthen training and professional knowledge to improve the medical staff's ability to diagnose and treat these patients. At the same time, in the future, there should be guidelines for the rapid diagnosis and treatment of patients with fever in critical condition. Furthermore, accelerating priority research and innovation should be encouraged.<sup>30</sup>

### **Limitations**

A limitation of the study is that it is a purposive sample involving 12 emergency nurses within a single hospital in Taiyuan. Therefore, the research results are not generalizable beyond this current emergency department. In addition, the participants in our subject pool were skewed toward a large number of emergency nurses in charge, which also influenced the results.

### **Implications for Emergency Nurses**

Emergency nurses should recognize the impact of different cultures and classification levels of hospitals on their preparedness. Further research should be conducted in different regions and at different levels in hospitals, which will provide more comprehensive information for responding to public health emergencies in emergency departments. In addition, the relevant organization needs to take the initiative to seek solutions to the shortcomings in cross-department multidisciplinary collaboration and in the diagnosis and treatment of patients in critical condition with possible SARS-CoV-2 infection. Therefore, the following links and resources of tools are provided to strengthen emergency preparedness and collaboration:

- The Revised Emergency Preparedness Checklist: <https://www.cms.gov/Medicare/Provider-Enrollment-and-Certification/SurveyCertificationGenInfo/Downloads/Survey-and-Cert-Letter-14-12.pdf>
- Disaster Nursing and Emergency Preparedness for Chemical, Biological and Radiological Terrorism and Other Hazards, 2nd Edition: <https://www.elsevier.com/books/readyrn/veenema/978-0-323-06361-6>
- Toolkit for Assessing Health-System Capacity for Crisis Management: [http://www.euro.who.int/\\_\\_data/assets/pdf\\_file/0008/157886/e96187.pdf](http://www.euro.who.int/__data/assets/pdf_file/0008/157886/e96187.pdf)

Moreover, a standardized system aiming to support institutional preparedness could also help to effectively communicate and align preparedness activities during a pandemic.<sup>28</sup>

## Conclusions

In the emergency department, during the COVID-19 outbreak, the organization, individuals, patients, and their families were actively prepared. Emergency nurses indicated that they trusted the organization to provide guaranteed personal preparedness. In addition, the active cooperation from patients and their families was a motivator for the nurses for personal preparedness. Therefore, it is necessary to optimize the preparedness of the organization, patients, and their families so that the personal preparedness of the nurses is fully mobilized to effectively respond to this public health emergency.

## Author Disclosures

Conflicts of interest: none to report.

## Supplementary Appendix Interview Outline

1. During the outbreak of NCP [COVID-19], what changes have been made in the emergency department and what are the challenges faced?
2. a. What changes have been made in the content of your work? And what is your attitude towards it?
3. b. What do you think of your current workload?
4. c. What is the impact of the changes in your workload?
5. d. What challenges did you encounter and how did you deal with them?

## 2.

What personal changes have taken place during NCP [COVID-19] and how are you responding to NCP [COVID-19]?

- a. What do you think of your work as for an ED nurse during the NCP [COVID-19]?
- b. What changes have been made in response to the NCP [COVID-19]?
- c. Work during the NCP [COVID-19], what happened to your life? And how did you deal with it?
- d. What changes happened to your mental state when working during the NCP [COVID-19]? And did you deal with them?
- e. What other changes will you make to response to the NCP [COVID-19]?

## 3.

In terms of NCP [COVID-19] response, talk about how the hospital and the department have responded and what are the existing deficiencies?

- a. What has the hospital done when responding to the NCP [COVID-19]? How do you feel about the hospital's response?
- b. How do you feel about the current protective framework and protective equipment?
- c. What are the deficiencies in terms of organization? And what is your opinion about them?
- d. What other changes do you expect from the organization?

## Supplementary Data

Supplementary data related to this article can be found at <https://doi.org/10.1016/j.jen.2020.07.008>.

Step	Performed in our study
1.Acquiring a sense of each transcript	a.Listened to each audiotape and read each transcript repeatedly to gain a sense of each participant’s description of their experience.b.Personal thoughts, feelings, and ideas that emerged during this stage were written in the reflective diary.c.Copies of the transcript with a comments sheet were returned to the 12 participants for validation.
2.Extracting significant statements	a.Read and reread the transcripts to identify and analyze the participants’ experiences that pertain to the phenomenon of preparedness.b.Significant phrases and statements were extracted and highlighted on each page of the transcripts in a Word document.c.Personal thoughts and feelings that arose during this stage were incorporated into the reflective diary.d.Returned to the research team for the first debriefing session and reached a consensus.
3.Formulating meanings from significant statements	a.Studied each significant statement carefully and developed a sense of its meaning.b.Formulated meanings were examined in light of the contents of the reflective diary and interview field notes, juxtaposed with each contextual significant statement.c.Returned to the research team for the second debriefing session and reached a consensus.
4.Organizing formulated meanings into clusters of themes	a.Significant statements with similar terms and the formulated meanings were grouped together to form theme clusters. Related theme clusters were then aggregated to establish themes.b.Returned to the research team for the third debriefing session to examine the relationship among formulated meanings, theme clusters, and emergent themes, and reached a consensus.c.Finally, 411 formulated meanings were arranged into 13 theme clusters that were then focused into a cluster of 4 emergent themes for the description of ED preparedness.
5.Exhaustively describing the investigated phenomenon	a.Achieved by reexamining and incorporating the emergent themes, theme clusters, and formulated meanings into the description to create its overall structure, containing all the elements of the experience.b.Exhaustive descriptions were returned to the research team at the fourth debriefing session, and a consensus was reached.



6.Describing the fundamental structure of the phenomenon	a.The fundamental structure of the phenomenon was revealed by reexamination, discussion, and analysis by the research team.b.Depicted as the preparedness of our emergency department during the COVID-19 outbreak from the nurses' perspectives, including a cluster of 4 themes. Organizational preparedness guaranteed the personal preparedness, and the preparedness of the patient and family represented the motivation for personal preparedness.
7.Returning to the participants for validating	a.Exhaustive description and fundamental structure of the phenomenon in the paper were returned to the 12 participants for validation.b.All participants considered the findings to be an accurate depiction of their experiences of the phenomenon.

Variable	n (%)
Sex	
Female	9 (75)
Male	3 (25)
Age, y	
18-30	4 (33)
31-40	8 (67)
Marital status	
Married	9 (75)
Unmarried	3 (25)
Technical title	
Primary nurse	3 (25)
Nurse	4 (33)
Nurse-in-charge	5 (42)

Educational background	
Bachelor's degree	11 (92)
Master's degree	1 (8)
Nursing experience, y	
<1	2 (17)
1-3	2 (17)
4-10	5 (41)
>10	3 (25)
Antiepidemic experience	
Yes	1 (8)
No	11 (92)

## DETAILS

**Subject:** Emergency medical care; Qualitative research; Fatalities; Public health; Relatives; COVID-19; Induction; Epidemics; Medical research; Research methodology; Pneumonia; Nurses; Coronaviruses; Cooperation; Emergency services; Emergency preparedness

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# Responding to the Severe Acute Respiratory Syndrome (SARS) Outbreak: Lessons Learned in a Toronto Emergency Department: JEN

[ProQuest document link](https://www.proquest.com/scholarly-journals/preparedness-our-emergency-department-during/docview/2487205950/se-2?accountid=211160)

## ABSTRACT (ENGLISH)

The Context SARS is an atypical pneumonia characterized by a fever of 100.4°F (38°C) or higher, myalgia, headache, malaise, chills, a dry, nonproductive cough, and shortness of breath or difficulty breathing.<sup>1</sup> The time from exposure to the onset of symptoms is 2 to 11 days.<sup>2</sup> The cause of SARS is thought to be related to the coronavirus, the virus responsible for the common cold.<sup>3</sup> Epidemiologic evidence indicates that transmission of the

illness occurs with close person-to-person contact (to household members, health care workers, or nearby patients who were not protected by contact or respiratory isolation precautions) and through droplet secretions.<sup>4</sup> Because coronaviruses can survive for several hours on inanimate objects, direct contact with contaminated objects potentially represents another mode of transmission. On April 10, 19 patients with suspected or probable cases of SARS had been treated, and 11 of those patients were health care providers.<sup>6</sup> To date, 51% of SARS cases in the GTA are nurses and physicians, and 77% of the total cases of SARS are the result of exposure within the hospital setting.<sup>5</sup>

**Controlling the Spread in the Emergency Department** In an effort to deal with the transmission and onset of illness within health care and community settings, the province of Ontario designated a Provincial Operations Centre (POC), which was responsible for issuing directives to hospitals about patient care and infection control practices. Even patients with minor lacerations or complaints of abdominal pain who come to the emergency department are triaged to negative pressure isolation rooms if they have any of the symptoms of or possible contacts with the illness.

**Controlling Traffic** In an effort to prevent exposure and transmission of SARS, we have virtually eliminated visitors to the hospital. There is now only one possible entrance to the emergency department with a security guard posted there, around the clock, to manage traffic, inform visitors of the new policy, provide patients with an N95 mask, have them apply a disinfecting hand wash, and direct them to the triage nurse.

## FULL TEXT

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In March 2003, an infection called severe acute respiratory syndrome (SARS) made its way to the Greater Toronto Area (GTA) and Simcoe County. This infection has had a profound effect on nursing practice and patient care in the GTA. The impact of SARS is analogous to the effect of HIV in the early 1980s. The causative agent is not well understood, a diagnostic test has not yet been developed, the mode of transmission is not well understood, no treatment regimen has been established, no immunization exists, and patients are dying. Hospitals have used the one and only tool available to control this outbreak: strict isolation procedures to eliminate transmission.

The Toronto outbreak of SARS has presented significant issues for ED care and work life. It has challenged our hospital to question how to deliver patient care safely, eliminate the spread of disease, and protect health care providers and members of the community. The intent of this article is to highlight some of the challenges faced by our emergency department as we managed this frightening new illness and the strategies that have helped us care for patients and control the outbreak.

### **SARS: The Context**

SARS is an atypical pneumonia characterized by a fever of 100.4°F (38°C) or higher, myalgia, headache, malaise, chills, a dry, nonproductive cough, and shortness of breath or difficulty breathing.<sup>1</sup> The time from exposure to the onset of symptoms is 2 to 11 days.<sup>2</sup> The cause of SARS is thought to be related to the coronavirus, the virus responsible for the common cold.<sup>3</sup> Epidemiologic evidence indicates that transmission of the illness occurs with close person-to-person contact (to household members, health care workers, or nearby patients who were not protected by contact or respiratory isolation precautions) and through droplet secretions.<sup>4</sup> Because coronaviruses can survive for several hours on inanimate objects, direct contact with contaminated objects potentially represents another mode of transmission. Airborne transmission is thought to potentially play a role in some settings, accounting for spread that has occurred in some apartment buildings in Asia.<sup>3,4</sup>

The first person who was diagnosed with SARS in Toronto had recently traveled to Hong Kong. The unfortunate woman died from the infection, and several of her family members developed the illness through household contact. In turn, these infected family members transmitted the infection to ED health care workers and patients before the implementation of isolation precautions. While the disease has been transmitted in the community, most of those infected are health care workers who were infected in patient care settings.<sup>5</sup> The first patient died on March 5, 2003.

On March 13, Mount Sinai Hospital received its first patient with the illness. On April 10, 19 patients with suspected or probable cases of SARS had been treated, and 11 of those patients were health care providers.<sup>6</sup> To date, 51% of SARS cases in the GTA are nurses and physicians, and 77% of the total cases of SARS are the result of exposure within the hospital setting.<sup>5</sup>

### **Controlling the Spread in the Emergency Department**

In an effort to deal with the transmission and onset of illness within health care and community settings, the province of Ontario designated a Provincial Operations Centre (POC), which was responsible for issuing directives to hospitals about patient care and infection control practices. These directives included when and how to close hospitals, necessary isolation/quarantine precautions for staff, patients, and visitors, admission and transfer criteria, and discharge protocols. All Greater Toronto hospitals instituted their "Code Orange" emergency disaster plans as a means of ensuring that appropriate staff were available to support new types of patient care activities. The focus was to ensure the safety of hospital staff and patients.

We needed to address many issues in a short period of time within acute care settings to prevent the spread of the illness. We created staff, patient, and visitor screening, isolation procedures, linkages with infectious diseases, and assessment protocols to guide practice. This involved the development and daily adjustment of new procedures, protocols, documentation processes, and practices as we learned about the nature and course of the illness. Depending on the stage of the infection, the symptoms of SARS can resemble many nonspecific viral illnesses. It is difficult to identify infected individuals because there are no hallmark clinical symptoms for SARS and there is no diagnostic test to identify the virus. At the start of the outbreak, we had few patients with suspected SARS presenting to our emergency department, and the epidemiologic links were clear. As the extent of the outbreak grew, the epidemiologic links became vague. SARS is classified as "Suspect and Probable." Many patients we admitted to the hospital were diagnosed as "Suspect SARS." They were clinically and hemodynamically stable. Some had normal chest radiography with no infiltrates demonstrated (yet) but had symptoms of fever, headache, myalgia, and malaise, and 1 of 3 distinct exposures: they had either traveled to Vietnam, China, Hong Kong, Singapore, or Taiwan; they had been exposed to a person with SARS; or they had been a health care worker, patient, or visitor in a hospital in the GTA where there had been recorded cases of SARS transmission. The diagnosis of "Probable SARS" is distinguished by the above, plus severe progression of respiratory illness (cough, shortness of breath, tachypnea, desaturation) and demonstrated radiographic findings.<sup>5</sup>

We developed a triage screening tool to elicit information about exposure, symptoms, and an epidemiologic link to SARS. If patients had a positive response to any of the questions in the screening tool, exhibited symptoms, or had a positive epidemiologic link to the illness, it meant that we would initiate the SARS protocol. An N95 mask was applied, and the patient was triaged to the negative pressure airflow isolation room in the emergency department. By the second week of the outbreak, patients with the infection were not as easily identified. More GTA hospital workers had inadvertent, unprotected exposure to SARS cases, and the infection made its way into the community. Patients had difficulty identifying the person or place where they might have been exposed. More than a month into the outbreak, patient information related to the epidemiologic link became vague and, as a result, we became more stringent in our epidemiologic and clinical assessment at triage. The screening tool was revised several times to include the new list of possible exposures and symptoms. Hospitals in the GTA with exposures to the illness were added to the list of possible exposures. Toronto Public Health kept us informed of persons who were to be considered "high risk" for the illness due to exposures with persons who had developed the illness at community events (funerals, religious retreats).

Today, the SARS triage screening tool is a permanent part of all patients' chart records. It includes the patients'

responses to all screening questions about potential exposure, symptoms, and their temperature at triage. (See <sup>Table 1</sup> for the questions that are included.) Now, regardless of whether patients have any symptoms of SARS, they wear an N95 mask. If they answer “yes” to any of the questions on the screening tool or have any symptoms of viral illness, shortness of breath, or cough, they are triaged to a negative pressure (reverse airflow) isolation room. Even patients with minor lacerations or complaints of abdominal pain who come to the emergency department are triaged to negative pressure isolation rooms if they have any of the symptoms of or possible contacts with the illness.

### **Controlling Traffic**

In an effort to prevent exposure and transmission of SARS, we have virtually eliminated visitors to the hospital. Visiting policies in the GTA were changed to restrict visitors early in the outbreak. Visitors are limited to families of the critically ill, dying, or birthing patients, or pediatric patients. Volunteers, nursing students, and non-essential staff were sent home at the onset of the outbreak and have been slowly reintroduced into the hospital based on provincial directives.

The number of entrances to our hospital building has also been limited. There is now only one possible entrance to the emergency department with a security guard posted there, around the clock, to manage traffic, inform visitors of the new policy, provide patients with an N95 mask, have them apply a disinfecting hand wash, and direct them to the triage nurse. Triage takes place with the patient wearing an N95 mask. We obtain the triage history and complete the SARS patient screening tool (including temperature assessment). We determine the patient's disposition based on the presenting complaint or a positive response to the SARS screening tool. All visitors who are permitted entry to the emergency department and all paramedics accompanying ambulance patients also require screening. The SARS screening process has increased the amount of time it takes to triage patients, so that sometimes triage requires 2 nurses.

### **The Impact on ED Space**

Mount Sinai Emergency Department, an urban academic facility, has experienced an increase in its annual volume of ED patients over the past 3 years, with an average of 37,000 visits annually. We have outgrown the physical capacity of the department such that every square foot of the department, including hallway locations, is used for patient care. Our philosophy has been that sick patients are safer being cared for in a hallway space than in the waiting room. Before SARS, we had 26 stretcher bays and could add 7 more hallway stretchers if volumes were high. With the advent of SARS, this practice has changed. In order to prevent the potential transmission of SARS, all hallway spaces have been eliminated. Several of our stretcher bays were only divided by a curtain and these have also been closed. Our resuscitation room had 2 divided rooms, each with 2 stretchers; this has been reduced to 1 stretcher in each room, leaving us with only 16 spaces in the department.

The emergency department is equipped with one permanent, reverse/negative air isolation room with an anteroom. As the number of patients with positive epidemiologic links or symptoms of SARS increased, we had to create additional negative pressure isolation rooms. Engineering and building services were pressed into service to help control the spread of infection with airflow and pressure adaptations. They created 6 additional negative pressure rooms in our emergency department, giving us a total of 7 negative pressure isolation rooms. We are currently considering further renovations, including replacing curtains with wall barriers between stretcher bays and creating additional reverse isolation and anterooms.

### **ED Isolation Procedures**

The emergency department has been categorized as a SARS unit because all hospital admissions with suspect or probable SARS originate via the emergency department. All of our staff (even the people at the coffee kiosk) have been wearing N95 masks since late March. As of this writing—April 28—we are only wearing them in clinical areas.

Initially, there was a shortage of the N95 masks, but to date we have enough. There are not enough of the duck-billed masks, the kind we prefer. Our staff (nursing, clerical, administrative, and support staff) are also required to wear hospital-provided scrubs. We remove all scrubs at the end of the shift and the hospital launders them. N95 masks are applied upon entry to the unit once staff screening for the illness has been completed. Isolation gowns are worn within patient care areas. If a patient is not considered to be at risk of SARS, care is conducted with a single set of gloves and protective eyewear. If a patient does not have SARS, staff do not have to change gowns after taking care of them. The isolation gown is only replaced if soiled or wet. Handwashing remains the number one aspect of infection control. This must be done hourly and before and after every patient encounter.

When we take care of patients being investigated for SARS, we wear double isolation gowns, a hair cap, an N95 mask, a face shield, and 2 pairs of gloves. Protective isolation gear is removed and replaced upon exiting the patient room. Special handling procedures for garbage, linen, bedpans, and urinals are in place, and terminal cleaning of patient rooms is done when the patient leaves the emergency department. Bedpans and urinals are contained, soaked in a disinfectant cleaner, and removed from the department with as little handling as possible. Equipment such as stethoscopes, thermometers, blood pressure cuffs, EKG machines, and capillary blood glucose monitors must remain in the patient's room and require terminal cleaning after use.

Our support service assistants have a combined role of housekeeping and patient transport. Their role is now largely dedicated to the cleaning and disinfection of patient care areas and equipment, and the safe disposal of laundry and garbage. They have been provided with in-service training about procedures for cleaning and linen and garbage disposal. Additional staffing has been required to manage this increased workload appropriately.

Our hospital established an isolation team as a means of ensuring that staff follow appropriate infection control precautions. This group has allocated isolation carts in the emergency department and throughout the organization, determined the appropriate supplies that the carts require for safe patient care to occur, set up a restocking schedule, and provided clear signage for infection control practices. Routinely, the carts are checked and restocked by our dispatch department.

### **Confusion of SARS Symptoms With Those of Other Illnesses**

The symptoms of SARS resemble many illnesses, contributing to some confusion around the recognition and diagnosis of the illness. In particular, those patients with community-acquired pneumonia have been extremely difficult to differentiate from those with SARS. Patients who historically would have been triaged to a non-acute area with "viral illness" are now triaged to a negative pressure isolation room. Our inability to clinically rule out SARS has led to an extensive diagnostic assessment and workup of many patients. The most reliable diagnostic indicator for SARS is chest radiography (posteroanterior and lateral) to assess for infiltrates. Early in the outbreak, we discovered that portable x-rays were limited in their ability to identify early pulmonary infiltrates. A written protocol, including appropriate patient dress (N95 mask, gloves, and isolation gown), was developed for transportation and imaging in our emergency department's x-ray suite. Laboratory investigation includes a complete blood count, electrolytes, calcium, magnesium, phosphate, creatinine, lactic dehydrogenase, liver function tests, and 2 sets of blood cultures. We collect several tubes of blood for serology and cytokine studies for future research of the illness. Throat swabs are collected for viral studies. Early studies have found that the hallmark diagnostic indicators of SARS are: leukopenia, lymphopenia, thrombocytopenia, elevated creatinine kinase, lactic dehydrogenase, alanine aminotransferase, and aspartate aminotransferase.<sup>4</sup> As more cases of the illness were identified, additional abnormalities were noted, including low calcium, phosphate, magnesium, and potassium levels and an elevated creatinine kinase on admission.<sup>5</sup> However, the specificity of these laboratory tests is unknown. A SARS clinical decision-making tool is in the process of being developed to assist clinicians in the screening, diagnosis, and

management of the illness.

### **Changing ED Equipment**

In the early stages of the SARS outbreak, many health care workers were inadvertently exposed to the infection before full isolation precautions were initiated. The causal exposures of health care workers have been largely related to respiratory procedures and interventions including endotracheal intubation, airway suctioning, and bronchoscopy.<sup>3,7</sup> As a result of these exposures, we have altered patient management guidelines and treatment protocols. The triage screening tool was drafted at least 5 times, the diagnostic tests were drafted again, the process for infectious disease consults became more inclusive, and the POC issued new directives daily (regarding isolation procedures, human resource issues, etc.). A policy is currently being drafted for intubation and code blue procedures for non-SARS and suspect SARS cases. Powered air purifying respirator hoods (PAPR; 3M, St Paul, Minn) have been added to the arsenal of essential equipment required for patient intubation, and the number of staff involved in such procedures is limited. Since the beginning of the outbreak, all treatments with noninvasive ventilation, nebulized medications, and humidified gases have been suspended. All bag valve masks are now single-patient use only, and filters have been added. Filtered rebreather masks delivering 80% oxygen have been introduced for SARS patients who require high flow oxygen. Single-patient use disposable oxygen saturation probes have also been introduced as a means of reducing potential transmission of the illness.

ED staff have been trained to assess and respond to A = airway, B = breathing, and C = circulation emergencies. With the outbreak of SARS, the "A" now stands for "Are," as in "Are we all protected?" Our emergency department has implemented a role for monitoring and reminding each other about infection control safety. The danger of an undiagnosed patient with compromised airway, breathing, or circulation infecting the entire team is no longer acceptable. The need to be constantly vigilant so that our colleagues adhere to strict isolation precautions is, and will continue to be, the most important practice shift. No one is allowed in the critically ill patient area without all the required isolation gear. Each nurse has been charged with the responsibility of ensuring colleagues are wearing protective gear before approaching the patient.

We have had to change the way we dispose of waste. All waste material from potential SARS patients is placed in a yellow biohazard bag, tied to seal, and then placed in cardboard boxes labeled "medical waste." The cardboard boxes are then sealed with packing tape and disposed of as medical waste. Special garbage boxes are located in the anteroom or outside the negative pressure rooms that do not have anterooms. There is an entire process for closing the bag, sealing the box, and transporting it to disposal. Linen hampers are in the room.

### **Interfacility Patient Activity**

Due to the potential risk of transmission between staff and patients with unknown or undiagnosed illness, all patients (regardless of their mode of transportation) who require transfer to an external facility must receive prior approval through a "transfer application" process. This system was designed to eliminate the spread of infection between health care institutions. The POC requires all sending facilities to communicate and document clearance from the infection control practitioners at both the sending and receiving facility. Every hospital in the GTA has been given a SARS category rating from 0 (no known SARS cases) to 3 (unprotected SARS exposure with transmission to staff and or patients). The category of both facilities is documented and taken into account in a decision-making algorithm. The triage patient-screening process becomes a vital component of the application process. A patient transfer authorization form is completed and faxed to the POC office. Approval or denial from the physician at the POC is faxed to the sending facility. Patients transferred to the emergency department from long-term care facilities go through this process, unless their condition is unstable or life threatening.

### **The Lived Experience of SARS**



Working 12-hour shifts with an N95 mask has indeed been a challenge to our ED staff. Finding a vein and taking blood with double gloves and a face shield are challenging. The only part of the nurse the patient can see is his or her eyes. We could write a paper on the challenges this presents to developing a therapeutic relationship. The goal of preventing the spread of the illness has resulted in many changes in day-to-day work life. Meal breaks are the only time that staff are permitted to remove their masks. Breaks have to be taken either alone or in small groups with a distance of 3 ft between one another. Only one person is able to have his or her mask removed at one time in an enclosed room. Once staff are done eating and drinking, the masks must be put back on. As a means of supporting staff under the current circumstances, the hospital has been supplying staff on all units with bottled water and bagged snacks.

Within the GTA, hospital staff were advised to stop social gatherings outside of work. Professional gatherings such as staff orientation and training sessions were canceled. Staff who worked in more than one facility were restricted. Several of our staff have part-time or agency positions in other hospitals. This additional work had to be documented and, in many cases, decisions were made to limit staff movement between facilities to stop potential spread of infection.

In our emergency department, 21 staff members were sent home on 4 days of quarantine after exposure to a hospital employee who was suspected of having the infection. To date, no ED staff, including those who were on quarantine, have developed the infection. The stress of being on home isolation, coupled with the fear of transmitting the illness to family members, was significant. There was a good deal of realistic fear. GTA health care workers who became ill were young and healthy, much like the staff taking care of them, and we all knew that others had died of this disease. Many of the staff also struggle with their conflicting roles. They are professionals, but they are also family members who need to protect their own family and friends. Many nurses have had personal appointments, such as those for routine dental care, canceled by providers because of the concern that the disease might be spread. Many of our family members and friends were reluctant to socialize with us over Easter and Passover. When the media reported that health care workers represented a threat in the community, it made us all feel socially isolated.

As anxiety mounted, it was recognized that staff needed more than just the equipment and directives to manage SARS; we needed emotional support. A drop-in center staffed by psychiatrists and mental health clinicians was established. We could drop by on an informal basis to relate our experiences, debrief, and cry if that was needed. Also, an employee support phone line was set up within the inpatient psychiatric unit.

On April 25, the Premier of the Province of Ontario and the Minister of Health publicly described the efforts and conditions to which health care workers in the GTA were subject. This turned media and the community's attention to praising and supporting health care workers. The positive impact of this on morale was amazing!

Within Mount Sinai Hospital, the Chief Executive Officer, Vice President of Nursing, and the Chief Information Officer (also a nurse) issued daily Internet updates on the status of the outbreak, new directives, and actions. We needed to hear positive words and encouragement to keep up our morale. Leadership staff have also increased their hours of work and adopted shift hours (including evenings, nights, and weekends) as a means of being visible and ensuring adequate support for staff. This has meant some 18-hour days and 14-day stretches. The Infection Control and Infectious Diseases Departments have been our guide and practice leaders. The number of personnel in nonclinical departments who were redeployed from their roles to frontline roles in order to control infection was one demonstration of the incredible effort and team work in managing the crisis within the organization.

## **Conclusion**

As of this writing, at the end of April, no staff member in our emergency department has developed SARS. We owe

that to our hospital's recognition of the illness and to the isolation procedures that were introduced, across the organization, early in the outbreak. The challenge of remaining safe and controlling the transmission of SARS has truly tested the endurance of our staff and organization. ED nurses and their medical and administrative colleagues in the GTA are to be commended for their diligence, commitment, stamina, and courage to control this outbreak. SARS remains a potential risk to staff and patients in health care settings everywhere. Proactive initiatives are essential to controlling its spread. The exchange of information, vigilance in detection procedures, and the support of staff in these stressful environments are crucial.

Have you had any unprotected contact with a person with SARS in the last 10 days?
Have you been in a hospital closed due to SARS in the last 10 days?
Are you in quarantine or have you been contacted by Toronto Public Health and put on home isolation?
Have you been to China, Hong Kong, Vietnam, Singapore, or Taiwan in the last 10 days?
Are you experiencing any of the following?
•Myalgia (muscle aches)
•Malaise (severe fatigue or unwell)
•Severe headache (worse than usual)
•Cough (onset within 7 days)
•Shortness of breath (worse than what is normal for you?)
•Feeling feverish, or have you had a temperature in the last 24 hours?
Record temperature now.
Have you been a patient or a visitor in another hospital or long-term care facility in the last 10 days? If so where?

## DETAILS

**Subject:** Infections; Severe acute respiratory syndrome; Patients; Cough reflex; Diagnostic tests; Complaints; Hospitals; Pneumonia; Precautions; Nurses; Breathing; Symptoms; Workers; Illnesses; Health care; Visitors; Triage; Abdominal pain; Medical personnel; Coronaviruses; Emergency services; Disease control

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# Emergency Nursing Care of Patients With Novel Coronavirus Disease 2019: JEN

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## ABSTRACT (ENGLISH)

Novel coronavirus disease 2019 is the disease caused by the novel coronavirus originally from Wuhan, China. Its pathophysiology is poorly understood, but it is known to be contagious and deadly. Multiple symptoms and complications from the disease have been described, with the most common complaints being respiratory. Nursing care of patients with novel coronavirus disease 2019 is largely supportive, but it should include a strong focus on mitigating the spread of infection to staff, other patients, and the community.

## FULL TEXT

### Contribution to Emergency Nursing Practice

- The current literature on COVID-19 is rapidly developing.
- This article contributes a review of the current knowledge and application of the science on COVID-19.
- Key implications for emergency nursing practice are that coronavirus disease can lead to hyperacute and refractory respiratory failure in a minority of patients, with the elderly and those with diabetes, heart, or lung comorbidities at most risk.

### Introduction

The novel coronavirus disease 2019 (COVID-19) is a respiratory viral disease that has rapidly spread worldwide. It is associated with an international pandemic, largely because of its rapid spread, its high mortality, and the lack of a cure or vaccine. Given its rapid spread, it is likely that emergency nurses will encounter patients with known or suspected COVID-19. This article is a review of COVID-19, specifically directed at the emergency nursing care of these patients.

### Biology

Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) is a positive-sense RNA virus and is the cause of COVID-19. Coronaviruses are common causes of mild respiratory illnesses in children and adults. Several novel strains or mutations of coronaviruses in the past decades have arisen, namely severe acute respiratory syndrome (SARS) of 2003<sup>1</sup> and Middle Eastern respiratory syndrome of 2012.<sup>2</sup> These novel strains are often associated with high mortality and virulence. These previous strains did not reach the international spread that COVID-19 has; thus they did not cause such widespread destruction nor reach pandemic status.

The novel coronavirus poses “spike proteins” that bind to the angiotensin converting enzyme (ACE) 2 receptor, which is found on endothelial cells including those in the lung, blood vessels, and gastrointestinal tract. The action of these spike proteins is thought to be the major cause of disease in COVID-19. In addition to respiratory disease, vascular issues such as clotting and gastrointestinal issues such as vomiting and diarrhea have been reported in patients who are positive for COVID-19. Furthermore, stool samples have been shown to test positive for viral RNA and could be contagious.

This virus is known to be spread by means of large respiratory droplets, similar to other respiratory viruses.<sup>3</sup> The evidence for indirect transmission is growing,<sup>4</sup> and there is ongoing debate about whether the virus undergoes “aerosol” transmission.<sup>5</sup> Typical breathing, sneezing, and coughing may cause some aerosolization of viral particles, but the data on whether this occurs and whether these particles are infectious continue. Most authorities would agree that “aerosol-generating procedures” (eg, intubation, bag mask ventilation, and bronchoscopy) put health care workers at risk of aerosol spread of infection. Research on the risk of transmission with noninvasive ventilation (eg, continuous positive airway pressure [CPAP], bilevel positive airway pressure [BiPAP], and high-flow nasal cannula [HFNC]) is ongoing.

It is generally accepted now that fomites (ie, objects or surfaces) can carry viral particles for many days: 3 hours in the air, 4 hours on copper, 24 hours on cardboard, and 2 days to 3 days on plastic and stainless steel.<sup>5</sup> Scientists in Wuhan found high numbers of viral particles in the restrooms, as well as near air vents and on the floor and the shoes of health care workers.<sup>5,6</sup> Another finding was that blood can also carry viral RNA in patients who are symptomatic, are asymptomatic, or have recovered from COVID-19.<sup>7-9</sup>

### **History and Spread**

Most authoritative sources believe that COVID-19 began in Wuhan, China. There is ongoing debate and research into its exact origin in Wuhan.<sup>10</sup> Nonetheless, the first case identified was reported on December 31, 2019; however, contact tracing and viral analysis has shown the potential for cases as far back as November 2019.<sup>6,11</sup> The World Health Organization raised COVID-19 to “highest risk” on February 28, 2020<sup>12</sup> and declared it as a pandemic on March 11, 2020.<sup>13</sup> In the United States, travel restrictions were initiated on January 23, 2020<sup>14</sup> and a national emergency in the US was declared on March 13, 2020. This led to nearly all states to implement some level of social distancing recommendations and nonessential business closures.

### **Risk Factors**

Risk factors for contracting the disease remain largely unexplored. Younger patients seem to have a better prognosis, with most children relatively unaffected, and older patients have mortality rates as high as 15% (208/1,408) in one study.<sup>15</sup> Although most children are largely unaffected by primary infection, there have been recent reports of delayed severe immunologic complications in children, termed multisystem inflammatory syndrome in children (MIS-C).<sup>16</sup> Obesity is another major predictor of poor prognosis, more so than many other “diagnosed” medical conditions.<sup>17</sup> High blood pressure, diabetes, heart disease, and lung disease are also predictors of poor prognosis.<sup>18</sup> Heart disease seems to confer more risk than lung disease.<sup>18</sup> In addition, smoking has been shown to be a minor risk factor in several studies.<sup>19</sup>

The Centers for Disease Control and Prevention (CDC) continues to advocate that patients who are immunocompromised are also at an increased risk of severe disease,<sup>20</sup> though there is not great evidence to support this.<sup>21</sup> It makes intuitive sense to take extra caution with patients who are immunocompromised. Similarly, patients with cancer, both those with active disease and those in remission, are shown to be at a risk of poor prognosis (ie, intubation and intensive care).<sup>22</sup>

Pregnancy is another high-risk situation, mainly because of the unknown risk to the mother and the fetus/newborn with an underdeveloped immune system. In addition, many patients who are pregnant are asymptomatic and found on routine screening.<sup>23</sup> Pregnant women can, rarely, become critically ill. There is no known risk of transmission of the virus across the placenta or in breastmilk; however, research is ongoing.<sup>24</sup> For example, recent pathologic examination of the placentae of 16 mothers who were positive for COVID-19 showed increased vascular damage, but none of these children tested positive for COVID-19.<sup>25</sup> A report of babies born to mothers known to have COVID-19 showed that 3 of the 33 babies were positive.<sup>26</sup> Two developed pneumonia, and one had a critical course that

was likely owing to prematurity and not COVID-19. Therefore, CDC recommends that providers and facilities consider “temporarily isolating” babies from their mothers if the mother is known to have COVID-19.<sup>27</sup> The use of medications such as nonsteroidal anti-inflammatory drugs (eg, ibuprofen, naproxen, aspirin), ACE inhibitors (eg, lisinopril, captopril), and angiotensin receptor blockers (eg, olmesartan, valsartan) has been suggested to be associated with a poor prognosis.<sup>28</sup> No data support this, and it is largely a theoretical risk owing to the fact that COVID-19 binds to the ACE2 receptor. Consensus is that patients with chronic illnesses should continue their medications, specifically their antihypertensive medications.<sup>29</sup> Congregate settings have emerged as niduses of outbreaks,<sup>30</sup> particularly nursing homes,<sup>31,32</sup> but also homeless shelters<sup>33</sup> and jails.<sup>34,35</sup> Once a congregate setting is identified to have more than 1 COVID-19 infection, all patients from that facility should be considered “exposed” and treated as such.

### **Presentation**

Most patients who present for medical care will have flu-like symptoms (fever 42%-91%, cough 50%-86%, fatigue 51%-70%, myalgias 35.4%, and shortness of breath 30%).<sup>18,36-38</sup> Other flu-like symptoms of sore throat, headache, and stuffy nose are also known but less common.<sup>37</sup> Cough seems to be the most common first symptom.<sup>36</sup> As few as 44% of patients will have a documented fever on arrival, with 80% to 90% developing a fever during hospitalization.<sup>39</sup> Subjective fevers appear to be a more common presentation.

Some more rare presentations of COVID-19 have been observed. Diarrhea seems to be a rare but known presenting symptom,<sup>7,40</sup> but up to 70% of patients will develop some gastrointestinal symptoms (nausea, vomiting, diarrhea, anorexia, abdominal pain, gastrointestinal bleeding).<sup>41</sup> Loss of smell (anosmia) and loss of taste (ageusia) are also known presentations of COVID-19.<sup>42</sup>

The viral incubation (time from exposure to symptoms) is typically 2-14 days.<sup>36,43</sup> Most patients will have contact with a person who is known or potentially positive for COVID-19, but as the disease incidence grows in certain areas, community spread can be presumed. That is, in areas with a high incidence (eg, New York City), all patients can be presumed to have had contact with a person with COVID-19.

For patients who develop severe illness, the need for hospitalization typically peaks around day 2-7 of symptoms, approximately day 10 after exposure.<sup>38,44</sup> After admission, the small percentage of patients who develop critical illness will do so remarkably rapidly.<sup>39</sup> Most commonly, patients go from minimal oxygen support to intubation within 24 hours.

### **Personal Protective Equipment and Staff Safety**

The first and foremost role of the nurse is to protect themselves from contracting or transmitting COVID-19. Adequate personal protective equipment (PPE) should be provided to all health care workers, especially emergency nurses. Even when caring for patients who are critically ill, it is important to protect one's self and take the time to don the appropriate PPE, despite instincts to want to render aid immediately. Education and training around appropriate donning (putting on) and doffing (removing) of PPE is essential, as these are times when health care workers are at a high risk of accidental contamination.

Patients with known or suspected COVID-19 should be placed under appropriate isolation precautions on arrival. Ideally, all patients with COVID-19 would be seen in negative pressure rooms with health care workers wearing airborne precautions (ie, an N95 mask or powered air-purifying respirator [PAPR]). This has proven to be impossible in most areas because of the limited number of these resources. In general, airborne precautions are required for patients with known COVID-19 undergoing aerosolizing procedures, such as cardiopulmonary resuscitation or intubation. Other PPE requirements will be based on local incidence, resources, and local and national guidance. Nurses should review their hospital's policy on what level and type of PPE are required for which risk-level patients.

Many hospitals have begun reusing previously single-use PPE, as noted by CDC.<sup>45</sup> CDC has also released a recommendation regarding mask sterilization,<sup>46</sup> which many hospitals are now trialing. Mask sterilization is a process of cleaning and reusing what were previously single-use masks.

Inadequate PPE, the reuse of PPE, and mask sterilization can cause great anxiety for nursing staff as they are concerned for their health and safety. Transparency regarding PPE supply and clear communication regarding reuse and storage of PPE are important for hospital leadership.

In patients with known or suspected COVID-19, both the number of people in the room and the time spent in the room should be minimized. Therefore, several hospitals have placed visitor restrictions. However, despite this, many hospitals have added innovative uses of technology for patients to communicate with family and friends. An example of this would be tablet devices and use of online meeting or communication applications. In addition, many nursing and medical schools have removed students/learners from clinical experiences to reduce exposure and PPE use. Nurses should focus on clustering care as much as possible to limit their time in the room and the number of times they enter and exit rooms. To further cluster care, patients should be given a way to communicate with their care team that does not involve entering the room; this may include a call bell system, a room phone, or a tablet device. It is important to communicate clear expectations for clustered care to patients, as patients may already feel isolated, but nurses also need to protect themselves from unnecessary exposure. Another way to lessen anxiety and loneliness of patients is to have identifiers on PPE. For example, a disposable name tag or permanent names on face shields.

In the emergency department, nurses often encounter patients who are critically ill. The instinct of many emergency nurses, in particular, is to run toward a patient who is critically ill and initiate assessment and care. It is important that nurses and other health care workers take a couple extra seconds to apply appropriate PPE before any resuscitation. This is supported by interim guidance from the American Heart Association.<sup>47</sup> Nurses must care for themselves to be healthy and available to care for future patients.

The proper donning and doffing takes additional time and often requires an additional staff member to assist with doffing or act as a runner to grab additional supplies or medications and send laboratory tests. Our hospital encourages a “spotter,” particularly during doffing, so any violations of sterility can immediately be identified and remedied. We also use erasable markers to write messages to team members outside the room on glass doors. The transport of patients will also need to be protocolized. This will need to be from triage to rooms and within the hospital. For in-hospital transport, careful consideration should be given to the number of staff needed, patient and staff PPE, and routes and elevators. Multiple staff will likely be needed for transport.

### **Triage and Primary Assessment**

The primary initial evaluation of patients includes an adequate screening program. What this includes will vary depending on burden of disease in a specific area. Many triage screening tools for COVID-19 initially started with travel or known contact screening. More recently, areas with a larger number of patients have switched to a symptom-based screening system. Screening should include questions regarding known contacts but also places of residence, bearing in mind that many congregated settings have been causes of rapid community spread. Any patient with fever or respiratory symptoms should be wearing a mask or face cover of some sort. Ideally, a surgical mask, but even cloth masks, are acceptable in areas that are short on PPE for health care workers. Ambulance arrivals will also need to be screened for COVID-19. Clear communication with prehospital staff before arrival and a standardized plan for transport for high- and low-risk patients are needed. For example, we ask that high-risk patients on CPAP or BiPAP be taken off of these temporarily while they are being transported through the hallway from an ambulance to a room. Our high-risk respiratory distress patients are then brought directly to a negative

pressure room, ideally with the necessary supplies and staff in the appropriate PPE at bedside. These few rooms have a large amount of supplies right outside of the room, but supplies in the room are limited to those needed or expected to be needed for an individual patient.

Nurses will need to prioritize patients who are critically ill. Many patients will hold off on presenting to the emergency department until they are in respiratory distress and possibly require resuscitation or emergent intubation. General appearance and vital signs will be the primary drivers in this assessment. Respiratory rate and pulse oximeter readings will be altered in most patients who are critically ill. Given the risk of rapid decline, patients who are ill-appearing should be expedited for resuscitation and physician evaluation. Note that there is a phenomenon in COVID-19 known as the “happy hypoxic” patient or “silent hypoxemia.”<sup>48</sup> These patients appear clinically well but have true saturations as low as 40% to 60%.

Some patients with mild symptoms may present and not need aggressive ED care. There are limited treatment options for patients who do not need hospitalization. Home care and quarantine are often sufficient. Some emergency departments are offering testing for COVID-19, others go through the state’s Department of Health. There are also drive-up options for patients who are well. These well patients will often be young, healthy patients with normal vital signs. Sometimes they can be sent to “fast track” areas of the emergency department. Other emergency departments have set up tents or their own drive-through options for limited testing. Bear in mind that obtaining a nasal swab is considered an “aerosolizing procedure” and would need full aerosol PPE (N95 or powered air-purifying respirator) and preferably be done outside for well patients. Good swabbing technique is needed as detailed in later text.

Given the risk of rapid decline, patients with known or suspected COVID-19 who will be in the emergency department for an extended period of time should be placed on continuous monitoring and pulse oximetry. Further assessment of patients in the emergency department should include duration of symptoms and risk factors as mentioned previously. Lung auscultation is controversial, as stethoscopes can be fomites that carry disease. Some providers have advocated to forego lung auscultation in patients with suspected COVID-19 who will be having imaging.<sup>49</sup> In general, patients with COVID-19 have bilateral findings on examination. Skin findings (rashes and “COVID toes”)<sup>50,51</sup> and neurologic findings (altered mental status, dizziness, headache, and loss of taste/smell)<sup>52</sup> can also be found.

### **Diagnostic Testing**

The most common test for active infection in symptomatic patients is a nasal swab polymerase chain reaction. This is an aerosolizing procedure, which requires appropriate PPE to obtain. Obtaining this test appropriately based on the manufacturer’s specification can yield improved sensitivity for detecting small amounts of virus. A refresher or training session for correct nasopharyngeal swabbing technique could be beneficial to ensure the appropriate technique among nurses to obtain accurate tests and ensure the quality of sample collection remains high. This technique includes inserting the swab to an adequate depth and for an adequate amount of time (normally 30 seconds). If done correctly, this test should be slightly uncomfortable for patients and may cause them to withdraw their head, sneeze, tear, or cough. There are many different tests approved by the Food and Drug Administration, but most of these tests have limited clinical data on their accuracy.<sup>53</sup> Sensitivity is as low as 65% to 70%, and repeat testing for patients who are high risk may be needed.<sup>54,55</sup> There is no practical human data on test specificity, though it is thought to be highly specific.<sup>56</sup>

Most patients will obtain a chest X-ray. This can show signs of viral pneumonia and severe illness. The most common finding on a chest X-ray is peripheral opacity, but other findings are possible such as focal pneumonia or pleural effusion. A chest computed tomography (CT) scan can be very sensitive for finding signs of COVID-19, even



more sensitive than nasal swabs.<sup>54</sup> However, using computed tomography for patients with COVID-19 presents another contamination risk and is not universally used because of this. The use of point-of-care ultrasound by emergency physicians has been proposed to alleviate these concerns<sup>49,57</sup> but is not yet widely adopted, likely owing to similar concerns of contamination. Many patients will have shortness of breath and may need an electrocardiogram to evaluate for cardiac injury or other causes of shortness of breath.

There are a variety of laboratory tests that are associated with the diagnosis and the prognosis of COVID-19 (Table). A blood count may often show a normal white blood cell (WBC) count with low lymphocyte count. However, an elevated WBC and a low WBC can also be seen. Platelets may be normal or low.<sup>58</sup> Small elevations in liver functions such as aspartate transaminase (AST) and alanine transaminase (ALT) can be seen. Lactate dehydrogenase (LDH) is also often elevated, thought to be due to injury to the liver.<sup>59</sup> There are typically marked elevations in ferritin and inflammatory markers such as C-reactive protein.<sup>58</sup> D-dimer is often elevated in severe disease and may or may not be associated with deep venous thrombosis or pulmonary embolism.<sup>59</sup> Troponin elevation is associated with myocarditis and poor prognosis.<sup>60,61</sup> To help evaluate for bacterial sources of critical illness, blood cultures are often obtained. Procalcitonin is sometimes obtained as well, as it is often normal in COVID-19 and elevated in bacterial infections. Other cytokine tests have been studied, such as interleukin-6, and have been shown to be good prognostic indicators but are not widely available.<sup>62</sup>

Regardless, a process to obtain and transport blood samples to the clinical laboratory is needed. Each laboratory or hospital may have different requirements. We initially did not use our pneumatic tube system and had samples walked to the laboratory, but we have since started using the tube system. The nurse obtains the sample in the room and then deposits the labeled samples in a specimen collection bag outside the room, held by a gloved, "clean" assistant. The assistant then cleans their hands, changes gloves, and then places the samples in the specimen bag into another bag and into the tube system.

### **Prevention and Treatment**

There is no specific treatment for COVID-19. The treatment is largely supportive. Much of the treatment can be done at home. This includes incentive spirometry or breathing exercises, rest, and adequate fluid intake. Quarantining or isolating at home to prevent spread is of the utmost importance. Patients should be strongly encouraged to avoid going out in public. Food and medications should be delivered, if possible. Patients should distance themselves as far as possible from others (at least 6 feet), and they should wear a mask at all times when they must be around others. Hand washing should be strongly encouraged. Proning is used for intubated intensive care patients with acute respiratory distress syndrome (ARDS), but elective proning has been implemented earlier in a patient's disease course. This has not shown benefit in patients not needing hospitalization, but it might be suggested for home care.<sup>63</sup>

Given the low sensitivity of the nasal swab, patients should be specifically informed that a negative test does not mean that they do not have COVID-19, and they should still quarantine until symptoms have resolved. Length of isolation is of debate. CDC recommends patients stay isolated for 7 days after symptoms start and 3 days after symptoms resolve.<sup>64</sup> The World Health Organization, in contrast, recommends that patients stay isolated for 14 days after symptoms resolve.<sup>65</sup> Quarantining for patients without symptoms but contact with a patient known to have COVID-19 can be as long as 14 days for health care workers<sup>64</sup> but has been relaxed for other essential employees in endemic areas.<sup>66</sup> Most patients will no longer be carrying the virus 2 to 3 days after symptoms resolve,<sup>67,68</sup> but a small percentage can carry the virus for several weeks.<sup>58</sup> Patients should be instructed to adequately disinfect their house when the quarantine is complete, including restrooms and floors.

Patients may require hospitalization, mainly for respiratory support. They should remain in appropriate isolation

precautions. Supplemental oxygen is the most common respiratory support needed. Proning should be implemented early, as it appears to symptomatically improve patients.<sup>63</sup> Initially, authorities recommended early intubation of patients with increasing oxygen demands (above 6 liters per minute nasal cannula).<sup>69</sup> This was due to the fear of using noninvasive ventilation, which has a risk of aerosolizing viral particles, and the thought that patients needing this level of respiratory support would need intubation in the near future anyway. More recently, some have argued for CPAP/BiPAP or HFNC to delay or prevent intubation.<sup>70</sup> Providers in endemic areas have noted, owing to low supply of ventilators, that avoiding intubation for even 1 day frees up much needed resources. Furthermore, recent data have shown a low risk of aerosol transmission when using HFNC.<sup>71</sup> This low risk can be further enhanced by ensuring that the patient is wearing a surgical mask over the cannula and applying viral filters onto BiPAP for CPAP circuits (and ventilators). These procedures are considered aerosol-generating and should be performed with the appropriate PPE and isolation. In addition, for invasive and noninvasive ventilation, as with all care, the number of providers in the room should be limited. For example, 1 physician is at the head of the bed for intubation and 1 respiratory therapist and 1 nurse are at the foot of the bed to assist and approach the bed only when needed. Many of these patients progress to severe ARDS and need intubation. The presentation of ARDS in these patients has been described as atypical.<sup>72</sup> Ventilator settings should be low tidal volume to avoid lung injury.<sup>73</sup> The ideal level of positive end-expiratory pressure (PEEP), though, continues to be debated, even among experts.<sup>73</sup> Patients with ARDS are frequently given steroids. Steroid treatment was initially associated with increased mortality in some observational studies with COVID-19 and was avoided; however, recent prospective data have shown steroids to be beneficial to patients requiring supplemental oxygen or intubation.<sup>74</sup> In addition to elective proning of nonintubated patients, proning is used in many intubated patients on the basis of arterial blood gas findings. Proning intubated patients requires a team and a checklist to avoid complications, such as line removal or pressure injuries. Aggressive intravenous fluid resuscitation is generally avoided in patients with COVID-19 to avoid further hypoxemia associated with even mild pulmonary edema.

Given that there is a delay in results from testing for COVID-19, many patients are placed on empiric antibiotics in case a bacterial source is causing their critical illness. Indeed, bacterial superinfection is often found in critical patients who die with COVID-19.

There are more than 100 ongoing studies of more than 20 potential treatments for COVID-19 registered in clinicaltrials.gov. Many of these have biological methods by which they may work or are laboratory studies,<sup>75,76</sup> but there are very few human studies. Perhaps the most well-known drugs are either chloroquine or hydroxychloroquine (Plaquenil). These are both antimalarial drugs. Chloroquine is generally less tolerated than hydroxychloroquine owing to worse adverse effects. Hydroxychloroquine is also used to treat autoimmune diseases such as lupus and rheumatoid arthritis. There is no overwhelming evidence that this drug works for COVID-19 in human trials. The most common adverse effect with this drug is QT prolongation, which can rarely lead to fatal arrhythmia.<sup>77,78</sup> These patients may be on several other drugs with this effect, such as azithromycin or propofol. Patients receiving hydroxychloroquine for COVID-19 should be on cardiac monitor and have regular checks of their QT interval. Other adverse effects include hypoglycemia, seizures, and irreversible eye damage (retinopathy).<sup>79</sup> Several trials have been stopped early because of worsened outcomes or no benefit with chloroquine or hydroxychloroquine treatment.

80,81

Remdesivir is an antiviral drug that was studied for dengue fever and is under investigation for COVID-19.<sup>82</sup> No high-quality human studies have been published. Unlike hydroxychloroquine, remdesivir does not have a Food and Drug Administration–approved indication and is only available for compassionate use or in clinical trials. Adverse effects of this drug include mostly liver enzyme elevation. Another antiviral drug lopinavir/ritonavir (Kaletra) has also been

studied. A large randomized controlled trial showed no benefit, so this drug has largely been abandoned.<sup>83</sup>

Convalescent plasma is a treatment that has garnered much attention for the treatment of patients who are critically ill with COVID-19.<sup>84</sup> Convalescent plasma has been around since the 19th century and was used for infections before antibiotics. It was also trialed in previous viral outbreaks.<sup>85,86</sup> In this treatment, the blood plasma of patients who have recovered from COVID-19 is tested for antibodies. If antibodies are present, the blood product is drawn and stored and then matched from donor to recipient. The thought is that this plasma gives the recipient patient antibodies to combat the virus. The case series of the first 5 patients showed improvement results.<sup>87</sup> As noted previously, quality research on this treatment is ongoing.

Several vitamins, minerals, and supplements are also being investigated. Zinc has been shown to have antiviral properties and reduce symptoms in other viral respiratory illnesses.<sup>88,89</sup> Intravenous vitamin C is an antioxidant that has controversial evidence in septic shock and is being studied for COVID-19.<sup>90</sup> Vitamin D and melatonin have also been hypothesized to be helpful and are also being studied.<sup>91,92</sup>

### **Complications**

Many complications have been reported in patients with COVID-19. Certainly, rapid respiratory decline is the most common.

Large and small venous and arterial blood clots have been reported, as has coagulopathy.<sup>93,94</sup> Patients have microthrombi found on autopsy<sup>95</sup> but also have overt deep vein thrombosis and pulmonary emboli.<sup>96</sup> Nurses should be mindful to carefully evaluate for signs of clotting, such as unilateral swelling or redness. Arterial clots have also been reported, including strokes,<sup>94</sup> therefore neurologic, vascular, and skin assessments are also important. Anticoagulation therapy, mostly with heparin, is rapidly becoming a universal treatment in these cases. Sometimes, elevations in D-dimer are used to determine the dosing of anticoagulation (prophylactic, half dose, and full dose). Patients have been reported to have a high incidence of propofol infusion syndrome.<sup>97</sup> Intubated patients on propofol rapidly develop high triglycerides. This can cause pancreatitis and exacerbate clotting owing to the viscosity of blood. This can sometimes be seen clinically when obtaining blood samples that appear to be fat-laden. In this situation, propofol must be immediately stopped, and an alternative sedative must be chosen.

Patients with critical illness will often progress to multiorgan system failure. At this point, prognosis is extremely poor and most of the patients with multiorgan system failure will die. Patients may have renal failure requiring dialysis or renal replacement therapy. Others will experience cardiomyopathy and may need extracorporeal membrane oxygenation.<sup>98,99</sup> Patients survive to extubation and then, days later, develop fatal cardiomyopathy, thought to be due to myocarditis. Patients who require intensive care often have prolonged stays on the ventilator and in the intensive care unit.<sup>100</sup> Given the intense resources required for these interventions, the high mortality, the risk of spread to health care workers, and the fact that many hospital systems in endemic areas are overwhelmed with resource limitations, there has been discussion of rationing care<sup>101,102</sup> and universal do-not-resuscitate orders in some areas.<sup>103-105</sup> Nursing care must include engaging the care team, patient, and patient's family in excellent communication about palliative care options, advanced directives, and end-of-life desires for the patient and family.

### **Other Notes**

It is important to remember that just because this pandemic is rampant in many areas, not all patients presenting with respiratory symptoms will have COVID-19. Although many emergency departments have drastically decreased volumes, patients will continue to have bacterial pneumonia, heart failure, heart attacks, and other viral illnesses. The care of these patients must not be compromised nor forgotten with the current focus on COVID-19. Furthermore, nurses must be mindful of caring for themselves. The stress of working in the environment of COVID-19 can take a toll on a nurse's health. There are increased demands on the job, risk of transmitting the virus home,

and limited health care resources that may need to be rationed. Rest, exercise, and other self-care activities are of utmost importance at times such as these. Although the term used in official communication is “social distancing” a more accurate term would be “physical distancing.” Social interaction is very important to continue. Interaction with colleagues at work helps provide social connection; however, nurses need to be mindful to check on each other and keep communication with friends and family active.

### Conclusion

COVID-19 is an international pandemic with many implications for nursing care in the emergency department. The first priority of any nurse should be to protect themselves with the appropriate PPE. The research on COVID-19 is preliminary and speculative, including most treatments. Health care resources may be overwhelmed at times, which may require alterations in previous policies and protocols. Many patients with COVID-19 will be asymptomatic or minimally symptomatic and can isolate and care for themselves at home. The elderly and those with other medical conditions are most at risk for severe illness and respiratory distress. Nursing care should focus on limiting the exposure and spread of the virus. The remainder of care is largely supportive. This may include early proning, supplemental oxygen, or intubation.

### Author Disclosures

Conflicts of interest: none to report.

Laboratory value	Direction in COVID-19	Meaning
White blood cell count	Any direction	If elevated, may point to bacterial source
Platelets	Low	Can be seen in many viral infections
Lymphocytes	Low	Can be seen in many viral infections
Liver functions (AST, ALT)	Mildly elevated	Can be seen in many viral infections
Procalcitonin	Low, Normal	If elevated, suggests bacterial source
Lactate dehydrogenase	Mildly elevated	Likely owing to mild liver injury
C-reactive Protein	Mildly elevated	Inflammatory marker, very elevated suggests poor prognosis or bacterial source
D-dimer	Elevated	Elevation suggests poor prognosis and may suggest thromboembolism
Ferritin	Elevated	Inflammatory marker, but very elevated thought to be more specific for COVID-19 and may suggest poor prognosis

Interleukin 6	Elevated	Elevated suggests very poor prognosis and may be an early indicator of ARDS
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# Nursing of Patients Critically Ill With Coronavirus Disease Treated With Extracorporeal Membrane Oxygenation: JEN

[ProQuest document link](#)

## ABSTRACT (ENGLISH)

According to the Extracorporeal Life Support Organization, in January 2015 the survival rate of patients with viral pneumonia on ECMO was 65%.<sup>5</sup> Among the 3 patients who received ECMO therapy, 2 patients recovered, and ECMO was discontinued successfully, whereas 1 patient died. Human immunoglobulin, human albumin, and thymalfasin were used to strengthen the immune system, and methylprednisolone was administered to inhibit excessive inflammatory reactions, whereas biapenem was combined with moxifloxacin for anti-infective therapy. [...]the patients were administered lipid emulsion, amino acids, and glucose in terms of nutritional support. Special Therapy All 3 patients underwent invasive mechanical ventilation through oral endotracheal intubation for respiratory support as well as right femoral vein cannulation through percutaneous puncture for blood drainage. According to the Guidelines for Prevention and Control of Novel Coronavirus Infection in Medical Institutes (First Version) released by the National Health Commission,<sup>7</sup> clinical staff should wear 12 items of personal protective equipment (PPE), including fission-type work clothes; disposable medical hoods; disposable surgical masks (or KN95 or N95 masks); coveralls; goggles; face shields or full respiratory protective devices or positive-pressure hoods; disposable fluid-resistant shoe covers; rubber boots; isolation gowns; disposable surgical masks; and 2 pairs of latex gloves. [...]the staff should take a bath, put on clean clothes, leave the isolation area, and return to the resting room.

## FULL TEXT

## DETAILS

**Subject:** Emergency medical care; Rubber; Discontinued; Masks; Life sustaining treatment; Artificial respiration; Gloves; Amino acids; Nursing care; Immunoglobulin; Equipment; Pneumonia; Glucose; Resting; Ventilation; Baths; Coronaviruses; Latex; Invasive; COVID-19; Extracorporeal membrane oxygenation; Antibiotics; Immune response

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# Hidden Danger: Pediatric Acetaminophen Overdose Unintentional and Intentional Emergencies: JEN

[ProQuest document link](#)

## ABSTRACT (ENGLISH)

Children younger than 6 years per 1,000 children accounted for 37.7% of these exposures.<sup>3</sup> One- and 2-year-old children had the highest incidence of poisoning overdose.<sup>3</sup> According to the National Poison Statistics Data 2018, unintentional ingestion accounted for 99.4% of children younger than 6 years.<sup>3</sup> Teens accounted for 48.3% of intentional suspected suicide gesture, whereas only 4% in children aged 6 to 12 years were intentional ingestion.<sup>3</sup> The 2017 Annual Report of Poison Control Centers reported that acetaminophen overdoses that required N-acetylcysteine (NAC) were provided intravenously to 196 children younger than 5 years, 287 children aged 6 to 12 years, and 6,228 children aged 13 to 19 years.<sup>4</sup> Acetaminophen overdoses that were treated with oral NAC included 30 children younger than 5 years, 36 children aged 6 to 12 years, and 928 children aged 13 to 19 years.<sup>4</sup> Acetaminophen, which is known as N-acetyl-p-aminophenol, and paracetamol, is the most common pain reliever and antipyretic for children worldwide.<sup>1</sup> Acetaminophen is extremely safe when administered appropriately to children. Opioids, diphenhydramine, and cough and cold formulations are examples of common combination medications that include acetaminophen (Table 1).<sup>1,2,5-7</sup> The 2017 Annual Report of the American Association of Poison Control Centers' National Poison Data System: 35th Annual Report stated analgesics (the category acetaminophen is in) are still the most common drugs identified in pediatric poisonings.<sup>4</sup> Fortunately, pediatric patients who experience acetaminophen overdose rarely develop acute liver failure compared with adult patients.<sup>1,2,5,6</sup> The speculation on why pediatric patients have better outcomes after acetaminophen overdose is that children have large hepatic cell masses that have the capacity to metabolize acetaminophen in a nontoxic manner.<sup>1,2,5,6</sup> Typically, children do not have underlying liver damage and their liver tissue can regenerate rapidly, which accounts for their rarely developing liver failure after acetaminophen overdose.<sup>1,2,5-7</sup> The basic pathophysiology of acetaminophen metabolism is a rapid absorption after ingestion from the stomach and small intestine. The presentation of the child's symptoms is important because acetaminophen overdose may appear up to 12 hours after ingestion with nausea, vomiting, diarrhea, abdominal pain, irritability, loss of appetite, generalized weakness, altered mental status, convulsions, and coma.<sup>1,2,5,6</sup> Late signs of acetaminophen overdose presentations may include hypovolemia, coagulopathy, acute renal failure, hypoglycemia, and jaundice.<sup>1,2,5,6</sup> The child's current medications are important to know because herbal medication, antiepileptics and antituberculosis medications can increase the risk for liver injury.<sup>1,2,5,6</sup> Pediatric emergency nurses should ask about other diagnoses or if the child is fasting or has malnutrition because these increase the susceptibility of acetaminophen overdose that may induce liver disease.<sup>1,2,5,6</sup> In the patient who is malnourished, acetaminophen metabolism converts to a toxic byproduct after acetaminophen overdose.<sup>1,2,5,6</sup> Underlying liver disease, Gilbert syndrome, and other genetic predispositions in children can contribute to increased acetaminophen toxicity during an acetaminophen overdose.<sup>1,2,5,6</sup> It is important to know nutritional status and medical conditions because during acetaminophen metabolism, available glucuronidation products are dependent on carbohydrate stores.<sup>1,2,5,6</sup> Children younger than 6 years seem to be less susceptible to acetaminophen toxicity owing to protection by increased supply and regeneration of glutathione and better enzyme activity.<sup>1,2,5,6</sup> Acetaminophen Overdose Management Acetaminophen overdose management includes oral decontamination with activated charcoal and administration of NAC, which is the antidote for acetaminophen overdose, if the child arrives within 4 hours of ingestion (Table 2).<sup>1,2,5,6</sup> The toxic dose of acetaminophen in children varies. Experts suggest that in children a minimal toxic acetaminophen acute ingestion is 150 mg/kg.<sup>1</sup> If the child is younger than 6 years, then an acute acetaminophen overdose is when greater than 200 mg/kg is ingested.<sup>1</sup> Cases of sustained-released preparations of acetaminophen or other coingestion of agents may slow gut motility such as opioids, diphenhydramine, and anticholinergic agents, which may indicate activated charcoal should be given even if ingestion was greater than 4



hours.<sup>1,2,5,6</sup> The emergency nurse (or health care provider) should contact the Poison Control center to receive recommended treatment on each child arriving with any concern for overdose.

## FULL TEXT

On any given shift, you may be in triage when parents bring a toddler to the emergency department worried about an unintentional acetaminophen ingestion. The parents state that the child was found playing with an open acetaminophen container. Chewed pills were seen on the child. Later that evening, a teenager presents with nausea after ingestion of multiple acetaminophen tablets. When the triage nurse gently inquires if anything happened during the day, the teenager admits to a verbal argument with friends. What is your acetaminophen overdose plan of care? Emergency nurses with all levels of experience (novice, competent, and expert) can gain new knowledge from this pediatric acetaminophen overdose article. Evidence-based information obtained will strengthen and update emergency nurses' previous knowledge about the hidden dangers of acetaminophen ingestion to ensure safe patient care. Early recognition of potential acetaminophen overdose situations can lead to prompt treatment to avoid permanent liver damage in children. This article raises awareness for pediatric emergency nurses to promote effective limited health literacy prevention teachings to children and families of all ages regarding the hidden dangers of intentional and unintentional acetaminophen overdose.

### Introduction

Pediatric acetaminophen overdose emergencies continue to be a significant problem in the United States and worldwide.<sup>1-3</sup> The National Poison Statistics Data 2018 reported that Poison Control centers gave telephone advice to approximately 2.1 million human poison exposures. Children younger than 6 years per 1,000 children accounted for 37.7% of these exposures.<sup>3</sup> One- and 2-year-old children had the highest incidence of poisoning overdose.<sup>3</sup> According to the National Poison Statistics Data 2018, unintentional ingestion accounted for 99.4% of children younger than 6 years.<sup>3</sup> Teens accounted for 48.3% of intentional suspected suicide gesture, whereas only 4% in children aged 6 to 12 years were intentional ingestion.<sup>3</sup> The 2017 Annual Report of Poison Control Centers reported that acetaminophen overdoses that required N-acetylcysteine (NAC) were provided intravenously to 196 children younger than 5 years, 287 children aged 6 to 12 years, and 6,228 children aged 13 to 19 years.<sup>4</sup> Acetaminophen overdoses that were treated with oral NAC included 30 children younger than 5 years, 36 children aged 6 to 12 years, and 928 children aged 13 to 19 years.<sup>4</sup>

Acetaminophen, which is known as N-acetyl-p-aminophenol, and paracetamol, is the most common pain reliever and antipyretic for children worldwide.<sup>1</sup> Acetaminophen is extremely safe when administered appropriately to children. Unintentional and intentional acetaminophen overdose are a high probability in children for multiple reasons. Acetaminophen is available over the counter, which makes it common in households, allowing easy access to children to ingest if not stored safely. Many medications can be combined with acetaminophen in households, which compounds the risk for overdose. In addition, children's households can have pediatric- and adult-strength acetaminophen products for the child to unintentionally ingest. Pediatric acetaminophen is available in multiple confusing strengths, which is another risk for overdose. Situations in which the parents are unable to read or understand pediatric weight acetaminophen administration instructions can lead to overdose. Some medications are not clearly labeled that they are combined with acetaminophen, which increases the risk for overdose. Opioids, diphenhydramine, and cough and cold formulations are examples of common combination medications that include acetaminophen (Table 1).<sup>1,2,5-7</sup> The 2017 Annual Report of the American Association of Poison Control Centers' National Poison Data System: 35th Annual Report stated analgesics (the category acetaminophen is in) are still the most common drugs identified in pediatric poisonings.<sup>4</sup> Fortunately, pediatric patients who experience acetaminophen overdose rarely develop acute liver failure compared with adult patients.<sup>1,2,5,6</sup> The speculation on why pediatric patients have better outcomes after acetaminophen overdose is that children have large hepatic cell masses that have the capacity to metabolize acetaminophen in a nontoxic manner.<sup>1,2,5,6</sup> Typically, children do not have underlying liver damage and their liver tissue can regenerate rapidly, which accounts for their rarely developing liver failure after acetaminophen overdose.<sup>1,2,5-7</sup>

The basic pathophysiology of acetaminophen metabolism is a rapid absorption after ingestion from the stomach and small intestine. The peak absorption of acetaminophen can be from 30 minutes to 2 hours after ingestion.<sup>1,2,5,6</sup> If the acetaminophen is the immediate relief formula, the plasma levels peak around 4 hours after ingestion.<sup>1,2,5,6</sup> Patients with liver dysfunction who ingest acetaminophen can have a half-life that lasts 17 hours.<sup>1,2,5,6</sup> In overdose situations, the peak acetaminophen level can be longer if there is coingestion of other medications that delay gastric motility or gastric emptying, or if the extended-release form of acetaminophen is ingested.<sup>1,2,5,6</sup> A liver transplant will be required if, in the rare occurrence, liver failure occurs.<sup>1,2,5,6</sup>

### **Discussion Why Should Emergency Nurses Care About Acetaminophen Overdose?**

Emergency nurses should care about acetaminophen overdose because it can lead to acute liver failure requiring a liver transplant to prevent death.<sup>1,2</sup> Early screening for acetaminophen overdose can facilitate treatment to prevent liver failure. Clinicians who diagnose and treat patients promptly can decrease the mortality from acetaminophen toxicity to less than 2%.<sup>1,2</sup> Acetaminophen is included in hundreds of prescriptions and over-the-counter medications (Table 2). Emergency nurses must apply a forensic approach and critical thinking in each patient encounter to identify hidden acetaminophen overdose situations. Acetaminophen is safe to use at therapeutic doses. Children who are administered repeated supratherapeutic doses of acetaminophen (rather than a single overdose) can develop liver toxicity if they have certain risk factors that include dehydration.<sup>1,2,5,6</sup>

### **In Whom Should Emergency Nurses Suspect Acetaminophen Overdose?**

Pediatric emergency nurses need to have a high level of suspicion that a potential acetaminophen overdose may have occurred for patients whose presentations range from no symptoms to vague symptoms, altered mental status, convulsions, and coma.<sup>1,2,5,6</sup> Children younger than 5 years, especially when they start crawling, are at a high risk for unintentional drug overdose.<sup>1,3,4,7</sup> Family or childcare providers who leave medications in their pocketbooks, diaper bags, or within children's reach are usually the causes of unintentional drug overdose. If there is more than 1 child in the area when the unintentional ingestion occurred, all children should be evaluated for acetaminophen drug overdose.<sup>1,3-6</sup> A thorough history from adolescent patients who arrive with any drug overdose should be obtained. Unintentional acetaminophen supratherapeutic ingestion can occur if pain relief (especially seen in dental pain) is not obtained and the patient takes more than the recommended dose to get pain relief. Adolescents may intentionally ingest an overdose of acetaminophen as a self-harm gesture. The adolescent age is a high risk time for intentional overdose, which then mandates initiation of suicide precautions according to your agency's protocol.<sup>1,7</sup>

### **What Questions Should Emergency Nurses Ask During Acetaminophen Ingestion?**

There are 10 questions emergency nurses can ask to identify children at risk for potential acetaminophen overdose (Box). Nonjudgmental communication strategies surrounding events should be used by the pediatric emergency nurse because the parent or health care provider may be reluctant to report the unintentional overdose of acetaminophen. Emergency nurses should ask about symptoms, ingestion time, dose, form, quantity, chronic acetaminophen use, medications ingested, circumstances around ingestion, current medications, and medical history (Box).

The presentation of the child's symptoms is important because acetaminophen overdose may appear up to 12 hours after ingestion with nausea, vomiting, diarrhea, abdominal pain, irritability, loss of appetite, generalized weakness, altered mental status, convulsions, and coma.<sup>1,2,5,6</sup> Late signs of acetaminophen overdose presentations may include hypovolemia, coagulopathy, acute renal failure, hypoglycemia, and jaundice.<sup>1,2,5,6</sup> The child's current medications are important to know because herbal medication, antiepileptics and antituberculosis medications can increase the risk for liver injury.<sup>1,2,5,6</sup> Pediatric emergency nurses should ask about other diagnoses or if the child is fasting or has malnutrition because these increase the susceptibility of acetaminophen overdose that may induce liver disease.<sup>1,2,5,6</sup> In the patient who is malnourished, acetaminophen metabolism converts to a toxic byproduct after acetaminophen overdose.<sup>1,2,5,6</sup> Underlying liver disease, Gilbert syndrome, and other genetic predispositions in children can contribute to increased acetaminophen toxicity during an acetaminophen overdose.<sup>1,2,5,6</sup> It is important to know nutritional status and medical conditions because during acetaminophen metabolism, available glucuronidation products are dependent on carbohydrate stores.<sup>1,2,5,6</sup> Children younger than 6 years seem to be less susceptible to acetaminophen toxicity owing to protection by increased supply and regeneration of glutathione and better enzyme

activity.<sup>1,2,5,6</sup>

### **Acetaminophen Overdose Management**

Acetaminophen overdose management includes oral decontamination with activated charcoal and administration of NAC, which is the antidote for acetaminophen overdose, if the child arrives within 4 hours of ingestion (Table 2).<sup>1,2,5,6</sup>

The toxic dose of acetaminophen in children varies. Experts suggest that in children a minimal toxic acetaminophen acute ingestion is 150 mg/kg.<sup>1</sup> If the child is younger than 6 years, then an acute acetaminophen overdose is when greater than 200 mg/kg is ingested.<sup>1</sup> Cases of sustained-released preparations of acetaminophen or other coingestion of agents may slow gut motility such as opioids, diphenhydramine, and anticholinergic agents, which may indicate activated charcoal should be given even if ingestion was greater than 4 hours.<sup>1,2,5,6</sup>

The emergency nurse (or health care provider) should contact the Poison Control center to receive recommended treatment on each child arriving with any concern for overdose. This will allow an individual plan of care to be developed that incorporates the Poison Control center's recommendations. Usually 1 g/kg of activated charcoal with a maximum dose of 50 g by mouth is recommended for children who arrive to the emergency department within 4 hours of acetaminophen overingestion.<sup>1</sup> Contraindications to activated charcoal are gastrointestinal obstruction, unprotected airway, sedated patients, or altered mental status.<sup>1</sup> Pediatric emergency nurses need to be aware that the US Food and Drug Administration has only approved the 3-bag method of intravenous (IV) acetylcysteine administration (Table 2).<sup>1,2,5,6</sup>

Documentation of when doses are given and timely administration of NAC is vital to treatment success in acetaminophen overdose. The emergency nurse must be familiar with the hospital's protocol for NAC administration. Different hospitals use different bag methods affecting the timing and administration of doses. For example, if a hospital uses a 3-bag method, the first dose is infused over 1 hour, which means the second dose will need to be ordered, prepared by the pharmacy, delivered to the emergency department, and be ready for administration before the first dose ends. During that hour, the patient might get transferred to a different floor or to an outside hospital requiring coordination with the floor nurse or transfer team and pharmacy to ensure that the second dose arrives and administration is on time. Nurse-to-nurse communication and proper documentation of when the doses were given is essential to ensure that the patient gets the appropriate dose at the correct time with no lapse in therapy.

### **How Should Emergency Nurses Provide Care In a Potential Acetaminophen Overdose?**

A nonjudgmental approach should be used when pediatric patients arrive with unintentional or intentional ingestion. These situations could become a medical legal child-neglect or abuse situation. The emergency nurse should incorporate medical legal principles from triage to discharge.<sup>8</sup> Young children typically explore, which can lead to unintentional acetaminophen ingestion, whereas adolescents may have intentionally overdosed. Suspected intentional ingestion should immediately trigger the incorporation of suicide precautions according to hospital protocol.<sup>8</sup>

Each patient's plan of care after an acetaminophen overdose depends on when the child arrived at the emergency department, time of ingestion, dose, route, formulation (extended release), or if the ingestion was in combination with other medications.<sup>1,2</sup> The initial approach in a potential acetaminophen overdose should begin with stabilization of airway, breathing, support circulatory measures, and treat immediate life-threatening emergency situations.<sup>1,7</sup> The child should be weighed with documentation of weight in kilograms to ensure an accurate weight-based emergency treatment.<sup>7</sup> If the patient has an altered mental status then each emergency nurse must recognize that the child's airway is compromised, which is a high risk for aspiration and a contraindication to receive oral-activated charcoal or oral NAC (Table 2).<sup>1,2,5,6</sup>

Pediatric emergency nurses need to know how they are going to administer NAC.<sup>1,5,6</sup> Oral and IV are the 2 routes in which NAC is able to be given. NAC has a foul egg taste and odor.<sup>1,5,6</sup> The oral dosing of NAC requires 18 doses given 4 hours apart, which requires 72 hours of treatment.<sup>1,5,6</sup> It is often much easier to give the IV form of NAC because it only requires 20 hours of treatment.<sup>6</sup> Children who arrive at the emergency department fewer than 4 hours after acetaminophen overdose ingestion and are alert and have no alteration in airway, mentation, or ability to swallow may receive administration of activated charcoal.<sup>1,2</sup> Those children who arrive at the emergency department

after 4 hours of ingestion will not benefit from activated charcoal unless they had coingested agents, which slow gastric motility such as anticholinergic agents or opioids.<sup>1,2</sup> Emergency nurses should plan on obtaining an acetaminophen level 4 hours from ingestion of acetaminophen and additional acetaminophen blood levels if extended-release acetaminophen was ingested.<sup>1,2,5,6</sup> Acetaminophen levels should be obtained as soon as possible if the child arrives to the emergency department from 4 to 24 hours postingestion (Table 2).<sup>1</sup>

Late signs and symptoms of liver injury or failure from acetaminophen overdose may appear in children who present to the emergency department after 24 hours.<sup>1,5,6</sup> The signs and symptoms of liver injury or failure include nausea, vomiting, abdominal pain, jaundice, coagulopathy, gastrointestinal bleeding, renal injury, hepatic encephalopathy, hypotension, or cerebral edema.<sup>1,2,5,6</sup> Serum acetaminophen levels may not be detectable in these children. These children should be treated as if there was chronic acetaminophen poisoning, which may include emergent resuscitation, airway management, IV fluids, hemodialysis, vasopressors, or cerebral edema management.<sup>1,2,5,6</sup> If unmetabolized acetaminophen is present in patients with late presentation who demonstrate liver injury, the Poison Control center could direct you to administer NAC.<sup>1,5,6</sup>

How NAC is administered is complex and pediatric emergency nurses should carefully follow the 3-dose regimen (Table 2).<sup>1</sup> A rare case of compartment syndrome has occurred after NAC IV extravasation into the surrounding tissues.<sup>9</sup> Pediatric emergency nurses who care for children with suspected acetaminophen overdose who need IV catheter placement insertion should avoid the joints or areas that may increase the likelihood of NAC infiltration. During NAC administration, the emergency nurse should frequently monitor the pediatric patient's IV site for infiltration or any of the 7 P's of compartment syndrome, which include pain (out of proportion than what is expected), paresthesias (tingling and burning sensation), pallor, paralysis, poikilothermia (cool skin), pulselessness, and pressure (tense rigid extremity).<sup>8</sup> If any signs of infiltration occur during the administration of NAC, the pediatric emergency nurse should immediately stop the infusion, notify the ordering health care provider, and restart an IV in a different location to continue the NAC infusion. In the case of infiltration, the pediatric emergency nurse should also contact the hospital pharmacist for treatment management and follow the institution's guidelines. Acetaminophen overdose management includes multiple diagnostic tests, which are guided by the Poison Control recommendations and individual agencies policies. Patients with high levels of acetaminophen need to be admitted and administered NAC.<sup>1,2,5,6</sup> If NAC is given within 8 hours of ingestion, it fully protects the liver against toxicity from the acetaminophen overdose.<sup>6</sup> If the patient has concurrent renal failure, hemodialysis may be an effective treatment.<sup>1,2,5,6</sup>

### **When Should Emergency Nurses Apply Acetaminophen Overdose Treatment?**

It is important for pediatric emergency nurses to know when the acetaminophen ingestion occurred.<sup>1</sup> The treatment and management of acetaminophen overdose is contingent on the time of ingestion. Clinically, acetaminophen toxicity is separated into 4 stages. In the first stage (0.5-24 hours), the patient may be asymptomatic or may have nausea, vomiting, and anorexia.<sup>1,2,5,6</sup> During the second stage (18-72 hours), the patient may complain of right upper abdomen pain, vomiting, and hypotension.<sup>1,2,5,6</sup> In the third stage (72-96 hours), there is significant liver dysfunction, renal failure, metabolic acidosis, coagulopathies, and encephalopathy.<sup>1,2,5,6</sup> During the third stage, gastrointestinal symptoms return and death most commonly occurs.<sup>1,2,5,6</sup> Finally, stage 4 (4 days to 3 weeks) is when recovery occurs.<sup>1,2,5,6</sup>

When pediatric acetaminophen level results are obtained, the health care provider will plot the results on the Rumack-Matthew nomogram that will guide the NAC administration.<sup>1,2,5,6</sup>

### **Implications for Emergency Nursing**

Children who overdose on acetaminophen may arrive asymptomatic. The hidden danger of pediatric acetaminophen overdose still exists, which is why it is critical that emergency nurses do not let their guard down during the care of pediatric emergency patients. Parents frequently bring their child to the emergency department after acetaminophen unintentional or intentional overdose. Emergency nurses need to communicate in a manner that maintains a shame-free atmosphere. A social service consultation should be obtained to evaluate if the situation fits within the nurses mandated reporting of child abuse or neglect. The pediatric emergency nurse should incorporate medico-legal documentation of all findings, treatment, teachings, family involvement, and follow-up plan before discharge or

admission.<sup>9</sup>

When children have been treated for acetaminophen overdose, it is the emergency nurse's responsibility to ensure discharge teachings are provided at a limited health literacy level that includes poison prevention teachings. Half of the adults in the US population have limited health literacy, which may account for the excessive ingestion of acetaminophen because they are unable to read the dose instructions.<sup>1,10</sup> Limited health literacy basic principles include communication that involves clinician-patient level interventions. The emergency nurse should talk slowly; not use any medical jargon; apply common, clear health communication strategies; limit the number of teachings; confirm understanding; and reinforce teachings.<sup>10</sup> Effective limited health literacy teachings include finding out what the parent already understands and addressing the parent's main concern and what they need to do.<sup>10</sup> Teachings should include how to read medication labels carefully and double check for proper dose.<sup>10</sup> If possible, the nurse should give a proper pediatric dosing device and mark the safe acetaminophen dose for this child. It is important to teach parents to never use household tools or spoons for measuring medication. Pediatric age and developmentally appropriate home poison prevention information should be provided to families and childcare providers. The Poison Control Help phone number is 1-800-222-1222 and the American Association of Poison Control Centers internet access link, <https://www.poisonhelp.org/help>, should be provided. An excellent free family resource for poisonings prevention can be accessed at <https://www.cdc.gov/homeandrecationalsafety/poisoning/preventiontips.htm>. Another great free resource for over-the-counter medication family safety tips is <https://aapcc.org/prevention/over-counter-medicine-safety>, which is from the American Association of Poison Control Centers.

Families and childcare providers should be provided with information to keep medications, including poisons, locked and high out of children's reach. They should be instructed to call 911 in the US or their local emergency services immediately if a child has trouble breathing, collapsed, is unable to awaken, or had a seizure. Before discharge, families and child care providers should be educated on how to read any medication labels and to avoid combining drug administration to prevent overdose. In addition, parents should be educated on the proper dosing for children and understand that dosing is different with children than adults.

### Conclusion

Emergency nurses must recognize that children may present to the emergency department with hidden acetaminophen overdose as asymptomatic, symptomatic, or with alterations in mental status. Acetaminophen overdose situations must be identified on arrival at the emergency department to prevent liver failure. Emergency nurses should include the 10 "what" questions related to acetaminophen overdose. These questions can guide the overdose plan of care to prevent missing a reversible acetaminophen overdose. Teenagers who admit to acetaminophen overdose should be screened for suicidal ideation, have appropriate suicide precautions initiated if indicated and have follow-up. Children and families who arrive with acetaminophen overdose situations should be provided clear instructions on how to administer acetaminophen to their child and poison prevention teachings and resources before discharge.

Pharmacologic category	Active ingredient(s)	Route/Dosage forms	Nursing notes
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Analgesic, nonopioid OTC	Acetaminophen*	Oral: tablet, caplet, extended-release tablet, chewable tablet, dispersible tablet, liquid, dissolve packs, gels. Rectal: suppository	<ul style="list-style-type: none"> <li>•It is beyond the scope of this chart to include all generic manufactures of products that contain acetaminophen. Contact pharmacy or use the hospital references.</li> <li>•The emergency nurse should try to obtain the bottle to confirm product ingested. Medications can have look-a-like, sound-a-like names that can be easily confused.</li> <li>•Identify the quantity of medication ingested.</li> <li>•Verify dosage form was taken.</li> <li>•Ingestion of extended release dosage forms and acetaminophen combination products may cause longer observation times may be required in the ED depending on which acetaminophen product was ingested.</li> <li>•In some patients the first acetaminophen blood concentration level may be below the toxicity level and need to be repeated hours later according to Poison Control and provider recommendation.</li> <li>•Combination medication overdose with antihistamines and decongestants may show signs of lethargy, bradycardia, seizure, and hypertension.</li> <li>•Patients presenting with poisoning from combination medications with dextromethorphan or opioids may show signs of respiratory depression or coma.</li> </ul>
Cold preparations, OTC	Acetaminophen, antihistamines, antitussives, decongestants, ethanol*	Oral: caplet, liquid caplet and liquid	Analgesic, opioid (prescription)

Medication	Dose/Route/Duration	Nursing notes
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Activated charcoal	1 g/kg PO × 1 (max dose 50 g)	Used in the following situations: •Patient presents within 4 hours of ingestion of >150 mg/kg of acetaminophen. NOTE: Patients who ingest sustained-release dosage forms of acetaminophen or anticholinergic medications that slow gut motility such as diphenhydramine or opioids may benefit from AC after the 4-hour time period. Consult Poison Control. •Patient does not have a gastrointestinal obstruction and/or an altered mental status, is sedated, and cannot protect their airway.
NAC IV	21-hour 3-dose regimen* Patients ≤20 kg•Loading dose: 150 mg/kg in 3 mL/kg of diluent infused over 60 min (max 15 g/dose)•Second dose: 50 mg/kg in 7 mL/kg of diluent infused over 4 h (max 5 g/dose)•Third dose: 100 mg/kg in 14 mL/kg of diluent infused over 16 h (max 10 g/dose)Patients >20 kg and <40 kg•Loading dose: 150 mg/kg in 100 mL of diluent infused over 60 min•Second dose: 50 mg/kg in 250 mL of diluent infused over 4 h•Third dose: 100 mg/kg in 500 mL of diluent infused over 16 hPatients ≥40 kg•Loading dose: 150 mg/kg in 200 mL of diluent infused over 60 min•Second dose: 50 mg/kg in 500 mL of diluent infused over 4 h•Third dose: 100 mg/kg in 1,000 mL of diluent infused over 16	•NAC IV is only compatible with 5% dextrose (D5W), 0.45% normal saline (half normal saline) and water for injection. Preparations made using other solutions should be discarded immediately. •May cause anaphylactoid reactions. Monitor vital signs (HR, BP, RR), flushing erythema, and itching frequently. Reactions are more likely to occur in patients with history of asthma but can occur in anyone. Medications to treat anaphylactoid reactions should be readily available in the automated dispensing cabinet in the ED. •Be aware fluid overload can occur if the medication is mixed in the incorrect volume of diluent resulting in hyponatremia, seizure, and death. Ensure medication is mixed in the correct volume and monitor volume status closely. Contact pharmacy with any questions. •NAC is hyperosmolar (2,600 mOsm/L). Monitor line for signs of infiltration/extravasation such as pain, swelling, and erythema. Stop infusion and restart in a different IV site. Follow hospital policy if signs of either occur or contact pharmacy for treatment recommendations. Compartment syndrome has occurred in rare cases. <sup>†</sup> Assess the 7 P's (pain, paresthesias, pallor, paralysis, poikilothermia, pulselessness, and pressure).

NAC oral	Dose: 140 mg/kg (max 15 g/dose) PO × 1 then 70 mg/kg every 4 h × 17 doses (max 7.5 g/dose)	<ul style="list-style-type: none"> <li>•NAC for oral use can be prepared using the injectable or nebulizer formulation.</li> <li>•Oral solution theoretically enters portal circulation making it a good option for patients that have no contradictions to taking PO medications.</li> <li>•Smells/tastes sulfur-like (rotten eggs) making it difficult to tolerate orally and may cause vomiting. May put on ice, in a cup with a cover and drink through a straw to help mask smell.</li> <li>•Readminister dose if patient vomits within 1 h of administration.</li> <li>•May be administered via NG tube if patient cannot tolerate by mouth.</li> </ul>
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1. What symptoms are the child experiencing? 2. What time was the ingestion? 3. What dose (milligrams or milliliters per pill)? 4. What form (adult tablets, extra-strength tablets, extended-release tablets, chew tablets, combination analgesic, infant liquid, child liquid, adult liquid, rectal suppository etc.)? 5. What quantity (number of pills or milliliters)? 6. What length of time has the child been taking acetaminophen (chronic overdose ingestion screening)? 7. What other medications may have been ingested? 8. What were the circumstances surrounding the ingestion? 9. What are the child's current medications? 10. What is the child's medical history?

## DETAILS

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# Amplifying Infection Prevention Self-Management Among Patients and People in the Community: JEN

[ProQuest document link](#)

## ABSTRACT (ENGLISH)

Often, before an infection is diagnosed, health care workers and the public are exposed, and the condition of patients can go from minimal signs and symptoms to severe within a matter of minutes, hours, or days. [...]an infection requires early recognition and containment. [...]my science primarily focuses on innovative strategies that will engage patients in infection prevention self-management. Through our work, we know that patients are able and willing to practice hand hygiene if they are reminded and if their hand hygiene products are conspicuously placed and easy to use.<sup>3</sup> I learned from one of my studies that most patients perceive health care worker hand hygiene to be more important than their own, and that the hand hygiene products in the hospital are intended for health care

workers, not for patients.<sup>9</sup> Even after our continual effort at exploring innovation that put forth unconventional interventions in acute care settings, I wanted to know more about how pathogens transferred among surfaces and about people's hand hygiene behaviors in various settings, including the emergency department. Mandates and requirements put in place by governing and accrediting bodies primarily focus on hospital settings, and are major drivers of the public's dependence on the health care system to prevent and mitigate germ transmission even in the communities in which they live.

## FULL TEXT

The World Health Organization declares 2020 "Year of the Nurse," 2020 marks Florence Nightingale's 200th birth anniversary, and simultaneously, coronavirus disease (COVID-19) is declared one of the most life-altering communicable infections of our time. As I reflect back on my time as a nurse, I recognize that infection prevention and control has always been a major cornerstone of nursing. Nightingale's use of sanitary techniques for maintaining a clean environment and clean soldiers resulted in a reduction of death rates during the Crimean War (1853-1856), even during a time when the prevailing theory of germ transmission posited that disease was caused by a miasma, or "bad air." The same foundation for infection prevention in nursing rang true even during my time in nursing school. I learned early of the importance of infection prevention, from meticulous techniques such as not fluffing sheets and avoiding germs moving in the air during bed change to learning the proper ways to cleanse and dry patients' faces and bodies with specific wash towels to prevent cross-contamination. This special issue of the *Journal of Emergency Nursing* focuses on infections, a problem that faces us not only in times of a pandemic, but also one that nurses have challenged since the beginning of time. Often, before an infection is diagnosed, health care workers and the public are exposed, and the condition of patients can go from minimal signs and symptoms to severe within a matter of minutes, hours, or days. Thus, an infection requires early recognition and containment. But, as with most communicable infections, by the time diagnostic tests are confirmed, patients and staff have unknowingly transferred the infection to others owing to the general public's limited knowledge of infection transmission and prevention. The purpose of this editorial is to briefly share my journey from bedside nurse to clinical nurse scientist, and the role my research and community advocacy play in shifting the paradigm to include the education and practice of infection prevention by patients and people in the community.

Every person will encounter harmful bacteria, fungi, or viruses, whether in health care or community settings, and therefore every person should know how to combat them. Nearly 15 years ago, I delivered my child by way of an emergency cesarean. I signed an informed consent and was educated on the risk for infection. I saw the signage in my room empowering me to ask my nurse and doctor to clean their hands. Yet, as a "falls risk" while the anesthesia wore off and I regained my strength, I could not get out of bed to clean my own hands before changing my baby's first meconium diaper or to simply hold him when I wanted to. Even as an adult patient who learned the personal value of hand hygiene as a child, I second-guessed my personal value of maintaining clean hands not because I did not know better, but because I felt vulnerable to needing instructions about myself while I was the patient under care. My nurses rightfully focused on not transmitting harmful germs to me or my baby by cleaning their hands, but did not consider the germs that I myself could get by touching a contaminated bedrail or equipment that I could then transmit to my baby. In nursing school, the first technique I learned in preparation for my first clinical rotation was proper handwashing and drying. After constantly being reminded verbally and through signage of hand hygiene and reflecting back on my experience as a patient, one day I asked my clinical instructor, "Why is it that hospitals do not educate and teach patients how to maintain their own hand hygiene?" She stated to me, "Our hands are more important in stopping infections."

When I graduated from nursing school and started my first job, I experienced outbreaks, epidemics, and pandemics such as H1N1 influenza, and experienced the donning and doffing of personal protective equipment for hundreds of isolation precautions to prevent the transmission of multidrug-resistant organisms colonized in patients' wounds, bloodstreams, urine, and nares. I watched patients attempt to touch their wounds, and use the urinals and then eat their food with no hand hygiene practice, and did my best to educate them and correct their behaviors.

Unforgettably, I cared for a patient with *Klebsiella pneumoniae*, *Clostridium difficile*, and *Escherichia coli*. Despite educating my patient about hand hygiene, procedural use, disposal of personal protective equipment, and his ability to transfer germs to others and advising him to clean his hands, he left the nursing unit to go get lunch in the hospital eatery. As my mind raced, thinking about how many germs my patient could spread, I promised myself I would put more efforts toward educating patients about infection prevention and figure out ways to validate or invalidate the value of patient hand hygiene in health care settings.

As I continued my nursing journey, I began to look for evidence to gain a deeper understanding of why infection prevention education and patient hand hygiene were not common practice in health care settings. My predoctoral to postdoctoral experience involved the development of a patient hand hygiene model, its use among providers, and the discovery that although patients are aware of the importance of hand hygiene, they rarely practice it without assistance.<sup>1</sup> I learned that placing the responsibility on nurses to assist patients with their hand hygiene can be effective, but the procedure can burden nurses who have many important responsibilities to perform for many patients. Thus, my science primarily focuses on innovative strategies that will engage patients in infection prevention self-management. My colleagues and I have standardized the most important times when patients should practice hand hygiene<sup>1</sup>; explored the use of verbal, electronic, and visual cues<sup>2,3</sup> as reminders for patient hand hygiene; evaluated product usability<sup>4,5</sup>; and have measured outcomes through pathogen transmission,<sup>6,7</sup> observations,<sup>8</sup> and product consumption.<sup>3</sup> Although patient hand hygiene is an emerging area of research, our goal is to create a sustainable patient-centered infection prevention program that will ultimately contribute to effective infection prevention in hospitals and long-term centers. Through our work, we know that patients are able and willing to practice hand hygiene if they are reminded and if their hand hygiene products are conspicuously placed and easy to use.<sup>3</sup> I learned from one of my studies that most patients perceive health care worker hand hygiene to be more important than their own, and that the hand hygiene products in the hospital are intended for health care workers, not for patients.<sup>9</sup> Even after our continual effort at exploring innovation that put forth unconventional interventions in acute care settings, I wanted to know more about how pathogens transferred among surfaces and about people's hand hygiene behaviors in various settings, including the emergency department. In February 2020, I began a study (unpublished) in the emergency department of a public hospital for which I had collected data for 6 observational periods of hand hygiene performed by ED visitors. Of nearly 200 people visiting, only 1 cleaned their hands; yet, many of them came in contact with 2 or more surfaces on average and our environmental swabs revealed 1 or more harmful bacteria on various surfaces such as translator phones, counter tops, and signature pads. As nurses, we have an understanding that our patients are the community, that communities encompass our patients, and that we have a responsibility to know what patients need even if they do not. I witnessed patients coming into the emergency department for various reasons lacking hand hygiene and protective measures to keep themselves safe from each other as each patient sat with various illnesses not knowing each other's ability to transmit illness among one another while waiting to be seen by a provider.

The recent emergence of COVID-19 exacerbates the public's knowledge deficit and shows us how vulnerable we are to the acquisition and spread of communicable diseases. COVID-19 also shows us that it takes more than just health care workers doing their part to prevent infections—that there has to be a collaborative effort with the people we care for. We also understand that at some point in our lives we will all be patients. From early February, when the impact of COVID-19 began to affect our daily lives, I said, "America is being given a crash course in infection prevention overnight," and most people are overwhelmed with implementing additional infection prevention practices in their daily work, personal routines, and habits. Traditional infection prevention and control protocols and practices primarily focus on quality and safety in health care settings, with the ultimate goal of preventing patient-to-patient transfer of germs. Mandates and requirements put in place by governing and accrediting bodies primarily focus on hospital settings, and are major drivers of the public's dependence on the health care system to prevent and mitigate germ transmission even in the communities in which they live. Patients, who are the center of health care, rely heavily on the personal protective equipment, environmental cleaning, antibiotics, and best evidence-based practices of health care workers to keep them safe from infections. However, patients are not often educated or

asked to partake in infection prevention except in reminding their health care workers to clean their hands. Hand hygiene was among one of the first messages delivered by the leadership in our country and internationally as a preventive practice, and most assumed hand hygiene to be a simple behavior; yet, it is known that approximately only 5% of people clean their hands correctly.<sup>10</sup> At the beginning of March when COVID-19 shut down establishments in my state, and many people were given guidance on preventive practice, I was seeing the world differently. I was watching people take their perception of infection prevention and adapt it to their daily lives without understanding preventive practice techniques. I saw every person I came across as my patient in need of infection prevention education. When I visited the grocery store, I observed gloves being treated as the wearers' hands, with the wearers touching multiple items in the store, their cell phones, and their faces with no hand hygiene in between. I observed 5- to 10-second handwashing occur with no drying. I observed people wear their masks beneath their chins. I watched people move through their daily lives with frustration owing to not knowing how to balance frequent and proper hand hygiene, social distancing, and mask use.

America was given a crash course in infection prevention overnight, and immediately I knew that the messaging from local, state, and federal entities had a different meaning depending on the many internal and external factors affecting individuals. Although COVID-19 education is being provided electronically, these resources are not always readily available at the time the information is needed, and they lack capable practical steps that people can take while managing their activities of daily living. In addition to the challenge of health literacy, people, during COVID-19, are challenged with both misinformation and a lack of accessible visual information regarding practical infection prevention steps they can take to manage their care and quality of life. Owing to the aforementioned barriers, communication regarding the management of infection prevention during daily activities is being minimally addressed on multiple fronts, which is why I felt compelled to do something for communities. I wanted to walk with people in their day-to-day lives so that I could ease their stress levels by providing them with practical tools. My science took on a different meaning. It became bigger and took the shape of an implementation and dissemination approach. I began rapidly developing and disseminating "Practical Accessible Preventative Education that's Readable and Seeable" (PAPERS), an innovative approach to providing education, which aligns with nurses' commitment to providing easy-to-understand communication to patients and helping them self-manage. PAPERS addresses health literacy, self-management, and empowerment, and provides practical information to the community by (1) helping them identify best practices in an easy reading format, (2) providing visuals of the steps that should be taken, (3) providing material written at a third- to fifth-grade level, and (4) providing material evaluated by community members for readability of the content. To address the communication barriers and education insufficiency, I created a series of a dozen infographics that is being disseminated across multiple communities electronically in collaboration with organizations and through door-to-door delivery, with the ultimate goal of empowering ordinary people to prevent infections and to help them embrace the ideal that prevention is better than treatment. The <sup>Figure</sup> is an infographic created and disseminated initially to help people remember key information about COVID-19 and its prevention at the beginning of the pandemic before we discovered a decrease in taste and smell to be an early symptom. Some of the other infographics created demonstrate managing infection prevention during shopping, care of babies and children, use of assistive devices, lifestyle benefits and risks, playing board and card games, and navigating doctor visits. PAPERS provides an innovative framework for not just COVID-19 materials, but also for addressing nurses' commitment to educating our patients and enhancing their quality of life throughout their lifespan. My professional philosophy as a nurse, infection preventionist, and nurse scientist is to "treat patients as I want to be treated as a patient"; therefore, I make a conscious effort to ensure that I can innovatively mainstream science to the public in a way that they can apply it in their day-to-day lives.

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# 2020 Tribute and Thank You to Journal of Emergency Nursing Editorial Team Members: JEN

[ProQuest document link](#)

## FULL TEXT

2020 has been a year of tremendous ongoing transition and change in both planned and unexpected ways for the emergency specialty, Emergency Nurses Association (ENA), and the *Journal of Emergency Nursing (JEN)*. This year, the following members are retiring or stepping down from their *JEN* editorial roles after a decade or more of deeply committed and inspiringly productive service. This editorial is an expression of sincere and heartfelt gratitude, dedicated to their service to ENA and *JEN*. Each of their special and unique perspectives and contributions has shaped and influenced both an ongoing legacy of excellence at *JEN* as well as my own professional journey.

Susan Paparella, MSN, RN, has been the author and Section Editor of *Danger Zone*, *JEN*'s regular clinical column committed to medication and patient safety, since 2004. She is the Vice President at the Institute for Safe Medication Practices (ISMP) and has served as Chair of the ENA's Patient Safety Committee. *JEN* *Danger Zone* readers have benefited from her tremendous expertise and active leadership practice on the investigation of adverse medication safety events in emergency care, safety learning culture, and strategies for advancing medication safety. At ISMP, Paparella leads the Consulting, Collaborative, and Educational Services program with risk assessment, root cause analyses, research, and international training activities. Nationally in the United States, she is a knowledgeable, sought-after speaker on medication safety-related risks and challenges. Her distinguished professional career also includes 20 years in acute care practice as the Director for Critical Care and Emergency Services, with additional leadership as the Director for Hospital-wide Quality Improvement, Risk Management, and Education. As faculty, she has provided crucial interdisciplinary leadership to the development and implementation of the American Society of Hospital Pharmacists/ISMP Medication Safety Certificate Program and ISMP's Medication Safety Intensive program. Her numerous accolades include a 2012 Villanova University College of Nursing Medallion for Distinguished Contributions to Nursing Practice and 2016 induction into the Abington-Dixon School of Nursing Hall of Fame. A graduate of the Abington Memorial Hospital School of Nursing, she earned her BSN and MSN with honors from Villanova University. In every interaction, I was personally inspired by the depth of Susan's expert knowledge and professional commitment to excellence in patient safety. Thank you, Nurse Paparella, for more than 15 years of remarkable clinical and leadership contributions to *JEN*.

Anna Valdez, PhD, RN, PHN, CEN, CFRN, CNE, FAEN, FAADN, has served as an Associate Editor, Section Editor, and member of the Executive Editorial Board for *JEN*. At the beginning of 2020, she continued her editing career in a new position as the Editor in Chief for the journal *Teaching and Learning in Nursing*. Dr Valdez has more than 28 years of experience in clinical practice and nursing education. She has taught nursing at all levels and in a variety of settings. Dr Valdez is currently serving as Professor and Chair of Nursing at Sonoma State University. She is

passionate about emergency nursing, social and environmental justice, health equity, academic progression in nursing, and evidence-based nursing education strategies. She is nationally certified in emergency nursing, flight nursing, and nursing education. Her current research interests focus primarily on emergency nursing, social determinants of health, health disparities, and nursing education. Dr Valdez has served on a variety of health-related advisory boards. She has published more than 25 peer-reviewed articles and contributed as an author to 2 current emergency nursing books. In 2015, she was inducted as a Fellow in the Academy of Emergency Nursing. In addition, Dr Valdez was inducted as a Fellow in the Academy of Associate Degree in Nursing in 2018. Personally, I've had the distinct opportunity to consider Anna both a colleague and a friend and continue to admire her deep and sincere commitment to elevating the emergency nursing specialty, as well as her special ability to open doors of opportunity for others. Heartfelt thank you, Dr Valdez, for your ongoing editorial commitment and leadership.

Cindy Lefton, PhD, RN, CPXP, has served as *JEN* Associate Editor, Section Editor of the Experience Talks column, and Executive Editorial Board Member. Dr Lefton has combined her knowledge as an organizational psychologist with her extensive experience as a registered nurse to develop strategies aimed at helping hospitals across the country have a positive impact on their communication and collaboration. As a consultant for Psychological Associates and as a staff nurse in emergency department waiting areas at Barnes-Jewish Hospital, Dr Lefton uses a variety of evidence and resources to guide patient care areas in creating and sustaining healthy work environments, and having a positive impact on patient perceptions. Dr Lefton has published articles on communication, collaboration, and meaningful recognition, and has presented these topics at various national conferences. Dr Lefton is also a member of the Editorial Board for the *Journal of Trauma Nursing*, and she is the Director of Patient Experience for The Diseases Attacking the Immune System Foundation. Dr Lefton's organizational transformation and change efforts were crucial to laying the successful foundation and providing mentorship for the launch of the *JEN* Blog, *On the Other Side of the Rails*. Personally, I will deeply miss Cindy's humor and her defining presence as a force for comradery, team building, and a genuine sense of cohesion. Thank you, Dr Lefton, for more than a decade of committed service to our editorial team, reviewers, and readers.

Finally, I'd like to express my sincere appreciation for our other outstanding editorial team members who were with us at *JEN* for fewer than 10 years. The editorial team looks forward to continued ways to elevate the specialty of emergency nursing in partnership with you as we look forward to engaging your wisdom, perspective, and emergency leadership know-how.

Sincerely,

Jessica Castner with, and on behalf of, the *JEN* Editorial Team

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# Urine Drug Screens in the Emergency Department: The Best Test May Be No Test at All: JEN

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## ABSTRACT (ENGLISH)

The manuscript purpose is to provide a resource for clinicians on the functionality and pitfalls of the rapid urine drug screen for clinical decision making. Many providers remain under-informed about the inherent inaccuracies. The rapid urine drug screen is the first, and often only, step of drug testing. In the majority of emergency departments the urine drug screen is a collection of immunoassays reliant on an interaction between the structure of a particular drug or metabolite and an antibody. Drugs in separate pharmacologic classes often have enough structural similarity to cause false positives. Conversely, drugs within the same pharmacologic class often have different enough structures that they may result in inappropriate negatives. This lack of sensitivity and specificity significantly reduces the test



utility, and may cause decision-making confusion. The timing of the drug screen relative to the drug exposure also limits accuracy, as does detection threshold. Confirmatory steps following the initial immunoassay include chromatography and/or mass spectrometry. These are unavailable at many institutions and results rarely return while the patient is in the emergency department. In addition, institutional capabilities vary, even with confirmatory testing. Confirmation accuracy depends on a number of factors, including the extent of the catalog of drugs/metabolites that the facility is calibrated to detect and report. In summary, the standard emergency department urine drug screen is a test with extremely limited clinical utility with multiple properties contributing to poor sensitivity, specificity, and accuracy. The test should be used rarely, if ever, for clinical decision making.

## FULL TEXT

### Illustrative Patient Case

A 19-year-old man is brought from his workplace to the emergency department by emergency medical services after coworkers expressed concern. He was saying things that made them worry about drug exposure and possible intentional self-harm. On arrival, the patient is slightly agitated but alert and directable, has a normal fingerstick glucose, and has vital signs of heart rate 131, respiratory rate 20, blood pressure 140/80, and temperature 37.7°C (99.9°F). The emergency medical service providers offer that the patient's family is bringing a number of prescription drugs to which the patient had access and that his coworkers shared that he has also had issues with recreational use of illicit drugs. The patient is mostly cooperative, comfortable, and monitored, and the ED team is ready to investigate further as to what sort of drug exposure is causing the patient's signs and symptoms. The provider steps outside the room to enter orders into the electronic medical record...

Someone in the room asks, "Is a urine drug screen needed?"

The answer to that question depends on the standard practice at each institution, but there is a good argument that a drug screen does not need to be done on this patient.<sup>1</sup> Obtaining a rapid urine drug screen (UDS) may be in line with one's current practice habits or may be distinctly the opposite of what is expected for this common ED presentation.<sup>2</sup> If the UDS has never been a part of past management, or it used to be and is no longer, what follows will reinforce current practices. If the UDS is currently a staple of the workup for drug exposure, then what follows will argue that the team is using a test with poor sensitivity and specificity that questionably affects ED decision making. The purpose of this manuscript is to provide a resource for emergency clinicians on the functionality and many pitfalls of the UDS for clinical decision making. Many providers remain underinformed about the inherent inaccuracies of the test. Continued discussion in published literature is necessary to help correct common clinical misconceptions.

### What Is a Urine Drug Screen and How Does It Work?

The definition of UDS varies somewhat depending on the institution from which the test is ordered. In general, though, UDS is the terminology used for the basic immunoassay test that constitutes the beginning of drug testing; this is the part of the test that can produce results within approximately 1 hour and is frequently viewed as a part of the ED evaluation in the context of a potential drug exposure or in unknown altered mental status.<sup>3</sup> There are other contexts in which the test is ordered, such as in a psychiatric evaluation, suspected drug presence in pediatric patients, or a drug-assisted abuse scenario such as a drug-facilitated sexual assault. However, there are significant limitations even in these settings because of the problems with accuracy and follow-up confirmatory testing.<sup>1,4-6</sup> A typical UDS panel includes immunoassays meant to screen for amphetamines, barbiturates, benzodiazepines, cocaine, opioids (opiates), and cannabinoids. Phencyclidine (PCP), lysergic acid diethylamide, and tricyclic antidepressants (TCAs) remain on some test panels but have been removed from many. Some institutions make specific additions with multiple drugs within the same functional class to reduce the chances of false negatives (discussed later in the text). Examples of this would be maintaining the use of the opioid screen that targets opiates and adding specific screens for synthetic opioids such as methadone and fentaNYL.

The functionality of the rapid immunoassay UDS is similar to other antigen/antibody scenarios (<sup>Figure 1</sup>). In this case, however, the antibody is created to target a particular epitope on a drug structure. A manufactured "antibody" (the

test) looks for an “antigen” (the part of the drug for which it was designed), and if they match up, it triggers a signaling cascade, giving a positive result. It is important to note that this match is an actual physical interaction with the targeted drug’s structure. For example, a basic opioid screen as a part of the UDS is usually looking for a part of the structure of a natural opioid or opiate, such as morphine.<sup>3</sup>

### How Do False Positives Occur?

A UDS immunoassay generates a positive result after the physical antibody interaction with a chemical structure exactly like, or similar to, the drug it was designed to detect.<sup>7</sup> Therefore, drugs that are structurally close to the desired target can make the test react as though it is actually interacting with that target drug. The test does not discriminate; if there is a physical interaction, it turns positive, regardless of whether the interaction is truly with the drug of concern. For example, the amphetamine portion of a UDS (typically designed to actually detect amphetamine) can result positive in the presence of pseudoephedrine or phenylephrine.<sup>8</sup> The PCP (targeting PCP) screen can result positive by reacting with dextromethorphan.<sup>9</sup> The tetrahydrocannabinol (THC) screen can be made positive by some nonsteroidal anti-inflammatory drugs (in laboratories without up-to-date capabilities),<sup>10</sup> as the TCA screen commonly turns positive in the presence of diphenhydramine<sup>11</sup> and other similarly structured drugs,<sup>12,13</sup> and the cocaine screen can turn positive with the ingestion of coca tea.<sup>14</sup> These examples culminate in an odd scenario in which someone aggressively treating a cold could feasibly have a UDS “positive” for amphetamines, cocaine, opioids, PCP, THC, and TCAs. <sup>Figure 2</sup> illustrates an example of structural similarity resulting in a false positive. A more complete list of common false positives is shown in <sup>Table 1</sup>.

### How Do False Negatives Occur?

There are multiple reasons for false negatives on a UDS, including the opposite of the interclass structural similarity discussion for false positives. However, for false negatives, it is intraclass structural dissimilarity as the culprit. In this case, if a drug from the same class as the UDS test’s target drug is structurally dissimilar enough, it may result in a false negative.<sup>15</sup> This dissimilar drug may interact at the same receptors in the body as the target drug, it may cause the same signs and symptoms in overdose, and its toxicity may be effectively treated the same as that from the target drug, but it may not cause a positive result on the UDS.<sup>16</sup> Morphine and fentanyl can be used as an example. Both are opioids; in excess, both will cause respiratory and central nervous system depression, and this toxicity can be reversed with naloxone in both cases. However, the structures of morphine and fentanyl are distinctly not the same. Fentanyl will never make an opioid screen positive if the target is one of the natural opioids (opiates such as morphine).<sup>17</sup> A patient could present to the emergency department having taken a cornucopia of drugs, including a phenethylamine-substituted 2-C drug,<sup>18-20</sup> an amphetamine-like cathinone “bath salt,”<sup>21</sup> a synthetic cannabinoid,<sup>22,23</sup> a synthetic opioid U-47700,<sup>24</sup> and ALPRazolam,<sup>17,25</sup> and still have a UDS “negative” for amphetamines, THC, opioids, and benzodiazepines. <sup>Figure 3</sup> illustrates a structural example of dissimilarity within the same drug effect classification. A more inclusive list of false negatives is shown in <sup>Table 1</sup>. In addition to the inability of immunoassays to detect novel psychoactive substances, they also do not detect most prescription drugs that are not controlled but frequently misused for recreational purposes, such as bupropion<sup>26</sup> and quetiapine, because they are not targeted to do so.<sup>27</sup> An additional limitation that is often overlooked in the binary result of a standard UDS is that the test is not just binary, similar to a urine pregnancy test. Commonly used UDS tests have quantification limits that determine whether a test is “positive” or “negative.” Thus, a drug can be present and detected by the assay yet report out as “negative” because the preset level of detection (determined by both the manufacturer preset and the laboratory itself) was not reached.

### Why Does the Timing Matter?

Sometimes there is a true positive test result on the UDS, but it still should not affect emergency medicine decision making.<sup>3</sup> The UDS will stay positive for lengths of time that vary depending on the particular drug for which the test is positive. <sup>Table 2</sup> shows the time estimates for various positive tests. The main issue with the length of time a test will stay positive is a common pitfall in medical decision making, anchor bias. If a patient comes in and is slightly hyperthermic, tachycardic, agitated, and uncooperative and has a UDS positive for amphetamines, what will many providers assume? Should they anchor to the patient having used methamphetamine because that can cause all of

the symptoms? That may be a correct assumption. However, it also may be the case in which the patient used an amphetamine (or something similar) 3 days prior and their symptoms are from meningitis or encephalitis, sepsis, thyroid storm, as well as other toxicologic-related conditions such as sedative-hypnotic withdrawal, serotonin toxicity, neuromuscular malignant syndrome, or any of the other causes of similar symptoms. The workup and management for these other entities obviously vary widely, and something vital could be missed if the differential thinking ends when the UDS result returns.<sup>3</sup>

### **What About Confirmatory Testing After the Urine Drug Screen?**

Most of the information on further testing is beyond the scope of this article, but in short, there are options for confirming the result of a UDS. Typically, this confirmation is done with some form of chromatography (eg, gas, liquid, high-performance liquid) followed by mass spectrometry.<sup>7</sup> There are a few issues that make confirmation problematic. First, confirmation capabilities vary tremendously from institution to institution; some have none at all. At facilities with confirmation capabilities, the trigger to confirm varies. At some hospitals, confirmation occurs after each UDS, whereas some do it only when a portion of the UDS is positive, and others do it only on request. In addition, and this is the piece of the confirmation puzzle probably the least well-understood, even laboratories with confirmation capabilities are limited to discover and report only what their laboratory is calibrated to discover and report.<sup>15</sup> Some laboratories have small catalogs of detectable drugs, and some are expansive. Furthermore, novel drugs of abuse frequently do not yet have standards available to commercial laboratories, effectively leaving them undetectable.<sup>16</sup> In some cases, this can even alert the astute clinician to the presence of a novel drug of abuse. For example, with the widespread substitution of fentaNYL<sup>28</sup> and fentNYL analogs<sup>29</sup> for heroin,<sup>30-32</sup> many institutions have added a fentaNYL immunoassay to their standard UDS.<sup>32</sup> The presence of a positive fentaNYL immunoassay with negative confirmatory testing suggests a fentaNYL analog; a drug structurally similar to fentaNYL that may have radically different clinical effects.<sup>33</sup> Finally, if a drug creates a spike on the mass spectrometry very close to another drug's spike, one of the 2 can "hide" within the other, meaning only one of them will be detected. This is particularly true with novel substances outside of a laboratory's detection catalog.<sup>34</sup>

### **What Are Some Common Arguments for Some Potentially Useful Applications of the Urine Drug Screen in the Emergency Department?**

#### **(1)**

Some providers argue that a UDS is necessary for medical clearance before psychiatric evaluation. In fact, it does not really affect the clearance for psychiatric assessment at all.<sup>1</sup> This discussion is based on the UDS, which typically results within an hour or 2, and not on the confirmatory testing, often coming back 2 days later. As discussed previously, positive or negative findings on a UDS only may be true. Many studies and other peer-reviewed manuscripts have come to the conclusion that the UDS does not have clinical utility in the context of a psychiatric evaluation.<sup>4,35-41</sup> In addition, many psychiatrists tend to ignore the results even if they have them.<sup>4</sup>

#### **(2)**

It seems logical to get a UDS in the context of a potential drug-facilitated sexual assault. This is complicated by the overlap of medicine and the legal system. In short, work with the hospital to plan for this scenario, which hopefully includes some sort of preplanned strategy for a formal sexual assault examination by a trained examiner along with preparation for a chain of custody on any samples taken and a strategy for testing body fluids appropriately. The wrong thing to do is to order a hospital's version of a UDS without a postsampling chain of custody and without knowing if there is confirmatory testing available, and if so what type of testing that includes. Especially at small community emergency departments, where there may or may not be an organized sexual assault examiner program and where there frequently is not in-house testing, ordering a drug screen can provide the opposite of support for the existence of a drug involved in the case. Many of the drugs that have been associated with this assault typically do not cause a positive screening UDS. This includes agents such as clonazepam, lorazepam, alprazolam, midazolam, flunitrazepam, zolpidem, zaleplon, gamma-hydroxybutyrate, gamma-butyrolactone, 1,4-butanediol, and many others.<sup>3</sup>

#### **(3)**

There is an argument to get a UDS in pediatric patients in whom drug involvement is suspected. This is also complicated. As in the aforementioned scenario, this is complicated, and it is best to work within the hospital's guidelines. If one's hospital does not have a preset plan, do not try to create one. Because of the many false positives and negatives that can occur, as previously discussed, actions can either be taken or not taken quite inappropriately on either side on the basis of the inaccuracy of the UDS.<sup>5</sup> However, and more importantly, because there is evidence that any UDS result rarely changes clinical management, it is generally not worth the resources it takes to get them in this scenario and not worth the risk of a false result.<sup>40,41</sup>

**Box 1** Summary and Implications for Emergency Clinical Practice

1. The UDS is an immunoassay targeting a part of the chemical structure of certain drugs.
2. If another drug contains a similar structure to the drug intended to be tested (eg, methamphetamine vs pseudoephedrine), this can result in a false positive result.
3. If members of a class of drug (eg, opioids) contain drugs that are structurally different (eg, heroin vs methadone), the test can lead to false negatives.
4. Even a true positive result has little clinical utility; the length of time a test stays positive limits its applicability at the time of testing. An additional issue is that there are concentration cutoff limits for detection; thus, a drug that was used may fall below this limit of detection, leading to a false negative result.
5. Contact the laboratory processing the UDS if one chooses to use it, because they will be able to clarify what the test includes along sensitivity and specificity for particular drugs one may be curious about given the clinical scenario.
6. Confirmatory testing with methodologically advanced testing takes time and resources and is limited by the catalog of calibrated drugs at a particular institution.
7. For potential forensic scenarios (drug-facilitated abuse) use the institution guidelines and the help of trained examiners and/or law enforcement to maintain the appropriate testing and the chain of custody.
8. False positives, false negatives, broad time frame of detection, and delayed confirmation all make the UDS inapplicable to real-time clinical decision making. The authors of this article do not use the UDS in the management of patients in the emergency department.

Therefore, in reviewing the initial case, the 19-year-old slightly agitated patient with the tachycardia, who may have used prescription or illicit drugs in a self-harm effort, do we need the urine for the UDS? The authors are of the opinion that it is not warranted. This is a test with many potential false positives and negatives. We do not want to be falsely anchored by the potentially misleading time frame of a true positive, and in addition, it is not necessary for an ED-based psychiatric evaluation if his altered mental status improves enough for it to occur. We do not want to anchor on an unreliable result that may prevent us from evaluating the patient in front of us at the expense of missing an important finding. In this case, the best test is no test at all.

**Acknowledgments**

The patient case was presented hypothetically to explain the clinical scenario and not based on an actual patient.

**Author Disclosures**

Conflicts of interest: none to report. **Editor's Note** Opiate or Opioid? Cocaine or Cocaine Salt? Terminology in Context

The following exchange between the authors and reviewers was informative on variations in terminology. The exchange is paraphrased here as an editor's note for readers. Opiates are opioids, whereas only some opioids are opiates. A standard approach is that the opioid drug class includes the opiate morphine-like natural drugs (eg, morphine, codeine, etc.), the semisynthetics (eg, oxyCODONE, HYDROcodone, etc), and the synthetics (eg, fentaNYL, methadone, traMADol, etc). In this manuscript the authors refer to the opioid class as inclusive of opiates. This is representative of "Opioids" chapter in Goldfrank's Toxicologic Emergencies (Lewis Nelson and Dean Olsen): "...the term opiate specifically refers to the relevant alkaloids naturally derived directly from the opium poppy. Opioids are a much broader class...The term opioid as used hereafter encompasses the opioids and the opiates."

In common linguistics writing "cocaine" is meant to refer to the processed usable drug as opposed to just the non-processed plant-based alkaloid. This could be technically clarified by referring to cocaine as "cocaine salt." Although coca leaves and coca tea contain the base cocaine alkaloid, it is in exceedingly low levels. This is why it requires processing through an extraction process (commonly through acid-base extraction to a hydrochloride salt) to achieve "usable" mass per volume. In this manuscript, the authors use the broader term "cocaine."

Nelson LS, Olsen D. Opioids (chapter 36). In: Nelson LS, Howland SE, Smith SW, et al, eds. *Goldfrank's Toxicologic Emergencies*. 11th ed. McGraw Hill. 2019;519-537.

Drug (with common immunoassay target)	Substance causing false positive	Substances associated with false negatives
Amphetamines (D-amphetamine, D-methamphetamine)	Amantadine, atomoxetine, buPROPion, chloroquine, ePHEDrine, pseudoephedrine, phenylephrine, metFORMIN, phentermine, raNITidine, selegiline, labetalol, chlorproMAZINE, promethazine, traZODone, doxepin, desipramine	MDA, MDMA, most substituted cathinone derivatives, most substituted phenethylamine derivatives
Barbiturates (secobarbital)	Ibuprofen, naproxen	Sodium thiopental
Benzodiazepines (nordiazepam, oxazepam)	Sertraline, oxaprozin, efavirenz	Clonazepam, LORazepam, ALPRAZolam, midazolam, flunitrazepam, chlordiazepoxide
Cocaine (cocaine, benzoylecgonine)	Coca tea, some forms of yerba mate	Fluconazole (however, this is with confirmatory testing)
LSD (LSD, 2-Oxo-hydroxy-LSD)	FentaNYL, norfentanyl, FLUoxetine, busPIRone, haloperidol, labetalol, risperiDONE, traZODone, doxepin, diTIAZem, verapamil, amitriptyline, metoclopramide, methylphenidate, imipramine, ergonovine, sertraline, buPROPion, prochlorperazine	n/a

Opioids (Morphine, Codeine)	Poppy seed containing foods, levofloxacin, ofloxacin, imipramine, naltrexone, rifAMPin, dextromethorphan	Non-naturals (HYDROcodone, HYDROmorphine, oxyCODONE, fentaNYL, traMADol, U-47700, methadone, buprenorphine)
Opioids (OxyCODONE, oxyMORphone)	n/a (typically very specific to oxyCODONE and metabolites)	n/a
Opioids (Methadone, EDDP)	Doxylamine, diphenhydrAMINE, verapamil, QUETiapine, tapentadol	n/a
Opioids (Buprenorphine, norbuprenorphine)	Morphine, codeine, methadone, traMADol	n/a
PCP (PCP)	Venlafaxine, o-desmethylvenlafaxine, dextromethorphan, ibuprofen, thioridazine, diphenhydrAMINE, traMADol, ketamine, MDPV, lamoTRigine, zolpidem	n/a
THC (9-carboxy-THC)	Efavirenz, promethazine, some NSAIDs, pantoprazole	Synthetic/designer cannabinoids
Tricyclic antidepressants (amitriptyline, imipramine)	Cyclobenzaprine, QUETiapine, carBAMazepine, cyproheptadine, hydrOXYzine, cetirizine, diphenhydrAMINE	n/a

Drug class and specific drug	UDS detection window (times may vary between laboratories)
Amphetamines	
Methamphetamine	3
Amphetamine	3
MDMA	2
Pseudoephedrine	5
Barbiturate	
PHENobarbital	15

Butalbital	7
PENTobarbital	3
Secobarbital	3
Benzodiazepines	
DiazePAM	10
ALPRAZolam	5
LORazepam	5
Temazepam	5
Clonazepam	5
ChlordiazePOXIDE	5
Flunitrazepam	5
Midazolam	2
Cocaine	
Cocaine	< 12 h
Benzoyllecgonine	5
LSD	
Lysergic Diethylamide	< 1
2-oxo-3-hydroxy-LSD	5
Opioids Natural	
Heroin	3
Morphine	3
Codeine	3

Semisynthetic	
HydroCODONE	3
HYDROmorphine	3
OxyCODONE	3
OxyMORphone	3
Synthetic	
FentaNYL	3
Methadone	7
Buprenorphine	7
Phencyclidine	8
THC	3-30

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# The Influence of Patient Safety Culture and Patient Safety Error Experience on Safety Nursing Activities of Emergency Nurses in South Korea: JEN

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## ABSTRACT (ENGLISH)

### Introduction

The unique nature of the space and environment of emergency departments is a threat to patient safety. Enhancing patient safety and minimizing safety-related issues are important tasks for ED health care staff. The purpose of this study was to examine the relationships among patient safety culture, patient safety error, and safety nursing activities of emergency nurses in South Korea.

### Methods

A convenience sample of 200 emergency nurses working in 12 general hospitals in South Korea were surveyed for safety nursing activities using the Hospital Survey of Patients' Safety Culture, a 4-item questionnaire for patient safety error and ED safety management items in the Guidelines for Patient Safety (seventh revision).

### Results

Hierarchical regression analysis revealed that the potential factors associated with safety nursing activities were safety training experience ( $\beta = 0.180, P=.01$ ), organizational learning–continuous improvement ( $\beta = 0.170, P=.04$ ), age ( $\beta = 0.160, P=.02$ ), and implementation of domestic and foreign accreditation ( $\beta = 0.147, P=.03$ ).

### Discussion

To improve patient safety, it is essential to identify problems in medical institutions, determine areas of improvement, and improve the organization's patient safety activity system on the basis of patient safety error experience reports. After training the emergency nurses for continuous improvement, the effect of patient safety activities must be analyzed.

## FULL TEXT

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# Active and Passive Distraction Interventions in a Pediatric Emergency Department to Reduce the Pain and Anxiety During Venous Blood Sampling: A

# Randomized Clinical Trial: JEN

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## ABSTRACT (ENGLISH)

### Introduction

Distraction is a method that is easy to use in emergency departments and effective in relieving procedural pain and anxiety. This study aimed to determine the effect of 2 new distraction methods—1 active distraction (rotatable wooden toy) and 1 passive distraction (toy wristband)—on procedural pain, fear, and anxiety in children during venous blood sampling.

### Methods

This study was a randomized controlled experimental study. The sample consisted of 216 children aged 6 years to 12 years. They were divided into 3 groups using the block randomization procedure: active distraction group ( $n = 72$ ); passive distraction group ( $n = 72$ ); and control group ( $n = 72$ ). The levels of pain and anxiety in the children were measured before and during the blood sampling by the children themselves, their parents, and the researcher using the Visual Analog Scale, the Wong-Baker FACES Pain Rating Scale, and the Children's Fear Scale.

### Results

The children and their parents included in the control and experimental groups had similar sociodemographic characteristics. The active distraction group had lower levels of procedural pain, fear, and anxiety than the other groups (children's visual analog scale score,  $F = 134.22$ ;  $P < 0.05$ ; Wong-Baker FACES Pain Rating Scale score,  $F = 137.54$ ;  $P < 0.001$ ; and Children's Fear Scale score,  $F = 92.44$ ;  $P < 0.001$ ).

### Discussion

Both the toy wristband and rotatable wooden toy interventions can be used to reduce procedural pain, fear, and anxiety in children during blood sampling in emergency departments.

## FULL TEXT

### Contribution to Emergency Nursing Practice

- Studies have reported that distractions are effective in reducing procedural pain and anxiety in children during venous blood sampling.
- This study has used 2 new distractions: 1 active (rotatable wooden toy) and 1 passive (toy wristband). The study contributes to other study results showing that active distraction is effective in reducing procedural pain and anxiety in children during venous blood sampling.
- Pediatric emergency nurses should have knowledge of the efficacy and use of toy wristband and rotatable wooden toy practices, which are easy to use in reducing procedural pain, fear, and anxiety during venous blood sampling, and these methods could be used as routine nursing practices.

### Introduction

Pain is a significant phenomenon that children frequently experience and is influenced by environmental, sociocultural, and individual factors, mostly causing fear, anxiety, and stress.<sup>1,2</sup> One cause of this biopsychosocial emotion is an invasive medical procedure.<sup>3,4</sup> Although venous blood sampling is thought to be a minor invasive procedure, it is one of the greatest fears of children, and can turn into an unpleasant experience for children, parents, and health care professionals.<sup>1,5-7</sup> Focusing on this issue, the American Academy of Pediatrics and the American Pain Society report that minor medical procedures such as blood sampling and vascular access should be

performed properly, with a minimum level of pain and anxiety.<sup>8</sup> Therefore procedural pain and anxiety assessment and management should be approached with careful attention in emergency departments.

There are many approaches, including pharmacological and nonpharmacological methods, to reduce procedural pain and anxiety that may occur during medical procedures.<sup>9-13</sup> Nonpharmacological methods are independent nursing practices that are easy and cheap to use; are time-saving; have no adverse effects; promote collaboration in children; increase both activity level and sense of individual control; and reduce analgesic use, pain, stress, and anxiety.<sup>13</sup> Distraction, a nonpharmacological method, is one of the easiest and most effective methods, which is used in 2 ways: active and passive distraction.<sup>9,11,12,14-16</sup> Active distraction encourages children to participate in activities and display their own skills during medical procedures, activating their visual, auditory, and kinesthetic senses, whereas passive distraction is when parents or nurses involved in the medical procedures do not allow children to engage in activities, activating only their visual and auditory senses.<sup>9,11,12,14,15</sup> A national survey across 15 pediatric emergency departments identified distraction as a procedure that could be easily implemented to manage children's pain.<sup>6</sup> In addition, distractions used during medical procedures are effective in reducing procedural pain and anxiety in children in emergency departments.<sup>2,4,5,7</sup> However, only one of the active and passive distractions is generally used in the same study and there are a limited number of studies showing the comparative effects of these 2 methods in controlling pain and anxiety. Therefore, there is a need for further research on this subject. This study examined the efficacy of 2 new distraction methods—1 active and 1 passive—in reducing procedural pain, fear, and anxiety in children aged 6 years to 12 years during routine venous blood sampling in the pediatric emergency department.

### **Study Hypotheses**

- Hypothesis 1: The use of a rotatable wooden toy during venous blood sampling relieves procedural pain, fear, and anxiety in children.
- Hypothesis 2: The use of a toy wristband during venous blood sampling relieves procedural pain, fear, and anxiety in children.
- Hypothesis 3: The active distraction method is more effective than the passive distraction method.

### **Methods**

This was a randomized controlled experimental study conducted to examine the effects of 2 new nonpharmacological distraction methods—1 active (rotatable wooden toy) and 1 passive (audible, colorful toy wristband) distraction—on procedural pain, fear, and anxiety in children during venous blood sampling.

### **Study Population and Samples**

This study was conducted between March 1, 2019, and April 30, 2019, in the blood sampling unit of the Pediatric Emergency Department at Dr. Sami Ulus Maternity, Children's Health, and Diseases Training and Research Hospital, which is one of the largest pediatric emergency departments in Ankara, Turkey. The study population consisted of children aged 6 years to 12 years who were admitted to the unit between these dates.

### **Sample Size Justification**

A power analysis was performed using G\*Power version 3.1.9 (Heinrich Heine University, Dusseldorf, Germany). A study by Canbulat et al<sup>17</sup> was taken as a reference. The sample size was determined as one that had a test power of 98% with an effect size of 30% at 95% confidence interval and with a Type 1 error probability (significance level) of 5% for the F-test analysis. Accordingly, the sample consisted of 216 children (active distraction group = 72, passive distraction group = 72, and control group = 72).

## **Inclusion Criteria**

The study inclusion criteria were as follows: children aged 6 years to 12 years; both children and parents were able to speak Turkish; having no mental or physical disability and no sedative, analgesic, or narcotic substance use 24 hours before admission to the blood sampling unit; blood sample being taken at the first attempt; and having a fever of less than 38°C (100.4°F). Fever can cause anxiety in children. They may not be as active or talkative as usual. In addition, fever can lead to a temporary diminishment of mental abilities and changes in consciousness (fainting or swooning), and trigger convulsions. Because of these reasons, they were excluded from the study.

## **Data Collection Tools**

Data were collected using an introductory information form, the visual analog scale (VAS), the Wong-Baker FACES Pain Rating Scale (WB), and the Children's Fear Scale (CFS).

### **Introductory Information Form**

This form was prepared by the researchers in line with the literature.<sup>10</sup> The form consisted of 15 questions regarding the introductory characteristics of the children and their parents (child's age, gender, parents' age, education levels, income levels, and so on).

### **Visual Analog Scale**

The visual analog scale is an easy-to-understand and applicable pain scale for children aged 3 years to 18 years.<sup>18</sup> The scale is a 10-cm-long unidimensional ruler, ranging from "no pain" on the left-hand side to "unbearable pain" on the right-hand side. The child is asked to mark a point on the line that will identify their pain.<sup>19</sup> The Turkish validity and reliability study was conducted by Aydın et al.<sup>19</sup> The Cronbach's alpha coefficients of the scale ranged from 0.73 to 0.93.<sup>19</sup>

### **Wong-Baker Faces Pain Rating Scale**

This scale was developed by Wong and Baker<sup>20</sup> and is used to assess pain in children aged 3 years to 18 years. The scale consists of 6 faces representing the increasing severity of pain from left to right, and scored from 0 to 10 points (0 = no pain, 10 = very severe pain). The child is asked to choose the face expressing their pain.<sup>20</sup> The Cronbach's alpha coefficient of the scale was 0.93.<sup>21</sup>

### **Children's Fear Scale**

This scale was developed by McMurtry et al<sup>22</sup> to measure children's fear and anxiety levels. The CFS is suitable for children aged 3 years to 16 years. In this method, the child is shown a picture containing 5 facial expressions, which are scored from 0 (no fear and anxiety) to 4 (highest fear and anxiety). The scales' Turkish validity and reliability study was conducted by Gerçeker et al.<sup>23</sup> The Cronbach's alpha coefficient of the scale was 0.89.<sup>23</sup>

## **Research Procedures**

The CONSORT 2010 report<sup>24</sup> was used while planning and reporting the present study (Figure 1). Before the blood sampling procedure, all parents and children were informed about the study; written consent was obtained from the parents who wanted to participate in the study, whereas verbal and written assents were obtained from the children. Parents are the ones who know their children best, and they may notice sensitive changes in their child's attitudes and behaviors, and therefore they were included in the study. In this manner, we aimed to prevent bias and improve the validity of the data in the study. The introductory information was collected in approximately 3 minutes using the introductory information form. The parents and children were given explanations regarding the scales to be used in the study. The children were asked to score their pain levels on the VAS and WB and their fear and anxiety levels on the CFS. The parents and the researcher also scored the children's pain levels on the WB and fear and anxiety levels on the CFS by observing their behavioral status before the procedure.

## **Allocation**



In the study groups, a block (stratified) randomization method was used according to the child's age (from 6 years to 12 years), gender (female or male), and fear of blood sampling (afraid or not afraid). A total of 36 pouches were created (6 y, F, scared; 6 y, M, afraid; 6 y, F, not afraid; 6 y, M, not afraid; and so on), and there were 6 envelopes with different colors (2 for control, 2 for active distraction, and 2 for passive distraction) in each pouch. The children who agreed to participate in the study were assigned to the experimental or control group on picking the appropriate envelopes with different colors according to their characteristics. Each selected envelope was taken out of the pouch. The children were given an explanation regarding the blood sampling process, taking into consideration their developmental stage.

### **Venipuncture**

The blood sampling was carried out by the researcher who had been working in the pediatric emergency department as a pediatric emergency nurse for 9 years. In this study, the participants underwent the blood sampling only when the research nurse was on duty. The children's pain, fear, and anxiety levels were measured during the blood sampling using the same procedure used for measuring their pain, fear, and anxiety levels before the blood sampling. The venous blood sampling was successfully completed in the first attempt for all groups.

### **Control Group**

The standard blood sampling procedure of the clinic was used for the children in the control group.

### **Active Distraction Group**

The rotatable wooden toy used for active distraction was produced by Edmark in 2008.<sup>25</sup> When its handle is spun rapidly, the toy transforms from a "DNA helix" into a "pinecone" and back again in 1 motion owing to its kinetic shape (Figure 2). The rotatable wooden toy is a toy that stimulates children's cognitive, visual, and kinesthetic senses, enabling them to display their own skills. The children were instructed not to move the arm from which the blood was being drawn. They were asked to hold the toy with their free hand and spin its handle using their thumb and forefinger. They were encouraged to stay focused on spinning the toy until the sampling was over. The toy was disinfected after each procedure, making it ready for the next patient.

### **Passive Distraction Group**

The toy wristband used for passive distraction is an audible, colored toy designed by the researcher. It consists of 2 parts: a 7-cm × 7-cm colored plush toy containing a sound device, and an elastic fabric wristband (Figure 3). When the top of the toy is pressed, it plays a melody twice. The wristband was attached loosely to the wrist of the child's free arm so that the child could see the toy. The parent was asked to press the top of the toy to play a melody during the blood sampling procedure. The child was encouraged to look at the toy and listen to the melody until the blood sampling was over. The toy wristband was disinfected after each procedure, making it ready for the next patient.

### **Ethical Consideration**

The Ethics Committee of Ankara University gave ethical approval (number 56786525-050.04.04/14249; February 25, 2019), and Dr. Sami Ulus Maternity, Children's Health, and Diseases Training and Research Hospital gave institutional permission (number 73799008; March 12, 2019). Written consent was obtained from the parents, and verbal and written assents were obtained from the children.

### **Data Analysis**

Data were evaluated using SPSS version 24.0 (IBM Corp, Armonk, NY) and analyzed using percentage distributions, mean, SD, and minimum-maximum values. A *t* test was used to compare the normally distributed data of the experimental and control groups, chi-square test and Fisher exact test were used to examine the demographic differences in the experimental and control groups, analysis of variance was used to examine the differences between pain and anxiety mean scores of the control and experimental groups, and post hoc (Bonferroni) advanced

analyses were used to make intragroup binary comparisons. *P* values less than 0.05 were regarded as statistically significant.

### **Results Results Regarding the Introductory Characteristics of Children and Parents**

There were no significant differences in the children's and parent's demographic characteristics in both control and experimental groups ( $P > 0.05$ ) (Table 1).

### **Comparison of the Children's Blood Sampling Experiences**

The number of children with and without an experience of blood sampling ( $n = 71$  and  $n = 1$ , respectively) was randomly equal in the control and experimental groups ( $P > 0.05$ ). There was no significant difference among their experiences of blood sampling (by number of blood sampling procedures, time of last blood sampling, and previous hospitalization) ( $P > 0.05$ ). No nonpharmacological methods were used to reduce pain and anxiety during previous blood sampling procedures for any children in the control and experimental groups (Table 2).

### **Comparison of the Wb Mean Scores Measured Before and During Blood Sampling**

There was a significant difference in the mean WB pain scores between the control and active distraction groups before the blood sampling (children's WB score,  $F = 3.42$ ;  $P > 0.05$ ; Table 3). The active distraction group had the lowest pain level, followed by the passive distraction and control groups, respectively (children's WB score,  $F = 137.54$ ;  $P > 0.05$ ).

### **Comparison of the Vas Pain Mean Scores Measured Before and During Blood Sampling**

The control group had different VAS pain mean score measured before the blood sampling than the active distraction group ( $F = 3.54$ ;  $P > 0.05$ ; Table 4).

### **Comparison of the Cfs Anxiety Mean Scores Measured Before and During Blood Sampling**

The levels of anxiety experienced by children before and during the blood sampling were evaluated using the CFS by the children themselves, their parents, and the researcher. There was no statistically significant difference in the CFS mean scores of all groups before blood sampling ( $P > 0.05$ ). There was a statistically significant difference between the CFS mean scores of the control and experimental groups measured during the blood sampling (children's CFS score,  $F = 92.44$ ;  $P > 0.05$ ; Table 5). In addition, there was no statistically significant difference between the CFS mean scores of the control and experimental groups measured by the 3 raters ( $F = 0.54$ ;  $P > 0.05$ ).

## **Discussion**

This study examined the efficacy of using the rotatable wooden toy and toy wristband to reduce procedural pain, fear, and anxiety in children during venous blood sampling in a pediatric emergency department by comparing active and passive distraction effects. Our results indicated that the toy wristband and rotatable wooden toy decreased procedural pain and anxiety, and that the active distraction method was more effective than the passive distraction method, supporting our 3 hypotheses. There is no study in which a toy wristband, as a passive distraction method, and a rotatable wooden toy, as an active distraction method, have been used during venous blood sampling or in any medical procedure. In this aspect, this is the first study specific to this subject in the field. Children in the control and experimental groups were similar in terms of age, gender, parents' ages, and education levels (Table 1). The similarity of their introductory characteristics indicated that blocking and randomization were successful. A previous blood sampling experience has the potential to affect children's pain perceptions and anxiety levels; therefore, the similarity of the groups in terms of these variables (Table 2) was important for the efficacy of the active and passive distraction methods used during the venous blood sampling.

Venous blood sampling is widely used in the diagnosis and treatment of various diseases,<sup>26</sup> but it may turn into a painful and stressful experience for children when adequate pain control cannot be achieved.<sup>27</sup> Therefore, procedural pain management is very important for pediatric emergency nurses working with children. This study

found that both methods reduced pain (Tables 3 and 4), although active distraction was more effective in reducing pain. There are few studies comparing active and passive distractions in pain relief during blood sampling in emergency departments as well as other units, and they showed contradictory results. In addition to studies reporting that active distraction is more effective in pain relief than passive distraction,<sup>7,9,12,26</sup> there are studies suggesting that passive distraction is more effective in pain relief than active distraction.<sup>10,11</sup> Studies have reported that toys actively played with are effective in distracting children and reducing their pain levels by activating their visual, auditory, and kinesthetic senses during painful medical procedures.<sup>9,26,27</sup> In this regard, the fact that the rotatable wooden toy was more effective in reducing procedural pain may be because this toy changes shape after a complete turn once it is given a simple and rapid spin. The changing shapes attract children's attention, and they need to focus on the toy to actively spin the handle. This is active distraction, which stimulates their cognitive, visual, and kinesthetic senses, which in turn reduces their procedural pain levels.

A fear of medical procedures may develop if adequate nursing care is not provided during invasive procedures.<sup>15,28</sup> This can reduce children's participation in health care procedures, prevent them from receiving health services in case of illness, and negatively affect the treatment process by increasing their aggressive behaviors.<sup>15</sup> Therefore, it is important to eliminate fear and anxiety during invasive procedures in emergency departments. This study found that both of these methods reduced fear and anxiety in the children during the blood sampling (Table 5), with active distraction being more effective than passive distraction. There are very few studies comparing active and passive distractions in reducing fear and anxiety during blood sampling. Some of them found that active distraction was more effective in pain relief than passive distraction,<sup>9,10</sup> whereas some others found that they had similar effects.<sup>2,7,11,26</sup> There are also studies examining only one of these methods.<sup>29,30</sup> This study found that the rotatable wooden toy was more effective in reducing the pain and anxiety of the children during the blood sampling. This may be because children are more interested in creating new and simple shapes,<sup>27</sup> so they direct their attention to a pleasant and exciting process and away from anxiety-inducing stimuli through a game-playing experience.<sup>9,26,29</sup>

### **Limitations**

There are several limitations to this study. First, the researcher was the person who collected both information and blood samples from the children. Because the researcher was a nurse working in the unit where the study was conducted, and because of the workload and inadequate number of nurses in the unit, the study could not be blinded. To prevent bias and increase the validity of the data, the children's pain and anxiety levels before and during the procedure were scored by the children themselves, their parents, and the researcher. They were blinded to each other's scores. Second, the reasons for the children's admission to the hospital were not examined, but the pain level before the procedure was evaluated as the factor affecting the study. Third, taking into account the possibility of contamination of the distracting devices, the wooden toy and toy wristband were disinfected with an alcohol-based disinfectant after each blood draw. The study protocol was not preregistered.

### **Implications for Emergency Nurses**

Distraction is a nonpharmacological nursing intervention used for procedural pain and anxiety relief during blood sampling. According to the literature, the nonpharmacological methods used during blood collection in emergency departments include cartoon-patterned clothes,<sup>2</sup> bubble-blowing,<sup>2</sup> distraction kits,<sup>4</sup> parental involvement and parental presence,<sup>5</sup> Buzzy,<sup>7</sup> distracting cards, and balloon-inflating.<sup>7</sup> In Turkey, there is frequent crowding in emergency departments, and there is limited time for nonpharmacological methods and play. Most of the time, procedural pain management cannot be maintained effectively. As a matter of fact, in our study the participants stated that nonpharmacological methods were not used to reduce pain and anxiety in previous medical procedures. They showed great interest in the study and interventions. Pediatric emergency nurses should be aware of the pain and

anxiety of children in medical procedures and should attempt to reduce the pain and anxiety, although they have limited time at their disposal. During this process, distracting methods should be chosen according to the developmental characteristics of the child. In our study, the age groups were determined as ages 6 years to 9 years and ages 10 years to 12 years according to the gross and fine motor activities, cognitive development, and attention span of the children.<sup>31</sup> The toy wristband and rotatable wooden toy were found to be effective in reducing pain and anxiety in both age groups. Hospitals should develop quality assurance procedures to improve the management of procedural pain and anxiety in emergency departments. Pediatric nurses should be informed with in-service trainings on the use and effectiveness of the toy wristband and rotatable wooden toy applications, which are easy to use and cost-efficient, and these methods should be used as routine nursing practice. Once these methods become well-known, future research can focus on implementing strategies to improve procedural pain and anxiety management in the pediatric ED setting.

### Conclusions

Active and passive distraction techniques are effective in reducing pain, fear, and anxiety; therefore, they are recommended to be used during venous blood sampling. On the basis of the findings from this study, the toy wristband and rotatable wooden toy are feasible distraction interventions to potentially help manage procedural pain and anxiety in emergency departments. However, further evidence-based studies should be conducted to test the efficacy of these 2 new applications in painful procedures other than venous blood sampling and in children from different age groups.

### Acknowledgments

The authors would like to thank the children and their parents who agreed to participate in this study.

### Author Disclosures

Conflicts of interest: none to report.

Variables	Control group (n = 72) n (%)		Passive distraction group (n = 72) n (%)		Active distraction group (n = 72) n (%)		Test statistics $\chi^2$	P value
Child's age								
6-9	36	(50)	36	(50)	36	(50)	<.001	0.99
10-12	36	(50)	36	(50)	36	(50)	Child's gender	

Female	36	(50)	36	(50)	36	(50)	<.001	0.99
Male	36	(50)	36	(50)	36	(50)	The parent accompanying the child	
Mother	41	(56.9)	44	(61.1)	46	(63.8)	0.74	0.69
Father	31	(43.1)	28	(38.9)	26	(36.2)	Parent's age	
20–40	62	(86.1)	57	(79.1)	54	(75)	7.22	0.30
41 and above	10	(13.8)	15	(20.8)	18	(25)	Parent's education	
Less than primary school	1	(1.38)	3	(4.1)	3	(4.1)	6.93	0.54
Primary school	32	(44.4)	20	(27.7)	29	(40.2)	High school	
(31.9)	27	(37.5)	20	(27.7)	16	(22.2)	University and above	

Blood sampling experiences	Control group (n = 72) n (%)		Passive distraction group (n = 72) n (%)		Active distraction group (n = 72) n (%)		T e s t s t a t i s t i c s X <sup>2</sup>	P v a l u e
	Previous blood sampling procedures							
Yes	71	(98.6)	71	(98.6)	71	(98.6)	0.43*	0.99*
No	1	(1.4)	1	(1.4)	1	(1.4)	Number of previous blood sampling procedures	
1-5	34	(47.2)	30	(41.6)	31	(43.1)	2.27	0.89
6-10	20	(28.6)	20	(28.6)	18	(25.7)	1.15	0.5
(21.4)	20	(28.6)	20	(28.6)	Time of blood sampling procedures			
In last 6 mo	39	(54.1)	45	(62.5)	50	(69.4)	8.04	0.42

In last 1 y	16	(22.9)	7	(10.0)	8	(11.4)	More than 1 year ago	14
(20.0)	17	(24.3)	11	(15.7)	Fear of blood sampling			
Yes	36	(50)	36	(50)	36	(50)	< 0.01	0.99
No	36	(50)	36	(50)	36	(50)	Previous hospitalization	
Yes	32	(45.7)	27	(38.6)	28	(38.6)	0.01	0.06
No	40	(54.3)	45	(61.4)	44	(61.4)	Status of having a nonpharmacological intervention during blood sampling†	
Yes	—	—	—	—	—	—	—	—

Evaluation	Pain measurement time	Control group (n = 72) mean (SD)	Passive distraction group (n = 72) mean (SD)	Active distraction group (n = 72) mean (SD)	F	P value	Paired comparisons*
Child	Before blood sampling	5.49 (2.16)	5.86 (1.84)	6.34 (1.80)	3.424	<0.05	AD >CG; P = 0.02
	During blood sampling	7.33 (2.41)	3.30 (1.95)	2.60 (1.54)	137.538	<0.001	CG >PD >AD; P <0.001
	During blood sampling	5.51 (2.08)	6.00 (1.73)	6.46 (1.63)	4.649	<0.05	AD >CG*; P <0.05
	7.99 (1.93)	2.81 (1.72)	2.04 (1.20)	261.098	<0.001	CG >PD >AD; P <0.001	Researcher
	5.46 (2.15)	6.06 (1.66)	6.46 (1.63)	5.270	<0.05	AD >CG; P <0.05	During blood sampling
							7.94 (1.84)

VAS rating time	Control group (n = 72) mean (SD)	Passive distraction group (n = 72) mean (SD)	Active distraction group (n = 72) mean (SD)	F	P value	Paired comparisons*
Before blood sampling	2.96 (0.97)	3.17 (0.76)	3.33 (0.73)	3.541	0.03	AD >CG; P = 0.02



During blood sampling	3.79 (1.08)	1.97 (0.81)	1.50 (0.65)	134.220	< 0.001	CG >PD >AD; P <0.001
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Evaluation	Anxiety measurement time	Control group (n = 72) mean (SD)	Passive distraction group (n = 72) mean (SD)	Active distraction group (n = 72) mean (SD)	F	P value	Paired comparisons*
Child	Before blood sampling	3.21 (1.22)	3.36 (1.00)	3.60 (0.85)	2.45	0.08	—
During blood sampling	3.91 (1.22)	2.09 (1.07)	1.63 (0.82)	92.44	< 0.001	CG >PD >AD; P <0.001	Parent
Before blood sampling	3.29 (1.05)	3.50 (1.04)	3.56 (0.73)	1.21	0.20	—	During blood sampling
4.19 (0.99)	2.09 (0.95)	1.61 (0.66)	166.95	< 0.001	CG >PD >AD; P <0.001	Researcher	Before blood sampling
3.29 (1.05)	3.44 (0.97)	3.51 (0.81)	1.06	0.34	—	During blood sampling	4.29 (0.90)

## DETAILS

**Subject:** Parents & parenting; Emergency medical care; Intervention; Pain; Anxiety; Clinical research; Clinical trials; Fear & phobias; Pediatrics; Analgesics; Sample size; Validity; Hypotheses; Distraction; Blood tests; Medical research; Methods; Children & youth; Sampling; Nursing; Departments; Sociodemographics; Children; Emergency services

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## Can You Catch It? Lessons Learned and Modification of ED Triage Symptom- and Travel-

# Screening Strategy: JEN

[ProQuest document link](#)

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## ABSTRACT (ENGLISH)

### Introduction

Efficient identification and isolation of patients with communicable diseases limits exposure to health care workers, other patients, and visitors. In August 2014, our team developed and implemented an algorithm to triage suspected cases of Ebola virus disease in a midwestern United States emergency department and outpatient clinics based on patient travel history and symptoms. Here, we present the lessons learned and modifications to update the tool.

### Methods

Two strategies were developed and utilized to properly identify, isolate, and inform on patients with suspected highly hazardous communicable diseases: 1) a robust electronic symptom and travel screen with decision support tools in the electronic medical record, and 2) the availability of workflow protocols for Ebola virus disease, Middle East Respiratory Syndrome (MERS), and coronavirus 2019 (COVID-19) once a person under investigation is identified. After action reports provided opportunities to modify the algorithm and improve the identification and isolation processes.

### Results

Since our screening and travel electronic medical record inception 5 years ago, modifications changed iteratively to further enhance the screening process. Since 2018, staff have identified 5 patients at risk for MERS; in all cases, identification occurred during the check-in process. Exposure investigations in the emergency department decreased significantly after algorithm implementation in January 2019, from 30 in 2018 to 0 in 2019.

### Discussion

Although highly hazardous communicable diseases like Ebola virus disease and MERS are of concern due to their mortality rates and limited treatment options, these same concepts may be applied to the early identification and isolation of patients suspected of having more common communicable diseases like measles and influenza, emphasizing the importance of protocol-based screening in the healthcare environment.

## FULL TEXT

### Contribution to Emergency Nursing Practice

- The current literature indicates that prompt identification and isolation of both common illnesses (eg, seasonal influenza) as well as highly hazardous communicable diseases (eg, coronavirus disease 2019 and Ebola virus disease) can mitigate exposures to and transmissions of these diseases in clinical settings.
- This article contributes to the finding that this practice improvement project led to a decrease in the number of infection control exposure investigations in the emergency department.
- Key implications for emergency nursing practice found in this article are that the availability of this electronic screening algorithm arms emergency nurses to identify promptly and isolate both at-risk patients with common illnesses and highly hazardous communicable diseases, thereby reducing subsequent exposure.

### Introduction

The initial assessment of clinical symptoms is the cornerstone of triage in the emergency department. It is important to identify efficiently and isolate patients potentially infected with communicable diseases such as influenza and measles to limit exposure to health care workers, other patients, and visitors. Symptom assessment, paired with travel history, can identify patients who are at risk of highly hazardous communicable diseases such as Ebola virus

disease (EVD), Middle East Respiratory Syndrome (MERS), and coronavirus disease 2019 (COVID-19), which emerged in December 2019.

EVD is caused by a group of viruses within the genus *Ebolavirus*. Ebola virus causes a clinical syndrome known as viral hemorrhagic fever, which carries a mortality rate of up to 90%.<sup>1</sup> Ebola virus is transmitted via direct contact with infected bodily secretions, putting close contacts, including health care workers, especially at risk. Multiple outbreaks of EVD have occurred in Africa since the discovery of Ebola virus in 1976, but the West Africa outbreak in 2014-2016 was the largest ever recorded, with more human morbidity and mortality (more than 28,000 cases and more than 11,000 deaths) than all previous outbreaks combined.<sup>2</sup> As of this writing, the second-largest outbreak of EVD is ongoing in the Democratic Republic of the Congo.

MERS is a viral illness caused by Middle East Respiratory Syndrome Coronavirus (MERS-CoV), which produces a clinical respiratory illness with a 30% to 40% mortality rate. It was first reported in Saudi Arabia in 2012 and is epidemiologically linked to contact with camels.<sup>3</sup> MERS-CoV is transmissible via contact with the respiratory secretions of an infected person and has caused multiple outbreaks in the Arabian peninsula (especially in Saudi Arabia), as well as outbreaks in other countries traced to returning travelers. Recently, we saw the emergence of COVID-19 from Wuhan, China.<sup>4</sup> To date, confirmed cases of COVID-19 have been detected in more than 50 countries on 6 continents. Although the current estimated case fatality of around 2% is less than that of MERS or Severe Acute Respiratory Syndrome, the number of deaths attributed to COVID-19 has surpassed the number of deaths caused by the other 2 diseases combined.

EVD, MERS, and other highly hazardous communicable diseases have high mortality rates and limited or no treatment options, making prompt identification and quick isolation especially important to reduce the risk of transmission in the health care setting. As these diseases are initially acquired generally during international travel, travel screening and appropriate clinical and epidemiologic assessment are important tools to implement in emergency departments and other clinical areas of the health care system where patients may initially present for care. The absence of a streamlined process for screening and documenting travel history can lead to missed identification of patients who are potentially infected.<sup>5</sup> To address this challenge, the Centers for Disease Control and Prevention (CDC) in the United States developed an algorithm, termed "Identify, Isolate, Inform," to provide guidance for emergency departments and other health care points of entry on the evaluation and management of persons suspected of having EVD.<sup>6</sup> The algorithm is adaptable, having been modified for MERS, mumps, measles, and Zika; a similar algorithm was developed specifically for emergency medical services (EMS).<sup>7-11</sup>

The development of a readily available screening tool for highly hazardous communicable diseases with up-to-date guidance is, therefore, imperative for successful identification, isolation, and care. The purpose of this project was to update the screening algorithm and process on the basis of the lessons learned since its implementation in 2014 and to describe the tool's practical use in identifying and isolating suspected cases of highly hazardous communicable diseases, including detailing how our hospital recently adapted the tool to initially address potential cases of COVID-19.

## Methods

The quality improvement process described here is an intervention modification on the basis of pragmatic lessons learned. In August 2014, at the height of domestic preparations for EVD, our team developed and implemented an algorithm to triage suspected cases of EVD in a Midwest emergency department and outpatient clinics on the basis of patients' travel histories and symptoms; details of the development process were published in 2015.<sup>12</sup> Initially a paper version, the travel-screening algorithm was converted to an electronic format in October 2014 to provide visibility from the initial intake to providers downstream and provide clear and succinct directions to ensure proper

identification, isolation, and care of a suspected patient. Since 2014, the algorithm has become a hardwired process throughout the organization.

### **Intervention**

Two unique strategies were used to identify, isolate, and inform about patients in the emergency department with suspected highly hazardous communicable diseases. One was the use of the robust electronic symptom and travel screen with decision support tools in the electronic medical record (EMR). The second strategy used was the availability of workflow protocols at Nebraska Medicine for EVD, MERS (Supplementary Figure 1), and COVID-19 (Supplementary Figure 2) once a person under investigation was identified. The workflow algorithms, available on the hospital's intranet, are updated at regular intervals to reflect changing needs and best practices. Signage encouraging patients to cover their cough and visitors to refrain from coming to the hospital if they have a fever or cough are displayed in the emergency department and throughout the health system.

All patients presenting to the emergency department or outpatient clinics are screened promptly for symptoms and travel histories as described previously.<sup>12</sup> A greeter nurse (available 24/7) screens each patient as they present to the emergency department. The EMR decision support tool is automated: upon entering a patient's EMR record, the travel-screening questions appear both at registration and for the nursing staff. Although it is possible to bypass the screening questions, the nursing and registration staff are educated and encouraged to complete the EMR tool. Masks and gloves are available in the area where patients initially present; patients with complaints of respiratory symptoms are instructed to use a mask. This early use of masks helps mitigate patient, visitor, and health care worker exposure to influenza, measles, and other communicable pathogens with droplet or airborne transmission. Upon positive screening for EVD, MERS, or COVID-19, the identified person under investigation is moved to a negative pressure isolation room on the basis of information pushed from the EMR algorithm. The intranet protocol(s) then provide clinicians with guidance on proper personal protective equipment selection and donning/doffing, management of family or other persons who arrived with the patient, contact information to notify infectious diseases and infection control specialists, specifics on additional history and screening parameters needed according to CDC case definitions, and proper specimen collection, including instructions for proper handling and collection of nasopharyngeal swabs for MERS-CoV. In addition, the intranet protocols include links for just-in-time videos of personal protective equipment donning and doffing procedures, appropriate clinical specimen collection, and guidance for disinfection and waste management.

### **Study of The Intervention**

The impact of the intervention was assessed on the basis of a reduction in the number of exposure investigations after the presentation of a patient with a confirmed communicable disease. In addition, positive high-risk cases provided opportunities to modify the EMR workflow algorithm and improve the identification and isolation processes in the protocol. Positive cases (ie, cases that were flagged by the algorithm as a patient meeting the screening risk factors) triggered a review by emergency nurses and physicians, hospital infection control, infectious disease physicians, and hospital management. Collaborative "After Action Reports" were completed by these partners to provide robust observations on the management of these cases and adherence to the screening process and workflow algorithm.

### **Measures and Analysis**

After the identification of a high-risk case, After Action Reports were completed electronically. The ED manager or designee was responsible for initiating the chart review of the patient's medical record and timeline review into a standard After Action Report template. The tool was then disseminated electronically to frontline staff, hospital management, and infection control, all of whom collaborated to review and complete the reports to identify gaps and

critical points in the screening process. Moreover, the emergency department and Infection Control Department, in conjunction with the Nebraska Biocontainment Unit, worked together to fine-tune the identification, isolation, and treatment processes and protocols for patients under investigation for highly hazardous communicable diseases through annual competencies and no-notice drills. A review of these After Action Reports and collaboration with multiple partners ensured that the screening process was being adhered to consistently. Quantitative data to describe the proportion of patients presenting to the emergency department or outpatient clinics who were screened using the algorithm and flagged for being suspect patients for a highly hazardous communicable disease, as well as the number of exposure investigations before and after implementation of the EMR algorithm, are based on administrative data estimates from the hospital and ED leadership.

### **Ethical Considerations**

As a quality improvement project, this work was exempt from institutional review board approval. The implementation of the EMR screening algorithm generated several ethical considerations. For patients who were identified through the screening process as potential high-risk cases for EVD or MERS, there was a risk that care would be delayed for a more common diagnosis while testing for the highly hazardous communicable disease was conducted. As a result, a process was developed to continue diagnostic testing and treatment of the more common illnesses while awaiting test results for MERS or EVD. In addition, there were ethical aspects related to maintaining the isolation of a person under investigation who elected to leave before the test results were available. To address these cases, a process was developed for local public health officials, hospital infection control, and ED providers to conduct risk-benefit analyses jointly on the basis of risks to the public, the option to place a medical hold until the test results were available for cases with public health concerns, and the likelihood of the individual maintaining self-quarantine if the risk was determined to be low.

### **Results**

Since the implementation of the EMR algorithm, on the basis of estimations by our hospital and emergency management leadership, an estimated 75% of the patients presenting to the hospital system's emergency department or outpatient clinics were screened using the algorithm. Less than 1% of these patients were flagged as potential high-risk cases. Moreover, since the implementation of the improved intervention in January 2019, no exposure investigations in the emergency department have had to be performed.

### **Evolution of the Electronic Symptom- and Travel-Screening Process**

Since our screening and travel EMR inception 5 years ago, modifications were made iteratively to enhance the screening process further. Previously, the initial question upon emergency department or outpatient clinic presentation was "Have you traveled outside of the country in the past 21 days?" This question, which was EVD-centric on the basis of the incubation period, was replaced with "Do you have a fever, cough or rash?" A positive response cascaded a red-banner directive to offer the patient a mask, as shown in <sup>Figure 1</sup>. This promotion of proper infection-prevention practices reduces their exposure to others at the earliest moment of their ED visit.

The second question upon emergency department or outpatient clinic presentation, the travel-screening question, originally only captured individuals who had a pertinent travel history; our updated version included those who may have been in direct contact with someone recently returned from an area with an active outbreak. In addition, the travel period was extended to allow for the use of 1 question for multiple pathogen-incubation periods. Thus, the travel screening question was rephrased from "Have you traveled outside of the US in the last 21 days" to "Have you traveled and/or been in contact with a person that has traveled outside of the country within the last month?"

In the 2014 initial screening algorithm, a patient would screen positive if they traveled to an active outbreak zone and had a fever greater than 38.6°C (101.5°F). The updated version flagged a patient positive for fever, rash, or cough

and cascaded a directive if they or a contact of theirs had traveled to an affected outbreak zone within the previous month, as shown in <sup>Figure 2</sup>. The resulting directive provided information on donning a mask and gloves, isolating the patient, and notifying the appropriate staff.

### **Travel-Screening Process Improvement and Hospitalwide Implications**

The symptom and travel algorithm tool built into the admission navigator of the Nebraska Medicine ED EMR has been successful in identifying patients at risk of highly hazardous communicable diseases within minutes of arrival. To date, since 2018, the staff have identified 5 patients at risk for MERS; in all cases, the identification occurred during the check-in process within a few minutes of arrival.

Moreover, the process significantly reduced the numbers of exposure investigations that occurred in the emergency department. In 2018, before the implementation of the first screening question (“Do you have a fever, cough or rash?”) in mid-January 2019, 30 exposure investigations were conducted. The number of exposure investigations in the emergency department for 2019 was 0. The “prompt mask” application upon patient presentation all but eliminated these investigations for health care workers as well as for other patients and visitors exposed in the waiting areas. This translated into hospital cost savings in time, communication, and employee health services. The outcomes from After Action Reports led to improvements in the process. One such improvement was the inclusion of the symptoms of rash, fever, and other respiratory symptoms; previously, the nursing staff were not alerted until the patient had a documented fever, which created a significant lag between presentation and identification of risk. In addition, the process of reviewing the After Action Report identified the need to specify the location where the patient would wait if the negative pressure isolation room was occupied and until it was made available and how that waiting area would be processed after the patient was moved. Moreover, improvements were made to the evaluation process of other common respiratory causes while maintaining isolation for suspected MERS cases. The reduced turnaround time between specimen collection and laboratory results was an outcome of the creation of streamlined communications among the county public health department, the public health laboratory located on the Nebraska Medicine campus, and ED providers.

On the basis of the After Action Reports, steps were taken to improve the patient experience, which can be long and isolating, particularly when language barriers exist. For example, the staff provided patients details of the testing plans, risks and concerns, and time expectations for test results, and initiated investigations for more common causes of symptoms before the test results were received. An annual competency review and no-notice mystery patient drills have led to better tools, such as new checklists, more appropriate supplies for waste management, and improved means of communication among various departments, including radiology and laboratory services.

### **Adaptation of the Travel-Screening Process to Covid-19**

The emergence of COVID-19 in December 2019 provided the opportunity to adapt our algorithm for a novel disease. Owing to cases of local transmission of COVID-19 reported in multiple countries, we divided our second screening question (previously, “Have you traveled and/or been in contact with a person that has traveled outside of the country within the last month?”) into 2 parts (<sup>Supplementary Figure 2</sup>): (1) “In the last month, have you had close contact with a person known to have COVID-19, MERS, or EVD?” and (2) “Have YOU traveled outside of the country within the last month?” Positive symptoms and a positive response to the former question flag the individual as a suspected case and prompt directions for isolation. A positive response to the latter question prompts the individual to identify which country. Travel to one of the hot-spot countries (a list of countries is continually updated in the EMR on the basis of current events) and positive symptoms prompt directives for isolation.

Additional screening questions specific to persons under investigation for COVID-19 are asked once the person has been isolated. These include a more extensive travel history and contact investigation. Upon notification of infection

control staff, the Infection Control Medical Director determines if the person under investigation meets the COVID-19 case definition per the most up-to-date definition provided by the CDC. The process then includes directions for patients who fit the COVID-19 case definition (contacting county health department, following the MERS ED protocol for isolation and transport, and cleaning and disinfection processes) or for those who do not fit the case definition (notifying the ED provider).

## **Discussion**

The purpose of this project was to detail the revisions that were made to the screening algorithm developed in 2014 to identify quickly and isolate persons under investigation for EVD. On the basis of the lessons learned from the positive screenings in our hospital since its implementation, we revised the tool to enhance infection prevention in the emergency department and apply the process to broader use in identifying and isolating suspected cases of highly hazardous communicable diseases. With the recent discovery and increasing global spread of COVID-19, screening algorithms such as the one we have developed, implemented, and described here are key tools to disrupting hospital-based transmission and mitigating exposure events.

During the recent outbreaks of EVD and MERS, multiple patients presented to emergency departments around the world with symptoms consistent with these illnesses and were an epidemiologic risk via travel or contact with an infected person. When these patients were recognized, they were cared for as persons under investigation.

However, as recognition requires implementation of symptom, travel, and epidemiologic screening, some patients at risk for these illnesses were either not identified or identification was delayed, leading to health care-associated infections in patients as well as health care workers. In South Korea, a single traveler returning from the Middle East with undiagnosed MERS resulted in an outbreak of 186 additional cases after he presented to an emergency department.<sup>13</sup> Although not all regional Ebola and other special pathogen treatment centers in the United States require that a patient with suspected or confirmed MERS be cared for in a high-level isolation unit, this case highlights the impact super-spreaders can have in a health care setting without the most advanced engineering and administrative controls and emphasizes the critical need to identify patients with a highly hazardous communicable disease at the earliest possible time point.

There are many lessons learned from real-world experience with persons under investigation for highly hazardous communicable diseases. A partnership with local public health authorities for the identification process is imperative, especially because patients may present for care accompanied by friends or family members, necessitating public health guidance in case of exposure. In addition, from a public health perspective, consideration should be given to plans for patients who attempt to leave against medical advice. It is important to note that the index patient in the previously mentioned MERS outbreak in South Korea initially denied travel to the Middle East; therefore, inaccurate travel and medical histories are real-world possibilities that should be considered when patients present for care. Early involvement of specialists in infectious diseases is recommended so that they may assist with the epidemiologic evaluation. The availability of diagnostic testing for patients with suspected EVD and MERS is an important aspect of the evaluation of a person under investigation, and emphasis should be placed on timely and appropriate specimen collection, as well as ensuring the availability of laboratory personnel with experience in performing the necessary diagnostic tests. At our institution, a link to a video detailing the process of appropriate respiratory specimen collection is included in our MERS person-under-investigation evaluation protocol. Public health laboratory staff are on-call 24/7, and early laboratory notification is necessary to ensure timely processing of specimens. The Department of Infection Control is involved in the process and should be notified as soon as a person under investigation is identified so that they can ensure adherence to strict infection control practices during the patient evaluation.



The creation of comprehensive, readily accessible protocols, along with mechanisms for initial and ongoing training of health care workers, is the cornerstone of preventing the spread of infectious diseases in the health care setting. Although communicable diseases such as EVD and MERS are of concern owing to their high mortality rates and limited treatment options, these same concepts may be applied to the early identification and isolation of patients suspected of having more common diseases such as measles and influenza, emphasizing the importance of protocol-based screening in the health care environment.

This process improvement project had some limitations. Owing to the challenges in extracting aggregated data through our hospital EMR, the percentage of patients presenting to the emergency department or outpatient clinics who were screened and flagged, as well as the number of exposure investigations conducted before the implementation of the EMR algorithm, are all estimates from the hospital and ED leadership. As such, the collection method for this data relies on experts' reporting and is not comprehensive or robust. Systematic data collection is recommended for hospitals looking to implement and quantify the impact of implementing such an algorithm. In addition, although we believe that the described algorithm is straightforward and concise, screening outcomes rely on human factors for compliance and implementation.<sup>14</sup> In this case, the process rests on greeter nurses and registration staff posing the screening questions to every patient entering the emergency department or other health care entry point, regardless of visible symptoms. Education on the importance of the algorithm and the critical advantage of identifying and placing a mask on symptomatic individuals early is needed to ensure that those interacting with patients implement the process. In addition, diseases are ever evolving, and outbreaks undoubtedly will emerge in different regions of the world. As such, there is a need for health care teams to monitor current disease threats around the world continually and to update the system to match those events. Last, the travel-screening algorithm has undergone a number of revisions over the last 5 years and will continue to be updated on the basis of the lessons learned. Health care systems adopting a strategy similar to the one we have described must be open to modifying it to fit local, national, and international circumstances and needs.

### **Implications for Emergency Nurses**

Emergency nurses see patients with a variety of symptoms and chief complaints. It is essential that nurses are prepared to recognize the risk and isolate patients potentially infected with communicable diseases such as influenza, measles, MERS, EVD, and other emerging infectious diseases, including COVID-19. When a patient presents to the emergency department with the potential for a highly hazardous communicable disease, it is imperative that the first nurse or health care team member to encounter that patient recognizes the risk and isolates the patient to prevent transmission to other patients, visitors, and health care staff. The current intake process in many emergency departments leaves nurses unprepared to provide prompt recognition, and the lack of consistent tools places them in situations in which they have little information to recognize the risks. The implementation of a standardized screening process, such as the one we have described, that includes symptomology and travel history built into the EMR can arm emergency nurses with the tools they need to identify patients quickly and recommend isolation precautions; a workflow algorithm readily available on the intranet and used consistently provides a standardized and effective way to identify, isolate, and inform and can improve communication, efficiency, safety, and patient experience. Moreover, in our experience, implementation of this symptom- and travel-screening strategy has reduced staff exposures to more common communicable diseases such as influenza and measles, thereby reducing the need for postexposure prophylaxis and treatment.

### **Conclusions**

The use of EMR tools for symptom- and travel-screening in the emergency department and outpatient clinics should be used to optimize effective communication, coordination, and collaboration. Millions of international travelers visit

our communities each year, and with them comes the risk of lesser-known but highly consequential communicable diseases. The lack of a direct threat of a highly hazardous communicable disease event within the United States has resulted in waning attention and vigilance toward preparing emergency departments for these types of diseases since the West Africa EVD outbreak in 2014-2016; however, as we once again face the threat of a highly hazardous communicable disease event with the emergence of COVID-19, now is the time to implement processes and strengthen our systems. Emergency departments often represent the first line of response to a domestic case of a highly hazardous communicable disease, and the implementation of efficient and effective screening tools that improve identification and reduce exposures in the emergency department can truly determine whether we will be dealing with a single case, a cluster, or an outbreak.

#### Author Disclosures

Conflicts of interest: none to report.

#### Supplementary Data

**Supplementary Figure 1** Middle East respiratory syndrome (MERS) ED screening protocol. **Supplementary Figure 2** Coronavirus disease 2019 (COVID-19) ED screening protocol.

#### Supplementary Data

Supplementary data related to this article can be found at <https://doi.org/10.1016/j.jen.2020.03.006>.

## DETAILS

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# Development, Diagnostic Sensitivity, and Prognostic Accuracy of the Adult–Difficult Venous Catheterization Scale for Emergency Departments: JEN

[ProQuest document link](#)

## ABSTRACT (ENGLISH)

### Introduction

Difficulty in accessing peripheral veins in emergency departments increases patients' discomfort and impedes their diagnosis. The objective of this study was to develop and test the prognostic accuracy of an easily applied scale to measure difficult venous access to peripheral veins in emergency departments, called the Adult–Difficult Venous Catheterization scale.

### Methods

This prospective observational study was conducted in adults from the hospital catchment area attending the emergency department. Using the Delphi technique, 5 experts reached a consensus regarding a 3-item scale scored from 0 to 5. Concurrent validity and predictive validity were analyzed using a numeric rating scale and the number of access attempts, respectively. Internal consistency and interobserver reliability for 3 independent observers were analyzed using Cronbach alpha and Cohen kappa, respectively.

### Results

In 392 participants, the concurrent and predictive validity scores pointed to positive relationships with the numeric rating scale ( $r = 0.82$ ;  $P < 0.001$ ) and the number of access attempts ( $r = 0.5$ ;  $P < 0.001$ ), respectively. The odds ratio for 1 to 2 access attempts versus more than 2 access attempts in relation to the Adult-Difficult Venous Catheterization scale score was 2.76 (95% confidence interval 1.86, 4.08;  $P < 0.001$ ). Sensitivity and specificity values for the Adult-Difficult Venous Catheterization scale were good, at 93.75% and 78.99%, respectively, as were internal consistency (Cronbach alpha 0.81) and interobserver reliability (Cohen kappa 0.75).

### Discussion

The Adult-Difficult Venous Catheterization scale is a valid and reliable instrument for predicting difficult venous access in emergency departments.

## FULL TEXT

### DETAILS

<b>Subject:</b>	Intubation; Emergency medical care; Medical prognosis; Accuracy; Medical diagnosis; Catheters; Medical personnel; Workloads; Nurses; Catheterization; Access; Patients; Validity; Predictive validity; Discomfort; Veins & arteries; Adults; Pain; Data collection; Reliability; Departments; Ultrasonic imaging; Attempted; Emergency services; Venous access
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### FULL TEXT

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# A Cross-Sectional Examination of the Factors Related to Emergency Nurses' Motivation to Protect Themselves Against an Ebola Infection: JEN

[ProQuest document link](#)

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## ABSTRACT (ENGLISH)

### Introduction

The 2014-2016 West African Ebola outbreak impacted the United States. Owing to the sporadic occurrence of the Ebola infection, there is insufficient research regarding how US emergency nurses provide care to patients potentially infected with the Ebola virus and the nurses' motivation to protect themselves when providing care to

these patients. This study aimed to investigate the predictors of emergency nurses' protection motivation.

### Methods

A cross-sectional design was employed. A survey developed based on a modified Protection Motivation Theory was administered to randomly selected members of the Emergency Nurses Association. Descriptive statistics, nonparametric Kruskal-Wallis H test (as well as post hoc Dunn-Bonferroni test), Spearman rho correlation, and stepwise multiple linear regression were conducted for data analysis.

### Results

Protection motivation was found in 2 components: proactive and passive protection motivation. Regression analysis indicated that response efficacy ( $\beta = 0.27, P < 0.001$ ) and self-efficacy ( $\beta = 0.17, P < 0.01$ ) significantly predict emergency nurses' proactive protection motivation, whereas perceived vulnerability ( $\beta = 0.26, P < 0.001$ ), response cost ( $\beta = 0.19, P = 0.001$ ), and knowledge ( $\beta = -0.15, P < 0.01$ ) significantly predict emergency nurses' passive protection motivation.

### Discussion

The results indicate the need for interventions to improve emergency nurses' response efficacy, self-efficacy, and knowledge, while simultaneously reducing the nurses' perceived vulnerability and response cost. Such interventions would be expected to proactively motivate nurses to protect themselves when providing care to patients who exhibit the signs and symptoms of an Ebola infection and reduce their passive protection motivation.

## FULL TEXT

### DETAILS

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## A Song for Frontline Nurses: JEN

[ProQuest document link](#)

### FULL TEXT

Dear Editor:

When I first heard the song, "Keeper of the Flame" by Miranda Lambert, I couldn't help but feel that she was singing about nurses. The more I listened to the song the stronger the feeling. The song is especially relevant now in the era of the coronavirus disease pandemic and the role of the nurses in combating this fearsome disease.

When Miranda sings "I'm bent, but not broken" and made of flesh and bone ...not made of steel but "I'm stronger than I feel," it speaks to the dedication and strength of the nurses on the frontline! We are keeping the flame started by "...ones came before me" such as Florence Nightingale, Clara Barton, Dorothea Dix, Hazel W. Johnson-Brown, among many others as well helping the new graduates, "...little pilot lights waiting to ignite" assimilate into professional nurses. I hope that this song will help nurses maintain their strength and dedication in this severe acute respiratory syndrome coronavirus2 era.—*Edward Chung, MSN, RN, CEN, NYU Langone Health Radiology, New York, NY; E-mail: chung03@nyu.edu*. **Figure** Nurse with a candle. (Figure courtesy of Patrickmercy @ flickr.)



## DETAILS

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# Pneumothorax: JEN

[ProQuest document link](#)

## ABSTRACT (ENGLISH)

A 40-year-old man presented to the emergency department complaining of a sudden onset of right-sided chest pain and dyspnea after a motor vehicular accident (Figure). He denied any medical problems and was not taking any medications. He spoke in short sentences as he answered the questions. His vital signs were as follows: blood pressure, 110/60 mm Hg; heart rate, 94 beats per minute; respiratory rate, 18 breaths per minute; and oxygen saturation by pulse oximetry, 90% in room air.

## FULL TEXT

A pneumothorax is a collapsed lung. A pneumothorax occurs when air leaks from the lung into the space between the lung and the chest wall. A pneumothorax is categorized as primary spontaneous, secondary spontaneous, or traumatic pneumothorax. A primary spontaneous pneumothorax occurs in individuals who have no known history of lung disease and are generally tobacco or cannabis smokers, are tall men, are in the age range of 15 to 35 years and sometimes have a family history of pneumothorax.<sup>1</sup> A secondary spontaneous pneumothorax can be caused by a variety of lung diseases such as chronic obstructive pulmonary disease, infective etiology, and cancer.<sup>2</sup> The clinical management of a pneumothorax depends on how much the patient is symptomatic. The management ranges from observation if the pneumothorax is small, with placement of a chest tube to re-expand the lungs, to pleurodesis and video-assisted thoracoscopic surgery.

### Clinical Scenario

A 40-year-old man presented to the emergency department complaining of a sudden onset of right-sided chest pain and dyspnea after a motor vehicular accident (Figure). He denied any medical problems and was not taking any medications. He spoke in short sentences as he answered the questions. His vital signs were as follows: blood pressure, 110/60 mm Hg; heart rate, 94 beats per minute; respiratory rate, 18 breaths per minute; and oxygen saturation by pulse oximetry, 90% in room air.

## DETAILS

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# One Person Can Truly Make a Difference: JEN

[ProQuest document link](#)

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## ABSTRACT (ENGLISH)

The first case diagnosed in the United States was on January 20, 2020, in Washington state.<sup>2</sup> Just 11 days later, WHO issued a statement for a Global Health Emergency, and on March 11, 2020, WHO declared coronavirus disease 2019 a pandemic. Two days later the US would declare a national emergency.<sup>3</sup> Throughout the pandemic, nurses, especially emergency nurses, continue to be on the front line caring for our communities. Not only are we facing a global pandemic this year, we are also facing demonstrations highlighting the social injustices our Black and brown brothers and sisters have faced for centuries in the US.

## FULL TEXT

It is truly hard to believe that I am sitting here writing my final president's message to you all. It is a bittersweet moment to take in; however, it is also a great time of reflection. As 2020 ends, we reflect on what the year has brought us. We all knew that 2020 was going to be a big year as we anticipated celebrating the Emergency Nurses Association's 50th anniversary, along with 2020 being designated the Year of the Nurse and Midwife by the World Health Organization (WHO).

As I prepared for 2020 and thought about my platform, it was all about recognizing the great care that emergency nurses exercise every day and the impact they have on their patients. To help highlight this message, the slogan I came up with is "One Person Can Make a Difference." This slogan is a reminder to us that each one of us can make a difference.

The year started off with the Gallop poll listing nursing as the most trusted profession for the 18th year in a row. This designation shows that 85% of those polled said that nurses have very high or high ethical standards.<sup>1</sup> This designation is truly an honor for our profession; however, it comes with high responsibility. This designation demonstrates that our communities trust us and expect us to do what we believe is right to care for them.

This year has been one that we could never have projected. We continue to face a global pandemic with coronavirus disease 2019. The first case diagnosed in the United States was on January 20, 2020, in Washington state.<sup>2</sup> Just 11 days later, WHO issued a statement for a Global Health Emergency, and on March 11, 2020, WHO declared coronavirus disease 2019 a pandemic. Two days later the US would declare a national emergency.<sup>3</sup>

Throughout the pandemic, nurses, especially emergency nurses, continue to be on the front line caring for our communities. These communities continue to look for guidance as we face these unprecedented times. We do not have all the answers, and sometimes the answers seem to change from day to day as we learn more. One constant is the fact that we are there, willing to step up and serve our communities. The nurses are there when visitors are not allowed in the hospitals, trying to support the patient from both a medical standpoint and an emotional standpoint. The nurses are there when no one is.

Not only are we facing a global pandemic this year, we are also facing demonstrations highlighting the social injustices our Black and brown brothers and sisters have faced for centuries in the US. These demonstrations range from peaceful protest to riots as described by law enforcement officials. These demonstrations started after the tragic death of George Floyd; however, his death was just the latest death by law enforcement. We cannot forget Breonna Taylor, who was an emergency medical technician killed in her apartment by police as they issued a no-knock warrant.<sup>4</sup> These demonstrations target law enforcements' response to the Black and brown communities; however, the dialogue is so much more. It is about looking at all aspects of our society and ensuring that all are treated equally no matter their racial background.

How does this all relate, you may be asking? The simple response is that through the challenges that we have faced in 2020, there is one thing that stands true: emergency nurses are here serving their communities. It is a simple act of kindness, holding the hand of a dying patient or trying to console a family member over the phone after their loved one has died. It is a nurse caring for a victim of violence, treating the victim with kindness and grace regardless of the racial background of the victim or the nurse. These actions that nurses take every day are what have given us the respect of our communities. I am unsure what the next 50 years will bring us; however, I can assure you that emergency nurses will continue to be on the front line serving our communities. As I leave, I want to challenge you all with this: How can you make a difference in a life today? Remember, "One Person Can Make a Difference!"

## DETAILS

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# Triage Standing Orders Decrease Time to Antibiotics in Neonates in Pediatric Emergency Department: JEN

[ProQuest document link](#)

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## ABSTRACT (ENGLISH)

### Introduction

Infants aged 0 days to 28 days are at high risk for serious bacterial infection and require an extensive evaluation, including blood, urine, and cerebrospinal fluid cultures, and admission for empiric antibiotics. Although there are no guidelines that recommend a specific time to antibiotics for these infants, quicker administration is presumed to improve care and outcomes. At baseline, 19% of these infants in our emergency department received antibiotics within 120 minutes of arrival, with an average time to antibiotics of 192 minutes. A quality improvement team convened to increase our percentage of infants who receive antibiotics within 120 minutes of arrival.

### Methods

The team evaluated all infants aged 0 days to 28 days who received a diagnostic evaluation for a serious bacterial infection and empiric antibiotics in our emergency department. A nurse-driven team implemented multiple Plan-Do-Study-Act cycles to improve use of triage standing orders and improve time to antibiotics. Data were analyzed using statistical process control charts.

### Results

Through use of triage standing orders and multiple educational interventions, the team surpassed initial goals, and 84% of the infants undergoing a serious bacterial infection evaluation received antibiotics within 120 minutes of ED arrival. The average time to antibiotics improved to 74 minutes.

### Discussion

The use of triage standing orders improves time to antibiotics for infants undergoing a serious bacterial infection evaluation. Increased use, associated with nurse empowerment to drive the flow of these patients, leads to a joint-responsibility model within the emergency department. The cultural shift to allow nurse-initiated work-ups leads to sustained improvement in time to antibiotics.

## FULL TEXT

### Contribution to Emergency Nursing Practice

- The current literature on the management of neonates presenting to the emergency department for fever, hypothermia or other surrogate markers of serious bacterial infection shows a preference for early antibiotic administration but no specific recommendations or outcomes data for antibiotic timing exists.
- This article contributes a quality improvement project which demonstrates that the use of nurse triage standing orders to improve time to antibiotics for neonates undergoing evaluation for serious bacterial infection which may potentially lead to improved patient outcomes.
- Key implications for emergency nursing practice are that increased triage standing orders and associated nurse empowerment to drive the flow of patients, leads to a cultural shift to allow nurse-initiated work-ups, which leads to sustained improvement in time to antibiotics.

### Introduction Problem Description

Nurses and physicians noted delays in diagnostic work-up and antibiotic administration to neonates undergoing

evaluation for serious bacterial infection (SBI) in the Nationwide Children's Hospital emergency department. Other pediatric emergency departments have goals of obtaining all cultures and administering antibiotics to these patients within 60 minutes to 90 minutes of arrival because of their high risk for SBI. No formal goal or policy of early administration of antibiotics for these neonates existed in our emergency department. On inquiry, we found that infants aged 0 days to 28 days in our emergency department undergoing SBI evaluation received antibiotics an average of 192 minutes after arrival, well above comparable hospitals' goals.

### **Available Knowledge**

Infants aged 0 days to 28 days commonly visit the emergency department with the chief complaint of fever or other surrogate markers of SBI or sepsis such as hypothermia, lethargy, fussiness, and vomiting.<sup>1,2</sup> Serious bacterial illness, including urinary tract infection, bacteremia, and meningitis, occurs in 8% to 13% of neonates, although it may occur in 20% of infants aged less than 4 weeks, with risks for complications and mortality.<sup>1,3,4</sup> Many clinical-decision tools have been created to risk-stratify febrile neonates, but they often exclude younger infants aged less than 21 days to 28 days, or it is noted that these decision tools are less reliable in neonates aged 0 days to 28 days.<sup>5-7</sup> Although there continues to be a wide variability in the care of febrile infants, the United Kingdom National Institute for Health and Care Excellence guidelines include evaluation of blood, urine, and cerebrospinal fluid (CSF) cultures and admission with empiric antibiotics for all infants aged 0 days to 28 days and measured fever of 38°C (100.4°F) or more. These guidelines are echoed within the United States' literature and include similar evaluations for other surrogate markers of infection.<sup>8,9</sup> There are no guidelines for the timing of antibiotic administration in neonates being evaluated for SBI.

There are no available published data regarding the timing of antibiotics within the emergency department and association with outcomes in infants presenting with fever or undergoing an SBI evaluation. There are data showing improved outcomes and mortality in pediatric patients with sepsis with early antibiotic administration.<sup>10,11</sup> Thus, because infants aged 0 days to 28 days are at high risk for SBI and often do not show other signs of severe sepsis until later in their course, it is generally accepted that early administration of antibiotics is preferred.<sup>1,2</sup>

Delays in diagnostic evaluation, length of stay, and subsequent administration of antibiotics in emergency departments can be multifactorial. A previous study showed that time to antibiotics in infants undergoing evaluation for SBI is related to ED volumes.<sup>12</sup> Multiple studies demonstrate that chief complaint-based triage standing orders (TSOs) lead to substantial reductions in ED length of stay in adult emergency departments, while validating that TSOs allow emergency nurses to accurately order the appropriate diagnostic tests.<sup>12-16</sup> In addition, the Emergency Nursing Association position statement asserts that TSOs are useful in improving flow, increasing patient safety, and expediting care.<sup>17</sup> Specifically, a few studies show that emergency nurses' use of TSOs decreases delays in diagnostic work-up and total ED length of stay for pediatric patients with extremity fractures.<sup>16,18</sup>

### **Rationale**

Our emergency department previously saw improvement in time to antibiotic administration in high-risk patients, such as patients with febrile neutropenia or fever in patients with sickle cell disease, with the implementation of formal quality improvement (QI) projects. In addition, other hospitals have shown improved adherence to pediatric advanced life support and septic shock protocols with QI projects.<sup>19,20</sup> Our department noted improvements in other "time to" projects with decreased time to order placement. Thus, the study authors felt that concerns over delays in antibiotic administration for these infants could be addressed effectively by the Institute for Healthcare Improvement's QI improvement model and pursuing the use of TSOs to mitigate some of the largest barriers in time to antibiotic delays.

### **Specific Aims**

The QI team aimed to increase the percentage of neonates aged 0 days to 28 days undergoing an evaluation for SBI in the emergency department who receive antibiotics within 120 minutes of arrival from baseline 19% to 80% by June 30, 2018, and sustain this for at least 6 months. The secondary goals included decreasing time in minutes from ED arrival to antibiotic administration in the target population and increasing TSO use for eligible infants. This article demonstrates how emergency nurse TSOs led to a decrease in time to antibiotics in our pediatric emergency department.

### **Methods Context**

The Nationwide Children's Hospital pediatric emergency department, a level 1 trauma center at a freestanding tertiary care pediatric hospital, cares for more than 90,000 patients annually. Patient data were extracted from the electronic medical record. Patients were included if they were aged 0 days to 28 days at ED presentation, were admitted to the hospital from the emergency department, and were undergoing an evaluation for SBI. Most included infants presented with a chief complaint of fever. However, as neonates manifest other surrogate indicators of SBI such as hypothermia, lethargy, fussiness, and apnea, all patients aged 0 days to 28 days receiving empiric antibiotics (ampicillin, cefotaxime, gentamicin, or vancomycin, or the antiviral acyclovir) were also screened for inclusion. The exclusion criteria included parental refusal of medications or work-up, or receiving antibiotics before ED arrival. Infants with an isolated infection who did not receive the full SBI evaluation, including blood, urine, and CSF cultures, were also excluded. The authors retrospectively reviewed charts from the baseline period and each month of the project period to ensure appropriate capture of the target patient population.

A robust list of emergency nurse TSOs exists in our emergency department, including administering acetaminophen or ibuprofen for fever or pain and ordering X-rays for suspected fracture. The hospital approved a febrile neonate TSO in fall 2015, which included intravenous (IV) placement, urine catheterization, and ordering blood and urine studies before the physician's evaluation for neonates aged 0 days to 28 days with a recorded temperature in the emergency department of 38°C (100.4°F) or more (Figure 1). Before initiating our QI project, febrile neonate TSO use was negligible. Not all neonates aged 0 days to 28 days undergoing an SBI evaluation were eligible for the TSO. Only patients with a documented fever in the emergency department were eligible; however, the TSO did target a key subset of the total target population. Our hospital institutional review board deemed this study QI, not human subject research, and therefore exempt from institutional review board approval.

### **Interventions**

We identified the initial problem in fall 2015, and our QI planning team was formed in spring 2016. The QI team used the Institute for Healthcare Improvement's Model for Improvement with Plan-Do-Study-Act (PDSA) cycles.<sup>21</sup> The QI team consisted of emergency nurses, physicians, pharmacists, and QI analysts. The team began meeting in spring 2016, and a key driver diagram was created after brainstorming sessions and process mapping to identify common barriers to antibiotic administration. Specific interventions and associated PDSA analysis began in July 2016.

The key driver diagram identified multiple processes resulting in delays in antibiotic administration, including delays in nurse and physician assessment, delays in physician orders, and difficulties performing venipuncture, bladder catheterization, and lumbar puncture. Our hospital's and emergency department's preference is to obtain all urine, blood, and CSF cultures before administering antibiotics. The QI team felt that increasing TSO use would address delays in physician ordering by allowing nurses to initiate evaluations and decrease delays in obtaining urine and blood studies and in IV placement.

The team completed regular education on a rolling basis to increase TSO use to nursing and support staff throughout the study period from July 2016 to December 2018. Our PDSA cycles used multiple modalities of education, including presentations at shift sign-outs and nursing leadership meetings, new staff orientation, flyers



posted throughout the emergency department, and the staff newsletter. A general improvement in TSO use occurred after each educational intervention, but TSO use would then gradually decline. As TSO use declined, we implemented a new round of education targeted at the most recently identified knowledge gap, whether it be new staff orientation, or eligibility criteria, and so on. A specific PDSA intervention distributed and analyzed an online survey administered through the REDCap website (Vanderbilt University).<sup>22</sup> This survey assessed nurses' awareness of TSO availability and eligibility criteria in June 2017.<sup>23</sup> Subsequent educational interventions targeted knowledge gaps identified by this survey, specifically TSO availability for new staff and reminders of eligibility criteria. Beginning in November 2017, the team sent e-mails to nursing staff with direct feedback of kudos and misses for patients eligible for TSOs.

Physician-dependent activities, including placing additional blood and urine study orders, ordering antibiotics, and performing a lumbar puncture for CSF, denoted another barrier. One PDSA cycle initiated in February 2017 provided educational presentations and flyers to physicians to reinforce project goals, improve order-set use, and encourage timely performance of lumbar punctures. The feedback from these educational presentations resulted in the creation of a streamlined order set in conjunction with the resident house staff and Infectious Disease attending staff in May 2017. The goal of the order set was to eliminate the need for repeat lab draws or adjustment of antibiotics by providing a consensus recommendation by the emergency department and admitting Infectious Disease service. An additional PDSA from January 2018 to June 2018 provided direct feedback on the length of time until CSF procurement and subsequent total time to antibiotic administration kudos or misses to physicians.

The QI team noted care-team communication as the final barrier. Our QI team was primarily made up of nursing staff, and through their leadership the entire department's nursing staff embraced increasing TSO use, which resulted in improvements in time to initial IV placement and obtaining blood and urine cultures. However, the QI team identified ongoing delays in the physicians' patient assessment, antibiotic ordering, and obtaining CSF cultures through lumbar puncture. In response, the team added a communication flag to the TSO in May 2017 directing the nurses to communicate to notify the ED attending once the TSO was activated. In addition, the team noted that by emphasizing goals to administer antibiotics within 120 minutes, nursing staff occasionally began initiating antibiotics before obtaining all cultures. The literature varies regarding the impact that antibiotic pretreatment has on culture sterilization and pathogen identification; thus, it is our hospital's preference to obtain cultures before initiating antibiotics.<sup>24-26</sup> To reflect hospital preference, the QI team added a nursing communication order attached to the physician's antibiotic order set requesting that the nurse verify with the ED attending or fellow prior to starting antibiotics. This encouraged team communication regarding ED patient flow and timing of cultures and antibiotic administration. All these PDSA cycles encouraged regular communication regarding delays and barriers in ED flow for the target population among the ED team.

## Measures

Initial data on 367 patients were collected from July 2014 through December 2015. Data from this time period were used to establish baseline performance metrics for the QI aim statement. From January 2016 to June 2016, the authors validated the data report through a monthly chart review to ensure appropriate capture of patients (N = 111) before initiation of the interventions in July 2016. During the project implementation period, July 2016 to December 2018, the data report and patient charts were reviewed each month to verify the patients' inclusion and exclusion criteria. A total of 684 patients met the inclusion criteria during the project implementation period, July 2016 to December 2018. Overall, 1,162 patients met the inclusion criteria between July 2014 and December 2018 and were included in the statistical process control (SPC) charting. The data collected included patient demographics (age and gender), initial ED temperature, arrival time, TSO use, order time and administration time for antibiotics, ED length of

stay, and admission unit and referring facility.

### **Outcome measures**

Our primary outcome measure was the percentage of infants aged 0 days to 28 days undergoing an SBI evaluation in our emergency department who had antibiotics initiated within 120 minutes of ED arrival. Although we had an ultimate goal of administering antibiotics in 60 minutes or less, we felt that an initial aim of 120 minutes or less was justified owing to the low initial baseline and institutional preference to delay antibiotics until all cultures were obtained. Our secondary outcome measure was time in minutes from ED arrival to antibiotic administration, which is a surrogate for ED length of stay. In our emergency department, antibiotic administration is the final step in ED care before patients are ready for transfer to an inpatient unit. Delays in transfer are likely multifactorial and related to ED crowding, inpatient unit crowding, delays in sign-out communication between providers, transportation staff availability, registration, and so on. Therefore, time from arrival to antibiotic administration more accurately reflects the length of stay outcome measure than the actual length of stay. We also monitored ED length of stay in minutes for the target population.

### **Process measure**

Our process measure was the percentage of TSO use in TSO-eligible patients (infants aged 0 days to 28 days with documented fever of 38°C [100.4°F] or more). The team sought 100% use of the TSO in eligible patients.

### **Balancing measure**

Our balancing measure was ED length of stay for all patients classified emergency severity index (ESI) level 2 seen in our pediatric emergency department.<sup>27</sup> All included infants met ESI level 2 criteria. We sought to ensure that the focus on the care of our targeted patients did not negatively affect the time to admission for other patients classified ESI level 2.

### **Analysis and Study of the Interventions**

To assess the impact of the interventions, we used SPC Shewhart charts for analysis of process variation and measurement of process performance. The SPC tool enabled the improvement team to define sequential process stage means, demonstrating improvement over the course of the project.<sup>28</sup> The calculation of control limits was based on process average and the within-subgroup estimate of the SD, with 3 sigma limits based on a normal distribution of the data. The subgroup size was factored into all our SPC control charts, and given that the number of included patients varied month to month, the charted upper and lower control limits also varied. Nelson rules directed centerline shifts.<sup>28-30</sup> The authors are planning a follow up, companion manuscript, which will discuss the QI methodology employed at our institution. In a future manuscript, we will address (1) use of Nelson rules to determine common cause versus special cause variation, (2) application of Nelson rules to determine significant improvement through centerline shifts, (3) calculation of upper and lower control limits, (4) preintervention SPC charting to establish a preintervention baseline to justify centerline shifts, and (5) ongoing interval charting to show stable improvement over time.

All measures were plotted monthly using SPC methods. The primary outcome measure of percentage of infants receiving antibiotics in less than 120 minutes was analyzed with a p-chart.<sup>29</sup> The secondary outcome measure of average time in minutes to antibiotics each month was analyzed with an Individual or "X-bar" chart. The TSO use process measure was analyzed using a p-chart. The balancing measure of average length of stay in minutes per month for all ED patients classified ESI level 2 was analyzed with the Individual or "X-bar" chart.

To further analyze our primary outcome measure, Stata version 15 statistical software (StataCorp LLC) was used to perform significance testing where a *P*-value 31.<sup>32</sup> A post hoc analysis using SAS Enterprise Guide version 8.1 statistical software (SAS Institute Inc) was performed to determine power and recommended sample sizes.

## Results

Our primary outcome measure of the percentage of infants receiving antibiotics within 120 minutes of arrival had an initial baseline of 19% (Figure 2). Our initial aim was to approximately double the baseline from 19% to 30%. In applying the Nelson rule of a point outside of the upper control limits and 8 consecutive points on 1 side of the centerline, a centerline shift on the p-chart occurred in January 2017, from 19% to 77%, after the initiation of our interventions in July 2016. After far surpassing our initial goal of 30%, we adjusted our aim in December 2017 to a goal of 80% by June 30, 2018, to be sustained through December 31, 2018. We reached this goal after another shift on the p-chart in January 2018 to an average of 84%.<sup>28</sup>

Our secondary outcome measure of average time in minutes from ED arrival to antibiotic administration also showed improvement with a centerline shift through application of the Nelson rule of 8 consecutive points on 1 side of the centerline from a baseline of 192 minutes to 99 minutes in December 2016. A second centerline shift followed a shift in our primary outcome measure, with improvement of average time to antibiotics of 74 minutes in March 2018, which was sustained through December 2018 (Figure 3). We did monitor average length of stay for neonates receiving an SBI evaluation, and a minimal improvement from a baseline average of 274 minutes to an average of 261 minutes was achieved during our intervention period. However, the delays with transfer from the emergency department to the inpatient unit and, subsequently, the ED length of stay were multifactorial as noted previously and were out of the scope of our QI team's capability and goals. Thus, we felt that this significant improvement noted in Figure 3 was a more accurate reflection of outcomes, with length of evaluation rather than ED length of stay.

The process measure of TSO use for eligible patients showed a centerline shift from the baseline of 20% to 72% in April 2016 (Figure 4). As expected, this preceded the outcome measure mean shift seen in January 2017 (Figure 2). During the 30-month project period, we reached our goal of 100% TSO use in eligible patients in 9 months. Because the overall increased percentage of TSO use was sustained, this led to our second centerline shift in our primary outcome measure in January 2018 (Figure 2).

The balancing measure of average length of stay in minutes for patients classified ESI level 2 seen in our pediatric emergency department showed no change (Figure 5).

To validate our outcome measure centerline shifts, we conducted a *t* test. We compared our baseline average from July 2014 through December 2015 ( $N = 367$ ) with the new average that occurred from January 2017 through September 2017 ( $N = 196$ ). The percentage of infants receiving antibiotics within 120 minutes of arrival was found to be statistically significant because it increased from an average of 19% during our baseline period to the new average of 77% in January 2017 ( $t$  estimate  $-16.031$ ; 95% CI  $-0.592$  [ $-0.675, -0.509$ ];  $P < .001$ ). We are writing a companion manuscript for an additional description of SPC charting applications.

## Discussion Summary

Through our interventions, we achieved our goal of 80% of newborns with suspected infection receiving antibiotics within 120 minutes of ED arrival and sustained this improvement for 6 months. TSO use by emergency nurses most significantly affected our ability to reach and exceed our goals. This project showed that emergency nurse TSOs can decrease time to antibiotics in neonates undergoing an evaluation for serious bacterial illness.

## Interpretation

Increased TSO use directly correlated with our improvement in outcome measures. The TSO allowed nurses to initiate the SBI evaluation on eligible neonates before physician assessment, and it improved early recognition and nursing assessment of this high-risk population. TSO use increased before the formal project implementation, likely because of the Hawthorne effect on the nursing staff because of their involvement in the QI project planning.<sup>34</sup> The sustained improvement in TSO use (Figure 4) correlated with the mean shifts in outcomes that occurred 6 months and

9 months after project implementation (Figures 2 and 3). This positive correlation leads us to believe that TSO use creates sustained improvement in time to antibiotic administration outcome measures.

Our study shows that emergency nurse TSOs could potentially lead to improvement in outcomes. Although reporting of patient outcomes such as morbidity or mortality was out of the scope of our QI project, our project demonstrates that TSO use improved time to antibiotics in our pediatric emergency department. Other studies show that early antibiotic administration positively correlates with improved patient outcomes such as mortality.<sup>11,24,35-37</sup> As such, emergency nurse TSO implementation and use may be correlated with improved patient outcomes.

Overall TSO use showed sustained improvement, although we only met our goal of 100% use in 27% of the 30 months of our project period. To be eligible for TSO activation, a fever had to be measured in the emergency department; however, our study included all infants being evaluated for SBI, including those with hypothermia, fussiness, or fever measured at home by parents before arrival. As such, only a small percentage of the included patients were eligible for TSO use. Given that the number of eligible patients varied from 0 patients to approximately 12 patients per month, 100% use during some months was a reflection of the practice of a few emergency nurses, and the barriers to achieving 100% TSO use were likely owing to the knowledge gaps noted previously. However, we saw through our project that as overall TSO use improved, our outcome measures also improved. Thus, the sustained improvement in TSO use may have more accurately reflected the culture shift of the emergency nurses' engagement and empowerment.

The authors feel that the emergency nurses' engagement with, and ownership of, this project led to the improvements seen and that we would not have reached our aim without nursing staff engagement. The emergency nurses on the QI team assisted in identifying barriers, brainstormed interventions, and drove education. Empowered to drive the ED flow of these patients, the nurses roomed and assessed these patients quickly, even notifying physicians of target patients who were not eligible for the TSO to expedite these patients' care. The nurses asked for quick physician assessments, encouraged rapid IV placement, called on support staff to help hold patients for procedures, and reminded physicians to place orders quickly and perform lumbar punctures efficiently. Nurse ownership led to a culture change of nursing staff driving the ED flow and care of these patients. Anecdotal feedback to the QI team indicated improved team dynamics and physician-nurse communication as they worked together to reach project goals.

As next steps, the QI team is continuing to work on additional interventions. We hope to add an electronic medical record best practice alert pop-up for the triage nurse, allowing TSO ordering with 1 click for eligible patients. The ease of ordering and immediate reminder of TSO availability for eligible patients could eliminate the barriers of specific nurse knowledge gaps and allow us to reach our process measure goal of 100% TSO activation for eligible patients. The alert would also continue to remind the nursing staff of project goals and encourage nurse empowerment to expedite physician orders and ownership of patient flow. Second, the emergency nurse leadership elicited feedback that newer nurses may feel uncomfortable initiating work-ups or discussing the need for nurse-initiated orders before physician assessment with parents. Therefore, the team created a parent education handout that discussed the need for an SBI evaluation in neonates; the recommended work-up and treatment, including antibiotics; and the expected ED and hospital course. This handout was approved in fall 2019 and is now being used. In addition, our team added hypothermia to the TSO eligibility criteria, thus increasing the number of targeted infants eligible for the TSO. Our team is also currently exploring if the decrease in time to antibiotics led to any change in patient outcomes of this population.

### **Limitations**

Several limitations exist with this project. Our hospital has a robust quality and safety culture with extensive

supporting resources. A lack of QI infrastructure and project engagement at other hospitals may make this project difficult to implement. In addition, the improved outcome measure resulted from repeated education cycles, which are time- and resource-intensive. Furthermore, some facilities may not approve similar TSOs, especially in pediatric patients, which might limit generalizability. In addition, although we were able to show an improvement in time to antibiotics, which is a surrogate for length of stay or ED evaluation, patient outcomes, including morbidity or mortality, were out of the scope of this project. In addition, many hospitals have different guidelines regarding the recommended evaluation for neonates presenting with fever or other surrogate markers of infection, recommended timing of antibiotics in relation to obtaining cultures, and admission recommendations, which may limit the generalizability of this project. Finally, although we acknowledge that this project does not address any concurrent changes that may have contributed to reaching outcome goals, the results seen in our outcome measures seem to stem directly from our interventions and correlate with the changes in our process measure. Thus, we can attribute causality from our interventions to the results based on QI methodology and research.<sup>38</sup>

### Conclusion

We decreased our time to antibiotics in infants aged 0 days to 28 days undergoing evaluation for SBI in this single-center QI project. The implementation of nursing triage orders positively affected the achievement of the project aim. These results may be used with other disease processes and ED evaluations to improve “time to” goals or ED work flow.

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### Author Disclosures

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## Beyond the Horizon: Pathways to our Vision: JEN

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### ABSTRACT (ENGLISH)

While searching for guidelines to present before the committee, I began to develop a proposal for a preceptorship course that would standardize and upgrade the level of education and intervention for emergency nurses. "Oh, I know, I'll contact my friend in the continuing education department at the university." In the fall of 1972, an editor from *RN* magazine wrote an article about the certification course.<sup>1</sup> This publicity led to the acceptance of the Certified Emergency Department Nurse certification by the emergency departments of many local hospitals.

## FULL TEXT

It was midsummer 1970. I received a call to meet a family whose young son had just entered the local emergency department. The child was admitted, yet specific intervention was not forthcoming because the family was waiting for the doctor, who was not readily available. Their wait was long and worrisome.

"Is there anything that can be done?" I inquired of the nurse, as time elapsed. "I am sorry, but we do have to wait for their physician," was the response I received.

Recognizing that the nurse was also troubled by the delay, I began to think, "There must be some way for emergency nurses to intervene with standing orders." I pondered this thought throughout the night and decided that something must be done.

The following morning, I contacted the Emergency Medical Care Committee for the county. While searching for guidelines to present before the committee, I began to develop a proposal for a preceptorship course that would standardize and upgrade the level of education and intervention for emergency nurses. Eventually I was invited to present my proposal, but received a rejection with the explanation that this was not in the committee's scope of performance.

"This won't stop me," I thought as I pondered my next steps. "Oh, I know, I'll contact my friend in the continuing education department at the university."

What happened next was truly an exciting miracle. Over the course of the next year (1971) a preceptorship course was designed and developed using didactic principles and implementing an ongoing practicum.

Nurses, physicians, and attorneys developed and provided their area of expertise in preparation for the launching of the course in February 1972. Word spread like wildfire, with a surprising course enrollment of 80 nurses from throughout the county.

The university created a certification, which was issued at the completion of the course. This certification was registered as Certified Emergency Department Nurse.

In the fall of 1972, an editor from *RN* magazine wrote an article about the certification course.<sup>1</sup> This publicity led to the acceptance of the Certified Emergency Department Nurse certification by the emergency departments of many local hospitals.

One day in early 1973, I received a phone call from a Mr. B. Wallace Hood, the nursing editor for the C.V. Mosby Publishing Company. "Hello, is this Carmen Warner Sproul?" The voice was strange to me, so I hesitated a moment before slowly answering, "Yes, it is."

The voice continued, "My name is Mr. Hood from C.V. Mosby, and I read the article that was just published in *RN* magazine."

"Yes, I know about the article," I responded hesitantly.

"Well," Mr. Hood paused, before continuing, "based on your course I would like to help you publish a book."

"A book?" I questioned. "I don't understand, you see, I don't know anything about publishing."

"Well let me tell you," he interrupted, "you already have the material for the book as presented in your course. I will help you each step of the way."

Well, Mr. Hood was right. The book, *Emergency Care: Assessment and Intervention*,<sup>2</sup> became a reality in the late fall of 1973, with a 1974 publication date. Yes, the seed was planted and a small vision of what possibly might be, after dreaming, hoping, and searching beyond the horizon, indeed became a reality.

So now, in our 50th year, are we not still searching beyond the horizon? Are we not being challenged to embark on new and greater pathways toward our vision? Remember, *nothing is impossible*.

Each one of us has been blessed with many gifts, abilities, and talents that God will never take away. It is time for each of us to reach for our greatest dream, to implement our fullest potential, and to celebrate even greater things to come. Let us set the pace for what will achieve excellence, elevate standards, and make a difference in the bright exciting future of emergency nursing.

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# Infection Control and Vaccine Hesitancy in the Emergency Department: JEN

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## ABSTRACT (ENGLISH)

At the time of writing this editorial, severe acute respiratory syndrome coronavirus 2 vaccines are being tested in clinical trials, and it remains uncertain if the ED setting will have a crucial role in a mass vaccination campaign as part of the ongoing pandemic response. However, we do anticipate that the emergency nurse will have a crucial role in assessing and addressing pandemic-related delays in routine childhood vaccinations in pediatric emergency settings.<sup>1</sup> In this timely context, the purpose of this editorial is to introduce a collection of infectious disease manuscripts published in this issue of the *Journal of Emergency Nursing (JEN)* and briefly introduce a framework of vaccine hesitancy relevant to emergency clinical practice.

## FULL TEXT

The emergency department is a crucial point of access to the health care system for patients with the initial signs and symptoms of infectious disease, as well as for patients in need of emergent prophylaxis after occupational or crime-related blood and body fluid exposures. Emergency nurses frequently care for patients with vaccine-preventable infections across the lifespan. Examples of these vaccine-preventable diseases range from reactivation of varicella zoster (shingles) or *Streptococcus pneumoniae* in the older adult, hepatitis B from an occupational exposure in a working-age adult, meningitis in the university student, to measles or chickenpox in young children. Owing to the overall success of vaccine programs and related infectious disease control and prevention measures,

many emergency clinicians may have no individual experience with specific vaccine-preventable diseases in practice. Despite this widespread lack of personal clinical experience, we must remain prepared and vigilant for the signs and symptoms of vaccine-preventable infection presentations through frequent professional development and refresher educational content. When well prepared, the clinician can rapidly identify the rare, yet high-stakes, infectious disease case presentation to ensure that isolation precautions, diagnosis, or treatment are not delayed. For example, in my own emergency nursing practice I found that the distinct presentation of the pertussis cough was straightforward to identify early and initiate proper interventions, whereas the vague and prolonged presentation of mumps was subtle and easy to overlook, masquerading as a dental emergency. Environmental controls and isolation precautions to limit infection transmission have been the top priority of emergency departments across the globe this year in response to the coronavirus disease (COVID-19) pandemic. This editorial includes an Emergency Nurses Association infographic about the chain of infection in the <sup>Appendix</sup>. At the time of writing this editorial, severe acute respiratory syndrome coronavirus 2 vaccines are being tested in clinical trials, and it remains uncertain if the ED setting will have a crucial role in a mass vaccination campaign as part of the ongoing pandemic response. However, we do anticipate that the emergency nurse will have a crucial role in assessing and addressing pandemic-related delays in routine childhood vaccinations in pediatric emergency settings.<sup>1</sup> In this timely context, the purpose of this editorial is to introduce a collection of infectious disease manuscripts published in this issue of the *Journal of Emergency Nursing (JEN)* and briefly introduce a framework of vaccine hesitancy relevant to emergency clinical practice.

### **Infectious Disease Manuscripts in this Issue of *JEN***

This is our final issue for 2020, a special year of celebration because both the International Council of Nurses and Nursing and the World Health Organization's designated Year of the Nurse and Midwife coincides with the Emergency Nurses Association's 50th Anniversary. In each 2020 issue, we have reprinted a *JEN* article from one of the Emergency Nurses Association's 5 decades. With our recent experience with the second severe acute respiratory syndrome (SARS) pandemic, we reprint the timely "Responding to the Severe Acute Respiratory Syndrome (SARS) Outbreak: Lessons Learned in a Toronto Emergency Department" from the first global SARS pandemic in 2003.<sup>2</sup> This *JEN* issue also includes 7 COVID-19-specific manuscripts.<sup>3-9</sup> As the state of knowledge and evidence-based practice have been rapidly evolving in the pandemic, the manuscripts reflect updated knowledge at the time of submission. These manuscripts provide crucial evidence and practice application for both the ongoing pandemic response as well as reference material for future infectious disease prevention and response stages. Before community spread, Schwedhelm et al<sup>7</sup> relay their continuous improvement updates on their facility's triage symptom and travel management intervention to rapidly identify highly hazardous communicable diseases such as Middle East Respiratory Syndrome, SARS, and Ebola. The authors provide a noteworthy example to all emergency departments about the importance of maintaining infectious disease screening practices and quality improvement efforts between epidemics and pandemics as a proactive, and not just reactionary, strategy to protect ED personnel and other patients from pathogen exposure and cross-infection in the waiting and treatment areas. Frontline clinicians in hospitals in Wuhan, China, where the COVID-19 pandemic response began, surveyed 297 health care workers about safety measures, training, and discomforts associated with personal protective equipment (PPE) donning, wearing, and doffing.<sup>8</sup> The authors Xia et al<sup>8</sup> relay their pragmatic lessons learned, with recommendations for staffing, limitations in direct patient care hours, PPE education, and measures to increase clinician comfort during PPE wear. COVID-19 clinical review and overview of the nursing care essentials are provided by Deitrick et al,<sup>6</sup> whereas Hu et al<sup>4</sup> enable an international perspective on the nursing care essentials for patients in isolation while suspected of, but not yet confirmed with, a severe acute respiratory syndrome coronavirus 2 infection. Still situated in time at the early pandemic response, Hou et al<sup>5</sup> analyze the perceptions of pandemic preparedness among nurses in Taiyuan, Shanxi Province, China. The expressions of trust that the emergency nurses relayed in the hospital's policy and operational response are striking, particularly when the reader contrasts the findings with the experiences of nurses in settings where the pandemic was a stressor that exacerbated pre-existing limitations in the PPE supply, highlighted a previous lack of investment in sufficient emergency nursing

workforce numbers and training, or revealed misaligned incentives that fail to adequately prioritize the health and well-being of the nursing staff or patient over short-term financial profits. For the most critical patients with severe COVID-19, intensive care experts Tu et al<sup>3</sup> publish their case reviews of patients treated with extracorporeal membrane oxygenation as a clinical reasoning resource to introduce, refresh, and deepen the emergency nursing knowledge of overall extracorporeal membrane oxygenation management. Furthermore, Dundin et al<sup>9</sup> developed a program to improve palliative care in the emergency department as part of disaster preparations for a COVID-19 surge. Providing compassionate and dignified end-of-life care in the emergency department is a long-standing and patient-centered practice where the emergency care sector has demonstrated a clear need for specialty-wide improvement.<sup>10-12</sup> Like many well-designed disaster preparedness programs, the actual disaster did not create the full need for the planned program as the authors had anticipated, but the program development process, template, and educational tools are included here in *JEN* as a resource for program replication and testing in other emergency departments, regardless of pandemic conditions.<sup>9</sup> This issue of *JEN* also includes infectious disease-related manuscripts on topics of Ebola,<sup>13</sup> HIV,<sup>14</sup> rabies,<sup>15</sup> and PPE,<sup>8,13</sup> vaccine,<sup>16</sup> antibiotic,<sup>17</sup> antipyretic,<sup>18</sup> and phlebotomy<sup>19</sup> interventions.

### **Vaccine Hesitancy Framework**

Vaccine hesitancy refers to an attitude of reluctance based on concerns, uncertainties, and doubts about vaccines that may lead to behaviors of delaying or declining to receive a vaccine, many vaccines, or all vaccines.<sup>20</sup> For readers engaged in leadership on a national, state, or large organizational level, the World Health Organization's Strategic Advisory Group of Experts on Immunization has developed *The Guide to Tailoring Immunization Programs* as a toolkit for vaccine program planning and development.<sup>21</sup> Evidence evaluating the success of the toolkit's implementation is evolving and ongoing. Although there is extensive evidence to validly measure and describe vaccine hesitancy, there is no strong evidence on any specific clinical or public health intervention to successfully enhance vaccine acceptance, overall.<sup>22</sup> Nurse outreach and education, including home visits and education in partnership with pharmacists where the nurse administers the vaccine, demonstrate the strongest association with increased influenza vaccination rates in older adults.<sup>23</sup> Alternatively, for children, a combination of education handouts, text messaging, and removing cost barriers have demonstrated initial efficacy to increase influenza vaccination rates in children.<sup>24</sup> There are also published case studies in nurse-led programs, with evidence from key informants on the pragmatic lessons learned, to increase vaccination rates in the most recent United States measles outbreak.<sup>25</sup> The colossal gap in the research literature on the efficacy of vaccine hesitancy interventions demonstrates the need and opportunity for rigorous emergency nursing science on the topic.

Most vaccine hesitancy interventions in the published literature focus on raising group/individual knowledge and awareness, but fail to address the valid concerns and negotiated care partnerships that many patients and families require to build trust and contextualize conflicting information.<sup>26</sup> Although the evidence must be interpreted in light of the moderate research design quality, dialogue-based interventions where the individual patient or group is able to express personal reasons for vaccine hesitancy and negotiate care or receive personalized education were most effective in addressing vaccine hesitancy.<sup>25,26</sup> Nurses and other vaccine providers also report a perception that rapport and clinician-patient relationships are priorities in successfully overcoming vaccine hesitancy through nonjudgmental listening, personal examples, and individual counseling.<sup>20,27</sup>

During the health history, health care record review, patient assessment, patient education, and counseling interventions of the emergency care encounter, the emergency nurse is in a key position to identify missed or delayed vaccines and vaccine hesitancy.<sup>1</sup> Although these activities may not be the clinical priority in many emergent patient cases, vaccine-focused interventions can be lifesaving during patient encounters with pediatric, vaccine-preventable illness case contacts, or patients at high risk for morbidity and mortality from infectious disease. Given that the current evidence, although of poor to moderate quality in research design, indicates that nurse-led and dialogue-based patient-clinician relationship building are key to overcoming vaccine hesitancy, the vaccine hesitancy framework (Figure) is presented here to aid the emergency clinician in conceptualizing and assessing the root cause(s) of the patient's or caregiver's vaccine hesitancy.<sup>1,25,28-31</sup>

The 3 levels of the vaccine hesitancy framework are vaccine, group/individual, and context. Various factors are underlined in the following discussion, and presented in the Figure. Eight vaccine-related factors that the emergency clinician can assess are listed in the bottom row of the Figure. On the basis of the route of administration, patients and families may have more hesitancy owing to fear and anxiety related to injection procedures. The emergency nurse can use best-evidence nonpharmacological interventions during all needle-related procedures to reduce procedural pain and anxiety, and potentially alleviate future vaccine hesitancy.<sup>32</sup> The simple convenience of offering vaccines to nonurgent patients in the emergency department may overcome access, cost, or contextual geography barriers, but must be adequately resourced and staffed so as not to interfere with the clinical priority and flow of the department.<sup>16</sup> Some parents may have concerns about the number of vaccines included in 1 injection, or desire personalized control over the temporal spacing of vaccines (recommended vaccine schedule).<sup>33</sup> The expert emergency nurse can prepare to provide specific education and information in these instances on immune system function, differences in immune response by age group, and the mechanism of action by type of vaccine: live attenuated, inactivated, subunit, or toxoid. Finally, hesitancy based on the maturity of the vaccine or recency of the vaccine's development, and on any changes in formulations or preservatives may be logical and can be met with a transparent discussion about risks and benefits to both the individual patient and the community at large. It is noteworthy that the characteristics of those who are vaccine-hesitant vary by region,<sup>29,34</sup> and in many instances vaccine-hesitant parents can be highly educated.<sup>35</sup> Although the reliability of the vaccine supply is rarely a major ongoing issue in high-income countries, we face great uncertainty about how this will affect vaccine hesitancy when and if a COVID-19 vaccine is available. The emergency nurse is in a vital role to not just provide one-way education to patients and families who are vaccine-hesitant, but to also actively and nonjudgmentally listen, counsel, and personalize precise and respectful strategies to overcome vaccine hesitancy.

Individual/group factors tend to be the most frequent and influential factors contributing to vaccine hesitancy, depicted in the second row of the Figure.<sup>31</sup> Most interventions focus on working to increase knowledge and awareness about vaccines, vaccine schedules, and vaccine benefits. The emergency nurse can apply the vaccine hesitancy framework to practice as a way to fully assess the underlying factors that contribute to vaccine hesitancy in individual patients and families, and work to overcome these factors for improved vaccination rates.<sup>26</sup> The emergency nurse is in a crucial role to build trust in the health care system and provider, and consider ways in which to both validate and mitigate instances where trust was broken between the group or individual and the health care system in the past. The emergency nurse may consider honestly acknowledging racial inequalities, profiteering, and past reasons for broken trust (eg, the role of prescriptions in the opioid crisis) in the health care system as a truth and reconciliation effort to rebuild healing and trust, while sharing clear and concise information about vaccine risks and benefits. Supporting a culture that normalizes vaccination, while individualizing vaccine assessment, teaching, and care to the patient's and family's cultural norms about vaccines, provides holistic care. There is a wide variety of attitudes and beliefs about vaccines, many of which are fueled by misinformation. A recent publication by Marcus<sup>25</sup> also includes common vaccine misinformation and pre-scripted nurse responses, with links to supporting scientific evidence that can serve as educational resources and tools for emergency nursing practice. The emergency nurse can also consider obtaining more detailed information about past vaccine experiences and reactions, and prepare to share scientific information about the differences between reactions to the vaccine itself, to the vaccination procedure or a vaccination error, and other coincidental reactions that are unlikely to be due to the vaccine. The emergency clinician can also personalize education by guiding the patient through the differences in minor and severe vaccine reactions, as well as the pathophysiology of the likely underlying cause for the patient's past experience with adverse events.<sup>36</sup>

The third and broadest level of the vaccine hesitancy framework is context, which is depicted in the top row of the Figure. A key example of the influence of context can be found in the 2019 measles outbreak in the US, where most of those infected belonged to a social network among the Orthodox Jewish community.<sup>37</sup> The social network, trusted gatekeepers, and intersectionality of identities contributed to the views about vaccines and vaccine status in this outbreak. Similarly, the political process in regions where the policy on compulsory vaccination is up for debate can

become an area where patients and families receive conflicting information from people they trust or who have concerns with which they identify. In many instances, the emergency nurse is situated in their own geographic, faith, recreational, and other communities to be a trusted source of information about vaccines. Emergency nurses are also frontline witnesses to the tragedies of vaccine-preventable illnesses. Similarly, nurses are under-represented in the media, and emergency nurses' knowledge and experience in caring for patients with vaccine-preventable illness are key, and underused, resources in large-scale strategies in public education to overcome vaccine hesitancy.<sup>38</sup> In the policy arena, childhood vaccinations are often required for children to attend public schools, for occupational workers to continue in their jobs, and for older adults to obtain day care or remain in some care facilities. Despite the widespread public health benefits of vaccination, there are few to no laws or regulations about what is required to be ingested, inhaled, or injected into one's own or one's child's body in Western cultures; this can create a cognitive dissonance or unexamined sense of a violation of individual rights or cultural norms. In my own practice experience, there were several instances where we identified that compulsory vaccination was a traumatic trigger associated with the parent's or patient's childhood trauma or other major adverse life experience that involved a loss of control. The effectiveness of the emergency nurse's patient education can be enhanced, in these instances, by basing communication and information on the principles of a trauma-informed approach.<sup>39</sup> Many patients are vaguely aware of historic vaccine safety problems, which may lead to vaccine hesitancy and mistrust. The Centers for Disease Control and Prevention publishes clear and concise information about historical vaccine safety concerns on its website.<sup>40</sup> It is important that this information is not oversimplified or withheld from patients to continue to build a trusting clinician-patient relationship about vaccine hesitancy. The emergency nurse can use this information about historical safety concerns to validate the patient's own concerns, contextualize the information, and minimize existing fears or concerns about unaddressed or ongoing problems in a fact- and evidence-based but nonjudgmental approach about the processes and approvals linked to vaccine safety. If the nurse assesses that geographic factors are a barrier to vaccine attainment, updated lists of referrals and information sources about mass vaccine outreach schedules or incorporating seasonal vaccines into the ED workflow may be considered. Last, and an area ripe for nursing policy interventions, are pharmaceutical industry influences. Information about vaccine manufacturers, competing incentives, overall profits, profit from vaccine product lines, inspections, safety violations, and regulatory actions or sanctions should be easily and transparently disclosed to the public. For example, in the late 1990s and early 2000s, the US military was vaccinating members deploying to high-risk environments for anthrax. The vaccine supply was limited owing to multiple safety violations and a federal drug administration suspension.<sup>41</sup> A full and transparent understanding of the competing interests, financial incentives, and safety profile for each vaccine and vaccine manufacturer is not currently readily accessible for patients and health care professionals to logically address all elements of vaccine hesitancy in evidence-based information (Figure).

### **Health Care Professional Basic Vaccination Education Refreshers and Resources**

The most common vaccinations given in the emergency department are the Tdap (tetanus, diphtheria, and acellular pertussis) and Td (tetanus and diphtheria) boosters. Emergency nurses are also in an influential position to counsel patients and families on the importance of the full range of adult and childhood vaccinations, particularly for family members and household contacts of a patient with a diagnosed vaccine-preventable disease in the emergency department. The expert emergency nurse is prepared to answer questions and provide information on immune system function, types of vaccines (live attenuated, inactivated, subunit, and toxoid), vaccine components (including adjuvants and preservatives), vaccination routes, schedules, adverse events (frequency and severity), and processes to assure safety. The Table provides a list of freely available resources and links for health professional education and resources on vaccines. Most interventions that have been evaluated through research focus on raising the knowledge and awareness of individuals or groups, but the actual vaccination or vaccination rate must be included as the primary outcome of interest to demonstrate efficacy and effectiveness in future research.<sup>26</sup>

In conclusion, this editorial provides an introduction to the collection of infectious disease manuscripts in this issue of *JEN*, presents an overview of the vaccine hesitancy framework, and includes clinical resources for ongoing health professional education on vaccines. The COVID-19 pandemic crisis has illuminated the essential role of emergency

care in the prevention of, and response to, infectious diseases. We, the editorial team, are honored to continue to support the specialty's advancement and excellence with the work disseminated in *JEN*.

## Appendix

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Organization	Resource	Link
World Health Organization	Vaccine safety basics course (6 modules)	<a href="https://vaccine-safety-training.org/home.html">https://vaccine-safety-training.org/home.html</a>
Centers for Disease Control and Prevention	Immunization education and training	<a href="https://www.cdc.gov/vaccines/ed/index.html">https://www.cdc.gov/vaccines/ed/index.html</a>
Government of Canada	Immunization tools and resources for health professionals	<a href="https://www.canada.ca/en/public-health/services/immunization/health-professionals.html">https://www.canada.ca/en/public-health/services/immunization/health-professionals.html</a>
Immunization Action Coalition	Handouts for patients	<a href="https://www.immunize.org/handouts/view-all-patient.asp">https://www.immunize.org/handouts/view-all-patient.asp</a>

## DETAILS

**Subject:** Emergency medical care; Intervention; Patients; Human immunodeficiency virus--HIV; Childhood; Hospice care; Emergency services; Immunization; Leadership; COVID-19; Hospitals; Emergency preparedness; Pandemics; Nursing care; Midwives; Vaccines; Health education; Medical personnel; Sympathy; Infectious diseases; Coronaviruses; Counseling; Antibiotics; Patient-centered care; Pediatrics; Clinical medicine

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# Assessment of Emergency Triage Directives and Wait Times: JEN

[ProQuest document link](#)

## FULL TEXT

Dear Editor:

We read with interest the article entitled "Assessing the impact of ED triage directives on febrile oncology patient wait times" by Leveille et al.<sup>1</sup> The excellent protocol has shortened the disposition wait time, and we consider it a useful study for future emergency care treatment. We have been particularly interested in "febrile neutropenia" in lung cancer patients,<sup>2,3</sup> therefore we would like to discuss 4 issues. First, the median shortening in patient disposition wait time was 74 minutes, which was considered a relatively long-time reduction. Please let us know concretely whether this was just the patient waiting time, the provider's explanation time to patient, or the preparation time for antibacterial drug administration. What specific time was shortened? If there were no descriptions in the medical records about it, please let us know your speculation. Second, Figure 5A shows that waiting times for "admitted" patients were significantly shorter than those for "discharged" patients. Did this indicate that treatment for admitted

patients started earlier than that for discharged patients? If so, please let us know why. Third, we would like to know about the protocols. Did you use serum C-reactive protein or procalcitonin to assess inflammation? We do believe these indicators are important, and they can be measured in a short time. We would like to ask whether the authors did not use assessment criteria such as quick “sequential organ failure assessment” to evaluate sepsis. Fourth, the authors concluded that additional research will be conducted to confirm the results. If so, how many patients will be required statistically in the prospective study?—*Naomi Kayauchi, RN, Division of Nursing, Mito Medical Center, University of Tsukuba, Mito, Ibaraki, Japan; Katsunori Kagohashi, MD, PhD, Division of Respiratory Medicine, Mito Medical Center, University of Tsukuba, Mito, Ibaraki, Japan; and Hiroaki Satoh, MD, PhD, Division of Respiratory Medicine, Mito Medical Center, University of Tsukuba, Mito, Ibaraki, Japan; E-mail: hirosato@md.tsukuba.ac.jp*

## DETAILS

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# The Physical and Psychological Effects of Personal Protective Equipment on Health Care Workers in Wuhan, China: A Cross-Sectional Survey Study: JEN

[ProQuest document link](#)

## ABSTRACT (ENGLISH)

### Introduction

The purpose of this study was to rapidly quantify the safety measures regarding donning and doffing personal protective equipment, complaints of discomfort caused by wearing personal protective equipment, and the psychological perceptions of health care workers in hospitals in Wuhan, China, responding to the outbreak.

### Methods

A cross-sectional online questionnaire design was used. Data were collected from March 14, 2020, to March 16, 2020, in Wuhan, China. Descriptive statistics and  $\chi^2$  analyses testing were used.

### Results

Standard nosocomial infection training could significantly decrease the occurrence of infection (3.6% vs 13.0%,  $\chi^2 = 4.47$ ,  $P < 0.05$ ). Discomfort can be classified into 7 categories. Female sex (66.0% vs 50.5%,  $\chi^2 = 6.37$ ), occupation (62.7% vs 30.8%,  $\chi^2 = 5.33$ ), working at designated hospitals (44.8% vs 26.7%,  $\chi^2 = 5.17$ ) or in intensive care units (70.4% vs 57.9%,  $\chi^2 = 3.88$ ), and working in personal protective equipment for >4 hours (62.2% vs 39.2%,  $\chi^2 = 9.17$ ) led to more complaints about physical discomfort or increased occurrence of pressure sores (all  $P < 0.05$ ). Psychologically, health care workers at designated hospitals (60.0% vs 42.1%,  $\chi^2 = 4.97$ ) or intensive care units (55.9% vs 41.5%,  $\chi^2 = 4.40$ ) (all  $P < 0.05$ ) expressed different rates of pride.

### Discussion

Active training on infection and protective equipment could reduce the infection risk. Working for long hours increased the occurrence of discomfort and skin erosion. Reducing the working hours and having adequate protective products and proper psychological interventions may be beneficial to relieve discomfort.

## FULL TEXT

### DETAILS

<b>Subject:</b>	Safety measures; Risk reduction; Emergency medical care; Hospitals; Health care; Personal protective equipment; Workers; Discomfort; Complaints; Working hours; Equipment; Medical personnel; Coronaviruses; Psychological aspects; Infections; Mental health; COVID-19; Intensive care; Pressure ulcers
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# The Effect of Implementing Bar-Code Medication Administration in an Emergency Department on Medication Administration Errors and Nursing Satisfaction: JEN

[ProQuest document link](#)

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## ABSTRACT (ENGLISH)

### Introduction

Bar-code medication administration has been shown to reduce medication errors in inpatient settings with limited studies on its use in emergency departments. In addition, no studies have evaluated nursing satisfaction with implementing bar-code medication administration in an emergency department. This study was designed to determine the impact of implementing bar-code medication administration in an emergency department on medication errors and nursing satisfaction.

### Methods

This is a before-and-after study, with no control group, of a bar-code medication administration intervention conducted in a community hospital emergency department. Direct observation was used to compare medication error rates before and 3 months after implementing bar-code medication administration. The Medication Administration System—Nurses Assessment of Satisfaction survey was used to assess the impact on nursing satisfaction before and 1 month after bar-code medication administration implementation.

### Results

A total of 676 medication administrations were observed in the period before bar-code medication administration implementation and 656 after. The medication administration error rate preimplementation was 2.96% with “wrong dose” errors being the most common. After bar-code medication administration implementation, the medication administration error rate fell to 0.76%, a relative reduction of 74.2% (Fisher exact  $P < 0.01$ ). The average (SD) Medication Administration System—Nurses Assessment of Satisfaction score preimplementation was 2.60 (0.75) and improved to 2.29 (0.66) ( $t = 2.00$ ,  $P = 0.05$ ) 1 month post implementation.

### Discussion

Implementing bar-code medication administration in a community emergency department was associated with a decrease in medication administration errors and an improvement in Medication Administration System—Nurses Assessment of Satisfaction scores. The results of this study suggest a benefit of bar-code medication administration in reducing medication administration errors and improved nursing satisfaction in the emergency department.

## FULL TEXT

### Contribution to Emergency Nursing Practice

- The current literature on bar-code medication administration in an emergency department indicates that implementing bar-code medication administration may reduce medication administration errors, but there is an unknown effect on nursing satisfaction.
- This article contributes that bar-code medication administration implementation reduces medication administration errors by 74.2% and improves nursing satisfaction with medication administration systems.
- Key implications for emergency nursing practice found in this article are that bar-code medication administration may be implemented in an emergency department to reduce medication administration error rates while improving nursing satisfaction with medication administration systems.

### Introduction

As much as health care workers try to do no harm, medical errors are still a frequent occurrence in hospitalized patients and attributed to as many as 98,000 patient deaths annually.<sup>1</sup> Errors related to the medication administration process contribute to the overall clinical mistakes that could lead to patient harm. Whereas errors related to medications can arise from the ordering or preparation process, one third of the errors occur during the administration process.<sup>2</sup> One way hospitals have combated medication errors is by implementing electronic medication administration record (eMAR) and bar-code medication administration (BCMA) systems in inpatient hospital settings, with studies showing a reduction in errors of as much as 40% to 70%.<sup>3-7</sup> However, limited studies have been reported on implementing these systems in emergency departments to reduce medication errors.<sup>8,9</sup> Medication administration in the emergency department differs greatly from that in the inpatient setting.<sup>10</sup> For example, the emergency department receives patients with unknown health care issues who undergo medical evaluation for their condition. Because medical information evolves with further assessments, the medical record has limited information on medication allergies, weight, and height, and most treatment with medications are one-time-only or a loading dose for medications that continue after admission. Other challenges faced in the emergency department are an increased number of verbal orders, a chaotic environment with rapidly changing census, and a variable patient type and load. Some medication orders are given when patients are being examined by the physician or another provider, and variation exists on order entry or processing. This also presents a challenge for pharmacists to properly reconcile medications and allergies before administration. In addition, most nurses draw medications from an automated dispensing cabinet without the aid of bar-coding or other systems to avoid errors related to a wrong drug or dose.

A bar-coding system for medication administration is one method to improve accuracy and safety in medication administration, such as by identifying and linking the patient to the medication order and reconciling this at the point of care. Whereas most reports are on BCMA implementation in inpatient settings, less information is available about its implementation in the ED setting. Implementing BCMA with integrated eMARs in the emergency department has shown a reduction of medication administration errors. Bonkowski et al<sup>8</sup> conducted a before-and-after observational study on medication errors during the implementation of an electronic medical record with BCMA capacity. They found an 80.7% relative reduction in medication administration errors, with wrong dose errors having the greatest reduction. However, in their study, implementation of BCMA with eMAR technology concurrently may have confounded results. In a study by Seibert et al,<sup>9</sup> results showed a 65% relative reduction in all medication administration errors after implementation of BCMA in the emergency department, although the study was

underpowered to detect a statistical difference.

Along with reducing medication administration errors, BCMA has been shown to increase nurses' satisfaction with administration systems. A validated study tool created by Hurley et al<sup>11</sup> Medication Administration System–Nurses' Assessment of Satisfaction (MAS-NAS) survey, can be used to measure nursing perceptions of safety, efficacy, and access before and after the implementation of point-of-care technology. Hurley et al<sup>12</sup> found that implementing BCMA and eMAR technology in an academic medical center increased nurses' satisfaction with medication administration systems, improving scores in all 3 areas of the scale (safety, efficacy, and access). However, this study was limited to only 13% of available users of the system and did not include those from the emergency department.

Studies on the impact of BCMA on medication errors in the ED setting are limited and may have been confounded by concurrent eMAR implementation, and no studies have been reported on emergency nurses' satisfaction related to BCMA implementation.<sup>8,9</sup> Thus, the purpose of this study was to add to the body of knowledge about the impact of implementing BCMA independent of eMAR in a community hospital emergency department on medication errors and nursing satisfaction.

### **Methods Study Design**

The study design was a before-and-after study in a single emergency department without a control group. This study is a replication of a study conducted by Bonkowski et al<sup>8</sup> with the addition of a nursing satisfaction survey. The investigators used direct observations of medication administration modeled after the study conducted by Bonkowski et al<sup>8</sup> and a validated survey of nurse satisfaction before BCMA implementation and 1 month after implementation of BCMA technology. The Orlando Regional Medical Center's Institutional Review Board determined the study protocol was exempt from review (17.058.05).

### **Setting and Sample**

This study was conducted in a 55-bed emergency department at a community hospital in the southeastern United States that included acute, fast-track, and rapid assessment areas. The inclusion criteria for subjects in the study were a convenience sample of registered nurses who were employed in the emergency department at the study facility and who administered medications to patients.

### **Data Collector Training**

Nurses on the hospital nurse practice council from inpatient units and pharmacists were given the opportunity to participate in this study as observers and external reviewers of medication administration practices in the emergency department and to avoid bias from peer observations. A total of 14 observers completed a 3-hour training session on the method of observing medication administration in the context of the study using an observational tool developed by the investigators. Inter-rater reliability was measured before clinical observations. After education and training, the observers then performed a simulated observation of medication administration using the tool, while being evaluated by 2 study investigators for completeness. The observers achieved 100% if they successfully marked all observations using the tool. All observers met this requirement before making study observations.

### **Participant Recruitment for Observation and Survey**

Nurses were invited to participate in the medication administration observation portion of this study before medication dispensing. If a nurse verbally consented to being observed by trained research personnel during the medication administration process, the trained observer proceeded with the observation.

All nurses who administered medications in the emergency department were invited to complete the survey portion of the study, irrespective of participation in the medication observation portion of the study. A study information sheet was provided to eligible nurses for an opportunity to participate. Consent was implied by their voluntary completion

of the MAS-NAS survey after reviewing the study information sheet.

### **Data Collection and Study Procedures Medication Administration Error Rates**

Direct observation of medication administration was used to determine medication administration error rates. Direct observation is a scientifically validated method of measuring medication errors and is nonpunitive.<sup>8,9</sup> The trained observers were blinded to the medication orders. In contrast to the study by Bonkowski et al,<sup>8</sup> this study included both nurse and pharmacy observers that were known to the emergency nurse personnel to dampen the potential of the Hawthorne effect associated with unfamiliar observers.

Before the intervention with BCMA implementation, the observers collected data on medication administration using the tool for 1 month. All medications administered, except those given during emergency conditions such as cardiac or respiratory arrest and rapid sequence intubation, were included in the analysis. The observers documented the patient medical record number; medication name, route, and dose; and time of administration. The observations were conducted in all shifts across all days of the week in the emergency department and were based on observer availability.

After the observations were completed, nonobserver nurses and a pharmacist compared the medications observed during administration with the medication orders entered into the eMAR by the provider. Medication errors were defined according to 4 of the 5 rights of medication administration: right patient, right drug, right dose, and right route. Right time was excluded because most of the medication orders in the emergency department are one-time or stat orders. The medication administration error rate, the primary end point, was calculated as the number of medication administration errors observed divided by the total number of medication administrations observed in each time period.

After the initial observations, the Informatics Services initiated BCMA with medication administration and documentation processes and added scanners to the ED computers. Over a 2-week period, the Informatics Services team provided education and training to nurses in the emergency department on BCMA processes. BCMA was then implemented throughout the emergency department. After a 3-month lead-in period to reinforce and coach the use of the new BCMA process, a postimplementation observation period of medication administrations was repeated using the same process as previously described. This was similar to the study by Bonkowski et al.<sup>8</sup>

### **Nursing Satisfaction Survey**

The MAS-NAS survey is an 18-item survey with 3 subscales with a Likert-type scale ranging from "Strongly agree" to "Strongly disagree."<sup>11,12</sup> Thus, lower scores indicate higher satisfaction with the item. The authors of the MAS-NAS survey reported the reliability coefficient for the 18-item scale as 0.86 using the Cronbach alpha. Hurley et al<sup>11</sup> conducted a principal components analysis to test validity and revealed 3 subscales including efficacy, safety, and access with individual factor loadings for items ranging from 0.36 to 0.80. The survey was conducted 2 weeks before implementation of BCMA and 1 month after the implementation of BCMA.

### **Data Analysis**

For the medication administration errors primary end point, all data were transcribed into an Excel spreadsheet (Microsoft Corp., Redmond, WA) for analysis. The primary end point was evaluated using the Fisher exact test for the detection of error rates that were anticipated to be low in number. To determine the sample size for the medication administration errors portion of the study, an a priori power analysis using G\*Power 3.1 was done. Using an estimated baseline error rate of 6% found in the study by Bonkowski et al<sup>8</sup> and an expected error reduction of 50%, 748 medication administrations were needed in each study period to show an effect at  $\alpha$  of 0.05 and 80% power. Because the survey was based on a convenience sample, a power analysis was not conducted for the survey part of the study.



Responses on the MAS-NAS survey were entered into an Excel spreadsheet and imported into Statistical Package for the Social Sciences software version 20 for analysis. Data analysis was conducted on the basis of pre- and postimplementation groups and matched pairs as available because the sample of nurses in the emergency department varied over the study period and not all nurses participated in both phases. Changes in MAS-NAS total scores and subscale scores were analyzed using an independent sample *t* test and paired-sample *t* test for matched pairs. The MAS-NAS survey has 3 section scores and a total score. When less than 20% of the respondent's data were missing for any of the 3 subscales, a computed mean was used for the subscale. If more than 20% of data were missing for a subscale in the survey, the participant's responses were not used in the final data in those sections of the survey. Any survey with insufficient data for the total score was eliminated from analysis. Descriptive statistics were used to define participant demographics.

## Results

A total of 676 medication administrations were observed in the emergency department before BCMA implementation and a total of 656 in the period after implementation. The number of observations did not reach the a priori estimation of a sample size of 748 for this study. <sup>Table 1</sup> summarizes the medication administration errors. The Fisher exact test was used to evaluate differences between pre- and postintervention medication error rates owing to small errors detected in the postobservation period. A total of 20 medication administration errors were found in the preimplementation period (2.96% error rate) and 5 medication administration errors (0.76%) in the postimplementation period. There was an absolute rate reduction in medication errors of 2.20% (Fisher exact test *P* = 0.03).

Nearly half of the emergency nurses participated in the MAS-NAS surveys. Of the 89 nurses, 41 participated in the MAS-NAS before implementing BCMA and 49 participated in the MAS-NAS after implementing BCMA. Two survey scores from the preimplementation and 3 survey scores from the postimplementation periods were excluded from the total MAS-NAS scores because of missing data. The respondents were predominately female with an average age of 38.2 years (range 24-63) and 10.5 years of nursing experience (range 0.5-40) (<sup>Table 2</sup>). An independent sample *t* test was used to evaluate differences in MAS-NAS scores for total (unmatched) pre- and postsurvey scores. The average total MAS-NAS score before implementation was 2.60 (0.75) (*n* = 39), and the average MAS-NAS score 1 month postimplementation was 2.29 (0.66) (*n* = 46; difference of 0.31; *P* = 0.05; 95% confidence interval [CI] 0.001-0.61). The safety subscale also showed improvement from the pre- to postimplementation periods from 2.84 to 2.25 (difference of 0.59; *P* Table 3. In the matched pairs group (*n* = 23), the total MAS-NAS scores did not significantly improve from the pre- to the postimplementation period (2.54 [0.63] and 2.26 [0.77] respectively; difference of 0.28; *P* = 0.12; 95% CI -0.08 to 0.64). The safety subscale in the matched pairs group did show improvement from the pre- to the postimplementation period from 2.94 to 2.33 (difference of 0.61; *P* **Discussion**

Implementing BCMA technology is aimed at reducing medication administration errors to improve patient safety. This study's results showed a 74.2% reduction of medication administration errors after implementing BCMA technology in an emergency department. This is consistent with previously published studies in inpatient units and emergency departments.<sup>3-8</sup> Although this study showed a reduction in errors, the rate of medication administration errors in the preimplementation phase was lower than previously reported in ED studies.<sup>8</sup> This may be due to the fact that our study facility already had an eMAR system in place for electronic documentation before BCMA implementation unlike the study by Seibert et al<sup>9</sup> in which BCMA was implemented concurrently with the eMAR technology and may have confounded the results in.

Wrong dose errors accounted for a significant portion of medication administration errors in both study periods. This was due to BCMA technology being able to associate medication orders with specific medication dosage packages

that contain the exact dose if possible. However, there were still wrong dose errors in the postimplementation period owing to the manipulation of oral and injectable dose forms to administer a partial dose. One way to possibly further reduce these errors is to provide nurses with more medication package options that match ordered doses.

Implementing BCMA in our study also prevented 2 medication errors from reaching patients. BCMA stopped 2 medications from being given to the wrong patient during the postimplementation study period. These were not included in the wrong patient errors in the postimplementation period because they did reach the correct patient after the nurse was alerted to the potential medication error once she scanned the patient's bar-code. This further shows how implementing BCMA technology can reduce medication errors in emergency departments.

Our results demonstrated that it is feasible to improve nursing satisfaction with the implementation of BCMA technology with the medication administration system in the emergency department. This improvement in the MAS-NAS scale was predominately driven by the safety subscale, which could be expected when implementing a technology aimed at improving patient safety. This is the first study to show reduction in medication administration error rates with the implementation of BCMA in the ED setting that also showed a corresponding improvement in nursing perceptions of safety, as well as overall satisfaction with the medication administration system. The results from the matched pairs showed no significant differences and this may be due to the small sample size that may have been underpowered.

### **Limitations**

This study was conducted in only one emergency department in a larger health care system, thus may not be generalizable across all settings. Further replication of this study is needed to substantiate the results more broadly with control and contemporaneous comparison groups to address potential confounding. Although this study did not meet the a priori sample size for medication administration observations owing to the prescheduled implementation of BCMA, a post hoc power calculation showed that our study was still powered to detect a difference with an  $\alpha$  of 0.05 and power of 84.4%. Although medication administrations were observed during all days of the week, only 12.7% and 12.5% of the total administrations were observed on weekends in the pre- and postimplementation periods, respectively. In addition, more medication administration observations were completed between the hours of 7:00 AM and 3:00 PM than any other period (preimplementation,  $n = 430$  medication administrations and postimplementation,  $n = 547$  medication administrations). The timing and date of medication administrations may have confounded the results. Medication administration observations were conducted on the basis of the availability of nurse observers with more observations occurring between 7:00 AM and 11:00 PM; however, this coincides with the peak volume of patients seen in our emergency department. In addition, there may have been seasonal bias based on the times of year when the medication administration observations were completed. However, during the study periods before and after implementation of BCMA, our study site saw an average of 237 patients per day and 243 patients per a day, respectively, indicating similar patient volumes. Future studies could include a 1-year postimplementation medication administration observation period to further confirm a reduction in medication errors. In addition, although this study used nursing colleagues and pharmacists as observers, a Hawthorne effect could not be excluded. Finally, the MAS-NAS scores statistically improved in the postimplementation period, but the statistical significance was not maintained in the matched pair subgroup owing to the small sample size.

### **Implications for Emergency Nurses**

For many health systems, the complexity of medication administration in the emergency department has limited the ability to implement BCMA technology in the emergency department. This study offers support for implementing BCMA technology in emergency departments despite the difference in practice from inpatient nursing units. Implementing BCMA can reduce medication administration errors and may improve overall nursing satisfaction.

## Conclusions

Implementing BCMA in a community-based emergency department can reduce medication administration errors and improve nursing satisfaction, with an emphasis on safety of the medication administration process.

## Author Disclosures

Conflicts of interest: none to report.

Medication administration errors	Preimplementation period (n = 676)		Postimplementation period (n = 656)		P value
	n	%	n	%	
Total errors, n	20	2.96%	5	0.76%	< 0.01
Wrong dose, n	16	2.37%	5	0.76%	0.03
Wrong patient, n	3		0		NS
Wrong route, n	1		0		NS

Participant characteristics	Preimplementation n = 41	Postimplementation n = 49	Matched pairs n = 23
Age in y, mean (range)	37 (24-63)	38 (24-63)	37 (24-63)
Sex, n (%)			
Female	32 (78)	34 (69.4)	14 (60.1)
Male	4 (9.8)	7 (14.3)	3 (13.0)
Highest nursing degree, n (%)			
AS/AD	4 (9.8)	5 (10.2)	2 (8.7)
BS/BSN	31 (75.6)	34 (69.4)	18 (78.2)
MS/MSN	1 (2.4)	1 (2.4)	0

Years of nursing experience, mean (range)	9.9 (0.5-38)	9.7 (0.5-40)	8.0 (0.5-31)
Number of hours worked in a typical week, mode (range)	36 (20-48)	36 (24-45)	36 (24-45)

MAS-NAS		Unmatched MAS-NAS scores					Matched pairs MAS-NAS scores n=23					
Preimplementation n = 41		Postimplementation n = 49		t	P value	Preimplementation		Postimplementation		t	P value	Mean (n)
SD	Mean (n)	SD	Mean (n)	SD	Mean (n)	SD	Total MAS-NAS					
0.05	2.54 (20)	0.63	2.26 (20)	0.77	1.63	0.12	Efficacy	2.57 (41)	0.96	2.17 (48)	0.99	1.91
0.59	2.54 (23)	0.92	2.27 (23)	1.07	0.96	0.35	Safety	2.84 (40)	0.85	2.25 (48)	0.63	3.71
< 0.001	2.94 (22)	0.79	2.33 (22)	0.73	3.30	<0.01	Access	2.39 (40)	0.74	2.42 (46)	0.75	-0.21

## DETAILS

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# An Assessment of Emergency Nurses' Perspectives on Nurse-Driven Human Immunodeficiency Virus Testing in the Emergency Department: JEN

[ProQuest document link](#)

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## ABSTRACT (ENGLISH)

### Introduction

Engaging emergency clinicians in universal human immunodeficiency virus screening is paramount to achieving goals of reengaging human immunodeficiency virus–positive persons into care, identifying new human immunodeficiency virus cases, and linking them to care. The study aim was to identify beliefs and barriers towards opt-out human immunodeficiency virus testing among emergency nurses.

### Methods

A cross-sectional study used Qualtrics software to deliver a survey on a tablet device to emergency nurses in a private Level 1 trauma hospital in Houston, Texas during downtimes of their clinical shifts. The survey evaluated perspectives on human immunodeficiency virus screening and knowledge relative to rapid screening and human immunodeficiency virus prevalence rates locally and nationally.

### Results

Fifty emergency nurses were enrolled. Few nurses accurately identified human immunodeficiency virus prevalence rates at the local hospital and city level (10% and 42%, respectively). Most (54%) of nurses correctly estimated human immunodeficiency virus prevalence rates nationally. Nearly half of the nurses (42.0%) correctly predicted the cost of a rapid human immunodeficiency virus test with accuracy and most were willing to offer rapid human immunodeficiency virus testing all the time (60.0%). Eighty-eight percent of nurses were supportive of facilitating universal human immunodeficiency virus screening. However, 92.0% strongly supported human immunodeficiency virus testing for high risk patients only when compared to 80.0% support of testing for all eligible patients. Qualitative data revealed time constraints and follow-up concerns as barriers.

### Discussion

Emergency nurses reported barriers that sometimes prevented application of Centers for Disease Control and Prevention recommendations to human immunodeficiency virus screening. Strategies to overcome these barriers are instrumental to programmatic success. Solutions can corroborate the importance of emergency nurses to the nation's Ending the HIV Epidemic plan.

## FULL TEXT

### Contributions to Emergency Nursing Practice

- The current literature on universal human immunodeficiency virus (HIV) screening indicates a paucity of content quantifying perspectives of emergency nurses towards universal HIV screening in the emergency department.
- This article contributes to the existing literature on HIV screening by offering descriptive details on perceived barriers to translating universal HIV screening into clinical practice as described by emergency nurses.
- Key implications for emergency nursing practice found in this article include that interventions to increase emergency nurse buy-in for implementing universal HIV screening are needed, while minimizing current barriers that prevent emergency nurses from guideline compliance.

## Introduction

The emergency department provides care to the most diverse patient population of any clinical setting, making it a key venue for initiatives capable of advancing population health in the United States. Houston, TX, is one of the nation's hotspots for human immunodeficiency virus (HIV). Concerted and consistent HIV-prevention efforts to date have not been successful at reducing the rate of new cases, unlike in other referent metropolitan cities (ie, New York City, NY, and San Francisco, CA) in the United States.<sup>1</sup>

The HIV burden in the South drives the US HIV epidemic.<sup>2</sup> Even though HIV rates at the national level are declining overall, the disproportionate burden of new HIV diagnoses in vulnerable segments of the population remain alarming. The consistent practice of universal HIV screening in emergency departments is a key component of the nation's Ending the HIV Epidemic plan, whose 4-pronged approach is to prevent, diagnose, treat, and respond.<sup>3,4</sup> HIV screening of eligible ED patients is paramount to achieving those goals by confirming a current negative status, identifying new HIV cases, linking new positives to HIV care, and reengaging persons who are HIV positive into care. To end the HIV epidemic, buy-in from all entities who interface with the public is needed. This includes frontline health care providers, particularly emergency nurses.

Before 2006, the Centers for Disease Control and Prevention (CDC) recommended routine counseling and testing for individuals at high risk of HIV, and for those receiving acute care in settings where the HIV prevalence was greater than or equaled 1%.<sup>5</sup> The 2006 revised recommendations addressed the nation's need to reduce the HIV incidence and diagnoses at the national level through initiation and funding of universal HIV screening.<sup>6,7</sup> This recommendation, which applied to areas where the local HIV prevalence was greater than 0.1%, was leveraged as a method to reduce the rate of undiagnosed HIV at the population level.<sup>8,9</sup> The screening protocol is for all people aged 13 years to 64 years in diverse settings, including emergency departments. Universal HIV screening has become a key strategy in interrupting transmission patterns of the HIV epidemic. It creates an opportunity for ED providers to identify members of the public who are HIV positive and who were either unaware of their positive status or were not linked to care. Many people are screened for HIV infrequently and are not aware of their current HIV status. In many cases, people who screen HIV positive for the first time are not linked to care. These groups of people do not have the tools to attain and/or maintain viral suppression.

The Houston Health Department (HHD) was funded by the CDC in Harris County to lead universal HIV screening in the participating emergency department for 12 years (2008-2020). The HHD manages required reporting of HIV screening to the state health department. Its local data repository served as the data source for the figures created and analyses presented here. The HHD dataset contained HIV screening records of patients who were tested for HIV during a local ED visit between 2008 and 2019. The trend depicts screening counts over time (<sup>Figure 1</sup>), revealing peak screening rates between 2009 and 2011, with a resurgent increase in screening rates from 2018 to the present. <sup>Figure 2</sup> depicts cumulative screening rates since the program's inception, with an accrual of nearly 8,000 tests over time. These figures reveal inconsistencies in HIV screening in the participating emergency department. In <sup>Figure 1</sup>, we observe a decrease in screenings between 2016 and 2017 in comparison with the previous and following years. This decrease is also visible in <sup>Figure 2</sup>, as displayed by a flat line during this time period.

Universal HIV screening in the emergency department has contributed to an increase in national HIV testing rates. Consistency and continuity of success are dependent on the ability of frontline providers to offer and perform the test alongside clinical care.<sup>10,11</sup> Implementation strategies of the CDC guidelines for universal HIV screening in emergency departments throughout the nation have not been uniform. Some programs are physician-driven, and others are led by nurses or hospital-based social workers. The published findings confirm that universal HIV screening through the emergency department has been high-performing, readily accepted, and practical in diverse

geographic areas in the United States.<sup>12-18</sup> As of 2009, 22.0% of emergency departments engaged in universal HIV screening, with far fewer using an opt-out–approach protocol.<sup>19-21</sup> A decade later, a quantitative report was developed on the basis of data provided by the HDD, the governing agency of the local universal HIV screening program at hospital sites. A site-specific analysis from the hospital under study on the local nurse-driven universal HIV screening program demonstrated similar inconsistencies in testing-rate trends over a 10-year period (Figures 1 and 2). This study aimed to identify the beliefs and barriers contributing to perspectives toward opt-out HIV testing in the emergency department among emergency nurses.

### **Materials and Methods Study Design and Setting**

This was a descriptive, cross-sectional, observational study using a survey-based strategy that was delivered on a tablet device by 5 research assistants who were trained by a research nurse and research coordinators (n = 3), each with 10 years to 20 years of research experience. Each research assistant team member had 1 year to 5 years of experience conducting research in the emergency department and at minimum had a bachelor's degree in a science field (some were trained at the master's level). The study assessed self-reported perspectives of emergency nurses on the CDC recommendations for universal HIV testing in an ED setting.

Nurses were enrolled during their clinical shifts when they aligned with research assistant shifts, which are Sunday to Saturday for 16 hours a day between 7 AM and 11 PM. Nurses who worked outside of these hours were not included in the study. Memorial Hermann Hospital–Texas Medical Center, the largest level 1 trauma center in the nation with 70,000 unique ED visits annually, provided the setting for the research to take place under an existing contractual affiliation with The University of Texas Health Science Center at Houston. Prospective data collection among emergency nurses occurred over 6 months (January 2018-May 2019).

### **Data Source**

Interviewer-assisted surveys of emergency nurses used Qualtrics survey software (Qualtrics LLC, Provo, UT).

### **Nurse-Initiated Protocols on HIV Testing in the State of Texas**

According to the Texas Department of State Health and Human Services' HIV-STD Program Policies (specifically policy number 900.001 for routine HIV testing in emergency departments), the guideline describes the testing process as “emergency nurses obtain blood specimens as their standard process. The blood is processed as STAT within the Texas Medical Center.” Thus, in Texas emergency departments, it is part of nursing practice and protocol to initiate opt-out consent for HIV testing and to collect the blood specimen for processing.

### **Selection of Participants**

The nurses were selected through convenience sampling when the nursing shifts aligned with research assistant shifts, which are Sunday to Saturday for 16 hours a day between 7 AM and 11 PM. Emergency nurses were approached by trained research assistants for participation during downtimes of clinical shifts. Before recruitment, the nurses were asked if they had participated in a survey asking about their perceptions of HIV testing in the emergency department. Nurses who said yes were excluded. The nurses provided verbal consent and were enrolled in a semiprivate space of the emergency department where patients and other clinical providers were not privy to the enrollment process. The research assistants asked questions and entered the nurses' responses onto the tablet device. The emergency nurses' identifiers were kept anonymous. The survey evaluated perspectives and knowledge of HIV prevalence rates. The survey ended with a question for emergency nurses to share their perceived barriers to the universal HIV screening on the basis of a predetermined list of potential barriers based on the existing literature.

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### **Measurements Demographics**

The demographic factors included 5 categories: race, ethnicity, gender, years in practice, and nursing qualifications.



## **Race**

Race had 6 categories: 1) White/Caucasian, 2) Black/African American, 3) Asian, 4) Native American, 5) American Indian or Alaska Native, and 6) Native Hawaiian or Other Pacific Islander.

## **Gender**

Gender was a dichotomous variable, requiring a “male” or “female” response.

## **Ethnicity**

Ethnicity was also a dichotomous variable, requiring a “Hispanic or Latino” or “Not Hispanic or Latino” response.

## **Years in Practice**

Years in practice for this study had 4 categories: 0-1 year, 2-5 years, 6-10 years, and 11 years or more. These were based on the categories in a previous publication in which emergency nurses represented a specific specialty area among nurses. The categories in that study were less than 3 years, 3 years to 5 years, 6 years to 11 years, and more than 12 years.<sup>23</sup> However, nurses with less than 1 year of experience were not included. Our nursing population included emergency nurses with less than 1 year of experience. Given the local turnover rates of emergency nurses shortly after completing nursing school, we decided to filter out the less-than-3-years-of-practice-experience category to identify a subgroup with less than or 1 year of ED experience.

## **Nursing Qualifications Based on Licensure and Education**

The nursing qualification variable had 6 categories: 1) a Registered Nurse (RN), 2) a Bachelor of Science in Nursing (BSN), 3) an RN with a BSN (BSN, RN), 4) an RN with a BSN and a Master of Science in Nursing, and 5) an RN with a Doctorate of Nursing Practice.

## **Perspective Questions**

The questions that evaluated perspectives were based on an instrument used in a previous study to evaluate nurses' perspectives toward universal HIV testing.<sup>22</sup> A 5-point Likert scale–response format (“strongly agree” to “strongly disagree”) was implemented for 10 questions that explored the nurses' perspectives on the opt-out HIV testing approach because this was an integral part of their multifaceted clinical workload. The questions explored whether the nurses supported the universal HIV testing approach to all ED patients or preferred a targeted approach to patients for whom an HIV test is clinically indicated and/or patients classified as high-risk, and/or HIV testing offered by physicians, nurses, or counselors. Additional questions made inquiry of how the nurses perceived the current rapid HIV testing program, as 1) successful in testing patients for HIV, or 2) beneficial to patients, or 3) should be expanded.

The same 5-point Likert scale was used in the assessment of the nurses' support of HIV testing in general. To gauge the nurses' support of HIV testing, they were asked if they favored routine testing for all sexually active US citizens. The nurses provided feedback on whether or not they favored HIV testing in the emergency department or perceived that an ED-based HIV testing program was a good idea.

## **Knowledge Questions**

The knowledge questions were based on a validated survey.<sup>12</sup> The research team used geographical epidemiology as the basis to assess the knowledge of the nurses on spatial patterns of HIV disease incidence within the population at their hospital site, in their city, and in the nation.<sup>24</sup> As such, the nurses estimated the HIV prevalence by percentage at 3 levels: 1) in their hospital, 2) in Houston, TX,<sup>25,26</sup> and 3) in the United States.<sup>22</sup> The responses to this question included 3 categories: less than 0.5%, 0.5% to 5.0%, and more than 5.0%.

The nurses shared feedback on their estimates of the cost of a rapid HIV test. The categories for the cost of an HIV test were based on published findings of costs, which included a wide variation of \$8.25 to \$113.74.<sup>27</sup> The research team determined 5 categories on the basis of this variation, which were as follows: 1) \$1.00, 2) \$15.00, 3) \$50.00, 4)

\$100.00, and 5) \$500.00.

### **Willingness to Offer Rapid HIV Testing**

The nurses shared whether they would be willing to offer an HIV test if another health care worker (ie, physician or nurse) in the emergency department provided the results within 20 minutes. The response format included 4 categories: 1) rarely, 2) occasionally, 3) most of the time, and 4) all of the time.

### **Perceived Barriers to HIV Testing**

A list of the perceived barriers to HIV testing by the nurses was compiled on the basis of existing literature<sup>22,28-31</sup> and presented to the enrolled nurses. The list used barriers noted at least twice in the discussion section of manuscripts that described the barriers to HIV testing in the emergency department,<sup>22,28-31</sup> and in <sup>Figure 1</sup> of the study by Schechter-Perkins et al<sup>22</sup> in which the frequencies of concerns by nurses and physicians were compared before and after an HIV testing program was implemented.<sup>22</sup> The emergency nurses were given 9 categories to select in alignment with their perceptions of the barriers to HIV testing during their clinical shifts. The 9 categories were as follows: 1) "It is not a currently recommended guideline," 2) "HIV prevalence is too low," 3) "It is too expensive," 4) "There are inadequate resources," 5) "There is not enough time," 6) "It is not part of provider's responsibilities," 7) "There are concerns with follow-up," 8) "I am uncomfortable with delivering HIV test results," and 9) "I do not know the legal implications of HIV testing." The nurses were given the option to select all the barriers that they felt were relevant to them, which in several instances were multiple categories.

### **Participant Accrual**

A convenience sampling approach was used to enroll eligible emergency nurses during clinical shifts. Of the 50 emergency nurses approached, 50 agreed to participate after 1 or more recruitment attempts (the number of recruitment efforts was not captured owing to the anonymity of the screened, recruited, and enrolled participants). Over a 6-month period, we reached a 100% accrual rate of nurses recruited for study participation. This accrual rate was possible because the nurses who were not available to participate during the initial recruitment effort were often reapproached by the research assistants later during their clinical shifts. In some cases, the research assistants reapproached eligible emergency nurses without the knowledge that their team members had made previous attempts to recruit the same nurse. The 5-member research assistant team staffed the emergency department for 16 hours a day, 7 days a week over the enrollment period. Eligible nurses verbally notified the research assistants when they had already participated in the study.

### **Analysis**

Data were analyzed using IBM SPSS version 25.0 (IBM, Armonk, NY). A frequency analysis was conducted of all demographic variables and categorical data. The nurses were stratified by years in practice and qualification level in an effort to control for confounding bias. We assessed their perspectives on universal HIV screening and their knowledge of HIV incidence rates by location. A Pearson chi-square test with *P* values was used to assess the differences between years of practice and qualifications of nurses in association with their knowledge of HIV prevalence rates in varied geographical areas with the aim to discern a meaningful difference at a significance level of *P*. **Ethical Considerations**

Ethical approval for the research study was granted by The University of Texas Health Science Center at Houston Institutional Review Board's Committee for the Protection of Human Subjects (HSC-MS-09-0571).

### **Results**

A total of 106 emergency nurses provide care to the adult ED population at this hospital and were eligible to participate in universal HIV screening. Of the eligible nurses, 50 agreed to participate and were enrolled. The study assessment revealed demographic differences among the nurses. The emergency nurses enrolled were mostly

White/Caucasian (84.0%), not Hispanic or Latino (86.0%), female (88.0%), had 2 years to 5 years of emergency nursing experience (38.0%), and a bachelor's level of nursing education (76.0%) (Table 1). Forty-two percent of the emergency nurses enrolled accurately reported the cost of a rapid HIV test. Sixty percent were willing to offer the HIV test all of the time if the results were available within 20 minutes (Table 1).

A frequency analysis revealed variances in support of universal HIV screening on the basis of the nurses' perspectives pertaining to their willingness to perform an HIV test with patients during an ED visit. Nearly 90.0% of the emergency nurses were supportive of serving on the frontline of universal HIV screening in the emergency department (Table 2). However, even more (92.0%) were strongly supportive of HIV testing for patients classified as high-risk and agreed that they would support an HIV testing program offered by hospital-based social workers so as to prevent interruptions to clinical care (Table 2). Eighty percent of the emergency nurses reported support of testing for all eligible ED patients, and 64% of them strongly agreed that the universal screening program in the emergency department was successful at testing patients.

Questions were posed to the emergency nurses to evaluate their knowledge of HIV prevalence rates at 3 levels: in the hospital, in the city of Houston, and in the United States (Tables 3 and 4). There was 1 missing response for this inquiry (Tables 3 and 4). Ten percent of the emergency nurses correctly identified the HIV prevalence at their local hospital. All of these nurses have a BSN, RN level of education and licensure (Table 4). Within this cohort, 60% (n = 3) had 0-1 year in practice. The other 40% (n = 2) had 2-5 years in practice (Table 3). However, 42.0% of the enrolled nurses correctly identified the HIV prevalence in Houston, TX. There was a larger variance in years of experience for responses to the question on HIV knowledge at a local level (Table 3). Nurses with 2-5 years in practice represented the largest group with accurate knowledge on the HIV prevalence in the participating hospital (42.9%, n = 9). They were followed by nurses with 6-10 years in practice (23.8%, n = 5), 0-1 year in practice (19.0%, n = 4), and, last, nurses with 11 years or more in practice (14.3%, n = 3). With regard to qualifications, emergency nurses with a BSN, RN were the most knowledgeable (62.5%, n = 15) regarding HIV prevalence rates in Houston, TX (Table 4). This subgroup was followed by nurses with an RN (19.0%, n = 4) and those with a BSN (4.8%, n = 1). The final knowledge assessment was for HIV prevalence rates at the national level. More than half of the emergency nurses (54.0%, n = 27) correctly identified the HIV prevalence at the national level. The leading group was composed of nurses with 2-5 years in practice (37.0%, n = 10), followed by nurses with 0-1 year in practice (29.6%, n = 8), 6-10 years in practice (11.1%, n = 3), and, last, nurses with 11 years or more in practice (11.1%, n = 3). In terms of qualifications, the leading group had a BSN, RN (74.1%, n = 20), followed by those with an RN (14.8%, n = 4), and an equal proportion among those with a BSN, Master of Science in Nursing, RN (3.7%, n = 1) or BSN (n = 1, 3.7%). The screening barriers among the emergency nurses were also assessed (Table 5). Among the barriers reported, time constraints and follow-up concerns were the leading barriers. In this instance, follow-up concerns refer to the inability of the nurses to provide follow-up care for their patients, as follow-up care is not part of the emergency department's clinical care cascade. The nurses who reported legal concerns with regard to testing (15.8%), perceptions of high costs associated with testing (11.4%), perceived inadequacy of resources (10.5%), was not part of their nursing responsibilities (5.3%), the program was not currently recommended (4.4%), and the HIV prevalence in their emergency department was too low to warrant universal screening (0.9%) were in the minority (Table 5).

## Discussion

The research team implemented a cross-sectional research study to deliver a brief survey with emergency nurses to evaluate the barriers to consistent HIV screening. The outcomes provided a description of knowledge on HIV prevalence rates locally and nationally and perspectives of emergency nurses with regard to the universal HIV screening program using an opt-out approach. The insight shared on the facilitators and barriers to universal HIV

screening provides population health researchers with the data needed to inform the development of tailored interventions for emergency nurses that are capable of motivating an increase in universal HIV screening rates amid very real and perceived barriers. This could increase the impact of emergency nursing as an essential practice in the national Ending the HIV Epidemic plan.

Leveraging research practice to evaluate the facilitators and better understand the barriers that prevent emergency nurses from consistently offering HIV screening in a universal way, as recommended by the CDC, is critical to local, statewide, and national plans to end the HIV epidemic. Emergency nurses are on the frontline of the HIV epidemic because they interface with the broadest cross-section of any patient population compared with every other clinical setting. Although routine HIV testing has been a guideline for 13 years to date, data presented through publication have been minimal, especially in health care settings other than primary care (ie, emergency departments).<sup>11,32</sup> We found only 2 other ED-based studies that assessed the perspectives of emergency nurses regarding routine opt-out HIV screening.<sup>10,22</sup> The findings from this study can lead to a better understanding of the challenges that emergency nurses face when tasked with universal HIV screening while providing time-sensitive care during the management of clinical emergencies.

### **Variation With Implementation Strategies of Universal HIV Screening In Emergency Departments**

Although most of the enrolled emergency nurses supported HIV screening in the emergency department, many preferred a targeted strategy compared with the nationally recommended universal screening approach. A study aimed at assessing ED staff's knowledge of the CDC guidelines found that 44.0% of registered nurses believed that HIV testing should be offered to all ED patients.<sup>22</sup> A qualitative assessment of ED staff's support of HIV testing revealed stronger support for testing with patients classified as high-risk when compared with universal screening.<sup>22</sup> Importantly, although ED physicians were more supportive of ED HIV testing than emergency nurses, neither group was overwhelmingly supportive of the program.<sup>22</sup> The emergency nurses in this study were more supportive of HIV testing on the basis of risk as opposed to universal HIV screening than nurses in other studies. Other research findings substantiate that in spite of recommendations, providers are still implementing routine HIV testing on the basis of risk (instead of using a universal approach).<sup>11</sup> Leblanc et al<sup>33</sup> reported that 1 in 5 eligible patients were offered HIV screening. In addition, the variance in HIV testing rates and strategies nationwide justify the attention paid to the strategies that are capable of enhancing providers' awareness of the CDC guidelines and how they are instrumental to the nation's Ending the HIV Epidemic plan. These strategies should include educational models on the importance of routine HIV testing and of current HIV testing rates within each setting in relation to referent settings.<sup>11</sup> The variation in support, perhaps, has important implications for reengaging persons who are HIV positive into care, identifying new HIV cases, and linking new positives to HIV care. The degree of variability in HIV testing rates across the nation seems acceptable because there is no policy or mandate in place that requires uniformity. Attention to universal HIV screening as a clinical priority requires far more than guidelines and must include solutions that will improve the balance within the clinical portfolio of emergency nurses so that they can create space and time to implement screening consistently.

Previous studies observed a progressive decrease in the rates of HIV tests that are offered by emergency nurses over time.<sup>33</sup> Changing trends in local HIV screening rates among emergency nurses, particularly with the steady decline between 2011 and 2017 (Figure 1), echo the findings in some studies and illustrate opportunities to enhance the universal HIV screening program. The barriers identified by emergency nurses in this study require the attention of policy makers who determine clinical recommendations and guidelines. Previous studies demonstrated that emergency nurses had lower compassion satisfaction and higher levels of burnout than nurses in intensive care, nephrology, and oncology.<sup>23</sup> The pathway for evidence-based practice to follow public health recommendations will

require help for emergency nurses who maintain caring attitudes to patients and contributions to patient satisfaction all while improving the population's health. Implementation strategies after the release of recommendations and guidelines for emergency departments require tailoring to the competing demands and provisions for patient safety among emergency nurses.<sup>23</sup> The findings here provide new data on nursing perceptions of the barriers and highlight needed attention to nursing concerns that, if attended to, will improve compliance with the CDC-recommended universal HIV screening protocol.

### **Provider Qualifications and Experience Level**

Most nurses enrolled had a bachelor's level of nursing training and less than 5 years of experience. Overall, this was a less experienced population of nurses, and the participants generally supported universal HIV screening as part of their practice. More than half of the participating nurses had less than 5 years of practice experience in the emergency department. Only registered nurses with a bachelor's level of nursing training and less than 5 years of experience were knowledgeable about the HIV prevalence in their local hospital. Similarly, nurses with less than 5 years of experience were most knowledgeable about the HIV prevalence in Houston, TX, (61.9%, n = 13) and at the national level. Within our local cohort, we identified a potential link between less clinical experience (measured in years) and higher HIV knowledge. We expect that this is influenced by recent nursing education that likely included HIV education. However, the link did not produce a significant association. When assessing the qualifications of the nurse participants alongside HIV knowledge of prevalence rates at varied levels, we learned that the nurses trained at the bachelor's level were the most knowledgeable about HIV prevalence rates at all 3 levels (hospital, city, and nation) compared with their referent counterparts. Other studies perceived a lack of training among younger providers as less of a barrier to HIV testing because recently trained clinicians likely received more training on HIV testing, diagnoses, and treatment than their older colleagues.<sup>11</sup> Younger providers have been reported as offering the HIV test more frequently than older providers.<sup>11</sup> In other studies, the average nursing experience among emergency nurses leading universal HIV screening protocols was 16 years.<sup>10</sup> The findings of this study support those of former studies that indicated that younger nurses and a less experienced cohort of nurses were supportive of HIV screening in the emergency department. Importantly, most of the nurses correctly assessed the HIV prevalence at the city and national levels; yet, they were inaccurate in their assessment of the HIV prevalence rate at their hospital. This knowledge is likely a reflection of recent qualifications and awareness regarding the HIV epidemic.

### **Exploring Barriers and Solutions to Universal HIV Screening Among Emergency Nurses**

Researchers and clinicians have assessed bivariate associations between HIV testing practices and provider characteristics. To date, clinical education level, age, race, and familiarity with managing HIV through provider-patient interactions are all demographic factors with significant associations with compliance with the CDC recommendations on universal HIV screening.<sup>11</sup> A previous qualitative study used prediscussion questions, focus groups, and semistructured interviews among 16 participants to assess emergency nurses' perspectives on a nurse-driven, routine opt-out HIV screening program. The thematic findings of that study demonstrated challenges with certain patient populations, including language barriers in communicating the program to patients.<sup>10</sup> Three years previously, a qualitative study reported pre-post findings on nursing perspectives of an emergency department-based HIV testing program, revealing a decrease in the perceptions of interference with patient flow, cost concerns, confidentiality/privacy concerns, and lack of appropriate follow-up over time.<sup>22</sup>

The enrolled emergency nurses in this study reported barriers to universal HIV screening. The top 5 barriers were time constraints, follow-up concerns, high cost, unknown legal concerns, and inadequate resources. In the literature, reports on the barriers to universal screening among nurses revealed the potential overburden that clinical staff

endured without balanced recognition of the time and resources needed for universal HIV screening.<sup>18</sup> In particular, missed screening opportunities occurred during times of ED high crowding.<sup>33,34</sup> Although 87.0% of the nurses in a previous study did not feel the screening slowed down the ED workflow, a few of them (13.0%) reported the program as “disruptive.”<sup>10</sup> In addition, providers sometimes exhibited testing resistance because of their own perceived barriers to a testing program.<sup>30,35,36</sup>

Plausible and effective solutions to the reported barriers, particularly the time constraints, have been reported. The addition of 4 nursing hours dedicated to universal HIV screening weekly has been proposed.<sup>18</sup> Whalen et al<sup>18</sup> added overnight testing using existing clinical resources, which were provided in kind by the department, which generated an additional 29.4 tests per week. Locally, an emergency nurse has been designated the champion for HIV screening. During her dedicated shifts for universal HIV screening, she motivates nurses to screen and offers them relief by facilitating some of the time-consuming logistical aspects of clinical care. This has created relief for her nursing teammates. It has been stated that the nurses immediately think of the screening program when they see her. The uptick in the program’s screening rates at Memorial Hermann Hospital–Texas Medical Center during the last year confirm an increase in the HIV screening rate (Figures 1 and 2). In other studies, some emergency nurses reported that additional training on opt-out language and strategies to build nurses’ comfort with the program would facilitate higher HIV screening rates.<sup>10</sup> Other programs have used patient care technicians to perform universal HIV screening in the emergency department as an approach to use internal resources and protocols to increase programmatic sustainability, limit the barriers to testing, and increase testing rates.<sup>35</sup> Overall, time, financial resources (ie, additional staff), sensitivity to the tested population (ie, absence of implicit or overt bias) along with privacy are key components to a successful universal HIV screening program.<sup>22</sup> Strategies to provide the additional resources that nurses reported as facilitators for compliance with recommendations, while minimizing the reported barriers, will increase chances of success for screening protocols. However, stakeholders must temper enthusiasm with the realities that successful HIV testing initiatives require financial support to balance the workload of emergency nurses and pathways to incorporate input from emergency care providers who provide day-to-day care in the planning process before implementation.

### **Limitations**

As with all observational, cross-sectional studies, the temporality of nursing knowledge and perspectives over time was not determined. The generalizability of the perspectives of the nurses and their knowledge to other nurses cannot be inferred. The types of data collected were limited because of the study design that required a 5- to 10-minute survey completion. The small sample size prevented a finding that would substantiate a meaningful difference among subgroups (ie, difference in HIV knowledge among nurses with varied qualifications and years in practice). The eligible nurses were approached by research assistants who staff the emergency department for 16 hours a day, 7 days a week. The nurses who worked outside of these shifts or were available while the research assistants were enrolling patients on the department’s other studies ( $n > 20$ ) were not included. Enrolling nurses within research assistant shifts is a limitation because night shifts on Sunday through Saturday between 11:01 PM and 6:59 AM are excluded. In addition, enrollment on holidays may represent a different segment of the nurses’ workforce who are also expected to participate in HIV testing initiatives.

There were limitations in the recruitment methods. The nurses were recruited in an open area of the emergency department. Although the enrollment process took place in a semiprivate area, the recruitment strategy may have infringed on their privacy as research participants because other nurses may have witnessed them having a conversation with the research assistant. However, the research assistant team members work alongside nurses daily; thus, a dialogue between research assistants and nurses is not out of the ordinary. Although the emergency

nurses were willing to participate in this brief survey-based study, a design with an interviewer-assisted data collection method, instead of an anonymous survey, may have presented the opportunity for social desirability bias in the responses.

The study design did not include a method for tracking the names of the nurses who had been approached for study participation. This likely led to several recruitment efforts and pressure to participate. In the future, we will track and limit the number of times participants are recruited to 3. We will also request institutional review board approval to capture identifiers, especially the names of those recruited for screening purposes only. This will improve our ability to limit recruitment efforts among eligible participants. To prevent coercion, the research assistants stated that participation was voluntary during all recruitment attempts. The research assistants expressed that the participant was free to stop or withdraw from participation at any time. This was also stated in the recruitment script and reiterated during the training of the research assistants. These improvements in the recruitment strategy will likely improve the protection of privacy, limit any potential coercion, and reduce potential social desirability bias.

The classifications for race did not include a mixed-race option. A substantial proportion of Americans have mixed-race or unknown racial heritage, which was not accounted for in the classifications provided. The first response option to the nurse qualifications based on education and licensure is not mutually exclusive with the other categories. This was an error in survey development.

In March 2009, the survey instrument used in Schechter-Perkins et al<sup>22</sup> was piloted with clinicians who were not involved in the study before the start of their data collection in 2011. Schechter-Perkins et al<sup>22</sup> developed the instrument with scientific rigor and analyzed the findings in SAS version 9.0 (SAS Institute Inc, Cary, NC), complete with double data entry to ensure accuracy. However, a limitation of the study was that the instrument was not validated at the time of publication. The iteration of the survey in this study presented an opportunity to validate the instrument.<sup>22</sup>

The item assessing the perceived barriers to HIV testing among nurses is new and its use in this survey was the first iteration of this question. Thus, the question has not been validated to date. Before future use of this survey item, the team plans to conduct a content validity index with this item among expert emergency nurses so that the research team can gain a better understanding of what is missing and the clarity of the item wording/response options.

The sample size of 50 was determined on the basis of a generated report listing the nurses who were eligible to implement the CDC guidelines for adult patients and who worked during the research assistants' shifts. On the basis of the report, we concluded that a sample size of 50 would allow the team to capture all eligible nurses. The sampling approach did not include a power analysis or a sample size calculation. The number of approaches for research participation was not tracked, nor were the reasons for declining to participate at the first approach. The 100% capture rate is not absolute, as it is based on the number of nurses who agreed to participate and the number of nurses who completed the survey. The enrollment concluded when the research assistants confirmed that no new or different nurses were working during their shifts over a 2-week period.

In future nurse-related research, a dedicated research assistant (a nonclinical research staff member who is familiar with research protocols and procedures as well as the clinical flow of the emergency department) is needed to more broadly capture the nurses eligible for enrollment. This dedicated research assistant would have more access and time available to collect data on a broader scope of factors such as implicit bias toward the tested versus untested population, perspectives on the cost-efficacy of testing, or a risk-benefit assessment of the program. This may inform emergency nursing practice in relation to universal screening.

A power analysis was run for future iterations of this protocol, which will be scaled up to assess temporality and changes in HIV testing rates with a pre-post design. The recommended sample size for the data analysis in a future

iteration is 88 nurses. We expect that 80% (88/110) of the nursing staff will be willing to participate in the future study, thereby sufficiently powering the study to assess a primary hypothesis. We will compare the baseline rates of HIV testing by nurses with the rates observed at a 6-month follow-up period. The average baseline proportion of HIV tests requested is estimated to be 15%, and the poststudy proportion of HIV tests requested is expected to increase to 60%. With a sample size of 88 participants, we will be able to detect an increase of 0.45 in rates of HIV testing with power of 0.80 and alpha 0.05.

### Implications for Emergency Nurses

National attention to population health will require more engagement with ED clinicians, particularly emergency nurses, to move health equity forward. The overarching interdisciplinary specialty to which emergency nursing belongs in the emergency health care sector needs buy-in from emergency nurses to serve as change agents with public interventions and social services such as universal screening. The findings of the research study presented here demonstrate the perspectives of a small cohort of nurses on universal screening, adding to the body of literature needed to design and implement behavioral interventions aimed at increasing compliance with national guidelines while minimizing the current barriers that prevent emergency nurses from doing so.

### Conclusion

The emergency department is a needed clinical venue for mobilizing public health programs and services, including universal HIV screening. Arguably, the emergency department is the place where HIV screening opportunities could offer tremendous public health benefit when consistently offered and performed.<sup>10</sup> It is imperative that public health practitioners engage emergency nurses as allies and change agents in our nation's plan to end the HIV epidemic. Universal HIV screening is a necessary and key part of the plan. Achieving maximum population health benefit of universal HIV screening requires ongoing program evaluations to improve efficiency, address barriers, propose solutions, and better inform process improvement strategies in the clinical practice and workflow for emergency nurses. The findings here can help to justify further evaluation of effective approaches to improve application of HIV screening guidelines according to the CDC recommendations.

### Author Disclosures

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Conflicts of interest: none to report.

Variables	N	%
Race		
Asian	3	6.0
African American/Black	3	6.0
White/Caucasian	42	84.0
Missing	2	4.0



Ethnicity		
Hispanic or Latino	7	14.0
Not Hispanic or Latino	43	86.0
Gender		
Female	44	88.0
Male	6	12.0
Years in practice		
0–1	11	22.0
2–5	19	38.0
6–10	12	24.0
≥11	7	14.0
Missing	1	2.0
Nursing qualifications (based on education and licensure)		
RN	10	20.0
BSN	1	2.0
BSN, RN	37	74.0
BSN, MSN, RN	1	2.0
DNP	1	2.0
Perceived cost of an HIV rapid test per emergency nurses		
\$1.00	3	6.4
\$15.00	20	42.6
\$50.00	16	34.0
\$100.00	6	12.8

\$500.00	2	4.3
Missing	3	5.7
Willingness to offer HIV test if the results were available within 20 min		
All of the time	30	60.0
Most of the time	13	26.0
Occasionally	5	10.0
Rarely	2	4.0

Survey questions	Perspectives					
Strongly agree	Somewhat agree	Neither agree or disagree	Some what disagree	Stron gly disagree	Missin g	N

%	N	%	N	%	N	%	N	%	N	%	HIV testing should be offered to all patients in the emergency department.	40
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80.0	7	14.0	1	2.0	1	2.0	1	2.0	0	0.0	HIV testing should be offered to patients in whom it is clinically indicated.	43
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86.0	5	10.0	1	2.0	0	0.0	1	2.0	0	0.0	HIV testing should be offered to high-risk patients.	46
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92.0	3	6.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	I would support HIV testing of referred by physicians.	44
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88.0	4	8.0	1	2.0	0	0.0	1	2.0	0	0.0	I would support HIV testing of referred by nurses.	44
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88.0	3	6.0	2	4.0	1	2.0	0	0.0	0	0.0	0	0.0	I would support HIV testing of ferred by consumers el or s w h o d i d n o t i n t e r f e r e w i t h m y a b i l i t y t o p e r f o r	46
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92.0	2	4.0	1	2.0	0	0.0	0	0.0	1	2.0	4.0	I support HIV testing of referred by emergency nurses, as it is currently practiced in our emergency
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80.0	7	14.0	0	0.0	1	2.0	2	4.0	0	0.0	0.0	32	The current ED rapid HIV testing program has been successful in testing patients for HIV.
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64.0	9	18.0	4	8.0	4	8.0	1	2.0	0	0.0	39	The current ED rapid HIV testing program is beneficial to patients.
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78.0	5	10.0	4	8.0	1	2.0	1	2.0	0	0.0	I would like to see the expansion of the current ED rapid HIV testing program.	37
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74.0	6	12.0	6	12.0	0	0.0	1	2.0	0	0.0	Do you favor routine testing for all sexually active U.S. citizens?	39
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78.0	6	12.0	2	4.0	2	4.0	1	2.0	0	0.0	Do you favor routine testing in the emergency department?	38
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76.0	9	18.0	2	4.0	0	0.0	1	2.0	0	0.0	Do you think a routine HIV testing program is a good idea?	40
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Variables	Y in practice	<0.5%		0.5%–5.0%		>5.0%	Actual HIV prevalence	Chi-square	P value	
		N	%	N	%					
N	%	N	%	N	%	Estimated HIV prevalence in local hospital population	5	10.0	34	
68.0	11	22.0	<0.5%	9.30	0.16		0–1	3	60.0	7
20.6	1	9.1					2–5	2	40.0	11
32.4	6	54.5					6–10	0	0.0	11
32.4	1	9.1					>11	0	0.0	5
14.7	2	18.2					Missing	0	0.0	0
0.0	1	9.1				Estimated HIV prevalence in Houston, TX		2	4.0	21
42.0	27	54.0	0.5%–5.0%	1.92	0.93		0–1	1	50.0	4
19.0	6	22.2					2–5	1	50.0	9
42.9	9	33.2					6–10	0	0.0	5

23.8	7	25.9					>11	0	0.0	3
14.3	4	14.8					Missing	0	0.0	0
0.0	1	3.7				Estimated HIV prevalence in the United States		3	6.0	27
54.0	20	40.0	0.5%–5.0%	3.72	0.72		0–1	0	0.0	8
29.6	3	15.0					2–5	2	66.7	10
37.0	7	35.0					6–10	1	33.3	6
22.2	5	25.0					>11	0	0.0	3
11.1	4	20.0					Missing	0	0.0	0

Variables	Nurses' qualifications	<0.5%	0.5%–5.0%	>5.0%	Actual HIV prevalence	Chi-square	P value
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N	N	N	%	N	%	Estimated HIV prevalence in local hospital population				
68.0	11	22.0	<0.5%	2.86	0.83		RN	0	0.0	8
23.5	2	18.1					BSN, RN	5	10.0	23
67.6	9	81.8					BSN, MSN, RN	0	0.0	1
2.9	0	0.0					BSN	0	0.0	1
2.9	0	0.0					Missing	0	0.0	1
2.9	0	0.0				Estimated HIV prevalence in Houston, TX		2	4.0	21
42.0	27	54.0	0.5%–5.0%	2.89	0.82		RN	0	0.0	4

19.0	6	22.2					BS N, RN	2	100.0	15
62.5	20	74.1					BS N, MS N, RN	0	0.0	0
0.0	1	3.7					BS N	0	0.0	1
4.8	0	0.0					Mis sin g	0	0.0	1
4.8	0	0.0				Estim ated HIV preval ence in the United States		3	6.0	27
54.0	20	40.0	0.5% -5.0 %	6.0 1	0.42		RN	2	66.6	4
14.8	4	25.0					BS N, RN	1	33.3	20
74.1	16	0.8					BS N, MS N, RN	0	0.0	1
3.7	0	0.0					BS N	0	0.0	1
3.7	0	0.0					Mis sin g	0	0.0	1

Perceived barriers	Original description of barrier	N (114)	%
Time constraints	There is not enough time	23	20.2
Follow-up concerns	There are concerns with follow-up	27	23.7
Cost is too high	It is too expensive	13	11.4
Unknown legal concerns	I do not know the legal implications of HIV testing	18	15.8
Uncomfortable giving test results	It is uncomfortable delivering the test results	10	8.8
Inadequate resources	There are inadequate resources	12	10.5
Out of scope	It is not part of provider responsibilities	6	5.3
Not recommended	It is not a currently recommended guideline	5	4.4
Low HIV prevalence	HIV disease prevalence is too low	1	0.9

## DETAILS

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## Response to Kayauchi Letter: JEN

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### ABSTRACT (ENGLISH)

[...]this should be interpreted with caution because we were only able to compare nursing triage protocols and could not investigate other variables owing to the study design. Because our results show a decreased time to disposition among the admitted patients, whom we would assume to be in need of the most urgent care, we can infer that this is due to the FN protocol's statement to "notify physician immediately if patient is deemed neutropenic." [...]although we agree that C-reactive protein and procalcitonin levels are useful markers in assessing inflammation and that assessment criteria can help sepsis screening, our study was limited to its focus on the FN and sepsis nurse-initiated protocols. [...]we hope that future research assesses nurse-initiated protocols prospectively. Because it

would be unethical to randomize patients to one protocol over another, we suggest using a prospective noninferiority design to detect if there is no difference in wait times.<sup>3</sup> Therefore, 276 patients (138 per group) would be required to be 80% sure that the lower limit of a one-sided 95% confidence interval will be above the noninferiority limit of  $-0.6$  (based on the effect size obtained from our post hoc analysis).

## FULL TEXT

Dear Editor:

We would like to thank Drs. Kayauchi, Kagohashi, and Satoh for their interest in our article, "Assessing the Impact of ED Triage Directives on Febrile Oncology Patient Wait Times."<sup>1</sup> In their letter they raised valid questions, further highlighting the importance of using protocols for triaging patients with cancer presenting with fever in the emergency department. We would like to clarify and answer each of the points discussed.

First, our group believes that the writers' first and second questions can be answered together. Our definition of triage to disposition time was defined as the total time until the patient left the emergency department. Disposition was further categorized into 2 subgroups: those who were admitted to a hospital ward for further medical care and those who were discharged home. Because this study was retrospective in nature, we must speculate about which part of the clinical encounter was shorter in this population. Although our results showed a significant time reduction through the febrile neutropenia (FN) protocol overall, we hypothesize that the reason for this reduction was due to the results presented in Figures 5A and 6. These graphs show that the FN protocol was associated with a decreased wait time for the admitted population in particular. Specifically, for times to laboratory tests received. Accordingly, we do not believe that the doctor's explanation time to patients would differ for each protocol pathway. This is because the protocol affects time to information rather than the information provided. However, this should be interpreted with caution because we were only able to compare nursing triage protocols and could not investigate other variables owing to the study design.

Because our results show a decreased time to disposition among the admitted patients, whom we would assume to be in need of the most urgent care, we can infer that this is due to the FN protocol's statement to "notify physician immediately if patient is deemed neutropenic." This leads us to 2 assumptions: that 1) antibacterial preparation/administration and 2) outside consultation are expedited. Because the provider is notified of the patients classified as most acute, quicker care could theoretically be tailored to this group, which would inevitably speed up the decision to admit these patients. If the patient's initial laboratory work shows neutropenia, the decision to admit is often made immediately, whereas the remainder of the patients undergo further criteria before being discharged home. In our case, we hypothesize that the FN protocol is more efficient in identifying these patients classified as high risk for further care.

Second, although we agree that C-reactive protein and procalcitonin levels are useful markers in assessing inflammation and that assessment criteria can help sepsis screening, our study was limited to its focus on the FN and sepsis nurse-initiated protocols. As a result, we chose to focus on a systems approach to nursing protocols rather than specific provider algorithms and did not collect data on whether the providers ordered these laboratory tests outside the initial protocols. In addition, at the time of our data collection (March 2013-April 2016), the Systemic Inflammatory Response Syndrome criteria were used as the evidence-based approach for sepsis evaluation and were built into the sepsis protocol rather than criteria such as quick Sequential Organ Failure Assessment.<sup>2</sup> We agree, however, that these tests can provide useful information in the quick assessment of sepsis in this population. We urge further research to assess whether these tests can be integrated into nurse-initiated protocols to hasten and accurately triage patients undergoing chemotherapy presenting with acute fever.

Finally, we hope that future research assesses nurse-initiated protocols prospectively. Because it would be unethical to randomize patients to one protocol over another, we suggest using a prospective noninferiority design to detect if there is no difference in wait times.<sup>3</sup> Therefore, 276 patients (138 per group) would be required to be 80% sure that the lower limit of a one-sided 95% confidence interval will be above the noninferiority limit of  $-0.6$  (based on the effect size obtained from our post hoc analysis).



We hope we have satisfactorily answered the questions raised by Drs. Kayauchi, Kagohashi, and Satoh. As we strive to improve patient-centered care and render our health care system more efficient, it is important that we continue to reevaluate and compare directives. Our data demonstrate that the FN protocol used for triaging patients with cancer presenting with fever was associated with a quicker time to disposition, and this quicker time to disposition may potentially lead to a quicker time to antibiotic administration and appropriate care.—*Cameron F. Leveille, BSc, MD, Division of Plastic Surgery, Department of Surgery, McMaster University, Hamilton, Ontario, Canada; E-mail: Cameron.levaille@medportal.ca; Isabella F. Churchill, BSc, MSc, Department of Health Research Methods Evidence and Impact, Faculty of Health Sciences, McMaster University, Hamilton, Ontario, Canada; Pauline K. Kosalka, MD, Division of Nephrology, Department of Medicine, Western University, London, Ontario, Canada; Shane R. Freeman, MD, Division of Emergency Medicine, Western University, London, Ontario, Canada; Madelyn Law, PhD, Department of Health Sciences, Brock University, St. Catharines, Ontario, Canada.*

## DETAILS

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# Facility-Level Case Report of Nursing Care Processes for Patients With Suspected 2019 Novel Coronavirus Disease in Shanghai, China: JEN

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## ABSTRACT (ENGLISH)

### Introduction

Coronavirus disease emerged in Wuhan, China, on December 31, 2019, and spread rapidly worldwide. Few studies have described the nursing care provided to patients in isolation between suspicion of having the disease and a confirmed diagnosis. The purpose of this study was to describe the treatment of, and nursing care processes for, patients suspected, but not yet confirmed, of having coronavirus disease at 1 facility in Shanghai, China.

### Methods

For this retrospective facility case review and patient health record study, data were collected on all patients with suspected coronavirus disease who were treated between January 22, 2020, and February 29, 2020, at 1 hospital. The facility's nursing care processes were described in detail.

### Results

A total of 119 patients were suspected of having coronavirus disease on the basis of the screening criteria. Nine (7.6%) patients had confirmed coronavirus disease and were transferred to a higher level of care. The remaining 110 (92.4%) were treated and discharged. No cross-infection between patients and hospital staff or other patients was detected. The patients' symptoms included fever (n = 98, 82.4%), cough (n = 79, 66.4%), dizziness (n = 28, 23.5%), headache (n = 26, 21.8%), fatigue (n = 26, 21.8%), myalgia (n = 16, 13.4%), rhinorrhea (n = 6, 5.0%), diarrhea (n = 5, 4.2%), severe nasal congestion (n = 4, 3.4%), and dyspnea (n = 1, 0.8%).

### Discussion

Coronavirus disease is very contagious. Nurses need to understand the symptoms and treatment of the disease as well as nursing procedures, and learn how to cut off transmission routes, control transmission sources, and use

protective equipment correctly to prevent transmission of the disease within the hospital.

## FULL TEXT

### Introduction

At the end of December 2019, an outbreak of a severe acute respiratory syndrome caused by coronavirus pneumonia occurred in Wuhan, Hubei Province, China; this pneumonia was named coronavirus disease (COVID-19). It is infectious, and the World Health Organization (WHO) declared COVID-19 a global public health emergency.<sup>1,2</sup> The infection has spread worldwide.<sup>1-3</sup> COVID-19 can cause pneumonia and damage the kidneys, heart, and other organ systems,<sup>4,5</sup> with a mortality rate of approximately 3.2% among 51,857 cases of COVID-19 as of February 16, 2020.<sup>6</sup> As of March 3, 2020, 80,270 confirmed and 520 suspected cases of COVID-19 in China had been recorded.<sup>7</sup>

Without timely care for, and treatment of, patients suspected of having COVID-19, the number of patients with confirmed COVID-19 will continue to increase, and the disease will have a major negative impact worldwide. These patients need to be isolated immediately, which results in the loss of personal freedom and face-to-face contact with their families. Research has shown that patients with suspected COVID-19 can become fearful, anxious, bored, and depressed.<sup>8,9</sup> Suicidal behavior after the imposition of quarantine has prompted patients and others to threaten lawsuits over quarantine policies.<sup>10,11</sup> Thus, the holistic nursing care provided to patients with suspected COVID-19 should aim to improve these patients' quality of life after discharge, and reduce the burden on their families and social economic pressure.

There is a paucity of research in the published literature on the challenges of caring for patients in isolation between the suspicion of having COVID-19 and a confirmed diagnosis, and on the success of processes to prevent transmission within the hospital setting. The purpose of this study was to describe our facility's nursing care processes to prevent hospital transmission, and describe the symptoms and treatment for patients in isolation owing to suspected COVID-19 infection.

### Methods Study Design

This was a hospital facility case study and retrospective health record review of the processes to prevent the spread of COVID-19 within the hospital and the nursing care, symptoms, and treatments for patients in isolation between suspicion of having COVID-19 and a confirmed diagnosis.

### Patients

For this retrospective study, data were reviewed from patients suspected of having COVID-19 who were admitted to Shanghai Jiao Tong University–affiliated Sixth People's Hospital between January 22, 2020, and February 29, 2020.

### Ethical Considerations

The study protocol was approved by the hospital's review committee (number 2020-KY-016), and all patients provided informed consent.

### Admission Criteria

The admission criteria were (1) suspicion of having COVID-19 on the basis of the New Coronavirus Pneumonia Prevention and Control Program (7th edition)<sup>12</sup> and (2) age 16 years or older. Very briefly, patients suspected of having COVID-19 were classified on the basis of a history of being in the Wuhan area in the previous 14 days with a fever and/or respiratory symptoms, a history of exposure to COVID-19 (contact with someone with nucleic acid positivity), imaging features of COVID-19 (such as multiple small patches, interstitial changes, double-lung multiple glass shadows, and lung consolidation), and a normal or low white blood cell count and a normal or low lymphocyte count.<sup>12</sup> Suspected COVID-19 was defined as an epidemiological history and any 2 clinical manifestations, or no clear epidemiological history and 3 clinical manifestations.<sup>12</sup>

### Facility Processes

We describe in detail the implementation of national and WHO guidelines in the isolation and observation wards accommodating patients with suspected COVID-19, considering infection control and incorporating the perspectives of the hospital, patient, patient's family, and nursing care.

## Data Collection

Two researchers (Y.L.H. and L.W.) reviewed the clinical records of the patients suspected of having COVID-19, and used a data abstraction tool designed for the purposes of this study to obtain the patients' general data (eg, age, sex, and employment), clinical symptoms (eg, fever, cough, and fatigue), and treatment of major clinical symptoms. The symptoms were abstracted from the narrative nursing notes (considered unstructured data in informatics).

## Statistical Analysis

Variables were analyzed with descriptive statistics using SPSS version 22.0 (IBM Corp).

## Results

The records of 119 patients (72 women, 47 men; ages ranging from 17 years to 80 years) were included in the record review. <sup>Table 1</sup> summarizes their sociodemographic data. After active treatment in our hospital, 110 (92.4%) of the 119 patients were discharged; the remaining 9 (7.6%) patients were confirmed to have COVID-19 and were transferred to the Shanghai Public Health Clinical Center for treatment. No cross-infection between patients and hospital staff or other patients was detected (absence of symptoms, negative nasopharyngeal swab, and negative antibody screening).

The main symptoms of the 119 patients with suspected COVID-19 were fever ( $n = 98$ , 82.4%), cough ( $n = 79$ , 66.4%), and dizziness ( $n = 28$ , 23.5%; <sup>Table 2</sup>). The treatment for fever is summarized in <sup>Table 3</sup>.

## Nursing Care for Patients with Suspected COVID-19

The nursing care provided to patients with suspected COVID-19 was designed to reduce development of the disease by reduction of COVID-19 transmission routes, controlling the infection, managing patients' symptoms, monitoring the patients, managing nurses, and the use of medical supplies.

## Reduction of COVID-19 Transmission Routes

At the time of writing this report, COVID-19 was known to be spread mainly through respiratory droplets and person-to-person contact.<sup>13</sup> The cutting off of transmission routes was very important. At the 4 entrances to the hospital and at each entrance to a ward or section, health care personnel performed the initial checks, including monitoring body temperature and making inquiries regarding the patients' epidemiological history on the basis of the National Health Commission of China New Coronavirus Pneumonia Prevention and Control Program (7th edition).<sup>12</sup> The staff showed their work cards; others entering the hospital were required to provide their names and telephone numbers and undergo temperature monitoring; those with body temperatures above 37.3°C were treated in the fever clinic. In treating patients suspected of having COVID-19, we followed China's National Coronavirus Disease guidelines and the WHO guidelines.<sup>14,15</sup> The hospital set aside 7 floors to care for patients with suspected COVID-19; each patient had a single room.

We admitted 119 patients with suspected COVID-19. Each patient had to wear a mask and could not leave the room or have visitors. The patient's excrement, urine, vomit, and other secretions were collected in special containers and disinfected with chlorine (20,000 mg/L) by immersion for 2 hours.<sup>14</sup> The patient's bed rails, bedside table, door handles, and other potentially contaminated items were sprayed, wiped, or soaked with chlorine (1,000 mg/L available chlorine) or chlorine dioxide (500 mg/L) disinfectant, and wiped clean with water 30 minutes later.<sup>14</sup> The air, water, and means of transportation in the patient's environment were disinfected according to national policies.<sup>14</sup> Health care workers were required to use masks, goggles, isolation clothing, and other personal protective equipment (PPE) for patient isolation care, prevention, and control of droplet and contact transmission.

## Control of Infection

To control the spread of COVID-19, national policies<sup>14</sup> and WHO guidelines<sup>15</sup> were followed to control infection from the perspectives of the hospital, patient, and patient's family.

## The hospital perspective

The hospital closed the departments that could spread COVID-19 through common procedures such as stomatology, otolaryngology–head and neck surgery, and gastroscopy and other related departments from January 2020 to February 2020; only the departments treating emergencies (eg airway foreign body, epistaxis, oral bleeding) remained open. When performing aerosol-generating procedures (eg, aspiration of sputum, intubation, and

bronchoscopy), the hospital staff used PPE, including gloves, protective clothing, goggles, protective face screen, and N95 masks. The health care staff donned PPE (N95 masks, goggles, gloves, protective face screen, and protective clothing) before entering the ward and removed it on leaving the ward. A room (semicontaminated area) was established in the ward where the staff could change their PPE. After contact with a patient, the staff would change their PPE in this room before returning to the ward to make contact with the next patient.

The staff's use of stethoscopes, blood pressure cuffs, and thermometers (unique to patients) was in strict accordance with the national disinfection policy.<sup>14</sup> The staff were instructed to not touch their eyes, nose, or mouth with potentially contaminated gloves or hands, and to ensure that the wards were ventilated and that they washed their hands correctly. When not performing a nursing procedure that required patient contact, a distance of at least 1 meter was kept between nurse and patient, for example, when speaking to the patient and taking a history. On completion of a nursing procedure, the nurses avoided contaminating surfaces such as door handles and light switches.

### **The patient perspective**

The patients were informed about COVID-19 and its transmission. We used videos, pictures, and a COVID-19 handbook to increase patients' knowledge of COVID-19. Patients suspected of having COVID-19 were instructed to use surgical masks, to cover their mouths and noses with tissue or their arms when coughing or sneezing, to wash their hands frequently before and after meals and after contact with respiratory secretions, and to drink bottled water. Family members were not allowed to bring food to the hospital. The patients' diets were configured by the dietitian; nurses with PPE were responsible for placing the meals on the table in each room; and the nurses also fed those patients who were incapacitated. The waste after dining was placed on the tables, which were disinfected, and packed up by the nurses. The patients were told that the wards needed to be ventilated 3 times a day for 30 minutes each. The clothes of patients suspected of having COVID-19 were placed in designated places and subsequently sterilized according to national guidelines.<sup>12</sup> Health care staff would help patients who needed psychological counseling. For example, to reduce the patients' fears of COVID-19, we provided COVID-19–related information that was relevant to each patient's condition; we also allowed the patients to listen to music, watch videos, and communicate with family members by phone or video regularly.

### **The family perspective**

To reduce cross-infection, family members were not allowed to visit the patients. However, when facing separation, patients and their family members can develop anxiety, fear, depression, and other psychological states.<sup>16</sup> We provided Wi-Fi access so that the patients could communicate with their family members by video or cell phone. Family members could contact the providers during working hours to learn more about the patients' conditions.

### **Symptoms Management**

Our patients' symptoms included fever, cough, fatigue, severe nasal congestion, rhinorrhea, myalgia, diarrhea, respiratory difficulties, dizziness, and headache. Fever was the most common symptom ( $n = 98/119$ , 82.4%). The degree of fever was classified as none ( $105.8^{\circ}\text{F}$ ),<sup>17</sup> and fevers corresponding to these categories were present in 18 (15.1%), 78 (65.5%), 14 (11.8%), 9 (7.6%), and 0 (0%) of the 119 patients, respectively. Following the Chinese national guidelines,<sup>12</sup> all patients were given oseltamivir (75 mg twice a day), umifenovir (Arbidol tablets) (0.2 g twice a day), and ofloxacin (0.5 g/day). After an internal medical diagnosis and treatment routine,<sup>18</sup> we treated the fever (Table 3 shows the treatments).<sup>18</sup> In addition, 46 (38.7%) patients had a productive cough, and 33 (27.7%) had a dry cough. After an internal medical diagnosis and treatment routine,<sup>18</sup> the cough was treated with Feilike Heji (10 mL thrice a day) or compound licorice (10 mL thrice a day), and ambroxol hydrochloride tablets (30 mg thrice a day).<sup>18</sup> Only 1 patient developed problems with breathing, which can lead to restricted lung function and impaired gas exchange. The nurses closely observed the patient's respiratory rate and rhythm, and blood oxygen saturation, looking for signs of chest tightness, shortness of breath, and cyanosis to inform the provider. We provided care for the patients according to the provider's prescription.

### **Patient Monitoring**

We measured each patient's temperature every 4 hours, except at 10 P.M. and 2 A.M. if the patient was asleep.

When a patient had a fever and was given medicine, the temperature was measured 30 minutes later. The patients were encouraged to drink 2,500 mL to 3,000 mL of water a day to help dissipate heat and to hydrate. When measuring the temperature, the patient's facial color, pulse, breathing, and diaphoresis were monitored, and a provider was informed of any abnormality. Patients with a fever were also provided psychological care. When patients with a fever were uncomfortable, they were able to page the staff members. We clothed ourselves in appropriate PPE and monitored the patients, listened to them discuss their conditions, explained their conditions to them, and encouraged them to remain confident. If a patient's systolic blood pressure was 140 mm Hg or higher, or if their diastolic blood pressure was 90 mm Hg or higher, we monitored their blood pressure twice per day. The nature of the patients' cough was observed, including urgency, color and nature of the sputum, timing of sputum production, and accompanying symptoms.

### **Nursing Staff and Materials Management**

Our hospital conducted 4 education sessions on COVID-19 per week, and the videos were available to the nurses through WeChat (Tencent).<sup>19</sup> On-site guidance was provided to the nursing staff on the use of protective clothing, goggles, gloves, and other materials. Only qualified professionals (chosen on the basis of testing: those with a passing score regarding theoretical knowledge of COVID-19 and a nursing operations skill score of 90 points or more) were permitted to take part in this work.

To reduce fatigue, senior nurses from other departments monitored the shift changes. Each shift was 8 hours long, with 4 hours or less spent providing direct patient care; the remainder of the shift was spent in activities such as writing nursing records and addressing provider prescriptions. Each nurse had 2 days off a week for 2 weeks, and then a full 7 days off. The bed-to-nurse ratio was 34:68 (1:2). Most patients were admitted to the emergency department for initial triage. The ED workers brought patients with a temperature higher than 99.2°F to the fever clinic for examination. Patients with suspected COVID-19 were transferred to the "suspected case" ward near the emergency department to arrange hospitalization.

During each shift, a lead nurse ensured staff safety. The lead nurse checked whether the staff were wearing their PPE correctly, as well as whether they removed their PPE and disinfected related items as instructed. When nurses encountered difficulties that they could not resolve, the lead nurse helped identify solutions.

To reduce cross-infection, the ward was divided into clean, semicontaminated, and contaminated areas, with the staff changing their clothes, eating, drinking, and resting in specified areas. Every week, psychologists and other counselors were available to provide online psychological counseling for the nursing staff to address psychological stressors and coping mechanisms. The protective clothing, N95 masks, goggles, eye-protection screens, and other equipment were changed at least once every 4 hours, and more often when they caused discomfort. After contact with a patient, each staff member removed their isolation clothing and gloves and changed into a new PPE set before contact with another patient. Any test sample collected was packed in a double plastic bag and transported in a special box. Nucleic acid test samples were sent to the Shanghai Municipal Center for Disease Control, and other samples were sent to the laboratory, which was contacted in advance.

### **Discussion**

At the time of writing, our facility case study was the first to describe the experience of providing nursing care to patients in isolation with suspected COVID-19 and before the diagnosis was confirmed. Following national and WHO guidelines, we treated patients suspected of having COVID-19 as if they had a confirmed COVID-19 diagnosis. We successfully treated and discharged 110 (92.4%) of the 119 patients suspected of having COVID-19, and transferred 9 (7.6%) patients with a confirmed COVID-19 diagnosis to the Shanghai Public Health Clinical Center for treatment. No cross-infection between patients and hospital staff or other patients was detected.

We achieved this result owing to several reasons and processes. First, our hospital provided care in strict accordance with Chinese national guidelines, including cutting off of transmission routes, control of infection sources (including disinfection of the ward environment), management of patient and medical staff supplies, and implementation of infection-reduction measures, including limits regarding visitors. Second, active training ensured that the nursing staff used protective equipment correctly when caring for the patients. The scheduling system

ensured that the nurses had sufficient rest and psychological counseling support. Third, protective materials were managed strictly. The departments implemented a policy of using 1 set of protective equipment per person per shift (ie, replacement of items such as surgical masks and caps after 4 hours), except in special circumstances. Fourth, close observation of the patients' physical condition and emotional state enabled the provider and psychologists to provide physical and psychological care interventions.

Two studies have described nursing experiences during the COVID-19 outbreak.<sup>20,21</sup> One summarized the experience of nursing care provision to 26 critical patients with COVID-19.<sup>20</sup> The other study described the experience of providing nursing care to 9 critical patients with COVID-19 using extracorporeal membrane oxygenation.<sup>21</sup> Our study was similar to the previous 2 studies<sup>20,21</sup> in that we carried out patient observation, monitoring, psychological nursing, effective disinfection management, and safety management of the ward. Our facility case study differed from these 2 in that we described the provision of care to patients with suspected COVID-19, instead of critical patients with COVID-19, and our sample was larger than those included in these previous studies.

A third study described the provision of nursing care for an 83-year-old woman with suspected severe acute respiratory syndrome (SARS),<sup>22</sup> which corroborated our findings with similar primary symptoms, including fever, cough, and severe fatigue. Moreover, during the treatment process, the nurses conducted patient triage, arranged for relevant examinations and treatments, and assumed care of the patients with suspected disease; the medical staff implemented patient isolation, then measured and reported the patient's temperature and general health condition.

During the 30-month rehabilitation period after recovery from the SARS outbreak in 2003, 58.9% of the patients developed posttraumatic stress disorder, depression, anxiety disorders, and other mental disorders.<sup>23,24</sup> SARS-related psychological trauma was sustained and widespread. One study found that 47.4% of the patients with suspected COVID-19 developed anxiety, and 30.3% showed depressive symptoms.<sup>25</sup> Another study found that patients with suspected COVID-19 showed signs of anxiety and fear; for example, when they were informed of the possibility of a COVID-19 diagnosis, they exhibited trembling, sweating, and dizziness.<sup>26</sup> Some studies revealed that patients with COVID-19 showed symptoms of depression, anxiety, and posttraumatic stress disorder.<sup>27,28</sup> Any hospital might receive such patients and must provide psychological counseling and other services. We recommend that public outreach, including that provided by news media, should communicate that patients with COVID-19 are suffering, afraid, and lonely to emphasize the need for respect and sympathy for affected patients, rather than discriminating against these patients, to reduce their psychological burdens.

On April 17, 2019, the WHO published guidelines for digital health interventions, including supportive psychotherapy, cognitive behavioral therapy, eye-movement desensitization, and reprocessing and digital health intervention, and affirmed their effectiveness, acceptability, and feasibility.<sup>29</sup> Most hospitals can use these methods to relieve patients' psychological stress.

Some patients with COVID-19 lose their senses of smell (anosmia) and taste (ageusia).<sup>30-32</sup> Most patients with anosmia or ageusia recovered within 3 weeks.<sup>30</sup> However, many viral infections and upper respiratory tract infections can cause anosmia and ageusia through damage to the olfactory epithelium.<sup>33,34</sup> Nevertheless, anosmia and ageusia have emerged as important symptoms to consider in the early diagnosis of COVID-19 since we initiated our screening processes.<sup>30</sup>

Since our facility processes were initiated, a greater proportion of patients with severe COVID-19 (including those who died from the disease) have met the diagnostic criteria for disseminated intravascular coagulation compared with patients with mild COVID-19 who survived.<sup>35,36</sup> Approximately 50% of the patients with COVID-19 have elevated D-dimer levels; the proportions and levels are higher in patients with severe and critical COVID-19, who have a high risk of thrombosis.<sup>4,36</sup> In 1 study of 449 patients with severe COVID-19, anticoagulant therapy with low-molecular-weight heparin reduced the mortality rate among those with markedly elevated D-dimer levels.<sup>36</sup> For people with low bleeding risk, low-molecular-weight heparin is recommended to be injected subcutaneously.<sup>37</sup> Health care workers should teach patients with COVID-19 about the need to prevent venous thromboembolism, and begin active or

passive movement of the lower limbs as soon as possible.<sup>38</sup>

No patients were severe enough to require intubation in our isolation and observation ward for suspected COVID-19 infection. If standard oxygen therapy for patients with severe COVID-19 does not relieve their respiratory distress or hypoxemia, they should be administered high-flow nasal cannula oxygen therapy or noninvasive ventilation for 1 hour to 2 hours. If their condition does not improve and they develop respiratory distress with respiratory frequency higher than 30 breaths/min and oxygenation index less than 150 mm Hg (1 mm Hg = 0.133 kPa), they should be intubated, and their lungs should be ventilated.<sup>12</sup> For patients with difficult airways who are breathing spontaneously, the recommended treatment includes sedation, analgesia, and topical anesthesia. A soft visual intubation mirror should be used to guide transnasal endotracheal intubation; if nasal endotracheal intubation is difficult or nasal bleeding occurs, oral endotracheal intubation should be performed.<sup>39-41</sup> Airway management instruments for use in patients with difficult intubation should include a visual laryngoscope and visual intubation soft endoscope. When difficulty with laryngeal mask placement and ventilation occurs, a surgeon or otolaryngologist should perform a direct tracheotomy.<sup>39-41</sup> Extracorporeal membrane oxygenation can initially be used to ensure oxygenation; tracheal intubation or tracheotomy can then be performed with the patient under anesthesia.<sup>42</sup>

The lack of supplies (such as PPE, hospital worker PPE, or supplies and equipment needed to care for these patients) during the COVID-19 pandemic is also a major social problem,<sup>43,44</sup> and studies should examine how to improve this situation.

### **Limitations**

Our study has some limitations. First, it was a single-center study with a relatively small sample. Future research should collect data on more patients with suspected COVID-19 in Shanghai, and share the experience of nursing care provision to these patients. Second, our study was retrospective. Rehabilitation hospitals should conduct prospective studies of the problems these patients have after discharge, and examine the effectiveness of various interventions. Finally, the potential for false positive or negative rate for laboratory tests confirming COVID-19 infection was not taken into account in this study.

### **Implications for Emergency Nurses**

To our knowledge, this facility case study is the first to describe the standards of care and processes implemented in the care of these patients within the COVID-19 isolation and observation ward, so that emergency nurses and other health care workers can improve their awareness of COVID-19 and provide better care to patients and avoid the threat of COVID-19. We detected zero cross-infection to other patients or staff, which is an important finding for other facilities to emulate. We have provided an exemplar to describe implementing national guidelines at a facility for the management and treatment of patients with suspected COVID-19 disease according to approaches used in China<sup>12,14</sup> and advocated by the WHO,<sup>13,15,29</sup> which might be adopted in other countries. Many emergency departments have an observation unit or level of care within the department or immediately adjacent to the emergency department that may operate as temporary isolation and observation units. Strict infection control, patient monitoring, nurse staffing ratios, psychological support, and rest periods for staff in our isolation and observation unit may provide a best practice for other emergency departments.

### **Conclusion**

COVID-19 is very contagious and has spread to more than 100 countries. The huge number of suspected COVID-19 cases worldwide is causing global tension and panic. This study summarizes the clinical characteristics of patients suspected of having COVID-19, and our experience in providing nursing care to these patients. Most of the patients were discharged from the hospital, and no cross-infection between patients and hospital staff or other patients was detected. In the future, hospitals should train their staff to respond to various emergencies, and provide individualized psychological counseling to relieve the psychological stressors and enhance coping for health care staff and patients.

### **Author Disclosures**

Conflicts of interest: none to report.

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Characteristics	Number (N = 119)	Percentage (%)
Sex		
Female	72	60.5
Male	47	39.5
Employed		
Yes	85	71.4
No	34	28.6
History of smoking		
Yes	6	5
No	113	95
Disposition		
Discharged (COVID-19 negative)	110	92.4
Transfer to other departments (COVID-19 positive)	9	7.6

Clinical symptoms	n	Percentage (%)
Fever	98	82.4
Cough	79	66.4
Dizziness	28	23.5
Fatigue	26	21.8

Headache	26	21.8
Myalgia	16	13.4
Runny nose	6	5.0
Diarrhea	5	4.2
Severe nasal congestion	4	3.4
Dyspnea	1	0.8

Fever	Route/Medication
Low-grade fever	Oral <sup>12 +,†,‡</sup>
Moderate fever	Oral <sup>12 +,†,‡, 18#</sup>
High fever	Oral <sup>12 +,†,‡</sup> Intravenous <sup>18 **</sup> Rectal administration <sup>18 ††</sup>

## DETAILS

<b>Subject:</b>	Dizziness; Symptoms; Fatigue; Medical diagnosis; Cough reflex; COVID-19; Nursing care; Equipment; Dyspnea; Nursing; Diarrhea; Coronaviruses; Masks; Emergency medical care; Medical screening; Case reports
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# The Acute Incident Response Program: A Framework Guiding Multidisciplinary Responses to Acutely Traumatic or Stress-Inducing Incidents in the ED Setting: JEN

[ProQuest document link](https://www.proquest.com/scholarly-journals/facility-level-case-report-nursing-care-processes/docview/2487205592/se-2?accountid=211160)

## ABSTRACT (ENGLISH)

### Background

Clinicians working in the ED setting are exposed to traumatic and stress-inducing incidents, which may increase the

incidence of psychological sequelae, including burnout and acute stress disorders. The purpose of this project was to develop and implement a novel debriefing program as an early intervention for acutely stress-inducing events in the emergency department.

### **Methods**

The 2-stage Acute Incident Response program was developed and implemented in the emergency department of the John Hunter Hospital to guide an interprofessional response to acutely stress-inducing incidents. This psychological support framework draws on existing concepts of critical incident stress management along with elements of contemporary “hot debriefing” models to create a concise, clinician-led response program incorporating elements of both work group peer support and clinical team performance improvement. The Acute Incident Response program is novel in its concurrent focus on both salient clinical factors and emotional responses of affected clinicians.

### **Results**

The developed Acute Incident Response program framework predominantly focuses on the wide dissemination of a peer-driven debriefing model. When additional support is deemed necessary by trained clinical champions after the Hot Acute Incident Response process, escalation to a central response coordinator ensures targeted secondary support follow-up for all affected team members.

This program has been introduced at 1 site and warrants further targeted investigation to determine its efficacy and utility in a broad range of clinical contexts.

### **Conclusion**

The Acute Incident Response program is an accessible and meaningful model to guide a functional, clinician-led response to acute incidents in the ED setting. The model could feasibly be applied in a wide variety of clinical contexts.

## **FULL TEXT**

### **Contribution to Emergency Nursing Practice**

- The existing literature indicates that the risk of increased harm historically associated with immediate post incident debriefing measures is limited and has not been well demonstrated in the emergency department setting.
- This article concluded from a review of the evidence that further research and development is required to find a suitable strategy to support emergency clinicians in the immediate period following exposure to stress inducing incidents.
- This article presents the Acute Incident Response (AIR) Program as a feasible strategy for providing a peer driven response to acute incidents in the emergency setting.

### **Introduction**

With the ever-increasing demands associated with working in the emergency setting, our frontline clinicians are under pressure—pressure to meet targets, pressure to manage patients who are critically ill, pressure to deal with violence and aggression—pressure that can lead to lasting psychological harm.<sup>1</sup> Recurrent exposure to traumatic events has been associated with both compassion fatigue and burnout in the international emergency nursing population.<sup>2</sup>

The purpose of this paper is to outline the background and development of the Acute Incident Response (AIR) program, a novel approach to the management of clinician well-being after exposure to acutely stress-inducing incidents in the ED setting. In principle, the AIR program focuses on guiding clinician-led workplace peer support and team cohesion in the initial stages of follow-up to a stressful workplace event ranging from immediately after the event to the days that follow. The defining novelty of this program is the deliberate integration of both an emotional support intervention and a guided reflection on clinical team performance, 2 concepts that are most commonly

delivered in very different ways. After an exploration of the relevant evidence, the AIR program framework is presented in this paper in detail following the Template for Intervention Description and Replication guidelines for the reporting of interventions.<sup>3</sup>

### **The State of Emergency**

Frontline clinicians working in the emergency department are frequently exposed to acutely stress-inducing incidents.<sup>4</sup> Although this statement is widely accepted, there remains a paucity of access to suitable models designed to guide immediate and ongoing response after such acute incidents in the emergency environment. With increasing patient volume and acuity, it is becoming more common for clinicians to be exposed to a wide variety of traumatic events.<sup>5</sup> This perpetual exposure to crises has the potential to produce serious negative outcomes for health care workers without the provision of appropriate care and support.<sup>6</sup> Frequent exposure to patients and relatives experiencing physical or emotional trauma can in turn lead to vicarious traumatization of clinicians without access to adequate support strategies.<sup>7</sup>

The AIR program developers aimed to provide a framework for appropriately and adequately guiding an interprofessional response to events or indicators that may signify potential psychological harm to clinicians working in the emergency department of the John Hunter Hospital (a 35-bed level 1 trauma center in the Australian metropolitan city of Newcastle).

### **Existing Support Structures**

The AIR program is based on the principles of 3 major constructs identified in the literature: critical incident stress management (CISM), psychological first aid, and peer support. The CISM concept of dividing a response into a “defusing” phase and a “debriefing” phase was central to this project because it was identified in our clinical setting that the defusing element (ie, the immediate response) was lacking.<sup>8</sup> Although this approach has not been demonstrated to be effective for the management of primary victims of trauma, it is effective in guiding responses to secondary victims of trauma, including emergency clinicians.<sup>9</sup> Psychological first aid as described in the World Health Organization’s disaster response literature further expands on the core concepts of the CISM framework.<sup>10</sup> Although the psychological first aid approach is designed for large-scale implementation (ie, communities affected by natural disasters), the underpinning ideology directly influenced the development of the AIR program.

In the clinical context of a busy emergency department, the social element of peer support draws together the benefits of the aforementioned constructs while promoting the value of using existing team members as responders. A 2019 joint scoping review of early post-trauma interventions in organizations advocated the use of organizational peer support frameworks as a positive way to effectively improve outcomes while addressing the logistic challenge of implementing early interventions in a diverse operational setting.<sup>11</sup>

Although CISM, psychological first aid, and peer support all primarily focus on validating and normalizing emotional reactions, it was important for a response delivered in the emergency context to identify these incidents as opportunities for clinical team performance improvement. The concept of the clinical “hot debrief” is widely used in the context of emergency and prehospital care to facilitate timely, reflective discussion evaluating team performance after an event.<sup>12</sup> A range of “hot debriefing” tools are widely available including the “Gather, Analyze, Summarize” and “Debriefing In Situ Conversation after Emergent Resuscitation Now” models.<sup>13</sup> Although each of these tools provides a structured approach to addressing team or individual performance, it is uncommon to find a hot debriefing model that concurrently addresses the emotional responses of the participants.

By combining elements of each of these existing response methodologies with respect to the emergency context, the AIR program aims to facilitate a response that considers the need for early intervention peer psychological support alongside the need for continuous performance improvement.

## Controversy: To Debrief or not to Debrief?

Whenever debriefing is considered in the emergency context, it is impossible to avoid the prevailing debate of benefit versus harm. The most commonly cited evidence indicating a potential correlation between routine debriefing and worsened outcomes was a Cochrane review by Rose et al<sup>14</sup> that concluded that “compulsory debriefing of victims of trauma should cease.” Although this review found that there was no reduction in the risk of inducing post-traumatic stress disorder (PTSD) when routine, single-session debriefing was employed after a traumatic event, the included studies focused exclusively on either nonclinical or non-hospital-based victims of trauma. Consequently, the findings of this review cannot be directly applied in the context of health care providers working in the acute hospital setting. Following on from the Cochrane review, an influential guideline on the prevention and management of PTSD was published by the National Institute for Health and Care Excellence in 2005, generally recommending against the routine use of postincident debriefing after exposure to traumatic events.<sup>15</sup> In the wake of these substantial publications in the early 2000s, the association of immediate debriefing with an increased risk of harm led many organizations to move away from offering such processes routinely.<sup>16</sup> However, in recent years, further scrutiny of the evidence contributing to the generalized recommendation against routine debriefing has opened the door to revisit the issue.<sup>17</sup>

In 2018, the National Institute for Health and Care Excellence guideline on PTSD (NG116) was updated to reflect the state of contemporary evidence and practice. The updated guideline reflects a more accommodating stance toward the need for immediate intervention in high-risk groups. This guideline openly supports the use of interventions that are commonly employed immediately after exposure with an emphasis on peer support as a core principle of care.<sup>18</sup>

More recently, expert sentiment has fueled interest in exploring the appropriate delivery of debriefing interventions after acute trauma in the emergency setting. In 2012, the Debriefing In Situ Conversation after Emergent Resuscitation Now tool was developed and validated, and has since been widely adopted in acute care areas.<sup>13</sup> The 2017 paper by Chinnock et al<sup>19</sup> outlined significant expert support for the application of locally endorsed postresuscitation debriefing practices after both rare and routine incidents in the emergency department. In addition, a growing body of evidence has been generated to support the utility of early targeted interventions for victims of trauma as opposed to the historically advocated watchful waiting approach.<sup>20</sup>

The underpinning concepts at the center of the debate for and against routine debriefing are clearly highlighted in the discourse between Clark et al<sup>21</sup> and Burchill<sup>22</sup> in their original paper and letter to the editor, respectively, both published in the *Journal of Emergency Nursing*. Clark et al<sup>21</sup> performed a qualitative study evaluating the perceptions of the staff in a pediatric emergency department relating to the routine use of critical incident stress debriefings. Among other themes, this study found that CISM concepts, when voluntarily accessed, may be well received by contemporary emergency clinicians.<sup>21</sup> In a letter to the editors of the *Journal of Emergency Nursing*, responding to Clark et al,<sup>21</sup> Burchill<sup>22</sup> reiterated the importance of considering the aforementioned historical evidence base establishing the potential for harm stemming from CISM interventions. This letter referenced the 2002 Cochrane review and meta-analysis<sup>14</sup> along with more recent examples, including an article outlining the impact of crisis intervention on the mental health status of emergency responders after a high-profile terrorist attack. Although the message imploring consideration of this evidence is well founded, the underlying issue remains that the evidence presented against postincident debriefing in the emergency context is almost entirely extrapolated from similar, yet importantly different, contexts such as prehospital treatment and community disaster response. To date, the evidence base evaluating the utility, efficacy, and potential harm of postincident debriefing in the context of hospital-based health care providers remains limited.

With the balance of relevant evidence in mind, the risk of harm associated with traditional debriefing constructs does not appear to sufficiently suppress the ongoing issue of unmitigated exposure to trauma faced on a daily basis by frontline emergency clinicians. We concluded that the need to develop a suitable strategy for responding to such circumstances remains a priority. Furthermore, the provision of a clinician-led framework for the combined delivery of clinical and psychological support in an acute care environment has not been sufficiently studied and warrants investigation as a potentially more suitable model.

### **The Acute Incident**

Although in many cases the events demanding a structured approach to psychological first aid in the emergency environment require little definition, the term “acute incident” was employed in this program as an umbrella term encompassing a wide variety of traumatic or stress-inducing events. The term acute incident in the context of this project was defined as “any acutely traumatic or stress-inducing event experienced by a health care worker during the course of their work.” The “Terrible Ten” list espoused by Mitchell<sup>23</sup> was adapted to reflect this definition in 7 broad categories listed in [Figure 1](#).

### **AIR Framework Development and Scope**

The AIR process was developed in consultation with key clinical and operational stakeholders, including nurses, doctors, executive sponsors, social workers, and the local Employee Assistance Program psychologists. A working group was formed, and a series of 3 meetings were held over a 3-month period to streamline stakeholder involvement in the design process while incorporating relevant feedback. The first meeting outlined the scope of the problem locally and synthesized the available processes and evidence to develop a plan for progression. During the second meeting, a draft framework was presented that was further refined at the final meeting. After the 3 working group meetings, the AIR program framework was disseminated to the local emergency physician and clinical nurse specialist groups as well as the ED executive leadership team. After the integration of final consultative feedback, the AIR program framework was introduced to the core clinical team.

The program presented to the clinical group was a 2-stage framework as graphically illustrated in [Figure 2](#). The program relied largely on the use of frontline clinicians as responders with targeted support from the ED leadership team.

After identification of an acute incident, any emergency clinician could request a guided response from a trained AIR clinical champion who would proceed to facilitate a first aid measure known as a Hot AIR debrief. This process would be employed in the minutes or hours after a team’s involvement in an incident and would commonly take 10 minutes to complete.

It should be noted that despite the opt-in nature of the AIR program, gathering the affected team members together after an acute incident was identified as a recurring challenge faced when coordinating Hot AIR debriefs. To address this issue at the initial implementation site, members of the ED coordinator group (nursing team leaders) were engaged to support the temporary release of staff from affected clinical areas. This often involved the redeployment of staff from other areas of the department, or the mobilization of nonclinical staff such as managers and educators to support attendance. When timely attendance was not possible for any reason, the Hot AIR debriefs were scheduled at the completion of a clinical shift.

### **Stage 1: Hot AIR**

The Hot AIR process primarily follows the structure of a traditional clinical hot debrief, with a focus on reflection and quality improvement. The major deviation from the exclusively clinical model is the addition of a simple step acknowledging the participants’ emotional response to a situation. The Hot AIR process is presented as a series of 7 individual steps, each of which is explored in more detail in the following sections.

Importantly, participation in both clinical champion training and the Hot AIR process itself was completely voluntary. This was essential because forced participation in such debriefing initiatives has been shown to be detrimental.<sup>24</sup> Clark et al<sup>21</sup> also found this nonmandatory approach to be favorable in their reported ED experience. This opt-in element is a core concept of the AIR process because it aims to address the significant failings of historical debriefing programs that enforce participation by all (risking the well-being of some). It is anticipated that the purposeful application of a targeted intervention to those who are receptive while remaining respectful of those who object will be significantly more beneficial than doing nothing (and risking the well-being of all).

This process was developed to be simple and user-friendly, with 7 fundamental steps ensuring that a standardized and appropriate response is delivered as required. To streamline the delivery of the Hot AIR intervention, all AIR clinical champions were supplied with a laminated reference card listing the 7 steps, which could be kept at hand and used as a cognitive aid when required. The use of such cognitive aids has been demonstrated to improve adherence to protocols when supplementing the delivery of intervention-based programs.<sup>25</sup>

The 7 steps composing the Hot AIR process are described below:

### **1) Gather Directly Affected Staff in an Appropriate Space**

The clinical champion gathers those involved in the incident in an area where distractions will be limited for 5 to 10 minutes. Generally speaking, the appropriate space was a clinical area such as the resuscitation bay or ambulance offload area. Maintaining relatively close proximity to the clinical area was intended to improve attendance by limiting disconnection from the department.

### **2) Acknowledge the Event**

The initial step in the Hot AIR conversation is to recount a summary of the incident. This establishes the facts of the scenario and gives each team member a chance to fill in any gaps they identify. This helps to ensure that the whole team shares a common understanding of the incident from the outset. The creation of a shared mental model within a team environment has been linked to improved team performance and function.<sup>26</sup>

### **3) Ask if Anyone Wants To Share Their Feelings About the Event**

The second step in the Hot AIR conversation is giving participants the opportunity to share how they feel after being involved in an incident. By providing a safe place to share emotional responses within a clinical team who have experienced the same event, the anticipated outcome is that participants at different levels of seniority and experience will communicate that their emotional responses were ultimately very similar (ie, if an event saddens 1 participant, it is likely to sadden another). This phenomenon has been identified in psychological experiments in which tens of thousands of social media users responded with the same emotional dialogue after a widely reported terrorist attack.<sup>27</sup> The true benefit of such a collective emotional response was identified in the same study in which the sharing of a negative collective emotion was followed by outward demonstrations of communal solidarity.<sup>27</sup> Incorporating this opportunity for the safe sharing of emotional responses provides an ideal opportunity within a group to reflect that clinician responses to these traumatic incidents are primarily normal responses to abnormal situations. By allowing the team to share their feelings with one another, you allow them the opportunity to validate and normalize their reactions with peer support and team cohesion.

### **4 and 5) As a Team Was There Anything We Did Well?/As a Team Was There Anything We Could Improve for next Time?**

The next 2 steps of the process are centered on technical clinical performance improvement. This step is important because often the most challenging situations in our work provide some of the best opportunities to learn. A simple and widely employed plus/delta model was selected for its ease of use and clarity. The plus/delta model has been widely used in clinical education to explore the positive elements of team performance, along with those areas



requiring improvement.<sup>28</sup> Chinnock et al<sup>19</sup> also supported the use of the plus/delta construct in the emergency setting for its concise and transferable design

#### **6) Is There Anything Else You Would Like to Talk About?**

This final interactive stage of the Hot AIR process provides an opportunity for participants to explore any remaining issues that are salient to their understanding and emotional processing of the incident but have not been covered in the preceding stages.

#### **7) Summarize the Discussion and Reflect on Normal Responses**

A final summary is provided back to the group. Rather than being a summary of the event (as occurs in step 2), this is a summary of the Hot AIR conversation itself. This summary acts as punctuation to the discussion and allows everyone to depart on the same page. During these closing statements, the AIR champion has an ideal opportunity to reflect on the normal humanity of the team's responses before redirecting them to their clinical duties.

#### **AIR Clinical Champions**

The primary goals of the Hot AIR process were to extend psychological first aid concepts into the provision of workplace peer support and team cohesion while reducing the likelihood that significantly affected clinicians receive less than adequate levels of support. Although many local units informally surveyed before the development of this program reported having a small number of staff capable of providing operational debriefing, none had a routine process for providing peer support and connecting affected individuals with these highly trained operational resources.

At the time of writing, more than 100 clinical champions have been trained to deliver the Hot AIR response at the initial implementation site. This group includes nurses, doctors, and social workers at both clinical and executive levels. Given the simplistic nature of the AIR intervention, there was no prerequisite level of experience or training to participate in the AIR program—all clinicians were trained the same way, from graduate nurses to senior emergency physicians. All participants were working within the initial implementation site at the time of training, and all independently volunteered to participate.

The process of training was kept intentionally simple; it consisted of the delivery of an AIR reference manual, a Hot AIR reference card, an AIR champion sticker (which was affixed to the participant's staff identification badge), and a brief orientation to the process. The orientation component of the training process consisted of a 15- to 20-minute face-to-face session with a member of the program development team. These sessions covered the important elements of the AIR program and allowed time for participants to ask questions. Training was delivered both individually and in groups to accommodate the diverse range of staff working at the implementation site. Training was most commonly delivered informally within the clinical environment while participants were on shift. Given the simplicity of the program and the associated training, no formal competency assessment was undertaken at the time of training. The benefit of training clinicians as responders rather than members of the leadership team exclusively was that it allowed for saturation of the department with AIR responders. On every shift, there was at least 1 AIR-trained clinician; often, there were many more.

Although the primary roles of the AIR clinical champion are to provide peer support immediately after an incident and to escalate the more significantly affected groups to the response coordinator, they also play a role in identifying participants requiring more individual attention or support. When a participant's response is significantly outlying from the rest of the group, the clinical champions are well situated to identify and make meaningful contact with the individual. The AIR program was not designed to instill its participants with a comprehensive understanding of the nuances of psychological disorders; instead, the program provided targeted orientation and training to support clinical champions using their own gestalt to identify those in need of further support.

Because the clinical champions trained during the implementation period came from multiple clinical disciplines (ie, nursing, medicine, social work, and so on), a strong collaborative culture was fostered around the program. It would be common for a member of any given discipline to be guiding a response for a diverse clinical group containing both their peers and members of other specialties.

Although the process of escalating concerns about an individual participant is the same as for a group, the clinical champion is able to highlight additional response options for individual participants, such as access to the Employee Assistance Program, facilitating clinical coverage for a short break off the floor, or relocating the individual to a different area of the department for the remainder of the shift. When available, the response coordinator or clinical team leader may be enlisted to assist in facilitating these measures directly.

Although members of the executive leadership team were trained alongside their clinical counterparts during the initial implementation, it should be noted that all Hot AIR responses delivered in practice were led by frontline clinicians. The primary benefit of including nonclinical leaders in the initial training was that it allowed for a shared understanding of the primary intervention and escalation process across all levels of the departmental hierarchy.

### **AIR Identification**

All clinical champions of the AIR program were given colorful 2.5-cm<sup>2</sup> stickers with a picture of a hot-air balloon bearing the legend “AIR” in bold letters. These stickers were affixed to the champions’ departmental identification badges that are worn clearly on the upper chest. Although this added layer of identification was intended to make it simple for staff to direct their escalations, they secondarily acted as a useful means of raising awareness of the program within the initial implementation site.

These stickers afforded another important benefit during project implementation. If clinicians affected by an acute incident chose not to take part in the AIR process, they were welcome to reengage with the clinical champions at any point. This process of reengagement was streamlined by the unambiguous identification system in which brightly colored and highly visible stickers were used to denote clinical champions in the department. This system allowed team members to readily identify clinical champions as required, facilitating engagement when and if it was individually required on a voluntary basis.

### **Stage 2: Secondary Follow-Up**

If a clinical champion identifies an individual or group that they feel requires more support after the Hot AIR stage, they have a clear process for escalation of their concerns that will reliably facilitate additional follow-up for any member/s of a team that they are concerned about. A small group of response coordinators consisting of fewer than 5 members of the departmental leadership team was designated within the implementing department. This group included members of the nursing education team and ED staff specialists who were available to receive any escalation deemed necessary by the clinical champion group.

If an incident was escalated to the response coordinators, the escalation triggered a secondary contact for all identified participants in the Hot AIR process. This contact came from a member of the department’s leadership team and may have been either face-to-face or via telephone. The intention of this contact was to allow each individual an opportunity to discuss the event with a senior leader in more detail if required. The response coordinator would then use the outcomes of the secondary contacts to determine whether further measures, such as delayed operational debriefing or clinical case discussions, should be employed.

Although it is dictated that all escalations beyond the initial Hot AIR phase will receive a secondary follow-up as directed by the response coordinator, this framework relies on existing expertise within the targeted department’s leadership team rather than prescribing a proprietary approach to secondary follow-up. This was intended to allow for integration with any existing clinical expertise in psychological support that existed at sites with skilled staff

whose practice could marry into the front-end strategies of the AIR program, thus increasing the transferability of the intervention. It is acknowledged that this simplified guidance may not address all the needs of departments without existing staff capable of providing meaningful secondary follow-up. In these cases, the AIR framework would ideally be supplemented by more intensive training in secondary debriefing and psychological support.

### **Documentation**

Although the AIR framework provides a tangible representation of the local response required after acute incidents in the emergency department, it is important to note that a conscious decision was made not to routinely record or document the application of the framework in practice. Although the routine recording of AIR interventions would likely result in a greater comprehension of the project's scale and scope, this foreseeable benefit was outweighed at the time of implementation by the desire to protect the privacy and confidentiality of program participants. This caution is not born of local precedent, and recent high-profile international cases, including the Bawa-Garba case in the United Kingdom, formed a sufficient base of concern for routine documentation to be excluded from this program.<sup>29</sup> The Bawa-Garba case, in particular, illustrated the potential for reflective data, including journaling, to be introduced as evidence with a limited context during legal proceedings related to clinical malpractice. Given the potential for a reflective device such as AIR to be used in the context of a clinical scenario in which areas for improvement were intentionally highlighted, the benefit of documenting these encounters was not deemed to outweigh the risk.

### **Local Experience**

After its development, the AIR program was implemented over a 3-month period in the emergency department of the John Hunter Hospital. After the program's 3-month introduction, medical and nursing staff trained as clinical champions were provided with an opportunity to provide open feedback on their experiences using the framework in practice. Individual responses can be found in the online [Supplementary Table](#).

Although this positive end-user feedback aids in establishing the feasibility of the AIR program for implementation in the metropolitan emergency setting, further rigorously designed research and quality improvement activities will be required to evaluate the efficacy and impact of the AIR intervention in a variety of contexts.

### **Transferability**

Although this model was developed with a focus on the ED environment, the simplicity of each individual element enhances the prospect of successful transfer to other acute care areas with minimal adaption. Although both the 2-stage structure of the AIR framework and the Hot AIR process are directly exportable, individual units wishing to implement the AIR program will need to individualize certain elements such as the designation and training process for clinical champions, the allocation of the response coordinator role, and the participant management process after secondary contact. Each of these elements will be dependent on the resources and existing operational structures available in the context of the adopting unit.

Following on from the development process and implementation in the ED setting, this process has been widely shared at a local level and has subsequently been implemented by a variety of clinical areas in the same hospital, including the intensive care unit, radiology department, and operating suite.

### **Recommended Outcome Measures**

Further robust investigation is required to determine the impact of the AIR program in the clinical environment. To inform the design and conduct of subsequent trials, the [Table](#) presents the recommended outcome measures that may be used to assess the impact of the intervention on both the well-being of clinicians and operational factors affecting the continuity of emergency care. These outcome measures are broken into 2 groups: those that would be quantifiable in the short to medium term (the first 6 months after implementation) and those that would be felt in the

medium to long term (>6 months after implementation).

Because many of these outcome measures may be influenced by the introduction of the AIR program into a new clinical area, they are simply suggestions. Stakeholders wishing to further evaluate the efficacy and impact of this intervention should feel empowered to thoroughly consider the possible effect of such a program in their clinical environment.

### **Potential Harms**

Given the sensitive nature of providing psychological and clinical support after an acutely traumatic incident, there are potential harms that must be addressed in any future effort to replicate or expand this program. The primary risk identified in the literature underpinning this program is the potential for such an early intervention to increase the risk of harm as opposed to the intended reduction. Although there was a strong sentiment in the early 2000s upholding this risk as sufficient to prevent the implementation of early debriefing interventions, the evidence in this area is generally mixed, with recent published evidence suggesting benefit from early intervention after trauma.<sup>17</sup> Although there is little reliable evidence supporting the claim that early supportive intervention increases the risk of harm, stakeholders in such programs should remain considerate of the potential for adverse outcomes.

In peer-driven support programs, there exists a risk for interpersonal factors to have an impact on the quality of care delivery. This risk is most notable in the AIR program in the context of a clinical champion observing and escalating responses related to more significantly affected individuals. These interactions between peers have the potential to both be influenced by pre-existing relationships and to influence team dynamics in the future, that is, if an encounter exposes or exacerbates an underlying condition or vulnerability of 1 team member, this may have implications outside of the context of the immediate response. Furthermore, the AIR program's reliance on an individual clinician's gestalt to determine when an escalated response is required may introduce an element of bias into the response that may be hard to anticipate. Where possible, these individual behavioral factors should be accommodated in the development and implementation of such interventions.

Finally, any intervention dealing with a clinician's reflections after a traumatic or stress-inducing event has the potential to identify behaviors, responses, or performance issues that may reflect poorly on those involved. Creating a safe environment for supportive interventions to be delivered is of high importance both in the early stages after exposure and beyond. In the case of the AIR program, the decision was made not to document encounters between clinical teams and responders to protect the privacy and confidentiality of participants. Similar protective measures should be considered in subsequent implementations of this intervention or any other that incorporates similar risks for clinicians.

### **Conclusion**

The AIR program represents an accessible and meaningful model for guiding a functional, clinician-led response to acute incidents in the emergency setting. After its development, the AIR program was introduced in a single metropolitan emergency department where it has since become a core part of standard ED unit clinical practice. The AIR model is highly transferable and can be rapidly applied in a wide variety of acute care settings. Further rigorous evaluative assessment is required to formally quantify the impact of the AIR framework in clinical environments.

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### **Author Disclosures**

Conflicts of interest: none to report.

**Supplementary Data**

**Supplementary Data**

The author has generously provided the intervention manual to readers as online supplementary material. This material was not peer reviewed or edited. Supplementary data related to this article can be found at <https://doi.org/10.1016/j.jen.2020.05.016>.

Time Frame	Measurable Outcome
Short- to medium-term outcomes (0-6 mo postintervention)	Individual clinician experience (ie, knowledge/confidence of staff responding to acute incidents, etc) Program/training evaluation measures (ie, participant satisfaction/experience after participation) Perceived availability of support within the individual department (measured pre- and postimplementation)
Medium- to long-term outcomes (6+ mo postintervention)	Staff satisfaction (quantified through regular workforce surveys) Patient satisfaction (quantified through institutional quality-scoring processes) Reduction in staff, absence owing to sick/personal leave Staff retention/job vacancy rate Prevalence of psychological sequelae among staff, ie, PTSD/anxiety symptoms and disorders) Staff burnout (measured using the validated Maslach Burnout Inventory) <sup>30</sup>

Please provide any feedback relating to your own use of the AIR program and/or your role in responding to an acute incident:
"Gave me the confidence to be able to respond to incidents other than acute in the dept"
"Has made the discussion more frequent and open"
"I think it's an awesome tool"
"Was great to debrief as a group initially after the incident had occurred"
"Recently used with a student who experienced first CPR. Debriefing worked well and student appreciated it. Also involved in 1 a Doctor ran post cardiac arrest in a younger person. Very therapeutic to talk through the clinical events then about how everyone felt about it"

"It is a useful structure for any difficult or feedback conversation"
"Helps break down the barriers of starting what could be a difficult conversation and takes the responsibility away as we know people will be followed up"
"Organised a quick debrief post cardiac arrest"
"I think it's helped me start those general are you ok conversations a little better and I have a little bit of an idea on structure for informal debriefs. I also HOT debriefed a friend who is not clinical after she witnessed a car accident"
"Already did this process but having the AIR process validated this and encourage others to ask for it"
"I think this project will make a huge difference within the department. We have to plug it more, become more aware of our colleagues and how they are handling situations (including outside of work) and not be afraid to ask our team members if they are coping ok"
"I think this project is very relevant to our department at present due to multiple factors - recent losses the department had faced, high acuity of department, increased presentations and new and junior staff. Very appropriate to be focussing on this and supporting staff with same"
"Great project! Well overdue for our department and other critical care areas"
"Reduces the stigma about just coping it sweet and getting on with the job, encourages people to talk so we have a happier workplace"

## DETAILS

<b>Subject:</b>	Critical incident stress; Emergency medical care; Trauma; Acutely; Stress management; Intervention; Emotional responses; Dissemination; Burnout; Psychological support; Group performance; Traumatic stress; Critical incidents; Peer tutoring; Efficacy; Interdisciplinary aspects; Teams; Acute; Nursing; Debriefing; Early intervention; Post traumatic stress disorder; Teamwork; Emergency services
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# Tackling Burnout With Team Science: Nursing and Physician Collaborations on Improving Psychological Well-Being Among Emergency Clinicians: JEN

[ProQuest document link](#)

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## ABSTRACT (ENGLISH)

Prolonged exposure to stressful environments has been associated with the development of adverse psychological outcomes, including the development of burnout.<sup>1,5,6</sup> Burnout is characterized by emotional exhaustion, physical fatigue, and cognitive weariness, which may lead to feelings of depersonalization and reduced accomplishment.<sup>7</sup> Nearly half of the nearly 900,000 practicing physicians in the United States report symptoms of burnout, with

emergency physicians reporting the highest rates of burnout.<sup>1</sup> Similarly, 2 recent systematic reviews on burnout in emergency nurses also found high rates of nurse burnout (eg, 31%).<sup>2,5</sup> Alarming, these elevated rates of burnout are seen even among early career clinicians and trainees, suggesting that the impact of burnout is significant even to early career individuals.<sup>8</sup> The negative impact of burnout on clinicians is broad, including increased risk for depression, anxiety, and substance abuse among nurses and physicians.<sup>9-11</sup> Burnout has also been associated with poorer delivery of medical care, including clinician-reported patient care, less empathetic communication, job absenteeism, and increased medical errors.<sup>12,13</sup> The combined impact on patients interacting with burned-out physicians practicing in highly stressful acute care environments represents a near perfect storm leading to dissatisfaction and risk of poorer outcomes.<sup>14</sup> Although a recent systematic review of interventions for physician burnout concluded that institutional interventions were most effective, none focused on burnout in acute care clinicians, as well as a core clinical partner in the emergency department (eg, nurses).<sup>15</sup> An understanding of both the unique and common variables associated with nursing and physician burnout would shed new light on the development and management of clinician well-being. Nurses and physicians are key partners in the acute management and stabilization of patients in the emergency department, with shared environmental stressors and risk factors for the development of burnout.<sup>16</sup> Furthermore, the unique dynamic of the nurse-physician relationship in the emergency department may interact with clinician burnout, while also having immediate and more sustained effects on patient care. Future interventions for acute care clinicians could include work cycles/schedules that optimize staffing models to adjust for real-time changes in factors such as crowding, which may simultaneously improve clinician well-being, patient outcomes, and even health care costs.

## FULL TEXT

Emergency care has historically been one of the health care specialties with the highest rates of clinician burnout for both physicians and nurses.<sup>1,2</sup> Although there has been an explosion of interest in burnout and wellness initiatives within the emergency specialty,<sup>3,4</sup> previous editorials or society statements have conceptualized burnout from the perspective of the individual clinician or specialist.<sup>3</sup> Taking a page from the adage that no individual is an island, acute care clinicians work intimately together as a team, in a common environment, where they are exposed to similar occupational stressors that may adversely affect both nurses and physicians. Given the broad effects of such stressors, an interdisciplinary approach to burnout science may be ideal, drawing on the unique contributions and synergies of emergency frontline nurses and physicians, along with researchers, administrators, and informatics experts.

Prolonged exposure to stressful environments has been associated with the development of adverse psychological outcomes, including the development of burnout.<sup>1,5,6</sup> Burnout is characterized by emotional exhaustion, physical fatigue, and cognitive weariness, which may lead to feelings of depersonalization and reduced accomplishment.<sup>7</sup> Nearly half of the nearly 900,000 practicing physicians in the United States report symptoms of burnout, with emergency physicians reporting the highest rates of burnout.<sup>1</sup> Similarly, 2 recent systematic reviews on burnout in emergency nurses also found high rates of nurse burnout (eg, 31%).<sup>2,5</sup> Alarming, these elevated rates of burnout are seen even among early career clinicians and trainees, suggesting that the impact of burnout is significant even to early career individuals.<sup>8</sup>

The negative impact of burnout on clinicians is broad, including increased risk for depression, anxiety and substance abuse among nurses and physicians.<sup>9-11</sup> Burnout has also been associated with poorer delivery of medical care, including clinician-reported patient care, less empathetic communication, job absenteeism, and increased medical errors.<sup>12,13</sup> The combined impact on patients interacting with burned-out physicians practicing in highly stressful acute care environments represents a near perfect storm leading to dissatisfaction and risk of poorer outcomes.<sup>14</sup>

Although a recent systematic review of interventions for physician burnout concluded that institutional interventions were most effective, none focused on burnout in acute care clinicians, as well as a core clinical partner in the emergency department (eg, nurses).<sup>15</sup> An understanding of both the unique and common variables associated with nursing and physician burnout would shed new light on the development and management of clinician well-being.



The impact of burnout at both the individual and team levels on effective team dynamics is a vital aspect of efficient and effective patient care delivery but has been understudied to date. This may be explored in numerous ways integrating nursing and physician scientists. Nurses and physicians are key partners in the acute management and stabilization of patients in the emergency department, with shared environmental stressors and risk factors for the development of burnout.<sup>16</sup> Furthermore, the unique dynamic of the nurse-physician relationship in the emergency department may interact with clinician burnout, while also having immediate and more sustained effects on patient care. For example, emergency nurses and physicians report high degrees of documentation burden.<sup>17</sup> The impact of this documentation load on individual clinician performance and its downstream effects on nurse-physician or clinician-patient communication may have important implications for patient care. In addition, approaching the potential impact that physician and/or nursing cognitive load may have on patient care as well as the interactions with their clinical colleagues may build a more comprehensive model of acute/chronic stress in the acute care environment, leading to the identification of common themes or potential modifiable targets of intervention. A collaborative research agenda involving key nursing and physician stakeholders should be based on a nonhierarchical approach, open to exploring the pathophysiology and associates of burnout from both clinical perspectives. The partnership between nurses and physician scientists should be fully integrated, with each team member's perspective equally valued, starting from study conceptualization to manuscript dissemination. Diverse key personnel teams on funded projects should include core nursing and physician representation on grant budget justification to recognize the efforts of both teams. In addition, involvement from not just nursing and physician scientists but also other frontline clinical disciplines would help shed unique insight from the perspective of the practicing clinician. Support for these endeavors should foster the creation of both early career nursing/physician investigators, as well as mentors to help encourage such dynamic nursing-physician team projects. Many academic professional societies encourage the growth of these interdisciplinary approaches. For example, The Society of Academic Emergency Medicine has a basic research methods and study design, the Advanced Research Methodology Evaluation and Design "ARMED" course, that specifically targets early career nursing and physician investigators.

There could be multiple unique themes on a nursing-physician-led burnout research initiative, including efforts to enhance nursing-physician communication, assessments of the impact of environmental factors such as patient acuity, load, and complexity to occupational patterns such as shift work pattern and length. Computational approaches to understanding the cognitive and physiological stress associated with acute care work could leverage novel methods in informatics and machine learning to assess broader models of how such variables interact and influence the development of any clinician based or patient-facing outcomes. Future interventions for acute care clinicians could include work cycles/schedules that optimize staffing models to adjust for real-time changes in factors such as crowding, which may simultaneously improve clinician well-being, patient outcomes, and even health care costs. Other hospital models designed to enhance the workflow environment, such as use of scribes, seamless voice recognition, or overlapping clinical shifts, should focus not just on implications for clinical productivity but also on their implications on nurse-physician team dynamics and clinician well-being. Dynamic clinical scheduling may be informed by large data set/informatic approaches, which may provide unique information about optimized work schedules to maintain clinical vigilance and clinician well-being. A key aspect of patient care rests on nurse-physician communication. Future interdisciplinary work bridging the unique expertise of nursing and physician scientists would permit novel insight into optimizing communication strategies among clinicians to improve patient care. Ideally, the fruits of this work would guide institutions toward tailored interventions to offset risk in patients, clinicians, and staff, all of whom are daily exposed to potentially harmful conditions.

Like an engine running constantly to pull a heavy load up a steep mountain, emergency nurses and physicians working in a work environment besieged by acute stressors may feel ineffectual, overwhelmed, and "burnt out." A multidisciplinary approach to studying this challenge is critical, and interventions will likely require investment from multiple components of the health care system. Ultimately, the adoption of such a research approach integrating nursing and physician partners may improve not only clinician well-being and career longevity but also optimize

patient care and hospital outcomes.

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# Management of Traumatic Tooth Avulsion Using 2-Octyl Cyanoacrylate Tissue Adhesive Splint: A Case Report: JEN

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## ABSTRACT (ENGLISH)

Introduction Many Australians living in the country's rural and remote areas do not have timely access to dentists.<sup>1</sup> In addition, people in these areas have lower levels of access to general practitioners and nurses in comparison with those who reside in inner-regional and major city areas.<sup>2</sup> Communities in rural and remote Australia are dispersed widely and generally lack the population concentrations to warrant a full-time dentist.<sup>3</sup> This limited access to dentists results in patients with acute oral conditions presenting to other primary care providers such as general practitioners, hospital emergency departments, pharmacies, Aboriginal Health Services, or periodic mobile dental clinics.<sup>1,3</sup> Nondental practitioners are often only able to provide temporary relief, with the resources available, before definitive treatment in a larger metropolitan area is sought by the patient (preferably through a health care professional referral).<sup>4-6</sup> Complaints relating to teeth and their supporting maxillofacial structures are common in the emergency department, and they are followed by secondary referral to a dentist for definitive therapy.<sup>7</sup> Tooth avulsion represents 0.4% to 3.0% of all dental injuries, with the prognosis predominantly influenced by first-aid actions.<sup>8,9</sup> However, rural and remote areas have limited dental capacity, which affects patients' access to subsequent definitive dental care after first-aid intervention.<sup>10</sup> As such, many of these patients require transfer to an area with dental service provision, such as a metropolitan region, or must await the visit of a mobile clinic to their area.<sup>1,1112</sup> The best chance of tooth survival is through the reestablishment of root circulation as soon as practicable. Disability:

Glasgow Coma Scale was 15 (Eye Opening Response is 4, Verbal Response is 5, and Motor response is 6); orientated to person, place, and time; pupils equal and reactive to light (size 4 mm); blood glucose normal; the patient had no known medication allergies; no prescribed medications were taken before arrival (noting the use of ecstasy); effective analgesia was administered on arrival (paracetamol and codeine, followed by oxycodone); there was no relevant medical, surgical, or psychiatric history. After the patient was cleared medically of all other injuries and concerns by the nurse practitioner, including a facial bone-view X-ray being reported as normal (orthopantomogram preferred but not available), the avulsed teeth were identified as upper left 9 and lower right 25 and 26 (Figures 1 and 2), with a pre-existing (unrepaired, Ellis class 1) dental fracture of lower left 24. Discussion Complaints pertaining to teeth and their supporting maxillofacial structures are common in emergency medicine, with an urgent referral to dentistry essential for definitive therapy.<sup>7</sup> The International Association of Dental Traumatology has developed a consensus statement, representing the best available evidence, to standardize practice to improve outcomes after tooth avulsion, noting that in most cases replantation is the preferred treatment.<sup>8</sup> The International Association of Dental Traumatology's "Save a Tooth" initiative guides the first-aid management of avulsed teeth, which involves reducing contact with the root, brief irrigation to remove contaminants, and then, if replantation is not possible at the time of the incident, transportation of the tooth/teeth in an appropriate medium (milk, osmolality-balanced saline, or, ideally, saliva), to preferably a dentist or health care provider.<sup>8</sup> Definitive treatment options are based on the maturity of the root, noting that a very open apex as well as a mature closed apex have a poorer prognosis (the apex is normally open in immature teeth), as well as the condition of the PDL.<sup>8</sup> It has been noted that all PDL cells are nonviable after 60 minutes of exposure because they dry up; hence, the importance of early replantation, or, if not possible or delayed, the placing of the tooth/teeth in an appropriate medium. Furthermore, if a dentist-applied flexible splint is not available or is delayed in application, a mechanical splint may be applied over the teeth, forming an actual bridge, using another common item in the emergency department, the pliable metal nasal bridge from a supplemental oxygen mask or filtration mask.

## FULL TEXT

### Contribution to Emergency Nursing Practice

- The current literature on the use of 2-octyl cyanoacrylate tissue adhesive as a dental splint is limited, especially during emergency management of avulsed permanent teeth.
- This article contributes by providing evidence-based clinical treatment of a patient with avulsed permanent teeth within aeromedical and emergency medicine.
- Key implications for emergency nursing practice found in this article are that it is essential to correctly replant the affected tooth or teeth to minimize the risk of tooth loss. This is especially important in the retrieval setting in rural and remote Australia, where access to dental treatment is limited.

### Introduction

Many Australians living in the country's rural and remote areas do not have timely access to dentists.<sup>1</sup> In addition, people in these areas have lower levels of access to general practitioners and nurses in comparison with those who reside in inner-regional and major city areas.<sup>2</sup> Communities in rural and remote Australia are dispersed widely and generally lack the population concentrations to warrant a full-time dentist.<sup>3</sup> This limited access to dentists results in patients with acute oral conditions presenting to other primary care providers such as general practitioners, hospital emergency departments, pharmacies, Aboriginal Health Services, or periodic mobile dental clinics.<sup>1,3</sup> Nondental practitioners are often only able to provide temporary relief, with the resources available, before definitive treatment in a larger metropolitan area is sought by the patient (preferably through a health care professional referral).<sup>4-6</sup> Complaints relating to teeth and their supporting maxillofacial structures are common in the emergency department, and they are followed by secondary referral to a dentist for definitive therapy.<sup>7</sup> Tooth avulsion represents 0.4% to

3.0% of all dental injuries, with the prognosis predominantly influenced by first-aid actions.<sup>8,9</sup> However, rural and remote areas have limited dental capacity, which affects patients' access to subsequent definitive dental care after first-aid intervention.<sup>10</sup> As such, many of these patients require transfer to an area with dental service provision, such as a metropolitan region, or must await the visit of a mobile clinic to their area.<sup>1,11,12</sup>

The best chance of tooth survival is through the reestablishment of root circulation as soon as practicable. As such, teeth avulsions represent a dental emergency, necessitating urgent recognition and management.<sup>8</sup> Avulsion of a tooth compromises the nerve tissue within the tooth and the periodontium that anchors the tooth in its bony socket.<sup>13</sup> Management of an avulsion requires reattachment of the periodontal ligament (PDL) and extirpation of nervous tissue within the tooth to prevent infection.<sup>14</sup>

Management of an avulsion in a specialized dental setting normally involves the stabilization of the avulsed tooth using a flexible orthodontic wire bonded with composite resin, forming a flexible splint. This method is preferred because rigid splints have been found to result in ankylosis of the tooth.<sup>15</sup> However, normal orthodontic equipment is not generally available in a remote emergency setting.<sup>16</sup> Emergency medicine studies have highlighted the use of the metal nasal bridge from a supplemental oxygen mask as a substitute for the flexible wire, with 2-octyl cyanoacrylate (2-OCA) as the bonding agent, owing to the flexibility and pliability of the metal nasal bridge.<sup>13</sup>

The aim of this case report is to extend the limited reports concerning the use of 2-OCA tissue adhesive, with or without a pliable metal nasal bridge from a supplemental oxygen mask, to replant and stabilize avulsed teeth within an emergency department.

### **Case Report**

This case report describes a rural patient who was transferred by ambulance to an inner-regional emergency department for substance use disorder and facial injuries.

At 5:34 AM a healthy 20-year-old man was brought to the emergency department by ambulance. He reported being punched in the face three times at approximately 4:45 AM which knocked out his three front teeth. On arrival, the patient was awake, alert, denied loss of consciousness, and recalled all events of the assault. The patient reported consuming alcohol and illicit drugs earlier in the night. A rapid general medical evaluation was performed, which found him stable with no compromise to his airway, breathing, circulation, or mental status. The avulsed teeth were brought with the patient. Emergency intervention for the teeth included placing the teeth in milk upon arrival.

A full assessment and imaging were conducted at 7:48 AM. The findings on initial examination and primary survey were as follows:

- Airway: Patent; full range of movement of the jaw/no malocclusion; no nasal complaints (septum in place); all avulsed teeth were accounted for.
- Breathing: Bilateral air entry; no adverse breath sounds; symmetry in thoracic wall movement; no accessory muscle use; no thoracic contusion/injury noted; respiratory rate 12; oxygen saturation 98% on room air (FiO<sub>2</sub> 21%).
- Circulation: Central capillary refill time was less than 2 seconds; pulse 92; blood pressure 127/82; there was no indication for intravenous access or therapy.
- Disability: Glasgow Coma Scale was 15 (Eye Opening Response is 4, Verbal Response is 5, and Motor response is 6); orientated to person, place, and time; pupils equal and reactive to light (size 4 mm); blood glucose normal; the patient had no known medication allergies; no prescribed medications were taken before arrival (noting the use of ecstasy); effective analgesia was administered on arrival (paracetamol and codeine, followed by oxycodone); there was no relevant medical, surgical, or psychiatric history.

•Exposure: Temperature 36.2°C (97.2°F); small superficial abrasion to right shoulder; in conjunction with the avulsion of 3 teeth, there was a through and through laceration of the lower lip (not involving the vermilion border) with no active bleeding; no other injuries; the patient's tetanus immunization was up to date.

After the patient was cleared medically of all other injuries and concerns by the nurse practitioner, including a facial bone-view X-ray being reported as normal (orthopantomogram preferred but not available), the avulsed teeth were identified as upper left 9 and lower right 25 and 26 (Figures 1 and 2), with a pre-existing (unrepaired, Ellis class 1) dental fracture of lower left 24.

## Discussion

Complaints pertaining to teeth and their supporting maxillofacial structures are common in emergency medicine, with an urgent referral to dentistry essential for definitive therapy.<sup>7</sup>

The International Association of Dental Traumatology has developed a consensus statement, representing the best available evidence, to standardize practice to improve outcomes after tooth avulsion, noting that in most cases replantation is the preferred treatment.<sup>8</sup> The International Association of Dental Traumatology's "Save a Tooth" initiative guides the first-aid management of avulsed teeth, which involves reducing contact with the root, brief irrigation to remove contaminants, and then, if replantation is not possible at the time of the incident, transportation of the tooth/teeth in an appropriate medium (milk, osmolality-balanced saline, or, ideally, saliva), to preferably a dentist or health care provider.<sup>8</sup>

Definitive treatment options are based on the maturity of the root, noting that a very open apex as well as a mature closed apex have a poorer prognosis (the apex is normally open in immature teeth), as well as the condition of the PDL.<sup>8</sup> It has been noted that all PDL cells are nonviable after 60 minutes of exposure because they dry up; hence, the importance of early replantation, or, if not possible or delayed, the placing of the tooth/teeth in an appropriate medium.

Regarding this patient, all 3 teeth involved had closed apices and were placed in an appropriate medium within 60 minutes of avulsion. When replanting an avulsed tooth, because it tends to be unstable in the socket, it requires stabilization in the acute phase, which is best done with a flexible splint applied by a dentist. However, if such flexible splinting equipment and/or expertise are not immediately available, the reimplanted teeth may be stabilized with a compound adhesive bridging the replanted tooth. Although not ideal, such stabilization may reduce PDL damage through timely reimplantation. Such specialist compounds are not always on stock in the emergency department and can be complex to manage secondarily by a dentist if not applied appropriately and sparingly in the dental context. A commodity that is readily available is a cyanoacrylate tissue adhesive, which has been indicated in the literature as effective in dental and more general maxillofacial procedures.<sup>7,17,18</sup> This is not a new concept, although less regularly applied, with the use of a cyanoacrylate to secure avulsed teeth being described by Baker<sup>19</sup> in 1987.

The procedure for replanting an avulsed tooth normally consists of the following steps:<sup>8</sup>

1. Lightly rinse tooth with saline solution, avoiding direct contact with the root.
2. Rinse socket with 20 mL of saline solution.
3. Gently reimplant the tooth into a satisfactory anatomic position.
4. Apply cyanoacrylate to the mesial and distal edges of the tooth, thereby adhering it to the adjacent teeth (creating a bridge).

5. After a minute, confirm stability.

Furthermore, if a dentist-applied flexible splint is not available or is delayed in application, a mechanical splint may be applied over the teeth, forming an actual bridge, using another common item in the emergency department, the pliable metal nasal bridge from a supplemental oxygen mask or filtration mask.

1. Use the pliable metal nasal bridge from an N95/P2/surgical respirator mask as a splint. Cut it to the appropriate size. Round off the edges to avoid injury.
2. Secure the replanted tooth by applying 2-OCA to the inner aspect of the splint and buccal surface of the target and adjacent teeth (creating a bridge).
3. Hold the splint under pressure for approximately 1 minute.
4. Confirm stability.

In this case, reimplantation of the 3 avulsed teeth was conducted in the emergency department because emergency dental treatment was unable to be arranged for the patient until significantly later that afternoon. In the emergency team's clinical judgment, prolonged period of displacement of the teeth would have a greater detrimental effect. Because there was no fracture identified on imaging, a fine suction catheter was used to ensure that there was no fluid or clot remaining in the socket, which could have prevented alignment. This technique resulted in appropriate preparation of the sockets (<sup>Figures 3 and 4</sup>). If a socket fracture had been identified, it would have necessitated more immediate specialist dental involvement to reshape the socket to achieve the best alignment and prognosis. The mechanical splint options were avoided in the case of this patient, considering the additional material that may compromise further definitive dental involvement. Owing to the natural saliva in the oral cavity, it is essential that all bonding surfaces are dry for the 2-OCA to adhere. Adhesion of the oral mucosa is unlikely, owing to such saliva being present, although this may need to be actively prevented. All teeth were replanted by 11:08 AM (<sup>Figures 5 and 6</sup>). Although there was a significant delay in reimplantation because of concurrent demands on the emergency department at the time, the patient had not been able to access dental services before or during this time; hence, all attempts were made in the emergency department to improve the prognosis for this patient's dental emergency. The patient was discharged home at 11:16 AM for follow-up with dentistry as soon as possible. The patient was contacted 7 days after the injury, noting that he had secured dental follow-up 2 days after his emergency department visit. The avulsed teeth remained in position with the 2-OCA emergency adhesive dental splint for these 2 days until a more appropriate flexible wire splint was applied by the dentist. The patient reported that dental follow-up on day 6 postinjury noted that the teeth remained viable.

### **Conclusion**

This case report supports the limited current literature confirming the validity of the use of 2-OCA tissue adhesive as an effective dental splint when applied in the emergency department, when a more appropriate flexible wire splint applied by a dentist is not accessible.

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# Spontaneous Coronary Artery Dissection: A Comprehensive Overview: JEN

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## ABSTRACT (ENGLISH)

Spontaneous coronary artery dissection is an underdiagnosed cause of acute coronary syndrome that primarily impacts young women. Spontaneous coronary artery dissection as a cause of acute coronary syndrome is not rare and should not be overlooked. Spontaneous coronary artery dissection should be considered on the list of differential diagnosis of any chest pain occurring in young women with few typical risk factors. The purposes of this article are to broaden the understanding and increase awareness of spontaneous coronary artery dissection, specifically its diagnosis and clinical outcomes.

## FULL TEXT

### Contribution to Emergency Nursing Practice

- The current literature on spontaneous coronary artery dissection (SCAD) indicates that it continues to be an underdiagnosed cause of acute coronary artery syndrome.
- This article summarizes the current state of science on SCAD.
- Key implications for emergency nursing practice found in this article are: Young females presenting with atypical chest pain should be screened for SCAD. Increasing awareness about SCAD among emergency nurses increases its detection and lessens misdiagnosis. Emergency nurses, especially in triage, play a central role in expediting the processes of diagnosis and treatment when SCAD is suspected. Emergency nurses with knowledge of factors

leading to SCAD are likely to ask the right questions and take a relevant history to quickly refer patients to the needed services.

## **Epidemiology**

Spontaneous coronary artery dissection (SCAD) is a poorly recognized, nonatherosclerotic cause of compromised blood flow through the coronary arteries. Its mechanisms have the potential to generate a heart attack or sudden cardiac death.<sup>1</sup> SCAD differs from typical acute coronary syndrome (ACS) caused by atherosclerosis and requires a different approach to management. The purpose of this article is to provide a comprehensive overview of the current state of literature on SCAD to raise awareness among ED providers about its manifestations in an attempt to improve diagnosis and clinical outcomes.

Owing to limited diagnostic techniques, younger age of presentation, often few coronary risk factors and unfamiliarity among clinicians, SCAD continues to be poorly understood and underdiagnosed.<sup>2</sup> It is estimated that 1% to 4% of the patients with ACS and 0.5% of sudden cardiac death cases result from SCAD,<sup>3</sup> with more than 90% of the cases occurring in women.<sup>2,4</sup> The American Heart Association reported SCAD to be the leading cause of myocardial infarction (MI) in women aged less than 50 years (35%) and the most common cause of MIs during pregnancy (43%).<sup>2</sup> Although SCAD can affect anyone between their late teens and 80s,<sup>5</sup> the average age of a female with SCAD is between 45 and 53 years, whereas men are often affected at a younger age.<sup>2</sup> SCAD has been reported in nearly all ethnic groups and geographical locations.<sup>2,5</sup> Chen et al<sup>6</sup> noted outcomes that do not reveal racial disparities. Liang et al<sup>7</sup> examined baseline characteristics of 158 survivors of SCAD. In the sample selected, Liang et al<sup>7</sup> established that all the participants had a yearly household income of at least \$50,000 and had completed high school. Furthermore, 70% of them completed 4 years of postsecondary education, and 97% were homeowners.

## **Risk Factors**

SCAD is typically associated with few atherosclerotic risk factors, although it is not uncommon for hypertension, smoking, and dyslipidemia to occur in patients with SCAD, especially in the older population.<sup>1</sup> The link between SCAD and such cardiovascular risk factors is unclear, but it is important for the practitioner to understand these risk factors are not absent in SCAD.<sup>1,8</sup> It has been hypothesized that SCAD is multifactorial and is caused by the interaction between predisposing and precipitating risk factors that potentiate susceptibility to coronary artery damage.<sup>1,2,9</sup>

The most common predisposing risk factors for SCAD are fibromuscular dysplasia (FMD), pregnancy and hormones that tend to be higher in females, and systemic inflammatory and connective tissue disorders and genetics.<sup>2,9</sup> A common triad found in SCAD is underlying arteriopathies (diseased artery), minimal cardiovascular risk factors and precipitating stress.<sup>10</sup> In 2019, Saw et al<sup>11</sup> analyzed data from 750 patients with SCAD and concluded that 50.1% of the patients had no identified risk factors.

## **Predisposing Factors Fibromuscular dysplasia**

FMD is an idiopathic, nonatherosclerotic, noninflammatory disease that typically occurs in small-medium-sized arteries in women before the age of 50 years.<sup>12</sup> FMD has many manifestations such as stenosis, aneurysm, tortuosity, and dissection, and the most commonly affected arteries are the renal, cervicocephalic and iliac arteries,<sup>1</sup> typically sparing coronary arteries.<sup>13</sup> Multifocal FMD, which is described to have a “string-of-beads” pattern, is 4 times more frequent than the unifocal phenotype<sup>1</sup> and is characterized by alternating stenosis and dilation.<sup>2</sup> FMD is thought to have a genetic predisposition, with theories directed toward an autosomal dominant trait. Ninety percent of cases occur in women suggesting estrogen has a role in its development.<sup>14</sup> Hayes et al<sup>2</sup> concluded that FMD has a prevalence in 25% to 86% of documented SCAD cases and 29% to 70% of impacted individuals have involvement

of 2 or more vascular beds. The pathophysiology between FMD and SCAD is unknown, but FMD is thought to weaken the artery through dysplasia of the smooth muscle, fibroblasts, and connective tissue matrix. Any layer of the vessel has the capacity to be affected by FMD, increasing susceptibility for dissection.<sup>15</sup> Causality is inferred, as SCAD and FMD are both rare, linking coronary FMD with SCAD.<sup>13</sup> Both SCAD and FMD are associated with a variant found on chromosome 6 at the *PHACTR1* locus rs9349379-A.<sup>16</sup> There is an association between severe FMD tortuosity and high risk for reoccurrence of SCAD.<sup>17</sup> Dissections, aneurysms (14%-23%), and extracoronary and coronary tortuosity (78%) have also been identified in patients with SCAD.<sup>2</sup> Extracoronary FMD with underlying coronary involvement is understood to predispose individuals to SCAD.<sup>13</sup>

### **Pregnancy and hormones that tend to be higher in females**

Pregnancy-associated SCAD is a less common subtype but presents with a worse prognosis and is responsible for 10% of SCAD cases.<sup>1,2,18</sup> SCAD is considered the most common cause of MI in women who are pregnant or postpartum,<sup>2</sup> generating approximately 40% of MIs in pregnancy.<sup>19</sup> The prevalence of SCAD in pregnancy is 1.8 per 100,000 pregnancies or up to 6 weeks postpartum.<sup>1,2,18</sup> Most pregnancy-related cases occur during the third trimester or early postpartum,<sup>1,2,20</sup> however, there have been cases of pregnancy-related SCAD during the fifth week of pregnancy, up until 1 year postpartum.<sup>2</sup> The exact mechanism of SCAD associated with pregnancy is not fully understood, but it has been suggested to result from a relationship between pregnancy-related hormones and pregnancy-associated stress. During pregnancy, a woman's body increases cardiac output and estrogen and progesterone release. Progesterone decreases collagen synthesis and quality of elastin fibrin and an increase in mucopolysaccharide, which weakens the tunica media of the artery. Estrogen causes the body to go into a hypercoagulable state and increases the release of matrix metalloproteinase, which leads to cystic medial necrosis and a weak vasa vasorum.<sup>19</sup> These hormone-induced changes are associated with a weakened vessel wall<sup>2</sup> and are escalated with the hemodynamic changes of pregnancy and strain from the labor and delivery process, which can proceed for 6 months postpartum.<sup>19</sup> The risk remains elevated as the woman continues to lactate.<sup>2</sup> The risk of SCAD increases in multiparous ( $\geq 4$  pregnancies) women as these changes accumulate.<sup>2,15</sup> Comorbidities associated with pregnancy-related SCAD are hypertension, lipid abnormalities, chronic depression, migraines, and advanced maternal age.<sup>2</sup> Between 2000 and 2015, Havakuk et al<sup>20</sup> analyzed 120 pregnancy-associated SCAD cases. The results yielded 75% of the patients had a ST-elevation MI (STEMI), of whom 80% had anterior MI and 40% had a multivessel component. The outcomes for these women were cardiogenic shock (24%), life-threatening arrhythmias, emergency percutaneous coronary intervention (27.5%), emergency coronary artery by-pass graft (28%), mechanical support (28%), maternal mortality (4%), and fetal mortality (2.5%).

In 2017, Tweet et al<sup>21</sup> evaluated the Mayo Clinic SCAD registry records between 2012 and 2016. Eleven women were identified to have chest pain in conjunction with menstruation. Of this subgroup, 36% described their onset of chest pain to occur 1 to 2 days before menstruating and continued into their cycle. Four of these women were postpartum, 2 had FMD, and 1 had Ehlers-Danols syndrome. Women's ovarian hormones are at the lowest levels during mensuration, and it is hypothesized that some women have a negative response to estrogen fluctuations, which puts them at risk for SCAD and chest pain.<sup>21</sup> The relationship between SCAD and exogenous hormone use is complex as pregnancy and hormone replacement therapy or oral contraceptive consumption put women at risk for SCAD. Exogenous hormone use (oral contraceptives, postmenopausal therapy, infertility treatments, testosterone, and corticosteroids) have a prevalence of 10.7% to 12.6% in SCAD cases.<sup>2</sup> Long-term exposure to endogenous or exogenous estrogen or progesterone have the potential to alter arterial wall strength and result in structural changes.<sup>2</sup> In 2015, Eng et al<sup>22</sup> inferred a cause and effect relationship between SCAD and female sex hormones. Out of 187 women included in their study, 15% had hormonal therapy, 27.3% had hormone replacement therapy,

40.6% used oral contraception, and 19.3% had gynecological procedures. Women have a higher risk for reoccurrence when receiving current hormonal treatment (32.1% vs 15.8%;  $P = 0.04$ ).<sup>22</sup>

### **Systemic inflammatory and connective tissue disorders and the role of genetics**

Systemic inflammatory conditions represent a small proportion of SCAD cases.<sup>2</sup> Cepas-Guillen et al<sup>23</sup> identified systemic lupus erythematosus, Crohn's disease, ulcerative colitis, rheumatoid arthritis, and celiac disease to have a prevalence in 6% to 8% of SCAD cases. Furthermore, Hayes et al<sup>2</sup> suggested that inflammatory bowel disease, polyarteritis nodosa, sarcoidosis, and cryoglobulinemia in the context of hepatitis C play a role in SCAD as evidenced by case studies. Connective tissue disorders such as Marfan syndrome and Ehlers-Danols syndrome have a prevalence of 1% to 2% of SCAD cases.<sup>23</sup> Loeys-Dietz syndrome, Ehlers-Danols syndrome, and Marfan syndrome all have a genetic component that contributes to artery frailty and possible dissection. Polycystic kidney disorder (an autosomal dominant condition) is a potential risk factor for SCAD.<sup>2</sup>

SCAD is not recognized as having a strong familial feature (1.2%),<sup>2</sup> with few cases of SCAD reported in sibling and mother-daughter pairs.<sup>16</sup> Hayes et al<sup>2</sup> stated that there are currently no genetic loci that are unequivocally associated with SCAD,<sup>2</sup> but newer research has made a link between the rs934937-A allele on the *PHACTR1* locus. In a 2019 study, out of the 1,100 patients analyzed, this allele had a frequency of 0.72 in SCAD cases and 0.56 in the control group.<sup>16</sup> It has been concluded that SCAD does not have a strong hereditary component.

### **Precipitating Factors**

It is important for health care providers to recognize the number of precipitating factors that can interact with predisposing factors to cause SCAD.<sup>2</sup> Precipitating factors such as intense physical movement (intense valsalva, isometric, and extreme exercises), vomiting, passing bowel movements, coughing, lifting heavy objects, intense emotional stress, labor and parturition, illegal drug use such as methamphetamines and cocaine, and the use of  $\beta$ -human chorionic gonadotropin injections, corticosteroid injections, and clomiphene were reported in more than 50% of the cases.<sup>1,2</sup> Psychiatric conditions such as anxiety, depression, and migraines can be identified as precipitating factors because of the intense emotional stress that can accompany these conditions. Women tend to report more variation in emotional responses toward emotional predicaments than men, which may augment dissection.<sup>8</sup> It is important to note that there may be a delay in the onset of SCAD symptoms from the last exercise event.<sup>1</sup> In 2019, Saw et al<sup>11</sup> reported 50.3% of the patients with SCAD reported emotional stress before the event, and 28.9% reported physical stress. Emotional stressors as precipitating factors are more common in SCAD cases among women than men who tend to experience a form of physical stress such as exercise. A total of 44% of men identified the precipitating factor to be a form of isometric exertion (lifting more than 23 kg) before their SCAD event. The link between SCAD and stressors (emotional and physical) is related to the circulating catecholamines that increase with natural stress response, which contributes to the coronary artery shear, mediating a significant component in the pathophysiology of SCAD.<sup>2</sup>

### **Pathophysiology and Pathogenesis**

The development of SCAD is based on 2 main pathological hypotheses. Both courses are distinguished by a spontaneous intramural hematoma (Figures 1 and 2) in the coronary artery wall that displaces the artery wall inward, resulting in the obstruction of blood flow in the true lumen. Most commonly, the false lumen created occurs in the outer third of the tunica media.<sup>1,2</sup> One proposed mechanism that causes SCAD is a tear in the arterial wall (Figures 1 and 2), which allows blood to cross the elastic lamina and collect in the media.<sup>1</sup> The second theory is a spontaneous rupture of the vasa vasorum within the vessel wall. The hemorrhage in the tunica media results in compression of the true lumen<sup>1,2</sup> (Figures 1 and 2). Both causes are nontraumatic and noniatrogenic, occurring in the absence of atherosclerosis.<sup>2</sup> It remains unclear which mechanism is most common. It is also unknown whether the intimal tear

happens independently or as a reverse intimal rupture from the pressure caused by the vasa vasorum hemorrhage or as an effect of imaging.<sup>2,19</sup>

Any artery can be affected, although 32% to 46% of SCAD cases occur in the left anterior descending artery with multivessel SCAD occurring in 9% to 23% of cases.<sup>2,24</sup> The left anterior descending artery is responsible for supplying blood to the anterior portion of the heart<sup>25</sup> and is the largest coronary artery supplying 50% of the blood carried in the coronary circulation. Any disruption in the flow of this artery will greatly affect cardiac function leading to left ventricle impairment.<sup>26</sup> The affected arteries and degree of blockage are responsible for the severity of symptoms.<sup>25</sup> The mid and distal segments of the artery are affected in most cases.<sup>2</sup> The least affected artery is the left main artery, accounting for 4% of the dissections.<sup>2</sup> The histopathology of SCAD shows a fibrin-rich hematoma in the false lumen (Figures 1 and 2) and neutrophil infiltration into the media.<sup>1</sup> Inflammatory infiltrate seen in SCAD often has a predominance of eosinophils, leading Pitliya et al<sup>27</sup> to infer a causative relationship between the inflammatory mediator and the development of SCAD. The cytotoxic products released from eosinophils have the potential to injure myocytes, types 1 and 3 collagen, elastic tissue, and the smooth muscle within the artery's media, provoking weakening, degranulation, and necrosis, inducing conditions such as dissection. The potential for neovascularization of the vasa vasorum as a result of eosinophil infiltration causes the production of fragile arteries that are susceptible to rupture and hemorrhage, which may predispose an artery to SCAD.<sup>27</sup> Uterine involution, which occurs after labor and parturition, has also been associated with eosinophil activation from hormonal changes. Furthermore, estrogen and progesterone have a role in eosinophil degranulation of cytotoxic substances.<sup>27</sup> Hayes et al<sup>2</sup> stated that a histopathological assessment of the distal segments of the epicardial arteries should be considered when SCAD is suspected.

### **Clinical Manifestations**

The clinical manifestations for patients with SCAD are almost indistinguishable from ACS. Accurate identification of SCAD symptoms will assist health care providers in making an accurate diagnosis. The most common symptom seen in 96% of the patients is chest pain.<sup>28</sup> Luong et al<sup>28</sup> reported common descriptions of pain to be burning, pleuritic and tearing, and/or positional. Other symptoms of SCAD noted were radiation to the arm (52%), nausea or vomiting (23.5%), radiation to the neck (22.1%), diaphoresis (21.4%), dyspnea (19.5%), back pain (13.8%), dizziness (8.7%), ventricular tachycardia or ventricular fibrillation (8.1%), fatigue (5.1%), headache (1.5%), and syncope (0.5%).<sup>27</sup> Luong et al<sup>28</sup> concluded that there is a higher prevalence of chest pain in individuals with SCAD than in individuals with ACS of atherosclerotic origin, and the frequency of symptoms is higher in SCAD than atherosclerotic ACS. The chest pain in SCAD may not only be caused by infarction as the arterial dissection itself is painful.<sup>2</sup> Lindor et al<sup>29</sup> reported 15% of the patients to be tachycardic and 60% to be hypertensive, however most of the presenting vital signs were within normal range.

The average time between symptom onset and hospital presentation was 1.10 ±3 days for patients with SCAD, and patients with STEMI were more likely to present in cardiac arrest than patients with non-STEMI (NSTEMI) (4.2% vs 0%).<sup>28</sup>

### **Diagnostic Findings**

Electrocardiogram (ECG) and laboratory work have demonstrated 26% to 87% of SCAD cases are classified as STEMI, and 13% to 69% are NSTEMI. STEMI is the result of infarction from the complete occlusion of a coronary artery as indicated by ST-segment elevation on ECG and elevated troponin levels, whereas NSTEMI is necrosis from incomplete occlusion of a coronary artery as indicated by ST-segment depression on ECG and either normal or moderately elevated troponin levels.<sup>12</sup> Of patients with SCAD, 2% to 5% present to the emergency department in cardiogenic shock, and sudden cardiac death accounts for less than 1% of the cases. Saw et al<sup>11</sup> published a



prospective observational study from 22 centers in North America. The study examined details from 750 patients with SCAD, 29.7% of them had a STEMI, 69.9% of them had an NSTEMI, and 0.4% had unstable angina. ECG findings revealed 22.7% of the patients had a normal ECG, 10.8% had nonspecific ECG changes, 18.4% had T wave inversion, 6.3% had ST depression, 11.3% had ST elevation less than 1 mm, 24.9% had ST elevation greater than 1-mm, 1.5% had Q waves present, and 0.7% had left bundle branch block noted on ECG.

A Vancouver cohort study of 168 patients noted a median troponin increase of 6 µg/L with a range from 0.7 µg/L to 200 µg/L (normal troponin levels are less than 0.05 µg/L)<sup>2,15</sup> Lindor et al<sup>29</sup> identified 72% of the patients had an increase in troponin levels when initially taken. Hayes et al<sup>2</sup> recognized that a normal troponin level at presentation to an emergency department is not uncommon. Saw et al<sup>11</sup> noted 97.6% of the patients had elevated troponin levels. An interesting finding from a 2016 Japanese multicentered cohort study<sup>30</sup> was that creatine kinase is often lower in patients with SCAD suggesting less of a myocardial impairment than when compared with an atherosclerotic condition (1,689 IU/L vs 2,874 IU/L;  $P = 0.002$ ). Left ventricular wall motion abnormalities was common among 84% of the patients ranging from hypokinesis to dyskinesis, with the most common being hypokinesis in 58.4% of the patients.<sup>30</sup> Left ventricular ejection fraction was commonly preserved among patients with SCAD, ranging between 51% and 56%, and was found to improve at follow-up.<sup>2,15</sup> The in-hospital mortality rate associated with SCAD was 5% with a 1% to 4% mortality rate for the first year after a SCAD event.<sup>30</sup>

Adlam et al<sup>1</sup> recognized that SCAD is often misdiagnosed as atherosclerotic ACS, coronary artery spasm, Takotsubo cardiomyopathy, coronary thromboembolism, or MI with nonobstructed coronary arteries. Suspicion can be made from a clinical presentation of symptoms and demographics.<sup>2</sup> Hayes et al<sup>2</sup> suggested that coronary angiography (CA) be completed immediately after SCAD is suspected, especially in STEMI. Saw et al<sup>15</sup> revealed a time difference between STEMI and NSTEMI CA (0.8 days vs 2.0 days;  $P = 0.002$ ). Although CA is highly valued for the diagnosis of SCAD owing to its accessibility and potential to manage ACS, there are limitations that have the possibility to impair diagnosis, further affecting the correct treatment. CA is a 2-dimensional luminogram that uses iodinated contrast to x-ray the arterial lumen. Although it has the capacity to detect narrowing of the artery, it cannot identify the cause or picture the coronary arterial wall.<sup>2,31</sup> In addition, there are no unique biomarkers for SCAD.<sup>1</sup> For a more precise diagnosis of SCAD, intravascular ultrasonography (IVUS) and/or optical coherence tomography (OCT) (gold-standard for diagnosis<sup>32</sup>) can provide a more detailed image of the artery, but these options are expensive and not always available in catheterization laboratories. Furthermore, these options require expertise.<sup>2</sup> Diagnosis becomes challenging without the presence of the multiple radiolucent lumen with a contrast staining of the arterial wall.<sup>31</sup> A solution to the barriers accompanied with accurate diagnosis is the ability for practitioners to perfect the identification of SCAD and its variations, using CA.<sup>2</sup>

Emergency nurses play a critical role in suspecting SCAD, typically in a middle-aged women with few atherosclerotic risk factors based on presentation. An adequate identification of this condition will result in sufficient triage and management.<sup>33</sup>

### **Coronary Angiography**

CA is the preferred method to diagnose intramural hematoma owing to its convenience and availability for suspected SCAD cases.<sup>2</sup> There are 4 phenotypes of SCAD that can be identified by CA.

Type 1 is considered to be a classical presentation with the pathognomonic multiple radiolucent lumens and a flap. This presentation accounts for 29% to 48% of the cases. Type 2, which accounts for 52% to 67% of the cases is described as a long diffuse stenosis, with varying lengths and severities. This form is common in the mid–distal segments of the artery and is usually greater than 20 mm, being described as a smooth narrowing. There is variation among this form with the potential for alternating stenosis with normal vessel. Type 3, which is responsible for 3.4%

of the cases, is classified to resemble atherosclerotic arteries with focal narrowing that is typically less than 20 mm in length.<sup>1,2,31</sup> An additional subtype of SCAD that is mentioned by Adlam et al<sup>1</sup> is a fourth type, which is uncommon and difficult to diagnosis from an angiograph alone, is characterized as a total occlusion of a distal vessel.

Before performing a coronary angiogram, a patient should be administered nitroglycerin (if blood pressure allows) to completely dilate the vessel and rule out coronary artery spasm.<sup>1</sup> An associated risk with the use of this diagnostic tool is secondary iatrogenic catheter-induced artery dissection owing to the fragile arteries. The risk of this increases from 0.2% to 3.4% for a patient with SCAD.<sup>1,2</sup>

A confirmed type 1 SCAD diagnosis does not require further intracoronary imaging such as IVUS or OCT.<sup>31</sup> In a 2015 study, Saw et al<sup>31</sup> identified type 2 and type 3 SCADs are often missed with typical CA, which emphasizes the importance of intracoronary imaging to avoid underdiagnosis. Hayes et al<sup>2</sup> have acknowledged that with improved angiograph identification of all SCAD forms, there is a decreased need for IVUS or OCT.

### **Intracoronary Imaging**

In recent articles, intracoronary imaging such as IVUS and OCT are viewed as complementary to angiography, with an aim to provide further SCAD diagnostic details.<sup>1,2,32</sup> IVUS provides a spatial resolution of approximately 150 μm of the arterial wall. Intimal tears, false lumens, and intraluminal thrombi can be observed with this technique. It provides an extensive assessment of the severity of intramural hematoma.<sup>2</sup> The process of IVUS is carried out using a specific catheter in conjunction with ultrasound technique to get a 360° view of the vessel. Although IVUS is superior to angiography, OCT (a newer technology) is more advanced than IVUS as its use of light waves have the capacity to capture more details within the arterial wall. Its advanced spatial resolution of approximately 10μm to 20μm allows for the detection and better visualization of peculiar details associated with SCAD.<sup>2</sup> A 2016 study assessed the use of IVUS or OCT in diagnosing SCAD on the basis of clinician preference, and the outcome was in the favor of OCT.

<sup>32</sup> Potential risks for the use of intracoronary imaging is extending the dissection, secondary iatrogenic catheter-induced artery dissection, catheter-induced occlusion of the true lumen, or hydraulic extension from the use of contrast injection in OCT. The indications for further evaluation with IVUS or OCT are when the diagnosis of SCAD is unclear and when the vessel diameter is large enough to permit intracoronary imaging.

### **Cardiac Magnetic Resonance**

Lebrun and Bond<sup>34</sup> have noted another diagnostic modality that is noninvasive and has the potential to assess ventricular function and myocardial perfusion. Cardiac magnetic resonance has been found to have diagnostic improvements in undetectable ECGs and is able to identify ACS despite negative cardiac enzymes. The clinical presentation of SCAD may often lead to early discharge when accompanied with negative ECG results. The use of this technology can lead to an accurate ischemia diagnosis.

### **Treatment**

An adequate diagnosis is critical to direct an appropriate management regime.<sup>9</sup> Conservative therapy is suggested to be an effective treatment for the management of SCAD as there is evidence that demonstrates a high percentage of cases will completely mend spontaneously given adequate time and prompt a low risk of reoccurrence.<sup>1,2,35-37</sup>

Conservative management has been successful in 70% to 97% of SCAD cases.<sup>2,35,36</sup> An algorithm produced by Saw et al<sup>15</sup> indicates a stable patient to be a candidate for conservative management, requiring a medication regime and in-hospital monitoring for 3 to 5 days. Coronary intervention has been recognized as potentially harmful with the capability to impede vessel healing. Unless persistent ischemia is present, the affected vessels have a high potential to stabilize and heal conservatively.<sup>1,35</sup> In a 2017 study, the mean hospital stay in a cohort study of 327 patients (83.2% treated conservatively initially and 18.7% treated with revascularization) was 3 days.<sup>3</sup>

### **Pharmacological Management**

The management of SCAD differs from that of ACS. With no randomized controlled trials to date, confirming evidence is lacking.<sup>3</sup> Thrombolytics are contraindicated owing to reports of dissection prolongation and coronary rupture, which can lead to cardiac tamponade. The use of antiplatelet and anticoagulation therapies presents conflicting evidence. These medications have the ability to prevent thrombosis, which is possible in SCAD, however their use has the potential to aggravate dissections, impose additional bleeding risks, or increase reoccurrence of SCAD with intramural hematoma. However, it is suggested that dual antiplatelet therapy be maintained for up to 1 year, (reports ranging from 1 month-12 months) independent of initial treatment with inclusion of lifelong aspirin therapy.<sup>2,3</sup> The use of dual antiplatelet therapy has been found effective with low reoccurrence rates.<sup>22,36</sup> The acute and chronic use of aspirin has the potential to prevent thrombus and ensure luminal patency.<sup>37</sup> The use of an anticoagulant may be discontinued once there is a certain SCAD diagnosis.<sup>37</sup> Moreover, it is essential to weigh the benefits and risks of antiplatelet or anticoagulant use in females who are premenopausal because of the potential for menorrhagia.<sup>1,2</sup> With regard to statins, their use is not recommended unless in the presence of dyslipidemia or diabetes.<sup>1,2</sup> Because of the emphasis of arterial wall stress in the pathogenesis of SCAD, unless contraindicated,  $\beta$ -blockers have the capacity to improve long-term survival, improve left ventricular dysfunction, and reduce lethal arrhythmias both acutely and long term.<sup>2,10,15,37</sup> The use of  $\beta$ -blockers is the only pharmacological agent to have been found to reduce reoccurrence and is suggested to be taken for up to 1 year after an acute SCAD event. Angiotensin enzyme inhibitors and angiotensin receptor blockers are indicated in the presence of left ventricular dysfunction.<sup>2,3</sup>

### **Interventions**

Percutaneous coronary intervention (PCI) may be used as a treatment option for patients with SCAD, but it often accompanies unfavorable outcomes owing to the condition of the affected vasculature. PCI treatment for SCAD has been noted to have increased complications and poor outcomes. Potential complications include the following: distal segments, which are often involved in SCAD and are often too small to stent; intramural hematomas have the tendency to naturally reabsorb, which can cause strut malapposition and potentially lead to stent thrombosis; balloon dilation and stenting can prolongate intramural hematoma in either direction, which will worsen obstructions; and coronary guidewires can enter the false lumen, which will occlude the true lumen.<sup>1,2</sup> Hayes et al<sup>2</sup> noted a 53% technical failure rate with PCI. It is important to understand revascularization modalities may be required in patients with active, ongoing ischemia, hemodynamic instability, and left main dissection in which conservative treatment is inadequate.<sup>38</sup> Luong et al<sup>28</sup> found a greater proportion of patients with STEMI required revascularization than patients with NSTEMI. Nakashima et al<sup>35</sup> compared the outcomes of revascularization therapy's (PCI and coronary artery by-pass grafting [CABG]) (56%) with conservative treatment (44%). The reoccurrence rate was similar between both cohorts (26% in revascularization group and 21% in conservative management group;  $P = 0.77$ ) but the rate at which SCAD reoccurrence happened in the same vessel treated by PCI was 17% compared with 0% in the conservative group ( $P = 0.002$ ). Despite the precautions listed, the goal of re-established blood flow can occur. Exercising extreme caution with radial access or using a femoral approach have been identified to improve PCI outcomes.<sup>2</sup>

Shah et al<sup>39</sup> examined 11,809 patient cases with a primary diagnosis of SCAD between 2010 and 2014. Outcomes revealed 75.9% of the patients underwent PCI, 6% received CABG, 6.8% of the patients underwent both, and 11.3% were not treated with revascularization methods. This study revealed revascularization resulted in a higher frequency of congestive heart failure, shock, and MI ( $P = 0.04$ ).

There is limited evidence examining the use of CABG in SCAD. CABG indications within the literature have been left main stem or proximal dissection, PCI failure, or complications and persistent ischemia notwithstanding conservative therapy.<sup>1,2,34</sup> Both off-pump and robotic techniques have been cited.<sup>1,2</sup> Adlam et al<sup>1</sup> stated that special considerations

are required to ensure anastomosis of the true lumen. There have been reports of positive outcomes associated with CABG intervention, but they do not offer protection against reoccurrence.<sup>23,34</sup>

### **Post–Spontaneous Coronary Artery Dissection Considerations Cardiac Rehabilitation and Exercise**

Cardiac rehabilitation is suggested for all patients after a SCAD MI with an individualized approach.<sup>2</sup> It is recommended that cardiac rehabilitation incorporate exercise, psychosocial counseling, and peer support.<sup>40</sup> A cohort study<sup>41</sup> published in 2016 set out to examine cardiac rehabilitation outcomes and adherence. Between January 2010 and December 2014, 354 cases were analyzed worldwide. A total of 76% of patients participated in cardiac rehabilitation with 82% reporting physical benefits and 75% declaring emotional benefits. Some barriers listed to cardiac rehabilitation engagement were lack of transportation, cost, limited insurance plans, anergia, too ill, or inadequate recommendations.<sup>41</sup> In 2016, Chou et al<sup>30</sup> examined the efficacy of a SCAD specific cardiac rehabilitation. Findings yielded decreased chest pain and increased exercise capacity with a low rate of cardiovascular conditions after SCAD.

In regard to exercise parameters, women should not lift more than 30 lbs, and men should not exceed 50 lbs. Individuals should aim for a lower target heart rate and a systolic blood pressure less than 130 mm Hg when exercising after a SCAD event.<sup>41</sup>

It is understood that physical exertion poses as a precipitating factor in the pathogenesis of SCAD, which can make exercise recommendations challenging after a SCAD event. Cardiac rehabilitation can be initiated 1-2 weeks after SCAD.<sup>42</sup>

### **Prognosis**

A multicenter, observational Canadian study published in 2019 examined 750 SCAD cases between 2014 and 2018.

<sup>40</sup> The results yielded in regard to major adverse cardiac events were as follows: 8.8% of participants experienced major adverse cardiac events while in the hospital, including recurrent MI (4%), severe ventricular dysrhythmias (3.9%), cardiogenic shock (2%), unplanned revascularization (2.5%), congestive heart failure (0.3%), and transient ischemic attack/stroke (0.8%). The rate for occurrence (8.8%) was the same for 30-day follow-up concerning recurrent MI (6.1%), unplanned revascularization (2.7%), congestive heart failure (0.4%), transient ischemic attack (1.2%), ED visits (4.9%), chest pain–related admissions (2.5%), pericarditis (1.9%), and new atrial fibrillation diagnosis (0.9%).<sup>40</sup>

### **Conclusion**

SCAD is a less conventional source of MI that is not uncommon and should not be overlooked. Angina pectoris in conjunction with other classical MI symptoms in an individual (higher among young women), with few atherosclerotic risk factors should be evaluated thoroughly to properly diagnose this condition and aid in optimal treatment. This report reviews current literature in regard to SCAD to determine its epidemiology, pathophysiology, diagnosis options, and treatment alternatives to improve patient outcomes. An understanding of the prognosis of the condition can help in preventing its complications. Finally, SCAD has unique characteristics that warrant clinicians to think outside of the ACS box when it comes to diagnosis and interventions.

## **DETAILS**

<b>Subject:</b>	Acute coronary syndromes; Emergency medical care; Dissection; Womens health; Hormone replacement therapy; Clinical outcomes; Age; Risk factors; Childbirth &labor; Medical diagnosis; Mortality; Coronary vessels; Connective tissue; Hypertension; Young women; Veins &arteries; Pain; Pregnancy; Females; Estrogens; Chest pain; Nurses; Coronary artery disease
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# Attitudes Toward Influenza Vaccination Administration in the Emergency Department Among Health Care Providers: A Cross-Sectional Survey: JEN

[ProQuest document link](#)

## ABSTRACT (ENGLISH)

### Introduction

Influenza is a burdensome and vaccine-preventable infectious disease. Lack of time was reported as a common barrier by Canadians who did not receive their influenza vaccine. Increasing convenient access to vaccination increases uptake, and a potential setting for vaccine administration is the emergency department, where long wait times are common.

### Methods

A cross-sectional survey to gauge health care provider support and perceived barriers and facilitators to delivering influenza vaccine was conducted at 1 emergency and trauma center in Halifax, Nova Scotia. Anonymous questionnaires were completed by a convenience sample of emergency nurses, physicians, and paramedics (n = 82).

### Results

In total, 86% (n = 68) of health care providers supported vaccination in the emergency department when sufficient staffing and resources were available. When asked to consider implementation of influenza vaccination in the emergency department based on current staffing and resources, only 59% (n = 48) supported making vaccination available. Most surveyed health care providers preferred screening for vaccination at triage (57%) and supported a nurse-initiated protocol for vaccine administration (74%). After Bonferroni correction, there was no significant association between preference for when to vaccinate and being a nurse or physician ( $\chi^2(2) = 6.208, P = 0.05$ ). The highest risk patient groups with the lowest provider endorsement of vaccination were people involved in poultry culling (77%) and pregnant women (83%).

### Discussion

Surveyed health care providers were supportive of ED influenza vaccination. However, this study revealed additional barriers that need to be addressed to effectively launch such a program.

## FULL TEXT

### Contribution to Emergency Nursing Practice

- The current literature on ED influenza vaccination indicates that some ED patients are willing to accept vaccination in the emergency department. Yet despite over 20 years of promising studies, this is not a routine practice.
- This article contributes the opinions of Canadian health care providers regarding the barriers and facilitations to implementing ED influenza vaccination. Those surveyed were supportive of administering the influenza vaccine in the emergency department but had concerns about the feasibility of integrating this into current workflow and some

general education needs surrounding influenza vaccination.

- Key implications for emergency nursing practice from this research are that health care providers must be both comfortable with their knowledge about influenza vaccination and well supported before an ED influenza program implementation.

## Introduction

Influenza is a vaccine-preventable viral illness of the upper respiratory tract; complications of influenza can cause pneumonia, hospitalization, and death.<sup>1,2</sup> When combined, influenza and pneumonia are among the top 10 leading causes of deaths for Canadians of all ages.<sup>3</sup> Canada's goal for influenza coverage is for 80% of adults aged 65 years or older, those with chronic health conditions, and health care providers.<sup>4</sup> Yet despite its widespread availability, only 36% of Canadian adults reported getting vaccinated against influenza during the 2016/2017 season,<sup>5</sup> prompting the need for new strategies to increase vaccination uptake. In the same influenza season, 15% of Canadians who did not get vaccinated reported that it was due to a lack of time.<sup>5</sup> It is plausible that a potential setting for influenza vaccine availability is the emergency department, where patients are often waiting longer than recommended for nonlife threatening concerns.<sup>6,7</sup> Past studies have found the Canadian emergency department as a formidable option for influenza vaccination, resulting in the vaccination of 43% to 65% of eligible patients.<sup>8-10</sup> Support has also been documented in surveys of Canadian ED patients, whereby willingness to receive the influenza vaccination in the emergency department was expressed by 20% to 59% of eligible patients.<sup>11,12</sup> Comparatively, there is a lack of research on the opinions of ED clinicians regarding vaccine administration. To date, only 2 studies investigated physician willingness to order influenza vaccination,<sup>9,12</sup> and the data from other ED clinicians were even sparser. A survey of American nurses' opinions was the only study found that investigated emergency nurses' experiences in implementing an influenza vaccine program.<sup>13</sup> To the authors' best knowledge, there were no studies surveying ED paramedics about ED influenza vaccination. In the available literature, both ED physicians and emergency nurses have expressed concern about time constraints and expressed that preventative interventions were "not the role" of an emergency department.<sup>12,13</sup> Yet primary care interventions, such as tetanus vaccination, have been part of wound care in an ED setting since at least the 1970s.<sup>14</sup> In addition, a recent (unpublished) study that focused on the tetanus, diphtheria, pertussis vaccine screened patients at triage for vaccination status. The authors found that the triage times for patients who were offered the vaccine in the emergency department were only extended by 52 seconds, when compared with the control group.<sup>15</sup> It is also interesting to note that while ED clinicians expressed concern that there was inadequate time for vaccination, non-ED clinicians expressed the same concern in explaining why they do not routinely discuss vaccination with their patients.<sup>16</sup> This study addresses an important gap in Canadian literature regarding clinician opinions of ED influenza vaccination programs.

## RESEARCH OBJECTIVES

The main objective of this research was to gauge emergency nurse, physician, and paramedic support for a potential ED influenza vaccination program at the Queen Elizabeth II Health Sciences Centre (QEII). The secondary objective was to determine factors that may affect the implementation of influenza immunization in the emergency department. These objectives were explored with the following question: What are the opinions of clinicians employed at the QEII emergency department with respect to the merit and feasibility of providing influenza vaccines during wait times to adult ED clients triaged as a 4 or 5 on the Canadian Triage and Acuity Scale?

## Methods

This study involved a prospective, cross-sectional survey design. It was 1 part of a 2-arm study; the other arm was

directed at low-acuity clients and is reported elsewhere.<sup>17</sup> The Promoting Action Research in Health Sciences (PARiHS) framework was the conceptual framework used with this study. PARiHS considers successful implementation of change, (ie, ED influenza vaccination program), to be based on the quality of supporting evidence, context of the setting, and the way the change was introduced.<sup>18</sup> This study's intention was to lay the groundwork for change, and thus the focus was on the "evidence" (empirical evidence, clinician opinion, and patient preferences).<sup>18</sup> In regards to the evidence for change, there were a few different factors to consider. For instance, the previously mentioned trial of offering the tetanus, diphtheria, pertussis vaccine at triage versus at a follow-up appointment was the only randomized control trial<sup>15</sup> that was identified. Most of the past research that supported the delivery of ED influenza vaccination provided only a descriptive analysis, which is often considered to be weak evidence for policy change.<sup>18</sup> Another aspect of evidence is client preference, which was explored by the client arm of this study and a past implementation study at the QEII in which 64% of eligible patients were willing to be vaccinated.<sup>10</sup> Both are discussed in further detail in a different article.<sup>17</sup> This article's focus is on the survey responses provided by clinicians, which provides the clinician opinion aspect of the evidence. The emergency department that forms the setting of this study is at the QEII (The Charles V. Keating Emergency and Trauma Centre), an urban teaching hospital located in Halifax, Nova Scotia. In 2017, the QEII emergency department served >75,000 adult patients.<sup>19</sup> A thorough assessment of the context (eg, available resources, values, receptiveness to change) at the QEII emergency department was beyond the scope of this research; however, the clinician survey provided information on some aspects of this phenomenon.

## DATA COLLECTION

Data were collected using short, anonymous, self-administered questionnaires (Figures 1 and 2) to limit recall and social desirability bias. Content was based on what was asked in previously published surveys on the same topic.<sup>8-12</sup> Surveys were reviewed for clarity by the research team and an emergency nurse not employed at the study site. A pilot test was not feasible within the time frame of the research. Questionnaires were divided into 3 sections, the first of which elicited professional information/demographics. The second section assessed the clinician's evaluation of the evidence, both for influenza vaccination in general and providing the vaccine in the ED setting. In this section, respondents were asked to identify which groups they believed should receive the influenza vaccine from a list of target groups, based on the National Advisory Committee on Immunization (NACI) list of groups for whom influenza vaccination is particularly recommended.<sup>2</sup> The third and final section of the clinician questionnaire included questions assessing clinician perceptions of our emergency department as a setting for influenza vaccination. Participants were a convenience sample of clinicians from our emergency department. Inclusion criteria were: employment as an physician (staff emergency physician [EP], Royal College of Physicians, and Surgeons Emergency Resident, or Canadian College of Family Physicians Emergency Medicine Certificate residents), emergency nurse, or paramedic (primary, advanced, or critical care) in our emergency department during the study period (October 28, 2018 to December 14, 2018). Learners, such as resident physicians from other services, nursing students, and paramedic students, were excluded. As data collection occurred at only 1 emergency department, the focus was on maximizing recruitment: a link to the questionnaire was e-mailed to participants, paper questionnaires were made available outside the staff lounge, and posters were displayed in staff-only areas. These posters were amended on day 31 (of 46) to include a link to the online version of the survey. The research assistant also collected survey data on an iPad (directly linked to the online survey tool) during a physician meeting. Clinicians had the opportunity to enter their name in a drawing for a small gift card as an incentive for participation. Snacks were available at the clinician questionnaire drop box in the final week of the study period as an additional incentive.



## ETHICAL CONSIDERATIONS

Ethics approval was obtained through the Nova Scotia Health Authority (NSHA) Research Ethics Board before the initiation of the study (ROMEIO file #1023927).

## DATA ANALYSIS

Data collected from the electronic surveys were stored directly into REDCap, the NSHA's secure online data collection tool. All paper questionnaires were entered manually into REDCap.<sup>20</sup> Secondary checks were completed on approximately 10% of the questionnaires to ensure accurate data entry. Descriptive statistics based on the QEII clinician's opinion on the merit and feasibility of an ED influenza vaccination program (eg, number of clinicians who support ED influenza vaccination in general, number who support it at the QEII) were the a priori plan for data analysis. After the data were collected, it was decided that chi-square tests comparing clinician-reported ability to change and support for ED influenza vaccination and a chi-square test of the preferences for when to vaccinate clients by profession would also be executed to facilitate more detailed discussion of these factors. Missing responses were not included in the analysis of that question, and each instance of this was noted within the presentation of results. The Bonferroni correction was used to adjust the  $\alpha$  value to account for the potential inflation of error owing to running multiple chi-square tests. The plan for analysis was reviewed by a statistician.

## Results PROFESSIONAL INFORMATION

Approximately 219 clinicians were eligible to complete the survey during the study period. There were a total of 82 responses; 36 emergency nurses (response rate 33%), 13 paramedics (response rate 27%), 32 physicians (response rate 52%), and 1 participant who did not identify a profession (excluded from analysis).

Demographics/professional information are summarized in <sup>Table 1</sup>. Most clinicians (n = 48, 67%) were vaccinated at the site. Among the 7 unvaccinated emergency nurses and paramedics, a lack of confidence that the influenza vaccine would prevent influenza was the most common reason for refusal (all, n = 3; emergency nurse, n = 2; paramedic, n = 1), with some emergency nurses also reporting that their personal clinician advised them not to get vaccinated (n = 2).

## CLINICIAN SUPPORT FOR ED INFLUENZA VACCINATION

The primary objective was to determine the level of site clinician support for influenza vaccination in the emergency department. Most clinicians from the 3 professions supported making influenza vaccines available to low-acuity patients, if current time/resources were not an issue (all, n = 68, 86%; physician, n = 31, 97%; paramedic, n = 10, 77%; emergency nurse, n = 27, 79%). One participant included multiple answers, and another clinician did not answer the question, therefore, both were excluded from the analysis. When current levels of staffing (ie, the number of physicians, emergency nurses, and paramedics on shift at any 1 time) and resources (ego, clinical time, space within the emergency department) were considered, most of the participants were supportive of making the influenza vaccine available to low-acuity ED patients (n = 48, 59%). This support was also present when physician and emergency nurse participants were considered separately (physician, n = 23, 72% and emergency nurse, n = 22, 61%). Most of the paramedic participants indicated they did not support influenza vaccine availability in light of current site resources (n = 9, 69%).

## RELATED FACTORS

The secondary objective of this research was to determine factors that may affect the implementation of the influenza vaccination. The first potential factor was clinician willingness to change their practice, summarized in <sup>Table 2</sup>. A chi-square test between the self-reported ease of making practice changes and support for ED influenza vaccination in light of current resources was executed (<sup>Table 3</sup>). Overall, there was no significant association between these 2 variables ( $\chi^2 (2) = 2.419, P = 0.3$ ). Post hoc power was calculated using G\*Power software version 3.1.9.2<sup>21</sup>

as  $1-\beta = 0.067$ .

Another potential barrier for clinicians was knowledge of influenza vaccine recommendations. Any response of “unsure” or “uncertain” was considered a lack of endorsement. Most of the clinicians recommended influenza vaccination for all high-risk groups. The only high-risk groups with Table 4). A chi-square analysis was used to compare physician and emergency nurse preferences (Table 5). There were too few responses from the paramedics; therefore they were not included. In addition, those who responded “Do not know” or “No opinion” were also excluded. The proportion of physicians who preferred that vaccination take place in the waiting room after triage (50.0%) was significantly higher than emergency nurses who shared this preference (20.6%),  $P = 0.013$ .

Conversely, the proportion of emergency nurses who preferred that vaccination occur after a physician’s initial assessment (61.8%) was significantly higher than the proportion of physicians who shared this preference (36.7%),  $P = 0.045$ . However, chi-square test results were only considered significant at  $P \leq 0.005$  (Bonferroni correction for type I error inflation over 10 tests between both study arms). Thus overall, there was no significant level of association between profession and preference for when the influenza vaccine should be given ( $\chi^2(2) = 6.208$ ,  $P = 0.045$ ). Post hoc power was calculated using G\*Power software version 3.1.9.2<sup>21</sup> as  $1-\beta = 0.28$ .

### **Discussion DEMOGRAPHICS**

Overall, there were approximately 219 clinicians eligible to complete the survey during the study period. Emergency nurses made up the largest proportion of the clinician staffing ( $n = 110$ , 50% of total ED eligible clinicians), followed by physicians ( $n = 61$ , 28% of total ED eligible clinicians), and then paramedics ( $n = 48$ , 22% of total ED eligible clinicians). In the study population, physicians were overrepresented, comprising approximately 40% of the respondents, whereas paramedics were underrepresented, comprising approximately 16% of the respondents. In addition, there was a higher vaccination rate for emergency nurses (86%) and paramedics (85%) within the survey than other rates reported for the 40% of site emergency nurses and paramedics recorded by the NSHA as vaccinated in 2017/2018 (Pettipas S, personal communication, March 19, 2019). There was no unit-specific data for physicians. This may represent a nonresponse bias among those who were not vaccinated.

### **CLINICIAN SUPPORT FOR ED INFLUENZA VACCINATION AND RELATED FACTORS**

As introduced previously, the PARIHS framework considers successful implementation of change to be a function of the context of the health care organization, the strength of the evidence for change, and the method of facilitating change.<sup>18</sup> This survey’s focus was the evidence of clinician opinion. Within the PARIHS framework, “strong evidence” exists when clinicians reach a consensus, though what constitutes “consensus” is not well defined in the framework.<sup>18</sup> The 3 main areas of clinician opinion elicited by this survey included whether having the influenza vaccine available in the emergency department was a good idea; clinician understanding of who should receive the vaccine; and finally, how vaccine delivery might fit into the present workflow of the emergency department.

As reported in the results, 86% of all clinicians ( $n = 68$ ) supported the idea of providing influenza vaccination to low-acuity clients if staffing and resources were not a concern. Therefore, most clinicians see merit in providing ED influenza vaccination to low-acuity clients. Support dropped to only 59% ( $n = 48$ ) when the current site ED resources were taken into consideration by the clinicians. For the physicians, 72% ( $n = 23$ ) supported ED vaccination in light of current resources, similar to the 76% ( $n = 29$ ) of EPs who were willing to order influenza vaccination in the survey of EPs by Kapur and Tenenbein<sup>12</sup> in 2000. Among the emergency nurses, 61% ( $n = 22$ ) supported site ED influenza vaccination in light of current available resources; this result is a higher proportion than the 41% ( $n = 24$ ) found in a previous United States study.<sup>13</sup> This discrepancy may be accounted for by the fact that the US study was conducted immediately following implementation of ED influenza vaccination, and thus the nurses surveyed had feedback regarding what had and had not worked in practice.<sup>13</sup> By contrast, this study asked emergency nurses to theorize

about potential benefits/concerns. In contrast to other clinicians, most paramedics (69%) did not support ED influenza vaccination in light of current staffing and resources. In the context of the expanding role of paramedicine toward preventative care in Nova Scotia,<sup>22</sup> this study adds important information to this body of knowledge. Thus, despite most clinicians being supportive of ED influenza vaccination in theory, there is some hesitation about whether we have adequate staffing and resources to feasibly move forward with this idea. If current staffing and resources were not considered, this study found that most of the surveyed clinicians supported influenza vaccination; this level of support decreased if current site ED resources were not supplemented.

With respect to targeted high-risk groups, most of the clinicians agreed that the same high-risk groups endorsed by NACI should also receive influenza vaccination. However, there were 3 high-risk groups that had 18

### **Limitations**

There were several limitations in this study. Having paper surveys available resulted in some clinicians creating their own answer options or skipping questions. In addition, in light of the differing opinions between clinicians who may be assigned to triage (emergency nurses/paramedics) and those who never work at triage (physicians), it would have been beneficial to have asked individual clinicians if they worked triage to allow further analysis on how this affected their clinician opinions. However, the most notable limitation was the low rate of survey response; the rates varied widely by profession and were lower than those from previous surveys.<sup>12,13</sup> Therefore, both chi-square tests were underpowered in the probability that they would detect an association between the analyzed variables, compared with the recommended  $\beta-1 = 0.8$ .<sup>23</sup> If the chi-square test comparing the ability to change and the vaccination status were to be replicated in a future study, the sample size to achieve statistical power of 0.8, calculated using G\*Power software version 3.1.9.2<sup>21</sup> would be 542. If the chi-square test comparing preferences for when influenza vaccination should be administered by profession were to be replicated, the sample size needed would be 162. The higher level of engagement from physicians may simply be because of recruitment methods that reach physicians more effectively. For example, this study mainly used less active recruitment methods (posters, e-mail), but the research assistant was able to attend an EP meeting to actively collect their responses. For paramedics specifically, they work isolated from most other staff and do not always use the staff lounge where the paper surveys were set out. There was no boost in recruitment during the last week of the study when snacks were made available. More active and varied methods of recruitment should be considered when conducting future surveys as a means of improving response rates. In addition, this work was limited by being site-specific. Including multiple ED sites in a future replication of this survey may allow for an adequate sample size to be achieved regardless of potentially low response rates at each location.

### **Implications for Emergency Nurses**

This study adds the perspective of Canadian clinicians whose opinions were not formerly included in previous studies of ED influenza vaccination and has implications for nurses in many different roles. For nurse executives and managers, this study highlights the willingness of staff to consider a new addition to practice. Although there is often no capacity to expand what is currently available, new initiatives can still be implemented to fit comfortably into existing workflows, minimizing inconvenience/disruption to staff. In addition, an important consideration is that any new education requirements attached to a new protocol should be balanced between addressing the learning needs specific to staff needs and only requiring a reasonable amount of time to complete. For advanced practice nurses, consider surveying clinicians at one's site to gauge local feasibility of ED influenza vaccination. Finally, for staff nurses, this is an opportunity for a moment of self-reflection as to whether influenza immunization is already within one's knowledge, skill, and judgment, or if one has any knowledge gaps that need to be addressed.

### **Conclusions**

ED influenza vaccination is an intervention that has the potential to improve the health of ED patients. Facilitators to initiating influenza vaccination in our emergency department included strong support from clinicians with increased staffing and resources, vaccination screening to be executed at triage, and vaccination to be ordered through a nurse-initiated protocol. Barriers to moving forward with this idea included the lack of consensus among clinicians regarding when clients should be vaccinated, where vaccination status should be charted, present resources may not be sufficient to cover vaccination, and the uncertainty regarding vaccination of some high-risk groups. An evaluation of whether the currently available education modules for influenza vaccination are appropriate for the learning needs of the ED clinicians will be an important area of future research. In addition, if influenza vaccination were to become a part of routine care during the yearly vaccination season at our emergency department, it would be essential to have strong supports to facilitate the change and to evaluate the program regularly for its impact on staff workload and effectiveness. The concerns and education needs of clinicians must be fully addressed for this program to move from an idea to a reality.

### Acknowledgments

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### Author Disclosures

Conflicts of interest: none to report.

Characteristic	All professions		MD		Paramedic		RN	
	%	n	%	n	%	n	%	Current gender identity
								Female
46	57	16	50	4	31	26	74	Male
34	43	16	50	9	69	9	26	Total (N = 81)
80*		32		13		35		Years at the QEII ED

								<1
15	19	6	19	0	0	9	25	1 to 5
26	32	11	34	5	38	10	28	5 to 10
14	17	6	19	4	31	4	11	10 to 15
12	15	4	13	0	0	8	22	15 to 20
7	9	3	9	2	15	2	6	>20
7	9	2	6	2	15	3	8	Total (N = 81)
81		32		13		36		2017/2018 Vaccination status
								Yes
73	91	32	100	11	85	30	86	No
7	9	0	0	2	15	5	14	Total (N = 81)

Level of difficulty	All professions		MD		Paramedic		RN	
	%	n	%	n	%	n	%	Very difficult
2	3	0	0	1	8	1	3	Difficult
12	15	3	9	3	23	6	17	Neutral
38	48	18	56	4	31	16	46	Easy

27	34	11	34	5	38	11	31	Very easy
1	1	0	0	0	0	1	3	Total (N = 81)

Ability to make practice changes		Support for ED influenza vaccination				Test statistics			Effect size	
Yes		No		Total	n	%	n	%	n	df
$\chi^2$	p	V	p	Difficult	6	12.5	8	24.2	14	
				Neutral	23	47.9	16	48.5	39	
				Easy	19	39.6	9	27.3	28	
				Total	48		33		81	2

Workflow preference	All professions	MD	Paramedic	RN
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n	%	n	%	n	%	n	%	When during their visit patients should be screened for vaccination status
At triage	46	57	22	69	5	38	19	53
During the primary assessment	18	22	6	19	2	15	10	28
On discharge during discharge instructions	7	9	2	6	2	15	3	8
During the physician assessment	6	7	1	3	2	15	3	8
Do not know/No opinion	4	5	1	3	2	15	1	3
Total (N = 81)	81		32		13		36	
How influenza vaccine should be ordered								
Nurse-initiated protocol	60	74	27	84	9	69	24	67
Pre-printed order to be signed by MD	12	15	4	13	1	8	7	19
Ordered individually as appropriate	6	7	0	0	1	8	5	14
Do not know/No opinion	3	4	1	3	2	15	0	0
Total (N = 81)	81		32		13		36	
When during their visit patients should be vaccinated								

After triage, in the waiting room	24	30	15	47	2	15	7	19
Before physician initial assessment	12	15	4	13	2	15	6	17
After physician initial assessment	23	28	6	19	5	38	12	33
On discharge	16	20	5	16	2	15	9	25
Do not know/No opinion	6	7	2	6	2	15	2	6
Total (N = 81)	81		32		13		36	
Where vaccination status of patients should be charted								
Nursing note	38	47	14	44	4	31	20	56
Triage note	26	32	15	47	4	31	7	19
Minor treatment record	22	27	10	31	4	31	8	22
ED physician note	15	19	2	6	3	23	10	28
Don't know/No opinion	8	10	5	16	2	15	1	3
Total (N = 81)	109*		46		17		46	

Response	MD		RN		Total	Test statistics			Effect size	
	%	n	%	n		df	$\chi^2$	p	V	p
After triage	15	50*	7	20.6*	22					
Before PIA	4	13.3	6	17.6	10					
After PIA	11	36.7*	21	61.8*	32					
Total	30		34		64	2	6.208	0.045	0.311	0.045



## DETAILS

<b>Subject:</b>	Emergency medical care; Polls & surveys; Barriers; Vaccines; Paramedics; Waiting times; Facilitators; Physicians; Questionnaires; Influenza; Data analysis; Nurses; Health sciences; Poultry; Staffing; Immunization; Tetanus; Health care; Pneumonia; Triage; Data collection; Uptake; Medical personnel; Whooping cough; Infectious diseases; Nursing; Adults; Management; Emergency services; Medical screening; Pregnancy
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# Shoulder Joint: JEN

[ProQuest document link](#)

## ABSTRACT (ENGLISH)

A 32-year-old man presented to the emergency department with the inability to move his right shoulder after a fall. The shoulder joint was very painful. The humeral head was palpable anterior-inferior to the normal position. The posterior shoulder showed a hollow beneath the acromion. The arm was held in slight abduction and external rotation. Internal rotation and adduction were limited.

## FULL TEXT

Figure 1 illustrates the glenohumeral joint of a normal shoulder joint, where the humeral head of the humerus articulates with the glenoid part of the scapula. In a normal shoulder joint, the articular surfaces should be parallel as noted in

Figure 1

Figure 2 illustrates an anterior dislocation of the shoulder joint, where the humeral head lies under the coracoid process of the scapula, and the glenoid fossa is empty. Causes of shoulder dislocation include sports injuries, traffic accidents, falls, or seizures and electric shocks that can cause muscle contractions that pull the humerus out of the joint. Anterior dislocation is the more common presentation; however, posterior shoulder dislocation usually results from forceful contractions of the internal rotators that occur during seizures and electrical shock. Treatment of a dislocated shoulder includes closed reduction. Surgery may be indicated if there is recurring shoulder dislocation. The clinical scenario for Figure 2 is described as follows: A 32-year-old man presented to the emergency department with the inability to move his right shoulder after a fall. The shoulder joint was very painful. The humeral head was palpable anterior-inferior to the normal position. The posterior shoulder showed a hollow beneath the acromion. The arm was held in slight abduction and external rotation. Internal rotation and adduction were limited.

## DETAILS

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**FULL TEXT**

## DETAILS

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# Emergency Nursing Review Questions: September 2020: JEN

[ProQuest document link](#)

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## ABSTRACT (ENGLISH)

During cardiopulmonary resuscitation, the end-tidal carbon dioxide capnograph displays a value of 7 mm Hg. Correct answer: B End-tidal carbon dioxide monitoring (PETCO<sub>2</sub>) measures the concentration of carbon dioxide in exhaled air at the end of expiration. Risk factors for DIC in this patient include liver injury, recent surgery, cancer, and septicemia. Because of the alteration in clotting, pulmonary emboli may be present.

## FULL TEXT

### Questions

1. A patient is being seen in urgent care for general malaise and neck pain. A temperature of 38.8°C (101.8°F) is noted along with increased pain in the neck with movement and a headache. A presumptive diagnosis of meningitis is given. Which of the following precautions should be observed by the staff?

2. A. Droplet isolation

3. B. Contact precautions

4. C. Enteric isolation

5. D. Acid Fast Bacillus precautions

2.

During cardiopulmonary resuscitation, the end-tidal carbon dioxide capnograph displays a value of 7 mm Hg. Correct endotracheal tube placement is confirmed. Which of the following actions should be increased?

•A. Respiratory rate and volume

•B. Compression depth and rate

•C. Oxygen concentration and flow

•D. EPINEPHrine dose and frequency

3.

A patient presents to the emergency department from a rehabilitation facility following abdominal surgery for metastatic liver cancer. Vital signs are temperature: 39.6°C [103.2°F], RR: 34, Blood pressure: 90/45 mm Hg, SP0<sub>2</sub>: 89%, and P: 133. The incision site has serosanguinous drainage and multiple venipuncture sites continue to bleed. Laboratory evaluation demonstrates an elevated white blood cell count. Which additional assessment would be most helpful in the evaluation of this patient?

•A. Fibrin split product

- B.Hepatitis panel
- C.Chest angiogram
- D.Focused assessment with sonography for trauma (FAST) examination, focusing on the liver

4.

A 10-year-old presents to the emergency department via emergency medical services (EMS) with difficulty in breathing. A history of asthma and several sick siblings at home is shared. Upon arrival at the emergency department the patient is tachypneic, RR: 40 with accessory respiratory muscle use, and is only able to speak 1 word at a time in between breaths. EMS has administered an albuterol (salbutamol) nebulizer treatment and there is no intravenous access. Physical examination reveals an awake, alert, and anxious child. On auscultation, there is poor aeration in all lung fields and no wheezing noted. The skin is pale and warm, and tachycardia is noted with a P: 168. EMS reports “a lot of puffs” of an albuterol (salbutamol) meter dosed inhaler were inhaled at home before their arrival. What is your next step?

- A.Stop the albuterol because the patient is tachycardic.
- B.Continue the albuterol and anticipate immediate orders for EPINEPHrine intramuscular injection.
- C.Begin assisted ventilations with a bag valve mask.
- D.Allow the EMS albuterol treatment to finish before any further treatment takes place.

5.

Following a skiing injury, an alert adult patient presents with an avulsed front tooth. The entire tooth is wrapped in a tissue and brought with the patient. Which of the following is the most appropriate intervention by the nurse?

- A.The nurse handles the tooth by the root only.
- B.The tooth is placed back in the socket as soon as possible.
- C.An outpatient visit is scheduled for the next morning.
- D.The tooth is placed under the tongue with reimplantation within 4 hours.

## Answers

### 1. Correct answer: A

Meningitis is transmitted by the respiratory route. Patients with suspected meningitis should be on droplet isolation. (A). Care should be taken to avoid respiratory secretions with the use of a mask for both the patient and staff. Contact precautions (B) are not considered since meningitis is transmitted by droplets. Enteric isolation (C) would be used for patients experiencing gastrointestinal issues. Acid fast bacillus precautions (D) would be used on suspicion of tuberculosis.<sup>1</sup>

### 2. Correct answer: B

End-tidal carbon dioxide monitoring (PETCO<sub>2</sub>) measures the concentration of carbon dioxide in exhaled air at the end of expiration. If the patient has a properly placed advanced airway, a level below 10 mm Hg indicates poor quality of CPR and compressions should be increased in depth and/or rate (B). Increasing the respiratory rate would decrease the PETCO<sub>2</sub> and increasing the concentration and flow of oxygen would not affect the PETCO<sub>2</sub>. (A, C). Epinephrine dosage and frequency (D) are not monitored by PETCO<sub>2</sub>.<sup>2</sup>

### 3. Correct answer: A

This patient is in septic shock, with a suspicion of disseminated intravascular coagulation (DIC). A standard test for DIC is a fibrin split product (A). Risk factors for DIC in this patient include liver injury, recent surgery, cancer, and septicemia. Although a hepatitis panel would be completed, it would not explain the uncontrolled bleeding issues (B). Because of the alteration in clotting, pulmonary emboli may be present. A chest angiogram would not be an immediate indicator for the cause of the clotting disorder (C). A FAST ultrasound (D) would be more appropriate for a patient with suspected intra-abdominal bleeding.<sup>3,4</sup>

### 4. Correct answer: B

Asthma exacerbation is 1 of the most common respiratory reasons for children to visit the emergency department and accounts for many missed days of school. The 3 components of asthma include bronchoconstriction, mucous production, and inflammation. A short acting beta-2 agonist such as albuterol (salbutamol) causes bronchodilation and is considered a standard emergent treatment for acute asthma exacerbations. In cases where patients have poor aeration despite albuterol treatment, intramuscular epinephrine should be administered for bronchodilation. (B) The albuterol (salbutamol) should not be stopped because of tachycardia alone. In general, children do not have cardiac disease and can tolerate the adverse effect of tachycardia. (A) Assisted ventilation and intubation should be a last resort for the treatment of asthma. (C) Asthmatics have a difficult time getting air out, and so forcing air in via assisted ventilation does not help resolve their distress. If the patient is in severe respiratory distress or has poor aeration, interventions should be escalated quickly to prevent further decline. EPINEPHrine can be administered while albuterol (salbutamol) is being administered (D).<sup>5</sup>

### 5. Correct answer: B.

Tooth avulsion is an acute emergency with tissue and tooth hypoxia developing rapidly. Options for immediate treatment include placing the tooth back in the socket in an alert patient. (B) Reimplantation within 30 minutes greatly increases the chance of viability as the periodontal ligament cells die if they are out of the socket for more than 60 minutes. If reimplantation in the socket cannot be accomplished, the tooth can be stored under the tongue, in a pH-balanced solution or milk. The tooth should be handled by the crown only to avoid any further damage to the periodontal ligament fragments (A). The avulsed tooth should be managed within 60 minutes for best results (C, D).<sup>6</sup>

## DETAILS

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# Coronavirus Disease: 4 Million Cases Worldwide and the Importance of Multidisciplinary Health Care Teams During the Pandemic: JEN

[ProQuest document link](#)

## ABSTRACT (ENGLISH)

At that period in time, Brazil appeared in the seventh position regarding number of cases, sixth in number of deaths, and second in number of active and serious cases (N = 8,318), with a low number of real-time polymerase chain reaction (RT-PCR) examinations per million inhabitants (N = 3,459).<sup>1,2</sup> During the COVID-19 pandemic, a multidisciplinary health care team (nurses, biologists, nutritionists, physiotherapists, medical doctors, pharmacists,



and psychologists), working exhaustive and continuous hours, is acting intensively to promote a better outcome for all patients with COVID-19, mainly those in intensive care units. [...]in Brazil, there have been some isolated cases of aggression toward health professionals, arising mainly from differences over political opinions, fear of contamination by contact with health professionals, fear of the spread of the disease by professionals who work directly with patients infected with severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), credibility of pharmacological treatments still undergoing efficacy tests, ignorance of the seriousness of the COVID-19 pandemic worldwide, and disagreement over ideologies linked to political issues. Female nurses represented 84.77% of the cases and 62.32% of the deaths. [...]the range of infections by age was as follows: age 20 to 30 years: 2,938 cases (5 deaths); age 31 to 40 years: 6,849 cases (29 deaths); age 41 to 50 years: 24,456 cases (38 deaths); age 51 to 60 years: 1,485 cases (35 deaths); age 61 to 70 years: 201 cases (25 deaths); and age 71 to 80 years: 22 cases (6 deaths).<sup>4</sup> In Brazil, at some referral centers, health professionals have poor access to the personal protection equipment they need when treating patients with COVID-19.

## FULL TEXT

Dear Editor:

On May 12, 2020—International Nurses Day—4 million cases of coronavirus disease (COVID-19) were recorded, with a total of 292,000 deaths worldwide. Brazil, at that point, recorded a total of approximately 178,000 cases and 12,404 deaths caused by the disease. At that period in time, Brazil appeared in the seventh position regarding number of cases, sixth in number of deaths, and second in number of active and serious cases (N = 8,318), with a low number of real-time polymerase chain reaction (RT-PCR) examinations per million inhabitants (N = 3,459).<sup>1,2</sup>

During the COVID-19 pandemic, a multidisciplinary health care team (nurses, biologists, nutritionists, physiotherapists, medical doctors, pharmacists, and psychologists), working exhaustive and continuous hours, is acting intensively to promote a better outcome for all patients with COVID-19, mainly those in intensive care units. Health professionals take all the steps involved in the treatment of patients with COVID-19, after the diagnosis by RT-PCR, by providing medical support during ventilatory maneuvers as well as psychological support to the patients and their relatives, mainly in cases of deaths. The multidisciplinary health care team should be better recognized for its actions during and after the COVID-19 pandemic.

Several countries around the world, including Brazil, have acknowledged multidisciplinary health care teams for their heroism during the COVID-19 pandemic, which is a stressful time. However, in Brazil, there have been some isolated cases of aggression toward health professionals, arising mainly from differences over political opinions, fear of contamination by contact with health professionals, fear of the spread of the disease by professionals who work directly with patients infected with severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), credibility of pharmacological treatments still undergoing efficacy tests, ignorance of the seriousness of the COVID-19 pandemic worldwide, and disagreement over ideologies linked to political issues. For example, an episode of aggression toward nurses occurred during a silent protest on Labor Day (celebrated in May in Brazil) regarding the number of deaths from COVID-19, and this episode was linked to political issues.

In many countries or regions worldwide, multidisciplinary health care teams are under intense stress as they work continuously to deal with the high number of patients with COVID-19 and the need to optimize the number of RT-PCRs and number of beds in intensive care units; moreover, these professionals are dealing with a high number of deaths of patients, health professional colleagues, and, perhaps, relatives. In some cases, health professionals are isolated from their familiar environments to avoid the contamination of their relatives by SARS-CoV-2, mainly if the relatives are older or present with comorbidities, both groups recognized as “at risk” for the disease. The COVID-19 pandemic is a challenge to health professionals, and the community should recognize their heroism and the importance of all members of multidisciplinary health care teams.

On May 18, 2020, the International Council of Nurses reported a total of 360 deaths of nurses caused by COVID-19.

<sup>3</sup> On May 20, 2020, Brazil's Conselho Federal de Enfermagem (Federal Nursing Council) declared a total of 138 deaths (111 confirmed cases and 27 suspicious cases) of nurses caused by COVID-19, representing 138/360 (38.33%) of all deaths of nurses by COVID-19 disease. Brazil, on May 20, 2020, had 15,923 cases of nurses with

COVID-19 (4,825 cases confirmed by RT-PCR), with a case fatality rate of 2.3% using only the confirmed cases as the parameters. In all states and the Federal District, there were nurses who had been infected by SARS-CoV-2 virus. Female nurses represented 84.77% of the cases and 62.32% of the deaths. Moreover, the range of infections by age was as follows: age 20 to 30 years: 2,938 cases (5 deaths); age 31 to 40 years: 6,849 cases (29 deaths); age 41 to 50 years: 24,456 cases (38 deaths); age 51 to 60 years: 1,485 cases (35 deaths); age 61 to 70 years: 201 cases (25 deaths); and age 71 to 80 years: 22 cases (6 deaths).<sup>4</sup> In Brazil, at some referral centers, health professionals have poor access to the personal protection equipment they need when treating patients with COVID-19. In addition, our data demonstrated the need to optimize the diagnosis by RT-PCR, including that for health professionals; for example, many nurses are treated as suspicious COVID-19 cases owing to the lack of an RT-PCR diagnosis. COVID-19 has caused a high number of deaths worldwide, including the deaths of health professionals. The loss of these professionals can result in more deaths because of the difficulty of providing treatment to all patients with COVID-19, mainly in places where the contagion rate is as high as it is in Brazil, and many health professionals are needed to optimize treatment.

Multidisciplinary health care teams are responsible for keeping patients alive, mainly in severe cases of COVID-19, including millions of people worldwide. As declared by Marson,<sup>5</sup> “We miss that global hug;” however, we need to thank our health professionals for giving us the opportunity to dream about that global hug after the pandemic.—  
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## DETAILS

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# Development and Psychometric Testing of a Tool Measuring Nurses' Competence for Disaster Response: JEN

[ProQuest document link](#)

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## ABSTRACT (ENGLISH)

### Introduction

There is a growing awareness among governments, communities, and health care agencies of the need to evaluate roles and competencies in disaster nursing. A validated instrument was developed to evaluate nurses' competencies for disaster response.

### Methods

A psychometric evaluation study was developed in 2 stages: 1) content and face validity, and 2) verification of feasibility and reliability with test-retest. Competencies were extracted from the Framework of Disaster Nursing Competencies published by the International Council of Nurses. The participants included 8 experts in emergencies

and disasters who were nurses with a PhD and had more than 2 years of experience with education or clinical practice in emergencies or disasters, and 326 nurses from a mobile emergency care service in southern Brazil. The data analysis used a content validity index and intraclass correlation coefficients. The psychometric properties of the instrument included reliability assessed with Cronbach alpha, feasibility and test-retest reliability assessed with *t* tests and intraclass correlation coefficients, and factor analysis.

### Results

The overall evaluation of the instrument yielded an intraclass correlation coefficient of 0.92 (SD = 0.04), and the mean content validity index was acceptable at 0.88 (SD = 0.12). Out of 51 items, 41 were validated and organized in 3 domains according to factor analysis: 1) care of the community; 2) care of the individual and family; and 3) psychological support and care of vulnerable populations. The instrument demonstrated good internal consistency (Cronbach  $\alpha$  = 0.96) and adequate test-retest reliability (intraclass correlation coefficient >0.7).

### Discussion

The Nurses' Disaster Response Competencies Assessment Questionnaire showed good internal consistency, adequate reproducibility, and appropriate feasibility for use to evaluate nurses' competencies for disaster response.

## FULL TEXT

### DETAILS

<b>Subject:</b>	Emergency medical care; Validity; Questionnaires; Psychological support; Data analysis; Emergency services; Likert scale; Nursing; Ethics; Correlation coefficients; Competence; Nurses; Reproducibility; Test-Retest reliability; Factor analysis; Health care; Feasibility; Emergency preparedness; Adequacy; Quantitative psychology; Knowledge; Verification; Data collection; Disasters; Variance analysis; Nursing education; Vulnerability; Disaster medicine; Clinical medicine
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# Mental Health Impacts of Climate Change: Perspectives for the ED Clinician: JEN

[ProQuest document link](https://www.proquest.com/scholarly-journals/development-psychometric-testing-tool-measuring/docview/2487205750/se-2?accountid=211160)

## ABSTRACT (ENGLISH)

Rising temperatures, precipitation extremes, extreme weather events, and sea-level rise have led to increases in exposures to extreme heat events, poor air quality, reduced food and water quality, changes in infectious agents, and population displacement.<sup>2,4,5</sup> These effects have also led to an increase in heat-related and cardiopulmonary illnesses, food-, water-, and vector-borne diseases, and mental health impacts.<sup>6</sup> The deleterious health effects of climate change are not distributed evenly; in fact, those who contribute the least to greenhouse gas emissions are disproportionately affected—a concept known as climate (in)justice.<sup>7,8</sup> The vulnerable groups include those living in low- or middle-income countries, as well as communities of certain colors, immigrant groups, indigenous peoples, children and pregnant women, older adults, people with pre-existing medical or psychiatric illness, certain occupational groups, people with disability, and those with low socioeconomic status.<sup>9</sup> These vulnerable groups are at significant risk of health consequences in our world with a changing climate. [...]an overview of the mental health impacts related to the coronavirus disease (COVID-19) pandemic are also provided. Recent reports in the medical and interprofessional literature regarding the association between physical health and climate change urge that clinicians become educated about the impact of greenhouse gas emissions on climate and health.<sup>2,3</sup> Important

advances in the scientific underpinnings of the impact of climate on health have emerged in recent literature with urgent warnings about current and emerging health impacts.<sup>1,12,13</sup> The most recent Intergovernmental Panel on Climate Change Special Report: Global Warming of 1.5°C [2.7°F]: Summary for Policymakers<sup>14</sup> and previous Intergovernmental Panel on Climate Change reports<sup>2,4,5,15</sup> strongly suggest that major pathways exist by which climate harms health through direct effects (eg, increased exposure to high ambient temperatures); respiratory air pollutants; infectious diseases (vector- and water-borne); respiratory disorders, including allergies such as pollen allergy; and food and water insecurity. The projected labor cost impact of climate-related ambient heat stress is estimated in trillions of dollars globally<sup>25</sup>—affecting developed as well as developing, fragile economies. [...]it is critical for ED clinicians to address, engage, assess, and treat the emerging dangers for patients related to occupational heat exposure and associated mental health consequences. Background of Mental Health Impact of Climate Change Weather and climate have long been known to have an impact on the mood of individuals, as in seasonal affective disorder.<sup>26</sup> It is also well established that individuals and groups living in regions that experience more severe weather are more likely to experience subsequent symptoms consistent with mood and affective disorders.<sup>17,27,28</sup> Emerging evidence suggests that there are multiple mental health effects of climate change and climate-related events.<sup>11</sup> These impacts can be categorized as acute and chronic mental health impacts related to climate change because of direct or indirect consequences.

## FULL TEXT

### Contribution to Emergency Nursing Practice

- The current literature on climate change and mental health impact indicates a significant need for education of health professionals in emergency departments and other health settings.
- This article contributes strategies to provide an overview of the health consequences of climate change with a focus on mental health impact to increase the awareness of ED providers.
- Key implications for emergency nursing practice found in this article are that nurses and advanced practice providers play a key role in ensuring timely screening for climate-related mental health impact in vulnerable populations and implement effective interventions to limit the long-term effects caused by the acute psychological trauma as well as chronic psychological trauma associated with the impact of climate change.

### Introduction

It is well established that climate change adversely affects health outcomes.<sup>1,2</sup> The 2019 report of The Lancet Countdown on Health and Climate Change: Ensuring that the Health of a Child Born Today Is not Defined by a Changing Climate suggests that a child born today will experience a world that is more than 4°C (7.2°F) warmer than the preindustrial average.<sup>3</sup> This impact on our climate has significant deleterious health consequences for individuals, communities, populations, and our world. Rising temperatures, precipitation extremes, extreme weather events, and sea-level rise have led to increases in exposures to extreme heat events, poor air quality, reduced food and water quality, changes in infectious agents, and population displacement.<sup>2,4,5</sup> These effects have also led to an increase in heat-related and cardiopulmonary illnesses, food-, water-, and vector-borne diseases, and mental health impacts.<sup>6</sup>

The deleterious health effects of climate change are not distributed evenly; in fact, those who contribute the least to greenhouse gas emissions are disproportionately affected—a concept known as climate (in)justice.<sup>7,8</sup> The vulnerable groups include those living in low- or middle-income countries, as well as communities of certain colors, immigrant groups, indigenous peoples, children and pregnant women, older adults, people with pre-existing medical or psychiatric illness, certain occupational groups, people with disability, and those with low socioeconomic status.<sup>9</sup> These vulnerable groups are at significant risk of health consequences in our world with a changing climate.

Notably, the physical health consequences of climate change have received greater attention in the literature, whereas the mental health impacts of climate change are often overlooked.<sup>10,11</sup> The purpose of this paper is to provide an overview of the health impacts of climate change with an emphasis on mental health impacts, examine the roles of ED clinicians, and describe a model of care based on developing a climate-change health history, physical examination, differential diagnoses, and management plan that incorporates patient education and follow-up evaluation. Key to this overview is the emergence of new terminology related to climate change and health, including solastalgia—mental distress caused by environmental change, particularly global climate change—and ecoanxiety—climate anxiety or grief related to environmental degradation or change. Last, an overview of the mental health impacts related to the coronavirus disease (COVID-19) pandemic are also provided. Although there is no established causal relationship between COVID-19 and climate change, there are notable similarities in their impact on human health and well-being.

Recent reports in the medical and interprofessional literature regarding the association between physical health and climate change urge that clinicians become educated about the impact of greenhouse gas emissions on climate and health.<sup>2,3</sup> Important advances in the scientific underpinnings of the impact of climate on health have emerged in recent literature with urgent warnings about current and emerging health impacts.<sup>1,12,13</sup> The most recent Intergovernmental Panel on Climate Change Special Report: Global Warming of 1.5°C [2.7°F]: Summary for Policymakers<sup>14</sup> and previous Intergovernmental Panel on Climate Change reports<sup>2,4,5,15</sup> strongly suggest that major pathways exist by which climate harms health through direct effects (eg, increased exposure to high ambient temperatures); respiratory air pollutants; infectious diseases (vector- and water-borne); respiratory disorders, including allergies such as pollen allergy; and food and water insecurity. The effect of climate change on mental health constitutes a critical area for clinicians, particularly emergency nurses and advanced practice providers—nurse practitioners, physician assistants, and physicians—to address. Haines and Ebi<sup>1</sup> note that exposure to extreme events increases the risk of mental health sequelae, particularly depression and anxiety, which may disproportionately affect those with pre-existing mental health problems.

Mental health issues related to climate change include acute stress disorder, post-traumatic stress disorder, depression, and anxiety. Several authors have discussed the significant mental health vulnerabilities—both acute and chronic—related to adverse effects that occur after climate-related disasters.<sup>16–19</sup> Galea et al<sup>20</sup> found that after Hurricane Katrina, 49.1% of those who remained in New Orleans had developed an anxiety mood disorder, whereas those who relocated had experienced a 26.4% prevalence of this disorder—both significantly higher than the national average. Patz et al<sup>19</sup> noted that the risk factors included low social capital (network of trusting relationships in one's community) or social support; physical injury; significant loss of property; witnessing injury, illness, or death; loss of family members; displacement; and a past history of mental health/psychiatric illness. Among vulnerable populations, children are at high risk, thus requiring an urgent response from emergency clinicians and mental health professionals.

### **Climate Change: Concepts of Mitigation, Adaptation, and Resilience**

Three concepts are central to addressing the effect of climate change on human health and well-being: mitigation, adaptation, and resilience. Mitigation refers to slowing the rate of global warming by reducing greenhouse gas emissions. By signing the Paris Agreement, nations acknowledged their commitment to reduce greenhouse gas emissions significantly by the year 2030,<sup>21,22</sup> with the goal of limiting warming to less than 2°C (3.6°F) above preindustrial levels. These governmental efforts were aimed at achieving mitigation of future increases in ambient temperatures and assuring the engagement of countries globally.

Adaptation refers to the measures taken at the individual, local, national, and international levels to reduce risks, and

prepare for present and future potential climate impact through efforts aimed at strengthening infrastructure and systems.<sup>23</sup> It is important to note that risk is a function of threat and vulnerability. As noted previously, certain groups are more vulnerable to the negative impact of climate change. The degree to which individuals, communities, or systems are vulnerable is determined by their sensitivity to climate impact, their levels of exposure, and their capacity to adapt to direct climate threats and impact.<sup>24</sup> Ultimately, the goal is to create resilience by addressing these threats to protect the health and well-being of both individuals and communities.

Resilience efforts are aimed at adaptation to current and future climate health impact. An example of efforts to increase resilience is enhancing proactive strategies and education of occupational workers exposed to ambient heat stress to avoid heat stroke. The projected labor cost impact of climate-related ambient heat stress is estimated in trillions of dollars globally<sup>25</sup>—affecting developed as well as developing, fragile economies. Therefore, it is critical for ED clinicians to address, engage, assess, and treat the emerging dangers for patients related to occupational heat exposure and associated mental health consequences.

### **Background of Mental Health Impact of Climate Change**

Weather and climate have long been known to have an impact on the mood of individuals, as in seasonal affective disorder.<sup>26</sup> It is also well established that individuals and groups living in regions that experience more severe weather are more likely to experience subsequent symptoms consistent with mood and affective disorders.<sup>17,27,28</sup>

Emerging evidence suggests that there are multiple mental health effects of climate change and climate-related events.<sup>11</sup> These impacts can be categorized as acute and chronic mental health impacts related to climate change because of direct or indirect consequences. Further mental health impacts of climate change are linked with conflict, violence, and migration<sup>7</sup>—and disaster response by emergency clinicians for both acute disasters and long-term follow-up is critical.

Acute mental health impacts result from natural disasters and extreme weather events. Trauma and shock can lead to anxiety, depression, phobic and somatic impairment, as well as substance use disorders. Without intervention, people may begin to experience symptoms of post-traumatic stress disorder (PTSD) and increase in suicidality. PTSD is more likely to occur in people who have lost loved ones, property, or things of personal value.<sup>29</sup> Suicides in farmworker populations, particularly during periods of prolonged drought, are increasing in prevalence and are related to climate change<sup>30,31</sup> and food insecurity.<sup>32</sup> With increasing natural disasters and extreme heat events, it is likely that more people will be affected by mental health consequences.

Extreme stress can occur when the effects of existing life stressors are compounded by climate-related stress, which can lead to not only chronic stress and its sequelae, including suicidality, but also to negative physical symptoms such as sleep disorders and immune system compromise, and strained social relationships.<sup>10</sup> One in 3 women and 1 in 7 men experience intimate partner violence (IPV), and 70,000 children per year suffer from maltreatment.<sup>33</sup> The incidence of IPV sexual violence and child maltreatment increases in families who have experienced disaster.<sup>34</sup> The reasons for this increase include parental stress, decreased social support, and economic loss.<sup>35</sup> In addition to facing the risk of maltreatment, children are particularly vulnerable to climate-related mental health impact related to the potential strain on the family/parents/communities because of climate stress and the potentially devastating interruption in education that may occur. Both can have negative effects on children's social, cognitive, and emotional development.<sup>10</sup>

Chronic impacts on mental health and well-being that are specifically related to rising temperatures include increase in violence, aggression, and mental health emergencies. Aggressive behavior increases as temperatures rise.<sup>36</sup> Likewise, the use of emergency mental health services increases with higher temperatures.<sup>10</sup> Water insecurity, particularly among vulnerable populations, is an increasingly complex problem in certain parts of the world, including



sub-Saharan Africa and Southwest Asia. Notably, the spark that ignited the Syrian conflict was a multiyear drought in which arable land was lost affecting farming outputs, with the resultant loss of livestock affecting food and water insecurity. This climate-related complex situation resulted in the subsequent war, the lingering migrant crisis in the Middle East, and further climate and conflict migration to western Europe. Thus, conflict, violence, and migration are critical problems related to climate change globally<sup>7,37</sup> and lead to complex mental health sequelae in emergency settings, with firearm violence as another exemplar.

### **Addressing Mental Health Impacts of Climate Change in Emergency Departments: An Interprofessional, Trauma-Informed Approach**

The Centers for Disease Control and Prevention<sup>38</sup> has developed an approach to understanding the impact of climate change on human health that can guide nursing, nurse practitioners, physician assistants, and physician practice in emergency settings (Figure). The impacts—all of which may affect mental health sequelae—include injuries, fatalities, and other mental health outcomes related to severe weather; asthma and cardiovascular disease due to air pollution with potential for depressive outcomes and anxiety; changes in vector ecology, that is, mental health outcomes related to Lyme disease and other vector-borne illnesses (encephalitis, hantavirus, and chikungunya—all of which may be associated with intellectual/mental health); respiratory allergies, asthma related to increase in allergens; water quality impacts secondary to cholera, harmful algal blooms, cryptosporidiosis, and leptospirosis; malnutrition and diarrheal disease due to water and food supply impacts/insecurity; conflict and violence—a secondary outcome of environmental degradation as well as heat stress due to climate change; and heat-related illness and death (eg, heat stress, heat stroke, and cardiovascular failure related to extreme heat).

The Substance Abuse and Mental Health Services Administration describes the concept of trauma as resulting from an event, a series of events, or a set of circumstances that is experienced by an individual, is physically or emotionally harmful or life-threatening, and which has lasting adverse effects on the individual's functioning and mental, physical, social, emotional, or spiritual well-being.<sup>39</sup> The agency's "Four R's" trauma-informed approach to care is a useful framework that can be implemented in an ED setting to care for patients who present with both physical and psychological impacts given the trauma associated with climate-related events. First, all people at all levels of the organization, for instance, a hospital, must have a basic understanding of trauma and how it can affect individuals, families, and communities. This understanding will enable care providers to recognize the signs of trauma. This leads to an organizational response that integrates this deeper understanding of the trauma experience into organizational policies, as well as changes in the language and behavior of those who interact with patients. Last, practicing a trauma-informed approach includes resisting retraumatization of both patients and staff by practicing the 6 key principles (Table 1), which include safety; trustworthiness and transparency; peer support; collaboration and mutuality; empowerment, voice, and choice; and cultural, historical, and gender issues.<sup>39</sup> Integrating these 6 principles into care can mitigate the mental health impact related to climate-related events. It is essential that ED clinicians realize the mental health impact of climate-related trauma and recognize psychological symptoms related to climate change. Furthermore, ED clinicians must respond to mental health sequelae in those affected by climate-related stressors and resist retraumatization by engaging with the Substance Abuse and Mental Health Services Administration's 6 key principles.

The critical importance of health assessment and physical examination by the ED clinician is key to appropriate diagnosis, treatment, evaluation, and long-term follow-up/referral. In their assessment of mental health impact, emergency nurses must consider the impact of depression, stress, and anxiety; strains on social relationships; complicated grief; substance use (exacerbating mental health impact or resulting from climate-related events); PTSD; loss of personal identity, particularly after extreme weather events and wildfires; and helplessness and

fatalism.<sup>10</sup>

After climate-related events, one of the most important considerations for hospital preparedness is the well-documented surge in ED use by patients.<sup>40</sup> Although the physical injuries sustained by patients are more visible, there is also a documented increase in mental health–related visits after a climate-related event—in both the acute and long-term phases after disasters.<sup>41</sup> In 2012, Hurricane Sandy affected the greater New York City area, which led to an increase in mental health–related inpatient and outpatient visits, often with the initial encounter in the emergency department—a trend that continued for several months after the hurricane.<sup>41</sup> Thus, it is clear that ED clinicians must be knowledgeable regarding climate change–related mental health sequelae. <sup>Table 2</sup> contains critical elements of care specific to climate-related mental health impacts.

Experiencing disasters related to climate change and weather can cause significant psychological stress and may exacerbate existing mental health conditions or launch new mental health challenges, such as PTSD, anxiety, and depression.<sup>41</sup> Nurses, as well as advanced practice providers—physician assistants, nurse practitioners, and physicians—are trained to assess, diagnose, evaluate, and manage mental health disorders in acute and nonacute care settings. The care provided by nurse practitioners and physician assistants may include a focused history and physical examination, and consultation and collaborative efforts with the ED physician. In the emergency department, while a provider evaluates patients who are emotionally distressed, an assessment of their mental health profile in the context of climate-related events must be included. Such an assessment is relevant whether it is related to gradual changes or a natural disaster because of the impact it has on the lives of these individuals. It is critical to recognize populations who are at an increased risk and to consider these factors in the overall assessment.

Individuals with pre-existing mental health conditions and those living in low-income communities, immigrants, minorities, older adults, and children are disproportionately vulnerable.<sup>42</sup> Vulnerable individuals who are victims of both gradual and extreme weather events are at an increased risk of anxiety, PTSD, self-harm, and suicidal ideation,<sup>43–45</sup> and are more prone to high-risk coping behaviors and substance abuse.<sup>46</sup> While completing a thorough social history, providers in the emergency department can use brief, validated screening protocols for the emergence of mental health symptoms. Screening tools that can be helpful include the Subjective Units of Distress Scale to measure intensity of distress,<sup>47</sup> universal suicide risk screening,<sup>48</sup> Patient Health Questionnaire–2 for depression,<sup>49</sup> Generalized Anxiety Disorder–2 for anxiety,<sup>50</sup> National Institute of Drug Association screen for substance abuse,<sup>51</sup> National Institute on Alcohol Abuse and Alcoholism screening for alcohol abuse,<sup>52</sup> and Primary Care–PTSD-5 for PTSD.<sup>53</sup>

A comprehensive review of the individual's current medication and assessment of medication adherence and any possible adverse effects in the context of their environmental exposure is important in guiding management and treatment. Emotional stress, restricted access to medications, and financial hardship can exacerbate existing mental illness by impairing one's ability to adhere to medication. Individuals taking psychotropic medication who experience increased exposure to heat may suffer from diminished heat regulation and impaired fluid homeostasis resulting in adverse medical events.<sup>54</sup> It is critical to identify other medications, such as cardiac or diuretic medications, for example, that might exacerbate possible negative hemodynamic adverse effects. Acute interventions and management in the emergency department may include medication recommendations, including administration of medications such as anxiolytics when appropriate. Suicide prevention and close monitoring may be indicated on the basis of a thorough assessment.

An important role of the ED team is to develop a plan for discharge and to identify discharge resources that may include a follow-up with a mental health clinician and referral to case managers and community health workers for

long-term follow-up. The ED team should promote access to, and continuity of, mental health treatment through timely referral for further screening, renewal, or initial prescription of psychotropic medications as appropriate, and awareness of national and local mental health resources. The team can serve as a peer-leader in climate health advocacy and patient safety when equipped with the appropriate knowledge and skills.<sup>55</sup>

Climate change–related health literacy of ED clinicians is a critical area for education, clinical practice, scholarship, and policy/advocacy. For example, heat is linked to mental health–related hospitalizations; therefore, anticipating more ED visits during heat waves, understanding the risks associated with certain psychiatric medications (eg, lithium), and considering how medications may affect thermoregulation are critical areas for further study.

### **Integration of Mental Health in Disaster Risk Management Plans**

The education of first responders and emergency personnel in the screening process and identification of risks for acute psychological stress and potential for chronic mental health sequelae for climate change are key areas. Early identification, intervention, and referral to community services can reduce the incidence of PTSD.<sup>10</sup> In addition, during or immediately after a disaster, the focus is on safety and attending to physical injury. As an adjunct to the trauma-informed framework, psychological first aid (PFA) can be considered. This early intervention strategy can be used with both climate-related event survivors and first responders and emergency services personnel, and consists of 5 principles of PFA aimed at ensuring that compassionate care is provided. Training first responders and emergency room personnel in PFA may limit long-term mental health trauma from acute events. These principles include promoting a sense of safety, calmness, a positive sense of self, and a sense of self-efficacy, connectedness, and hope.<sup>10,56</sup>

### **The Impact of the COVID-19 Pandemic on Mental Health and Well-Being**

Aaron Bernstein, MD, MPH, Director of the Center for Climate, Health, and the Global Environment at the Harvard T. H. Chan School of Public Health notes that although there is no direct evidence that climate change is influencing the spread of COVID-19, climate change increases the likelihood of emerging infectious diseases, which could lead to an increased occurrence of future pandemics.<sup>57</sup> Many of the root causes of climate change lead to changes in the way we interact with the environment and other species. For instance, deforestation leads to a loss of habitat, which in turn forces animal migration. The increased contact between humans and animals increases the likelihood of new and emerging infectious diseases.<sup>57</sup>

As of May 20, 2020, in the United States, there were 1,504,830 cases of COVID-19, the illness caused by severe acute respiratory syndrome coronavirus 2, and 90,340 deaths reported.<sup>58</sup> Globally, there were approximately 4.9 million confirmed cases, and 300,000 deaths.<sup>59</sup> It is well established in disaster mental health literature that emotional distress is pervasive in populations that are affected.<sup>60</sup> Therefore, it follows that the levels of emotional distress may be equally high in a disaster such as the current public health crisis. Groups that are particularly vulnerable to pandemic-related mental health impact include those who contract COVID-19; those with an increased risk for contracting COVID-19; those with pre-existing physical, psychiatric, or substance use disorders; and frontline providers, including health care providers.<sup>60,61</sup>

In an approach similar to that addressing the health impact of climate change, the initial priority was the provision of physical care of those afflicted with COVID-19. As the pandemic evolves, the necessity of addressing the psychological impact is becoming quite clear. The factors related to increased emotional distress include infringement of personal freedom, social isolation, the severity of the illness, job insecurity and financial loss, misinformation, unpredictability, and uncertainty.<sup>60,62</sup> Protracted social isolation can lead to anxiety, mood, or addictive disorder. Moreover, social isolation and subjective feelings of loneliness are associated with a higher risk of suicide.<sup>61</sup> Furthermore, Dettman<sup>33</sup> points out that—much like in climate-related disasters—the pandemic heightens

concerns about IPV and child maltreatment at home. Stay-at-home orders are restricting those experiencing violence from accessing traditional support systems such as the health care system or schools. These orders are also preventing those at risk or experiencing violence from escaping an untenable environment of violence. Dettman<sup>33</sup> urges that safe screening should be built into every interaction, whether in-person or virtual, and that those on the frontlines should have a heightened awareness of this critical public health issue.<sup>33</sup> Moreover, noting that at the peak of the pandemic in China the prevalence of psychological distress in the general population was significantly higher than usual, Hao et al<sup>63</sup> underscore the importance of integrating mental health and psychological support into emergency preparedness and response frameworks at the local, regional, and national levels.

The COVID-19 pandemic has created concern for the mental health and well-being of health care providers. Many of the providers caring for patients who are very ill have minimal mental health training and are susceptible to moral injury resulting from a perceived moral transgression that results in extreme guilt or shame. The contributing factors may include practicing in the face of equipment shortages (personal protective equipment and ventilators); trying to support families of patients who are critically ill and who cannot be with their loved ones; supporting large numbers of patients dying without their loved ones present; caring for sick coworkers; and the fear of exposing their own loved ones. Moral injury can lead to depression, PTSD, and suicidal ideation.<sup>64,65</sup> Administrators must proactively address these mental health impacts to optimize the well-being of frontline staff. Ongoing support and aftercare are important not only for those who continue to work, but also for those who are in isolation or quarantine.<sup>60,64,65</sup>

### Conclusion

Climate change is impacting human health and well-being globally. ED clinicians play a key role in the assessment, identification, early intervention, and care of those experiencing the psychological effects related to climate-related events such as extreme heat, natural disasters, and emerging infectious diseases. Moreover, ED clinicians can play an instrumental role in emergency preparedness to ensure the inclusion of mental health services and channels for community referral. As Kreslake et al<sup>66</sup> note, “As frontline witnesses to the human toll of climate change, health professionals are ideal advocates for collective action toward adaptation and mitigation policies.” Although climate change and the COVID-19 pandemic have not been causally linked, there are significant similarities of the impact of each on mental health and well-being. It is imperative that addressing the mental health impact of climate change becomes a priority and that interventions are fully integrated into emergency and disaster management frameworks to mitigate negative sequelae and optimize health outcomes during future pandemics and climate-related events.

### Author Disclosures

Conflicts of interest: none to report.

Key Principle	Definition
Safety	The organization creates a physically and psychologically safe environment for both employees and those they serve.
Trustworthiness and transparency	Organizational decisions are transparent and focused on building and maintaining trust with patients, families, and employees.

Peer support	Using the stories of trauma survivors to promote recovery and healing by establishing safety, hope, and trust, and enhancing collaboration.
Collaboration and mutuality	Partnering and leveling power differences between employees at all levels and those who are served enhances the recognition that everyone has a role in trauma-informed care.
Empowerment, voice, and choice	Recognizing and building on individual strengths of employees and those they serve.
Cultural, historical, and gender issues	Policies and practices are responsive to racial, ethnic, and cultural needs of patients and families. Historical trauma is recognized and addressed.

Consider a trauma-informed approach to care
Targeted mental health assessment
Examples of assessment tools focusing on acute and chronic mental health impacts:
Subjective Units of Distress Scale: Intensity of distress
Universal suicide risk screening
PHQ-2: Depression
GAD-2: Anxiety
NIDA: Substance use
PC-PTSD-5: PTSD
Comprehensive medication review
Management of acute symptoms
Targeted discharge planning referral
Referral to community services for follow-up
To mitigate effects of acute psychological impacts (eg, PTSD related to shock and trauma from experiencing a recent disaster)

To ensure continued care of chronic psychological impacts (ongoing depression, anxiety)

## DETAILS

**Subject:** Emergency medical care; Socioeconomic status; Healthy food; Emissions; Chronic respiratory diseases; Weather; Health status; Global warming; Contaminated water; Air quality; Greenhouse effect; Heat stress; Climate change; Post traumatic stress disorder; COVID-19; Allergies; Change agents; Indigenous peoples; Older people; Insecurity; Low income groups; Pandemics; Interdisciplinary aspects; Extremes; Infectious diseases; Coronaviruses; Mothers; Disability; Mental health

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# Increasing Disaster Preparedness in Emergency Nurses: A Quality Improvement Initiative: JEN

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## ABSTRACT (ENGLISH)

### Introduction

Emergency nurses are on the frontlines of disaster response. Current research reveals low to moderate levels of disaster preparedness in this population and suggests education as an effective means of increasing preparedness. The purpose of this study was to measure, explore, and increase the preparedness levels among emergency nurses at an acute care community hospital in Southern California.

### Methods

This was a single group pre/posttest of an educational intervention. The adapted Emergency Preparedness Information Questionnaire was administered to all emergency nurses at the practice site to assess disaster preparedness levels before and after a 6-month education intervention. The intervention was novel because the education was delivered through existing communication channels of daily shift huddles, regular e-mails, designated whiteboard, and staff meeting presentations. Descriptive statistics, Pearson correlation, and paired *t* tests were used to analyze the data.

### Results

Moderate levels of disaster preparedness were reported. The number of years worked in the emergency department had the strongest correlation with perceived preparedness levels, followed by prior disaster education/training. A 16.9-point (23.5%) increase between the respondents' mean pre- and post-Emergency Preparedness Information Questionnaire scores ( $t(33) = -10.27, P \leq 0.001$ ) was observed.

### Discussion

These results suggest that a tailored ED-specific disaster preparedness curriculum, delivered through established clinical communication channels, can effectively increase preparedness levels among nurses with little additional cost. The integration of concise, relevant disaster information can be implemented in any department interested in developing a more confident and prepared workforce.

## FULL TEXT

### Contribution to Emergency Nursing Practice

- The current literature on the disaster preparedness of emergency nurses indicates that emergency nurses have low to moderate levels of disaster preparedness and supports education as an effective method to increase preparedness levels.

- This article contributes the finding that it is possible to increase the perceived levels of disaster preparedness in hospital-based emergency nurses through a 6-month, revenue-neutral education intervention not previously studied.
- Key implications for emergency nursing practice found in this article are that preparedness levels can be increased over longer periods of time using existing avenues of education. This quality improvement initiative helped create a more confident and prepared frontline workforce. The teaching techniques from this study could also be applied to other educational objectives in different settings.

### **Introduction Problem Description**

The frequency of, and resulting damage from, natural and human-made disasters is increasing on a global scale.<sup>1-3</sup> Damage to infrastructure and large numbers of injuries, illness, and death can result in immense suffering, psychological and health risks, and high economic cost.<sup>4</sup> Emergency nurses have a vital role on the frontlines of disaster response.<sup>5-7</sup> Research conducted over the past decade surveying this group's level of preparedness reveals low to moderate levels of existing knowledge, perceived preparedness, and confidence levels in the area of disaster response.<sup>6-8</sup> The increase of the occurrence of disasters coupled with reported low levels of preparedness in this frontline workforce is an issue worthy of attention. Preparedness levels of emergency nurses are expected to have a significant impact on disaster response and recovery efforts and patients' outcomes.<sup>4-7,9</sup>

### **Available Knowledge**

Globally, existing literature reveals disaster response and disaster education/training as the 2 factors most strongly and consistently associated with increased levels of objective and subjective preparedness among nurses (Supplementary Table 1).<sup>1,6,7,10</sup> This internationally diverse research reveals higher levels of disaster preparedness (DP) in countries where most of the survey respondents have participated in actual disaster response.<sup>5,11</sup> A 2016 cross-sectional study out of Malaysia reported adequate knowledge (>60% in an objective survey) regarding disaster response. In this sample of 194 ED personnel, nearly half of the respondents had participated in prior disaster response, and three-quarters had participated in disaster training/education.<sup>11</sup> A 2018 study from Indonesia revealed moderate levels of DP among emergency nurses, with more than half of the respondents (56.7%) having experienced and responded to a disaster, and 63.3% having participated in disaster training/education (n = 120).<sup>5</sup> Owing to the fact that actual disasters cannot be predicted or controlled, disaster education is recognized as the most practical method to increase disaster knowledge in nurses.<sup>12-15</sup> Randomized controlled trials confirm education as a practical and effective method to increase DP levels among health care workers.<sup>16-18</sup> In an ED-specific literature review, Hammad et al<sup>19</sup> acknowledge that disaster education is the most appropriate way to prepare nurses. We identified several gaps in the published literature, as no prior studies that used preexisting communication channels at the practice site over extended periods of time were found. Furthermore, the reviewed studies were from Australia and 11 countries in North America, Europe, and Asia. More than half of these countries are considered high-income. Each nation faces unique risks and possesses specific disaster response systems. Thus, we identified that there was little prior published research conducted in a geographic region similar to our practice site. From this gap, we identified the need to tailor our quality improvement educational intervention to the specific needs and context of the practice site.

### **Rationale**

In light of recent research on DP, this project was initiated under the assumption that education is the most practical and effective way to prepare nurses for disasters. To maximize the usefulness of the information delivered during this education initiative, careful attention was paid to the amount of information given at one time, in respect of the



Cognitive Load Theory.<sup>20</sup> Small amounts of the same information were delivered consistently through 4 established channels (huddles, staff meetings, a designated whiteboard in the department, and e-mails). Previous studies with similar methodology delivered education materials over days to weeks in classroom settings, as opposed to over months in daily settings.<sup>21,22</sup> The intention of delivering small amounts of the same information frequently was to help information become more easily encoded into long-term memory,<sup>20</sup> and to lessen the load on fiscal resources required from the organization. In addition, this project used the Model for Evidence-Based Practice Change to help anticipate and proactively address barriers. The Model for Evidence-Based Practice Change consists of 6 steps with multiple feedback loops that are reflective of the true, nonlinear nature of change projects.<sup>23</sup>

### **Specific Aims**

In this project, we sought to explore the factors associated with increased levels of perceived preparedness in the pretest sample and to increase perceived levels of DP among emergency nurses. This was accomplished through pre- and posttesting before and after a created ED-specific education initiative during a 6-month study period.

### **Materials and Methods Context**

This quality improvement project was implemented at a 47-bed emergency department at a 444-bed level 2 trauma center community hospital. The risk of staff attrition and subsequent compromise of statistical power was acknowledged as a potential source of bias at the beginning of the study. Ultimately, the benefit of implementing a longer-term project with a limited-to-zero budget was very appealing to stakeholders at the practice site, given their knowledge of the local context. A tailored educational intervention was judged as more practical, sustainable, and reproducible than holding didactic courses outside of the clinical setting. In the expert judgment of the project planners and stakeholders, implementing the educational intervention in a tailored manner as part of clinical practice workflow was appropriate and cost-conscious, given the usual rate of staff attrition.

### **Interventions**

A 9-module ED-specific disaster preparedness curriculum (DPC) was created and implemented over a 6-month period (available as <sup>Supplementary Material</sup>). This curriculum was created using resources such as the hospital's Emergency Operations Plan, Mass Casualty Incident Response Plan, the Centers for Disease Control and Prevention (CDC), the Federal Emergency Management Agency, and other published literature. Hospital policies were used to educate staff on how they would communicate and function within the emergency department of study during mass casualty triage and as a part of the Incident Command System. Information regarding the detection of biological, chemical, and radiological attacks, epidemiology, clinical decision-making, and isolation, decontamination, and quarantine was obtained directly from the CDC's website. Information on how the health care system functions in disasters was obtained from the Federal Emergency Management Agency's website and hospital policies. Additional articles and more specific information were obtained through focused published literature search and authoritative websites listed in <sup>Table 1</sup>.

The categories of the adapted Emergency Preparedness Information Questionnaire (EPIQ) were used as a framework to build the curriculum (see <sup>Table 1</sup>). The EPIQ was developed in 2002 by the Wisconsin Nurses Association at the request of/with grant funding from the CDC and other state and federal stakeholders.<sup>24</sup> The EPIQ is known in existing research as a reliable, valid tool of measurement.<sup>21,22,25,26</sup> A factor analysis on the original 44-question tool showed high internal reliability, with a cumulative variance of 73.5%.<sup>24</sup> A secondary assessment from Garbutt et al<sup>27</sup> in 2008 revealed Cronbach's alpha values of 0.83 to 0.94 (0.97) for the entire instrument. This study used a version of the adapted EPIQ with 18 items.<sup>22</sup>

Our tailored education initiative was designed to be realistic in a resource-constrained environment and was implemented without a budget through 4 channels: daily shift huddles, staff e-mails, staff meetings, and a

whiteboard designated for the DPC. The 2 active channels (staff meetings and shift huddles) were preexisting, and the 2 passive channels (whiteboard and e-mails) did not require additional fiscal resources, negating the need for a separate budget outside of existing unit resources. One-page huddle sheets with approximately 7 questions were placed in the charge nurse's binder every Monday (as well as e-mailed to charge nurses and mentors). At every shift huddle, the charge nurse (or secondary investigator, as available) was tasked to discuss a question, information, or brief case study with staff. E-mails were sent out to all emergency nurses and the DPC-designated whiteboard was updated regularly to reflect the content of the current module. Mandatory staff meetings occurred roughly every other month, and this may have helped to create interest and excitement among staff and review the previously covered modules.

### **Teamwork**

Human resources were necessary for the creation and implementation of this project. Charge nurses were asked to review questions created for the huddles at every shift change. The primary investigator was responsible for creating and implementing the curriculum through the whiteboard, e-mails, and staff meetings. As part of a program for academic credit, this was not paid time. The coinvestigator, the Base Hospital Nurse Coordinator, was a salaried employee who reviewed and edited the curriculum as well as supported information dissemination at huddles as she was available.

### **Measures/Study of the Interventions**

A single group pre/posttest design was used to evaluate the impact of the education initiative, consistent with similar existing studies regarding DP.<sup>16-18,21,22</sup> The 18-item, adapted EPIQ was used to measure perceived levels of DP before and after the education initiative.<sup>22</sup> The possible scores ranged from 18 to 90. Responses were scored on a 1 = "I have never heard of this topic" to 5 = "I am very familiar with this topic; I am an expert in proficiency in this topic" scale. Demographic data and personal and professional preparedness information were included in the voluntary survey (see <sup>Table 2</sup>). These items helped the research team further understand the factors that influence perceived levels of DP.

The process evaluations of the delivery and effectiveness of the education initiative were assessed by the research team throughout the project by directly checking in with staff on various shifts, and adjustments were made accordingly. E-mails were sent to the charge nurses and mentors before starting new modules. No training was required, but it would have been helpful to meet with the charge nurses before implementation to answer any questions and help increase their knowledge and confidence in delivering the material.

### **Analysis**

Data were analyzed using Microsoft Excel (Microsoft Corporation, Redmond, WA) and R programming. Likert scores of familiarities on a scale of 1 to 5 (from least to most familiar) were analyzed for measures of central tendency as a needs assessment to ascertain what topics the respondents were most and least familiar with, and determine how much time to spend on each topic (see <sup>Figure 1</sup>).

Descriptive statistics were analyzed. The completeness and accuracy of survey data were checked independently by 2 members of the project team, and incomplete surveys were excluded. Pearson correlation was used to investigate factors associated with increased levels of perceived preparedness for the sample of study. Age, sex, marital status, dependents, education level (associate's, bachelor's, or master's degree in nursing), prior disaster response, prior disaster education, years worked in the emergency department, and hours worked per week in the emergency department were compared with individual mean and total EPIQ scores.

Surveys without unique identifiers were excluded from pre- and posttesting comparison. Paired *t* tests were used to help determine the differences that existed between the pre- and posttest means of the respondents.

## Ethical Considerations

This project was reviewed by the Scripps Memorial Hospital's Institutional Review Board, and a notice of exemption was given before pretesting or initiation of education. Pre-and posttesting were anonymous, and staff used a unique 3-digit number so that the primary investigator could match pre- and posttests.

## Results

Eighty pretests were distributed to emergency nurses, and 54 were completed for an initial response rate of 67.5%. The mean score of the pretest was 3.11 (SD = 0.35), indicating that staff reported limited knowledge on this topic, or a moderate level of perceived preparedness. Years worked in the emergency department had the strongest correlation with mean perceived preparedness levels ( $r = 0.34$ ,  $P = 0.01$ ), followed by prior disaster education/training ( $r = -0.27$ ,  $P = 0.04$ ). The other demographic characteristics (age, sex, marital status, dependents, education levels, and hours worked per week) did not reveal statistically significant correlations. Although causation cannot be inferred through correlation, it was notable that education revealed a stronger (and statistically significant) correlation than prior disaster response. This could be related to a small sample size because only 6 respondents reported prior disaster response. Contextually, descriptive statistics showed that many survey respondents were new to the emergency department (38 of 54 respondents had worked in the emergency department less than 5 years). The strongest correlation with increased perceived preparedness was years worked in the emergency department.

Posttests were completed 6 months later by 33 emergency nurses and revealed a mean score of 4.03 (SD = 0.17), indicating that staff felt familiar with the topics but not thoroughly proficient in all subject matter. There was a 0.92 increase from the mean pretest score of 3.11 ( $n = 33$ ), which was found to be statistically significant ( $t = -10.27$ ,  $P \leq 0.001$ ). Eleven staff members who completed the pretest were no longer working in the department during posttesting. The 3 surveys with missing data on the EPIQ pretest were excluded. Two of the initial 54 pretests were missing demographic data for years in the emergency department and hours worked per week. These surveys were included for all results except for those 2 questions to which the responses were missing. Two of the returned posttests did not have a 3-digit number and were excluded. Pre and posttest EPIQ scores are listed in [Table 3](#) by category.

## Pragmatic Lessons Learned

This project took approximately 1 year to complete. The preliminary literature search and planning took approximately 3 months before initiating the intervention. Curriculum writing continued while the project was being implemented over the 6-month study period. [Figure 2](#) reflects the steps taken to create and implement the education initiative. After the first staff meeting presentation, the study team perceived that staff were surprisingly engaged and interested. Two unexpected issues presented themselves shortly after initiating the education. Some charge nurses did not review huddle questions with staff, citing lack of time or that they did not feel qualified. The latter issue could have been mitigated by having a class just for that group to review the entire curriculum and answer any questions. The second issue was mid-shift huddles. These were supposed to happen daily at 3 p.m. but did not occur consistently. In response to these issues, the project lead began sending out weekly huddle questions to staff to ensure that everyone had the opportunity to review them.

## Discussion Summary

Our project results are consistent with existing studies that reveal low to moderate levels of baseline DP among emergency nurses. Seventy percent of respondents in the pretest sample had worked in the emergency department less than 5 years, and 88.9% of respondents had not participated in previous disaster response. Disaster training/education correlated with increased perceived levels of preparedness in this sample. In the pretest sample,

41 respondents (75.9%) had participated in prior training/education (n = 54). Looking at descriptive data from the pretest results assisted the investigators in understanding the reported education needs of the sample. Nearly 1 month was spent reviewing the Incident Command System because that had the lowest mean familiarity score (2.81, SD = 0.84). After posttesting, the top 3 categories with the greatest amount of improvement pertained to the Incident Command System, accessing critical resources, and epidemiology and clinical decision-making. The 3 categories that showed the most improvement were the categories with the lowest mean familiarity scores from the pretest needs assessment.

Table 3 outlines the mean pre- and posttest EPIQ scores by category. In looking at other studies that used the EPIQ, triage and first aid is frequently rated the most familiar category,<sup>21,22,26,27</sup> as it was in this study (mean 3.63, SD = 0.88). Psychological issues ranked second most familiar in both this study (mean 3.48, SD = 0.79) and the one by Georgino et al,<sup>22</sup> which examined a population of newly hired trauma nurses. Conversely, in several other studies, psychological issues is one of the least familiar categories.<sup>21,26,27</sup> This difference between our results and the ones in the previous studies could be owing to the fact that the other studies look at many types of nurses, not just emergency nurses. It is possible that emergency nurses (and trauma nurses) encounter behavioral emergencies more frequently in daily, nondisaster practice than nurses of other specialties. Regarding the lower mean familiarity scores, the category of epidemiology and clinical decision-making is reported among the lowest 3 categories in other studies, consistent with our findings (mean 2.94, SD = 0.81). Biological agent detection (mean 3, SD = 0.89) and the Incident Command System (mean 2.76, SD = 0.83) ranked in the lowest 3 categories in the study by Georgino et al<sup>22</sup> as well as in our findings presented here. Regarding the highest and lowest mean familiarity scores, this study had 5 out of 6 categories in common with the study by Georgino et al<sup>22</sup> involving trauma nurses. This could be owing to the similarities between emergency nurses and newly hired trauma service nurses. Many hospitals have integrated trauma and emergency departments, so the overlap and similarities between these populations is expected to be substantial.

A unique strength of our tailored education intervention was that it used established channels of information dissemination and did not require substantial resources to implement. It was also implemented by disseminating small amounts of information through multiple channels over a longer period. Typical education initiatives in classroom settings present large amounts of information over small amounts of time. Jacobs-Wingo et al<sup>28</sup> implemented an educational curriculum on chemical, biological, radiological, nuclear, and explosive events in New York City hospitals. The education was delivered through multiple channels favored by the nurses surveyed initially (n = 7,177): just-in-time training, train the trainer, and online. A pilot group of 30 participants revealed a mean increase of 35% between pre- and posttest scores, but the curriculum was not a mandatory requirement. The investigators of this study suggested presenting curriculum modules gradually over time rather than all at once to help increase participation.<sup>28</sup> A quasi-experimental study out of Iran in 2019 looked at the effect of daily education sessions through a social media platform over 34 days.<sup>17</sup> Similar to our project, the study by Ghezalje et al<sup>17</sup> used preexisting channels for education dissemination. Posttest scores in the study by Ghezalje et al<sup>17</sup> were significantly higher in the intervention group than in the control group, but the intervention only lasted approximately 1 month as opposed to multiple months. Another 2014 study out of Greece used a randomized controlled trial to evaluate longer-term learning 5 to 6 months after a 1-day, 8-hour disaster education class.<sup>18</sup> Pesiridis et al<sup>18</sup> found that even 5 months after the class, knowledge levels remained high, but this class only lasted 1 day. Collectively, these findings suggest that there is credibility to the effectiveness of a traditional classroom format, yet this method remains resource intensive. Because classroom methods were not feasible at our practice site, we trialed and demonstrated that our tailored intervention was effective. More work needs to be done to directly compare

classroom and tailored clinical workflow education methods.

### **Interpretation**

Descriptive statistics helped investigators understand specific characteristics of the emergency department of study as a needs assessment for education. Disaster experience is recognized in existing literature to be strongly associated with increased levels of preparedness,<sup>1,5,11,18,22,29,30</sup> but in this study, we did not replicate this finding. This difference could be related to the fact that this sample had a relatively young workforce (in terms of ED experience) with only 6 emergency nurses with prior disaster response experience. Although cause and effect cannot be inferred from a cross-sectional sample, years worked in the emergency department and disaster training had the strongest correlation with higher EPIQ scores, consistent with existing research.<sup>1,5,31</sup> The paired *t* test indicated a statistically significant difference between pre- and posttest mean EPIQ scores. These results validate previous research findings over the past decade that support disaster education as an effective and practical way to increase levels of DP among nurses worldwide. Overall, our results indicated that an ED-specific DP curriculum implemented over a longer period of time can increase emergency nurses' perceived levels of preparedness.

### **Limitations**

There are several limitations to this study that warrant consideration. Although the EPIQ is recognized in existing research as a reliable, valid tool of measurement,<sup>21,22,24,25</sup> it measures self-perception, which is subjective. This 18-item adapted EPIQ, although used in a previously published study, has not undergone the same psychometric testing as the full survey. Abbreviating this survey could potentially alter its validity and reliability, as acknowledged by Georgino et al.<sup>22</sup> Convenience sampling was used in this study as well as in most existing studies on this topic. This is a well-known threat to validity owing to selection bias and can compromise generalizability. The small sample size of this study may have produced statistically underpowered results, which also significantly limits the generalizability of this study. Staff turnover contributed to the small repeat sample size and was considered a strategic trade-off to a longer-term learning initiative. The effort of the project lead was contributed as part of the requirements of an academic program. Thus, the low cost of the program at the study site may not be exactly replicated in other institutions with different resources.

### **Implications for Emergency Nurses**

The occurrence of disasters cannot always be predicted or controlled, but emergency nurses can certainly anticipate that they will happen and prepare accordingly. Perceived DP levels were increased through this quality improvement initiative over a 6-month period using existing avenues of education in the hospital setting. The integration of concise, relevant information on this topic is something that could be implemented in any emergency department interested in developing a more confident and prepared workforce. The tailored disaster curriculum and education materials used in this project are available as online <sup>supplemental material</sup> for emergency nurses to replicate our educational interventions at their practice sites.

### **Conclusion**

This project implemented a disaster education intervention using a novel delivery format that has not been previously reported in published literature. This study trialed an education method that uniquely integrated the content into clinical practice workflow, overcoming common barriers to emergency nurses' professional development. This low-cost intervention used preexisting communication channels, which gives it the potential to be more easily reproduced and sustained. Staff in the emergency department of study remain very interested in this topic and feel that this content will prepare them to provide better care to patients in disasters. Future research is needed to determine if the methods trialed in this quality improvement project are effective in other ED settings. Future research could also be enhanced by a systematic literature search on the topic of disaster education

pedagogies.

### **Acknowledgments**

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### **Author Disclosures**

Conflicts of interest: none to report.

### **Supplementary Data**

PubMed (Ovid) MeSH Search, ran November 7, 2018:

Ovid Technologies, Inc. Email Service -----Search for: 19 or 25 or 26 Results: 75 Database: Ovid MEDLINE(R) and Epub Ahead of Print, In-Process & Other Non-Indexed Citations and Daily Search Strategy: -----  
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1. exp Disasters/ (69151)
2. exp Crisis Intervention/ (5510)
3. 1 or 2 (74136)
4. exp Emergency Treatment/ (111538)
5. exp Emergency Nursing/ or exp Emergency Service, Hospital/ or exp Emergency Medical Services/ (129817)
6. 4 or 5 (221702)
7. exp Nursing Staff/ (63272)
8. exp Nursing Research/ (50536)
9. exp Nurse's Role/ (38990)
10. exp Nursing Care/ (130115)
11. 7 or 8 or 9 or 10 (236456)
12. exp Clinical Competence/ (84619)
13. exp "Attitude of Health Personnel"/ (147243)
14. exp Education, Nursing/ (79953)
15. 12 or 13 or 14 (279523)
16. 3 and 6 and 11 and 15 (379)
17. limit 16 to english language (344)

18. limit 17 to yr="2000 -Current" (319)
19. from 18 keep 1,4,8,11,15-16,19-21,26,30 (11)
20. Disaster\*.mp. (38587)
21. Emergenc\*.mp. (387884)
22. nurs\*.mp. (693133)
23. 20 and 21 and 22 (1120)
24. limit 23 to ("in data review" or in process) (12)
25. from 24 keep 2-3,5,8,12 (5)
26. from 18 keep 9,12,35-37,40-44,49-51,56,59,62,64-66,68-69,71,73-74,78-80,82,86,88,93,112,121,128,130,138,142-143,157,159,171-172,179,183,189,195,202-203,209,233,242,244,264,280,286,293,298,300,306 (59)
27. 19 or 25 or 26 (75)

#### Supplemental Material

Project proposal pptModule 1 and disaster preparedness intro pptModule 2 pptModule 3 pptModule 4 pptModule 5 pptModule 6 pptModule 7 pptModule 8 pptModule 9 pptMCI scenario pptWhiteboard picturesRadiological emergencies pptWeeks 1-26 disaster questionsDisaster curriculumPoster 1Poster 2

#### Supplementary Material

The Disaster Preparedness Education Intervention Proposal, all module PowerPoints, whiteboard, and dissemination posters are included as supplemental online content. This supplemental content was not peer reviewed or copyedited, but generously provided as additional resources by the authors. To access the supplementary material accompanying this article, visit the online version of the *Journal of Emergency Nursing* at [www.jenonline.org](http://www.jenonline.org).

Curriculum modules	Topics	Resources
Triage and first aid	<ul style="list-style-type: none"> <li>•Use the START disaster triage model</li> <li>•Performance of a rapid physical and mental assessment</li> <li>•Basic first aid in a large-scale emergency</li> <li>•Considerations for the deceased</li> </ul>	Hospital policies

<p>Detection</p>	<ul style="list-style-type: none"> <li>•Recognize indicators of a biological, chemical, or radiological attack</li> <li>•Recognize relevant signs and symptoms of exposure to biological, chemical, or radiological agents</li> <li>•Recognize modes of transmission</li> <li>•Identify appropriate antidote and prophylactic medicine to specific agents</li> <li>•Identify possible adverse reactions and evaluate antidote effectiveness</li> </ul>	<p>ASTDR  CDC  County of San Diego HHSA  FEMA  NIAID</p>
<p>Epidemiology and clinical decision-making</p>	<ul style="list-style-type: none"> <li>•Knowledge of history and physical assessment of surveillance data for creating indexes of suspicion</li> <li>•Ability to identify the exacerbation of underlying disease from exposure to a chemical or biological agent</li> <li>•Match the prophylactic measures or antidotes to specific agents</li> <li>•Capacity to be able to recognize what and when to report to infection prevention, local, and state health departments</li> </ul>	<p>ASTDR  California Department of Public Health  CDC  National Center for Emerging and Zoonotic Infectious Disease</p>
<p>Isolation, decontamination, and quarantine</p>	<ul style="list-style-type: none"> <li>•Knowledge of isolation procedures and quarantine</li> <li>•Selection and use of appropriate PPE</li> <li>•Decontamination procedures</li> <li>•Environmental considerations</li> </ul>	<p>ASTDR  CDC  County of San Diego HHSA  NIOSH</p>
<p>Incident Command System</p>	<ul style="list-style-type: none"> <li>•Explain the rationale for Incident Command System plans and processes</li> <li>•Describe the chain of command in an emergency response</li> <li>•Reporting, assessment, and response to site safety issues</li> <li>•Decision-making processes</li> <li>•Delegation of volunteers</li> <li>•SMH-LJ emergency operation plan: Location and content</li> </ul>	<p>FEMA  Hospital policies</p>
<p>Psychological issues and special populations</p>	<ul style="list-style-type: none"> <li>•Signs and symptoms of post-traumatic stress</li> <li>•PsySTART Disaster Mental Health Triage System</li> <li>•Psychological first aid and coping</li> <li>•Knowledge of psychosocial needs and resources</li> <li>•Vulnerable populations and pediatric considerations</li> <li>•Disaster ethics</li> </ul>	<p>American Psychiatric Association  CDC  ENA  IOM  Hospital policies</p>



Communications and connectivity	<ul style="list-style-type: none"> <li>Standards of care</li> <li>Communicating critical information</li> <li>Describe communication roles in emergency response</li> <li>Communication devices</li> <li>Chain of custody</li> <li>Debriefing activities</li> </ul>	California Emergency Medical Services Authority ENA IOM Hospital policies
Reporting and accessing critical resources	<ul style="list-style-type: none"> <li>How to quickly access resources</li> <li>Gain access to Strategic National Stockpile</li> <li>Determine reporting agencies</li> </ul>	US Department of Health and Human Services County of San Diego HHSA
Personal and professional preparedness	<ul style="list-style-type: none"> <li>The Preparedness Cycle</li> <li>Importance of a personal preparedness plan</li> <li>Disaster-specific preparedness: Earthquake and wildfire</li> </ul>	FEMA Department of Homeland Security Ready.gov ReadySanDiego.org

Characteristics	Frequency (%)
Age	
≤30	18 (33.3)
31–40	21 (38.9)
41–50	10 (18.5)
≥50	5 (9.3)
Sex	
Male	9 (16.7)
Female	45 (83.3)
Status	
Married	26 (48.1)
Single	28 (51.9)
Dependents	18 (33.3)
No dependents	36 (66.7)

Education	
Associate's degree in nursing	8 (14.8)
Bachelor's degree in nursing	44 (81.5)
Master's degree in nursing	2 (3.7)
Previous disaster training	
Yes	41 (75.9)
No	13 (24.1)
Disaster response experience	
Yes	6 (11.1)
No	48 (88.9)
Years of work in the emergency department	
1–5 years	38 (71.7)
6–10 years	5 (9.4)
11–20 years	6 (11.3)
21–30 years	2 (3.8)
Not specified	1
Hours worked per week, emergency nurses	
<20	2 (3.8)
20–30	6 (11.3)
30–40	40 (75.5)
>40	4 (7.5)
Not specified	1

Category	Pre		Post		95% confidence interval		t value	P value	
	SD	Mean	SD						
Mean					Triage and first aid	3.67	0.56	4.27	0.65
-0.82	-0.39	-5.68	<0.001		Biological agent detection	2.96	0.83	3.83	0.60
-1.17	-0.56	-5.76	<0.001		Epidemiology and clinical decision-making	2.88	0.82	4	0.66
-1.46	-0.78	-6.71	<0.001		Isolation, decontamination, and quarantine	3.11	0.77	4.09	0.68
-1.32	-0.65	-6.02	<0.001		Incident command system	2.81	0.78	4.07	0.51

-1.48	-1.03	-11.47	<0.001	Psychological issues	3.42	0.69	4.17	0.67
-1.03	-0.47	-5.45	<0.001	Communications and connectivity	3.09	0.84	4.18	0.68
-1.43	-0.75	-6.61	<0.001	Reporting and accessing critical resources	2.97	0.77	4.02	0.54

Authors/Y ear of citation	Title	Research design	Data analysis and collection methods	Sample characteristics	Key findings
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Chen et al, 2017 <sup>10</sup>	Nurse participation in continuing education in disaster nursing in Taiwan	Anonymous survey questionnaire after an 8-hour disaster nursing class; 18 separate classes were held between 2012 and 2015.	Descriptive statistics analyzed by SPSS version 22 (IBM Corp, Armonk, NY).	Taiwan, 1,817 participants.	Disaster education for nurses is grossly unstandardized. Emergency/critical care nurses had a strong presence in classes and play a key role promoting continuing disaster education to facilitate better disaster management and care in their communities. Nursing competencies in DP can be enhanced through disaster nursing education. Disaster education that is tailored to nurses working in different settings is needed to expand the spectrum of nurses who can effectively respond in a disaster.
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<p>Park and Kim, 2017<sup>1</sup></p>	<p>Factors influencing disaster nursing core competencies of emergency nurses</p>	<p>Cross-sectional design, self-report questionnaire survey from April to May 2015: Nurses' Experiences of Disaster Scale (Nho, 2010); Attitudes toward Disaster Management Scale (Moabi, 2008); Nurses' Knowledge about Disaster Scale (Park and Kim, 2017); Disaster Nursing Core Competencies Scale (Nho, 2010).</p>	<p>SPSS Win 20.0. General characteristics were summarized with descriptive statistics; t tests and 1-way ANOVA used to test differences in competencies by characteristics; Pearson correlation (participant characteristics and age/work experience/ disaster experience, attitude, and knowledge); multiple linear regression for factors influencing competencies.</p>	<p>South Korea, 231 emergency nurses working in &gt;200-bed hospitals. Average age 28.4 years. Average work experience in emergency department 4.5 years.</p>	<p>The increase and range of disasters worldwide have led to the need to improve nursing competencies in disaster response. Nurses' belief that they are prepared for disasters increases their confidence in response. Most nurses remain inadequately prepared for disaster and lack confidence in response. Factors that influence DNCC must be understood so that education and training can be developed. DNCC mean scores 3.05/5 and 62.5/100 on disaster knowledge. Positive correlation between DNCC and age, total work experience, and ED experience, along with disaster-related knowledge and experience. Regression showed that disaster experience and knowledge had the strongest influence on DNCC. Education regarding disaster</p>
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					nursing should be provided to improve emergency nurses' DNCC. Disaster-related experience and education are essential for DNCC.
Hodge et al, 2017 <sup>2</sup>	Nursing self-perceptions of emergency preparedness at a rural hospital	EPIQ and Nursing Assessment of Readiness voluntary surveys online through survey vendor.	Descriptive statistics for demographic data; multiple logistic regression model analyzed age, experience, and professional status on overall familiarity levels.	Portsmouth, OH, 307 nurses (34% response rate). Convenience sample from 1 hospital. Rural RNs.	Occurrence and severity of natural disasters continue to increase. Nurses serve a critical role during disasters when life and health are most vulnerable; 40% reported that they would be less than effective if they had to respond to a disaster in their hospital.

<p>Tzeng et al, 2016<sup>29</sup></p>	<p>Readiness of hospital nurses for disaster responses in Taiwan: A cross-sectional study</p>	<p>Cross-sectional, researcher-designed questionnaire testing 4 domains: personal preparation, self-protection, emergency response, and clinical management. Hybrid of EPIQ, DPET, and READI surveys. Anonymous surveys were directly returned in sealed envelopes to second study author.</p>	<p>SPSS version 22.0 software (SPSS Inc, Chicago, IL). Descriptive statistics. Independent t tests for group differences. Generalized linear models for explanatory variables significantly associated with disaster readiness.</p>	<p>Taiwan, 311 military hospital staff. RNs (83% response rate) from 1 hospital; average age 32.7 years; 89.4% female. Focus is on response outside of hospital.</p>	<p>Patients in disaster areas often require critical care, necessitating a robust frontline workforce. Hospital nurses demonstrated poor readiness for disaster response. Disaster-related training, disaster experience, and ED/ICU experience were most associated with higher survey scores. Nursing experience (&gt;10 years) was also associated with higher self-reported scores in emergency response. The more nurses are involved in DP, the greater their readiness to respond.</p>
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<p>Ahayalimu din and Osman, 2016<sup>11</sup></p>	<p>Disaster management: Emergency nurse and medical personnel's knowledge, attitude, and practices of the East Coast Region hospitals of Malaysia</p>	<p>Cross-sectional design, voluntary questionnaire with 3 domains: knowledge, attitude, and practice.</p>	<p>SPSS version 19.0. Descriptive statistics. Chi-square and Fisher exact tests for inferenti (bivariate) were used to explore associations among variables among the 3 surveyed domains and among different hospitals.</p>	<p>Eastern Malaysia (experiences flooding annually), 194 emergency nursing and medical personnel (RNs, MDs, assistant medical officers) from 3 different states in Malaysia. Nearly half of study participants had taken part in a disaster response, and 75% had attended disaster training/education.</p>	<p>Malaysia often faces local disasters such as hazes, landslides, flooding, and pandemics, as well as tsunamis and earthquakes recently. Surveyed personnel had adequate knowledge regarding disaster management. Education level and gender were significantly associated with increased knowledge and practice scores. Working experience, disaster response experience, and attending disaster training or education also had a significant association with higher practice scores. Disaster-related education/training is significant and beneficial to improve knowledge, attitude, and practice of emergency medical personnel, specifically in nurses. Hospitals should increase their practice of disaster management by providing training</p>
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					to health care personnel, through lectures or drills.
Georgino et al, 2015 <sup>22</sup>	Emergency preparedness education for nurses: Core competency familiarity measured using an adapted emergency preparedness information questionnaire	Pre- and postsurvey descriptive design, 18-question adapted EPIQ. Trauma nurses were surveyed before and after a 3-day education period. This education was implemented as an addendum to the Trauma Nurse Curriculum.	SPSS. Paired t tests were used to compare mean familiarity scores between pre- and posttest scores.	Pittsburgh, PA, 63 trauma nurses.	The purpose of this project was to measure trauma nurse familiarity and improvement in emergency preparedness and disaster response core competencies as defined by the adapted EPIQ. The EPIQ is a reliable and valid tool in literature used to evaluate nurses' perceived familiarity of emergency preparedness and disaster response core competencies. This project resulted in statistically significant improvement in mean familiarity scores between pre- and posttest analyses.

<p>Whetzel et al, 2013<sup>7</sup></p>	<p>Emergency nurse perceptions of individual and facility emergency preparedness</p>	<p>Descriptive survey, 56 questions, "Yes/No/I don't know" answers, developed by the authors.</p>	<p>Paper surveys disseminated at an Emergency Care Conference.</p>	<p>Sample was obtained from a group of emergency nurses attending a conference in Atlantic City, NJ, in March 2007; 177 respondents.</p>	<p>Most emergency nurses believed that they were susceptible to disasters. Many emergency nurses were unsure of their role in disaster planning and response. Many emergency nurses have not taken basic actions to prepare themselves for a disaster, either personally or professionally. It is important for disaster education to be geared to the needs of emergency nurses.</p>
<p>Worrall, 2012<sup>21</sup></p>	<p>Are emergency care staff prepared for disaster?</p>	<p>Pilot study. Voluntary survey, adapted EPIQ, anonymous pre/post completing a self-paced learning intervention.</p>	<p>Paper surveys. Staff returned the questionnaires when they were completed; t tests were used to compare mean familiarity scores before and after intervention.</p>	<p>UK; 33 RNs and 8 health care assistants took the initial pretest; 33 completed the posttests.</p>	<p>The adapted EPIQ is a robust instrument for measuring self-assessed familiarity with emergency preparedness. Paired t tests were statistically significant, indicating that the education curriculum was successful in increasing perceived levels of DP in emergency nurses and health care assistants.</p>

<p>Hammad et al, 2011<sup>6</sup></p>	<p>Emergency nurses and disaster response: An exploration of South Australian emergency nurses' knowledge and perceptions of their roles in disaster response</p>	<p>Mixed methods: quantitative and qualitative data.</p>	<p>Obtained through a self-report questionnaire. Frequency distributions and measures of central tendency were examined.</p>	<p>South Australian emergency nurses working in 8 public hospital emergency departments in metropolitan Adelaide; 194 emergency nurses responded; average age of 36 years.</p>	<p>Australian nurses have minimal prior disaster experience. Low levels of disaster knowledge were discovered. Available disaster training/education is limited and appropriateness is questionable. There is a need for research regarding appropriate disaster education and training for health professionals. Disaster education and training should reflect annual EOP changes and be offered regularly.</p>
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<p>Al Khalailah et al, 2012<sup>3</sup></p>	<p>Jordanian nurses' perceptions of their preparedness for disaster management</p>	<p>Cross-sectional survey using DPET.</p>	<p>SPSS version 15. Descriptive statistics determined sample characteristics and distribution; frequencies, measures of central tendencies, and dispersion; t tests and 1-way ANOVAs tested the differences between variables and groups.</p>	<p>Jordan, 474 nurses from 3 randomly selected Ministry of Health hospitals and 2 university hospitals. Inclusion criteria: 1-year minimum experience, a 3-year diploma degree, currently working as an RN in a hospital.</p>	<p>Worldwide, natural and man-made disasters have increased significantly in recent years. A successful disaster response can be enhanced by DP. RNs consider themselves insufficiently or moderately prepared for disaster management; 65% of nurses felt that their current preparedness for disasters was weak. Ongoing training, including drills, is recommended to increase DP in RNs.</p>
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<p>Xu and Zeng, 2015<sup>9</sup></p>	<p>Necessity for disaster-related nursing competency training of emergency nurses in China</p>	<p>Literature summary regarding the current situation of disaster responses of Chinese emergency nurses and factors that impact disaster-related nursing competencies.</p>	<p>Summary of existing literature; search strategy not provided.</p>	<p>People's Republic of China.</p>	<p>The degree of DP of emergency nurses directly determines the success of disaster-related nursing, which considerably affects disaster response and recovery of injured patients. Disaster training and education are vital for disaster response. To address the low level of preparedness of emergency nurses for disasters, systematic disaster nursing education and training must be enhanced.</p>
<p>Rizqillah and Suna, 2018<sup>5</sup></p>	<p>Indonesian emergency nurses' preparedness to respond to disaster: A descriptive survey</p>	<p>Cross-sectional study; convenience sample; DPET.</p>	<p>Descriptive statistics (frequency, percentage, central tendency measures); independent sample t test; correlation tests; 1-way ANOVA and regression analysis to investigate demographic characteristics and DPET score.</p>	<p>Indonesia, 120 emergency nurses from 4 hospitals in Central Java. More than half of the participants had experienced a disaster and had prior disaster response experience.</p>	<p>Moderate levels of DP were found in Indonesian emergency nurses. Previous disaster experience and disaster training or education were positively associated with DP.</p>

<p>Wisniewski et al, 2004<sup>24</sup></p>	<p>Emergency preparedness competencies: assessing nurses' educational needs</p>	<p>Cross-sectional The EPIQ survey was posted on the Wisconsin Health Alert Network for nurses to voluntarily complete.</p>	<p>Internal reliability, cumulative variance, and equamax factor analysis were tested and proved high levels of internal reliability.</p>	<p>Monona, WI, 877 nurses.</p>	<p>Nurses reported low levels of preparedness. Respondents preferred face-to-face education, online courses, and self-instruction methods of disaster education.</p>
<p>Labrague et al, 2018<sup>31</sup></p>	<p>Disaster preparedness among nurses: A systematic review of literature</p>	<p>Systematic review of scientific articles from 2006 to 2016.</p>	<p>SCOPUS, MEDLINE, PubMed, CINAHL, and PsychINFO databases were searched. Keywords: emergency, disaster, DP disaster competencies, disaster nursing, disaster role, and nurse.</p>	<p>A total of 17 articles were selected for review.</p>	<p>Nurses are insufficiently prepared and do not feel confident responding to disasters. Prior disaster response experience and disaster-related training are factors that increase preparedness for disaster response. Hospitals should implement policies to address lack of preparedness among their employees.</p>

<p>Evans and Baumberger-Henry, 2014*</p>	<p>Readiness: How prepared are you?</p>	<p>Expert opinion</p>		<p>Chester, PA.</p>	<p>Disaster education is important for everyone, especially nurses. If a disaster occurs and nurses do not have basic core readiness for themselves/their families, the likelihood of their ability to care for patients becomes unknown. Nursing education on disaster topics is critical to knowledge, skills, attitudes, abilities, and the creation of a workforce necessary for the management of human needs during emergencies. Nurses need to understand their purpose, function, and role within their employer's emergency preparedness plan. Disaster education is needed to implement assessment skills for promoting health and preventing harm during a disaster.</p>
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<p>Hammad et al, 2012<sup>19</sup></p>	<p>Nursing in the emergency department (ED) during a disaster: A review of the current literature</p>	<p>Literature Review, 2000-2011.</p>	<p>5 themes identified.</p>	<p>18 studies included.</p>	<p>Identifies research problem: Focus on emergency nurses' response during a disaster is needed. The level of nurses' preparedness seems to be associated with knowledge and experience obtained through prior disaster experience or through disaster education/training. Clear emphasis that disaster education is the most appropriate way to prepare nurses. No consensus exists regarding the most appropriate method, content, delivery mode, or frequency of disaster education.</p>
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<p>Veenema et al, 2015*</p>	<p>Nurses as leaders in disaster preparedness and response: A call to action</p>	<p>Qualitative, thematic analysis to outline a vision for the future of nursing in DP and response, and to articulate an agenda for nursing practice, education, policy, and research to achieve the vision.</p>	<p>Conference calls (semistructured) with 14 national subject matter experts; invitational daylong workshop to expand and refine identified concepts.</p>	<p>United States.</p>	<p>At a time when disasters and public health emergencies are occurring at an increasing rate, it is internationally recognized that nurses play an integral role in disaster response, but disaster nurse readiness remains a concern. Nurse leaders in many countries have identified disaster nursing education and training as a vital need. Broaden lifelong continuing educational opportunities in disaster nursing and public health emergency preparedness and response for nurses through health care and related organizations across all health care settings. The best way to increase and maintain response capacities and to ensure the sustainability of this capacity is through workforce development. o Standardized disaster curricula, training guidelines, and performance measures are</p>
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					needed.
Hammad et al, 2017*	Why a disaster is not just normal business ramped up: Disaster response among ED nurses	Qualitative	Interviews performed face-to-face via Skype; analyses with thematic analysis and guided reflection.	Thirteen nurses from 8 countries.	Emergency nurses have a high likelihood of participating in disaster response and should be appropriately prepared to do so. Disasters lead to change in processes, space, and practices for emergency nurses. Preparedness and training activities should be focused on aspects of disaster response that are different from everyday ED functioning. Training should be focused on recreating realistic scenarios that orientate nurses to the realities of disaster response.

<p>Baack and Alfred, 2013<sup>25</sup></p>	<p>Nurses' preparedness and perceived competence in managing disasters</p>	<p>Cross-sectional; descriptive analysis; 58-question Disaster Readiness Questionnaire.</p>	<p>Data collected via e-mail link on hospital intranet sites. Scales used: self-regulation scale, EPIQ, Nurse Assessment of Readiness, Job Satisfaction Scale.</p>	<p>A total of 620 nurses in 2 main rural health systems in Texas; average age 42 years; 15 years of experience, 20% critical care/emergency department.</p>	<p>Nursing comprises the largest health care workforce. This study sought to determine what factors influence actions to achieve personal growth and development in preparing for disasters. Traditional demographics had no significant impact on overall preparedness. Most nurses were not confident in their disaster response abilities. Participation in a major disaster or postdisaster shelter were the greatest predictors of increased preparedness (education was not assessed). Low scores indicated a training need for ED staff, as they are at the forefront of care and could be exposed to harmful agents and need to identify them. Education should include knowledge application and mass casualty care, and should be a consistent, ongoing aspect of nursing careers.</p>
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<p>Aluisio et al, 2015* Excluded: nursing students</p>	<p>Case-based learning outperformed simulation exercises in disaster preparedness education among nursing trainees in India: A randomized controlled trial</p>	<p>Randomized controlled trial. Control group: didactic teaching; intervention group 1: didactic + case-based learning; intervention group 2: didactic + simulation exercises.</p>	<p>Performed during a 1-day DP class. Two questionnaires used for assessment. Robustness of randomization was evaluated using chi-square, ANOVA, and t tests. One- and 2-sample t tests for intergroup and intragroup analyses to examine mean knowledge attainment scores.</p>	<p>India, nursing trainees. Sample size of 60 calculated to detect <math>\geq 20\%</math> change in mean knowledge score; 88.3% completed posttests.</p>	<p>CBL was more effective than didactic, and SEs + didactic in short-term education. SEs showed no significant knowledge improvement. CBL resulted in a 20.8% increase in knowledge scores and may be preferred by, and more effective for, adult learners in similar disaster training settings.</p>
<p>Huh and Kang, 2018* Excluded: nursing students</p>	<p>Effects of an education program on disaster nursing competence.</p>	<p>Quasi-experimental with nonequivalent control group. Researchers developed their own questionnaire and tested it with content validity index by 6 experts. A disaster education program was developed from the International Council of Nurses framework for disaster nursing competencies and implemented in 4 120-minute sessions over 4 weeks (case-based small group learning).</p>	<p>SPSS (IBM, Armonk, NY). Chi-square test, t test, independent t test. Dependent variables: disaster nursing knowledge, disaster triage, and disaster readiness.</p>	<p>Korea, nursing students. 30 students in 2 groups. Participation was voluntary.</p>	<p>Experimental group showed a significant increase in disaster nursing knowledge, disaster triage, and disaster readiness. Education program was effective in increasing disaster nursing competencies in nursing students through case-based small group learning.</p>

<p>Bistaraki et al, 2011<sup>16</sup></p>	<p>The effectiveness of a disaster training program for health care workers in Greece</p>	<p>Quasi-experimental design. Control group: 35 people; intervention group: 56 people who attended a 5-hour course on hospital disaster management. Questionnaire validated by clinical and research academic personnel and experienced nurses (multidisciplinary), and Cronbach's alpha.</p>	<p>Questionnaires were used to assess knowledge; ANOVA, t test, and chi-square tests used to analyze data. Data were measured immediately after and 1 month after the intervention. Questionnaires evaluated objective knowledge and demographic information.</p>	<p>Greece, 56 health care workers in a public Athens hospital. Paramedics, medical, nursing, and administrative staff. Stratified random sampling from a population of 224 health care workers: 25 nurses, 13 MDs, 12 administrative staff, and 5-6 paramedics.</p>	<p>The education intervention resulted in a significant improvement in knowledge. Education was given in 2 classes over 2 days, through didactic PowerPoint (Microsoft Corporation, Redmond, WA) presentations and a tabletop exercise. One month after, this score was significantly lower than the score immediately after the education, but still higher than baseline/pretest. For pretest scores, those who had attended disaster education previously had much higher mean scores than those who had not. No difference in demographic characteristics. Disaster education for hospital employees needs to be improved and prioritized.</p>
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<p>Ghezeljeh et al, 2019<sup>17</sup></p>	<p>Effect of education using the virtual social network on the knowledge and attitude of emergency nurses of disaster preparedness: A quasi-experiment study</p>	<p>Quasi-experimental, with pre/posttest (disaster preparedness questionnaire, tested for validity) and control group. Selected from census and divided into an intervention group that received 34 education sessions of DP through a virtual social network. For control group, routine education was provided by the disaster management committee of the hospital.</p>	<p>SPSS version 22. Descriptive and inferential statistics; independent and paired t test, chi-square test, and Fisher's exact test. Education was disseminated through social media group, and participants replied "done" via instant messaging app Telegram daily and could also ask the researcher questions through this platform.</p>	<p>Iran, 2 hospitals in Tehran, 60 nurses divided into 2 groups, bachelor's degree, worked in emergency department for at least 6 months, use of smartphone with Telegram.</p>	<p>Posttest knowledge scores were significantly higher in the intervention group than in the control group. DP education through virtual social networks increased the knowledge of emergency nurses. Social media may be an effective method of learning to increase DP among emergency nurses, especially at a time of high workload and shortage of nurses.</p>
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<p>Pesiridis et al, 2015<sup>18</sup> ED INT</p>	<p>Development, implementation, and evaluation of a disaster training program for nurses: A switching replications randomized controlled trial</p>	<p>Randomized controlled trial with switching replications design, measured by a questionnaire before, immediately after, and 5 months to 6 months after a training program; questionnaire was tested for internal consistency and reliability (Kuder-Richardson Formula 20), confirmatory factor analysis, and Cronbach's alpha.</p>	<p>SPSS, version 20.0 (IBM Corp, Armonk, NY). Descriptive statistics for demographic characteristics; t tests and 1-way ANOVAs for differences in demographics; post hoc for ANOVAs, R-ANOVAS for differences between pre/post and follow-up tests; multivariate linear regression for pretest knowledge scores and demographics.</p>	<p>Greece, 207 hospital-based nurses, random assignment to intervention (112) and control (95) groups; 100% response rate for phase 1 and 2, 78.7% for phase 3.</p>	<p>Nurses had very low levels of knowledge before training. Those with prior disaster education in the past 5 years had significantly higher mean scores than those who did not (no other demographic characteristics were significant). The association between previous disaster training and baseline knowledge speak to the importance of disaster education/training. The training program resulted in a significant increase in knowledge levels. Even after 5 months, knowledge remained high.</p>
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<p>Jacobs-Wingo et al, 2018<sup>28</sup> ED INT</p>	<p>Emergency preparedness training for hospital nursing staff, New York City, 2012-2016</p>	<p>Investigator-made survey tested for validity by subject matter experts, assessed familiarity, and confidence (self-reported) for previous emergency preparedness training.</p>	<p>Descriptive statistics to identify gaps in knowledge and formulate a curriculum.</p>	<p>A total of 7,177 nurses from 20 New York City hospitals.</p>	<p>The formulated chemical, biological, radiological, nuclear, and explosive curriculum was offered in 6 modules, delivered with just-in-time training and with an available annual refresher course. Mean pre- and posttest scores in pilot group of 11 RNs for the chemical, biological, radiological, nuclear, and explosive class increased from 54% to 89%.</p>
<p>Mirzaei et al, 2019<sup>12</sup> ED INT</p>	<p>The effect of disaster management training program on knowledge, attitude, and practice of hospital staffs in natural disasters</p>	<p>Survey was given to measure knowledge, attitude, and practice; 72 items/132 possible points. Reliability and validity of questionnaire confirmed in previous studies.</p>	<p>SPSS version 22 to evaluate paired t tests.</p>	<p>40 nurses from one hospital in Iran, random selection.</p>	<p>1-day/8-hour DP training program. Resurveyed 1 month after intervention. Statistically significant increase in scores was noted in all 3 areas. Continuing education courses on crisis and disaster management are necessary.</p>

<p>Al Thobaity et al, 2015<sup>8</sup></p>	<p>Perceptions of knowledge of disaster management among military and civilian nurses in Saudi Arabia</p>	<p>Quantitative, descriptive design; 600 DPET paper questionnaires distributed + 11 extra questions. Reliability and validity tested.</p>	<p>SPSS version 20. Descriptive statistics, independent t tests for knowledge scores between the 2 groups.</p>	<p>Saudi Arabia, 396 nurses from 6 hospitals (3 military/3 government) in 3 cities, 1-year experience. Sample size calculated preemptively to be at least 384 (unknown nurse population in Saudi Arabia) for 80% power.</p>	<p>Saudi Arabian nurses had moderate knowledge regarding DP. Scores were higher in military hospitals than in government hospitals. Nurses perceive themselves to be not well-prepared but are willing to engage in education.</p>
<p>Martono et al, 2019<sup>13</sup></p>	<p>Indonesian nurses' perception of disaster management preparedness</p>	<p>Quantitative, cross-sectional. Survey given online over 4-month period to assess perception of knowledge, skills, and preparedness in disaster management (DPET).</p>	<p>Descriptive comparison, medical services versus educational institutions. ANOVA and t test. Electronic distribution to all Indonesian nurses.</p>	<p>A total of 1,341 Indonesian nurses. Voluntary response.</p>	<p>Nurses are less prepared for disaster management and do not understand their roles during or after disasters. Continuing education needs to address identified gaps.</p>

<p>Tabiee and Nakhaei, 2016<sup>30</sup></p>	<p>Nurses' preparedness for disaster in South Khorasan Province, Iran</p>	<p>Correlational descriptive design. Survey: 3 parts, demographics, capabilities in disasters, and viewpoints assessed. READI survey, tested for validity.</p>	<p>SPSS version 16. Independent t tests, 1-way ANOVA.</p>	<p>Iran, systematic random sampling, 304 hospital nurses from 9 hospitals.</p>	<p>Moderate levels of preparedness were reported. Nurses with &gt; 10 years' job experience and prior disaster training had higher scores in general preparedness. It is necessary to address preparedness through appropriate educational strategies to promote nurse preparedness in disaster response.</p>
<p>Duong, 2009<sup>14</sup></p>	<p>Disaster education and training of emergency nurses in South Australia</p>	<p>Mixed methods (descriptive/exploratory research design with integration of quantitative and qualitative data). Survey not tested for validity. Voluntary.</p>	<p>Descriptive statistics in Excel (Microsoft Corporation, Redmond, WA). Frequency distributions. Paper surveys.</p>	<p>Australia, 152 nurses in 8 emergency departments in Adelaide; 60% response rate.</p>	<p>Nurses perceived to have low levels of DP: 39% had never had disaster training; 63% had never participated in a response. Education and disaster response can affect emergency nurses' preparedness and confidence in disaster response. Disaster education should be standardized and made available to all emergency nurses.</p>

Seyedin et al, 2015 <sup>15</sup>	Emergency nurses' requirements for disaster preparedness	Cross-sectional. Voluntary/anonym ous survey (adapted EPIQ); validity and reliability tested with Cronbach's alpha.	SPSS version 16. Paper distribution. Descriptive statistics and Pearson correlation, independent t tests.	Iran, 110 emergency nurses (N = 460) from teaching hospitals in Tehran. Convenience sampling >6 months in emergency department. Bachelor's or higher degree.	Nurses lack necessary knowledge to respond to disasters. Education and training should be organized and made available. The average score was 2.43.
Nofal et al, 2018 <sup>26</sup>	Knowledge, attitudes, and practices of emergency department staff toward disaster and emergency preparedness at tertiary health care hospital in central Saudi Arabia	Cross-sectional study. Patchworked, 1 out of 5 sections was the EPIQ (reliable, valid). Voluntary, paper distribution over 4 months.	SPSS version 21 (IBM Corp, Armonk, NY) Chi-square tests; t tests for independent samples.	Saudi Arabia, 189 physicians and nurses (75.6% response rate) in a tertiary health care hospital.	Satisfactory knowledge scores in health care providers were found. Clinical experience >5 years and working at that hospital >3 years correlated with higher scores. A need to plan/design/develop an ED-specific educational program to increase knowledge identified.

RN	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15	Q16	Q17	Q18	N
Pre	4.00	3.20	3.70	3.10	3.20	2.90	2.90	2.80	3.00	3.00	2.70	2.80	2.80	3.10	3.50	3.40	2.90	3.10	33
Post	4.30	4.20	4.30	3.90	3.90	3.70	3.70	3.90	4.00	4.20	4.10	4.00	4.00	4.10	4.20	4.10	4.00	4.20	33
P-value	0.064	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	

## DETAILS

<b>Subject:</b>	Emergency medical care; Quality management; Educational programs; Intervention; Emergency preparedness; Curricula; Workforce; Meetings; Questionnaires; Evidence-based nursing; Health professional-Patient communication; Community hospitals; Disasters; Nurses; Communication; Evidence-based practice; Acute services; Nursing education; Emergency services; Quality control; Quality improvement; Disaster medicine
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# Practice Informs Research and Research Informs Practice: The Making of a Disaster Nurse Scientist: JEN

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## ABSTRACT (ENGLISH)

Nursing has led me from my first position in a 6-bed emergency department in South Georgia to that of an Assistant Professor at the University of Michigan, studying the health effects of disasters on vulnerable populations. Port St. Joe is recovering—and will be for years—while disasters across the United States are increasing in frequency and severity,<sup>1</sup> affecting more and more communities, often with protracted recovery periods.<sup>2,3</sup> Through my experience while studying disasters and health and providing care during the study, one of the most important things I have learned is that words do matter. DMAT has also provided me the opportunity to receive the highest level of training available in disaster response; a year ago I spent a week at the University of Nebraska's National Training, Simulation and Quarantine Center, preparing to respond to highly infectious disease situations, preparation that was then essential for the COVID-19 pandemic, and gaining on-the-ground experience in providing care in disaster settings, experience that is crucial for a nurse scientist, not to mention the lifelong friends and colleagues I have made. Today, my program of research focuses on the long-term health effects of acute community-level disruptions, specifically weather and climate-related disasters, concentrating on aging and the associated vulnerabilities.

## FULL TEXT

One of the greatest things about being a nurse is the multitude of paths and directions that a nursing career can take. Nursing has led me from my first position in a 6-bed emergency department in South Georgia to that of an Assistant Professor at the University of Michigan, studying the health effects of disasters on vulnerable populations. The goal of this editorial is to describe my journey as a disaster nurse scientist, which I hope will inspire others to consider this area of scholarship.

Growing up in the Florida Panhandle, I lived through hurricanes and severe storms on a regular basis without too many personal consequences. Recently, however, nearly every one of my relatives living there has experienced some kind of disaster-related loss. Last year, I traveled with an Emergency Nurses Association delegation to meet with emergency nurses in the town of Port St. Joe, Florida, where I saw evidence of similar damage and loss. Hurricane Michael had devastated this small town in the fall of 2018. The popular news cycle had already passed on

this community's sufferings, but the devastation there still remained; not just damage to buildings and roads but also damage to the health and well-being of its residents. Loss of jobs, damage to homes and businesses, changes in access to health care; all of these together critically affect the resilience of a community and the ability of its residents to lead healthy lives. Port St. Joe is recovering—and will be for years—while disasters across the United States are increasing in frequency and severity,<sup>1</sup> affecting more and more communities, often with protracted recovery periods.<sup>2,3</sup>

Through my experience while studying disasters and health and providing care during the study, one of the most important things I have learned is that words do matter. One of them is 'natural disaster,' a term I avoid using. Disasters in themselves are not natural. Hazards such as hurricanes, wildfires and tornadoes are naturally occurring, but the impact that they have on societies is largely human-made. These extreme weather events and fires are occurring more and with greater impact, as the effects of climate change advance.<sup>4,5</sup> Characterizing disasters as natural implies that we cannot do anything about them, when we absolutely can make changes to become resilient to these events.<sup>6,7</sup> Consider the difference between seasonal floods in uninhabited areas compared with the effects of flooding on communities, with the Lower 9th Ward in New Orleans after Hurricane Katrina as an example. This is an area that has high levels of inequalities and was crippled by its already suspect infrastructure after Hurricane Katrina, which undoubtedly cost many lives. Hurricane Katrina devastated New Orleans over 15 years ago, but neither have we advanced very far in terms of a scientific understanding of the mechanisms behind disasters that affect health, nor have we taken the steps needed to mitigate their effects.

As a new emergency nurse, I knew that I wanted a career where I could contribute in some small way to bring a meaningful change in the world, and that responding to crisis situations, like I experienced in the emergency department, would be part of that. I spent most of my early years in nursing in the emergency department and, later, in public health, both areas of practice that took time to learn and reach the point of practice mastery. Then, I focused on issues of health equity in the emergencies that occurred in these settings, whether from a critical illness in the emergency department or loss of housing in the public health setting. These experiences eventually led me to the path of disaster nursing, as a volunteer with a local chapter of the American Red Cross. There, I supported families affected by small disasters, such as house fires or floods. In this role, I helped navigate immediate health and safety needs, such as obtaining new prescriptions for lost medications or securing short-term housing. One of the most formative parts of my nursing career, though, came when I joined a Disaster Medical Assistance Team (DMAT) over a decade ago. This is an on-call position with the US Department of Health and Human Services National Disaster Medical System, to respond to disasters, public health emergencies and events of national security significance (such as state funerals) as a clinician. In this role, I have deployed to numerous areas of large-scale disasters and have often been away for weeks at a time with a short (or no) notice. I supported overwhelmed emergency departments after Hurricane Irma in 2017, spent a month in Puerto Rico after Hurricane Maria working in urgent care, provided shelter care after the 2018 Paradise, California, wildfires, and most recently, responded to 2 separate deployments related to coronavirus 2019 (COVID-19): one to the cruise ship quarantines and the other to conduct nursing home assessments and provide infection control training in Maryland. Each deployment brings different challenges and new opportunities to learn—in some I am asked to work to the full extent of my license and training. At other times, I provide very basic nursing care comparable with a novice's skillset. The bottom line for me is that I help meet crucial needs during national emergencies. DMAT has also provided me the opportunity to receive the highest level of training available in disaster response; a year ago I spent a week at the University of Nebraska's National Training, Simulation and Quarantine Center, preparing to respond to highly infectious disease situations, preparation that was then essential for the COVID-19 pandemic, and gaining on-the-ground experience in providing care in disaster settings, experience that is crucial for a nurse scientist, not to mention the lifelong friends and colleagues I have made.

A common challenge for academic nurses, such as myself, is walking the line between being a clinician and a scientist. Many nursing faculty roles require leaving clinical practice. I am currently involved in efforts calling for new models of nursing education that value the ongoing clinical focus needed to inform research innovations in clinical

care.<sup>8</sup> After all, my research informs my practice, and my practice informs my research. I am fortunate that my current workplace values the importance of these deployments to my primary career focus: a program of research that addresses health inequities related to disasters and works to build a better disaster response. I became a nurse scientist a few years into my nursing career, when I started asking questions about populations that were being affected disproportionately by disasters and about nursing practice in disasters and other emergencies, questions that I could not answer in my clinical setting alone. I knew there were answers to these questions, but I did not have the skills or sufficient knowledge to find these answers on my own at that time. There is much we know anecdotally about the effects of disasters, but much less has been substantiated through research. I also saw the need for leadership in disasters and health, and a space where I could use my clinical experience and educational preparation to advocate for those most likely to experience adverse health effects from disasters. I completed a PhD in nursing from the University of Michigan, focusing on health promotion and disease prevention, benefiting from formal training in advanced quantitative analysis, qualitative analysis, and health services research. I spent an additional 2 years of postdoctoral training focusing specifically on health policy in the context of disasters. Today, my program of research focuses on the long-term health effects of acute community-level disruptions, specifically weather and climate-related disasters, concentrating on aging and the associated vulnerabilities. Older age itself does not make an individual vulnerable to disasters; however, social isolation, frailty, chronic and comorbid diseases, and cognitive impairment—all issues common among older adults—do. The shared scientific rationale that I build upon is that adverse health effects on older adults increase after a disaster due to potentially modifiable factors that occur not only at the individual level, but at the community level as well. Identifying these factors can allow for progress toward the development of interventions to promote health, well-being and resilience in the face of these events. There is an unmet need for evidence-based interventions to prevent or minimize the impact of health breakdowns and improve health outcomes of older adults related to disasters. In addition to my nursing training, I draw upon multiple disciplines, including sociology, emergency management, geography, and epidemiology; as well as on nursing colleagues to conduct my research.

A fundamental goal of my work has been to understand the effects of disasters on health through the analysis of large data sets. This has led to a greater understanding of health care and ED utilization, which impacts staffing for both emergency nursing and clinical practice. I examine the impact the large-scale disruption caused by a disaster has on individual and community functioning among older adults. For example, in an analysis using Medicare claims data, we found that hospitalizations for any cause increased significantly among older adults in the 30-day period following a series of tornadoes in the Southeastern United States. This study demonstrated that older adults remain affected by disasters longer than expected outside of the immediate recovery period.<sup>9</sup> I have expanded the results of this study to include recent large-scale disasters, finding similar results. I have also provided evidence of the relationship between health risk behaviors and disasters, demonstrated through an analysis using longitudinal data from a larger study of retired adults.<sup>10</sup> This research shows that this sample of older adults had an increase in weight gain and a more sedentary lifestyle after living through a disaster. And finally, in an analysis of cancer program data, our research team found that individuals with a cancer diagnosis who lived through a disaster were more likely to die sooner than those who did not.<sup>11</sup>

Through my work, I have sought to understand the mechanisms behind older adults' responses to disasters throughout the disaster life cycle. By studying home-based care, my team identified challenges in provision of care in the postdisaster period for older adults, setting the stage for our ongoing qualitative study of home-based care after a disaster.<sup>12</sup> Using the National Poll on Healthy Aging, a nationally representative survey of community-dwelling older adults, my colleagues and I found decreased preparedness actions among older adults, particularly among those who are socially isolated or medically vulnerable.<sup>13,14</sup> Our systematic review explored the current state of science around health outcomes for older adults after disasters, which demonstrated the need for data-driven solutions on how best to provide care for older adults during and after disasters.<sup>15</sup> These studies are relevant to emergency nursing as they drive decision-making on supporting older adults to remain healthy and resilient to disasters in their community, thereby avoiding ED visits.



A crucial aspect of my research and clinical life is being an advocate for nursing and the populations I serve. Serving in national leadership positions has been a route for me to contribute to defining and developing policy related to health and disasters. As a member of Emergency Nurses Association's Emergency Preparedness Committee, I had opportunities to co-author topic briefs related to crisis standards of care and active shooter emergencies, and also to contribute to a disaster response toolkit for emergency nurses.<sup>16-18</sup> In response to the controversy surrounding disaster-related deaths due to Hurricane Maria in Puerto Rico, I joined the National Academies of Science, Engineering and Medicine Committee on Best Practices to Assess Morbidity and Mortality after Large-Scale Disasters. This committee, sponsored by the Federal Emergency Management Agency, is defining the needs of the disaster research community to understand how to account for disaster-related deaths and illnesses, with a report to be released this fall. The COVID-19 pandemic highlighted numerous gaps in the nursing workforce around preparedness. Studies included in this special issue of the *Journal of Emergency Nursing* have found a low-to-moderate level of disaster preparedness of emergency nurses around the globe, suggesting that a quality improvement project to increase nurse disaster preparedness through an education intervention may be an avenue to increase preparedness.<sup>19</sup> Leaders in the disaster nursing community and I called for needed changes in policy around pandemic preparedness for nurses in a recent report.<sup>20</sup> Finally, I am serving a 3-year term as Health Scientist Representative on the Federal Emergency Management Agency's National Advisory Council, where I have the unique opportunity to contribute to recommendations to improve the federal response to disasters and other emergencies.

In recent weeks, I have spent time as a clinician working with skilled nursing facilities affected by COVID-19, and I have also labored over my next research grant proposal that will allow me to continue my study of the larger effects of disasters on aging. As a nurse scientist, both are equally important, and both are rewarding. My goal is to build not only a better response to disasters, but also to contribute to building healthy and resilient communities that can withstand the effects of disasters for years to come.

## DETAILS

<b>Subject:</b>	Climate; Emergency medical care; Aging; Quarantine; Careers; Clinical medicine; Floods; Weather; Older people; Nurses; COVID-19; Health care; Emergency preparedness; Simulation; Nursing care; Public health; Disasters; Pandemics; Disaster management; Nurse led care; Storm damage; Infectious diseases; Coronaviruses; Friends; Emergency services; Vulnerability; Disaster medicine; Long term; Professional practice
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## Special Disaster Issue: JEN

[ProQuest document link](https://www.proquest.com/scholarly-journals/practice-informs-research-making-disaster-nurse/docview/2487205730/se-2?accountid=211160)

### ABSTRACT (ENGLISH)

Respiratory virus transmission and health care surges frequently occur in the fall after school-aged children typically return to classrooms and weather pattern changes result in more time congregated together indoors.<sup>3,4</sup> Although extensive preventative measures for the general public such as face masks, physical distancing, and limiting the number of individuals congregated together can limit virus transmission, it is prudent and reasonable to prepare for continued surges in COVID-19 infection presentations to the emergency department. Surge Planning Model Effective continued ED pandemic disaster response depends on the preparedness and competency of every member of the team at every level and in every role as we care for patients and for each other. The framework is briefly

summarized here in this editorial, and the original manuscript is available as an open access publication for readers who wish to have more detail.<sup>2</sup> The figure is reprinted here as an important and timely tool for every member of the emergency care team to incorporate into their own professional preparedness, habits, teamwork, and mental or physical drills and reminders. Because patient crowding is a major and protracted problem in the emergency care specialty, emergency nurses are extensively familiar with the causes of health care capacity strain depicted in the framework as one or more of the following: increased patient volume, increased acuity, special care requirements, and resource reduction.<sup>2,5</sup> The framework provides a clever and easily memorized “4 Ss” of surge preparation for (1) space, (2) staff, (3) stuff, and (4) systems. Imagine how preparedness would increase if every member of the emergency care team, at every level and in every role, reviewed the domains of focus (Figure 2, right column) and contributed to or felt ownership of disaster preparedness problem-solving ideas and actions within their scope of practice: case definitions, testing capability and logistics, personal protective equipment and isolation precautions, triage and cohorting, clinical protocols, staff health concerns and opt-out, clinician well-being, communication/coordination, surge planning, and scarce resource allocation.<sup>2</sup> The framework provides a useful mental model to address all of the listed domains of focus during acute surge (right column of Figure 2) to effectively respond to a patient volume surge of COVID-19 or other emerging infectious diseases. In This Issue The editorial team is honored to contribute to supporting and elevating the specialty of emergency nursing in the midst of the COVID-19 pandemic with a special collection of all-hazard disaster content. In an annual survey conducted by the US Federal Emergency Management Agency in 2018, nuclear explosive events were listed as the lowest levels of household emergency planning (42%), followed by earthquake (43%) and flood (47%).<sup>15</sup> Emergency nurses are well poised to address this planning and knowledge deficit through injury prevention programs, community outreach work, and patient education.

## FULL TEXT

We are preparing this special disaster issue of the *Journal of Emergency Nursing (JEN)* in the midst of the global coronavirus disease 2019 (COVID-19) pandemic. To date, the Centers for Disease Control and Prevention report that more than 590 health care personnel have died from COVID-19 in the United States alone, and there are likely many more owing to missing data.<sup>1</sup> As a professional community, we deeply grieve these tremendous losses of our valued and beloved colleagues and lift up their families in the US and around the globe. We pause to honor their lives, commitment, and sacrifice (Figure 1).

In addition to offering a sincere and heartfelt tribute to emergency nurses and other health care personnel who have lost their lives to COVID-19, the purpose of this editorial is to briefly relay a surge planning model<sup>2</sup> and the collection of all-hazard disaster manuscripts published in this issue of *JEN*. As the number of COVID-19 cases continues to rise with no approved or effective vaccine, we face unprecedented uncertainty on the continued impact of COVID-19 on our health care systems. Respiratory virus transmission and health care surges frequently occur in the fall after school-aged children typically return to classrooms and weather pattern changes result in more time congregated together indoors.<sup>3,4</sup> Although extensive preventative measures for the general public such as face masks, physical distancing, and limiting the number of individuals congregated together can limit virus transmission, it is prudent and reasonable to prepare for continued surges in COVID-19 infection presentations to the emergency department.

### Surge Planning Model

Effective continued ED pandemic disaster response depends on the preparedness and competency of every member of the team at every level and in every role as we care for patients and for each other. Anesi et al<sup>2</sup> published the framework entitled “An adaptable model for hospital preparedness and surge planning for emerging infectious diseases” in 2020 (Figure 2). The framework is briefly summarized here in this editorial, and the original manuscript is available as an open access publication for readers who wish to have more detail.<sup>2</sup> The figure is reprinted here as an important and timely tool for every member of the emergency care team to incorporate into their own professional preparedness, habits, teamwork, and mental or physical drills and reminders. Because patient crowding is a major and protracted problem in the emergency care specialty, emergency nurses are extensively familiar with the causes of health care capacity strain depicted in the framework as one or more of the following:

increased patient volume, increased acuity, special care requirements, and resource reduction.<sup>2,5</sup> The framework provides a clever and easily memorized “4 Ss” of surge preparation for (1) space, (2) staff, (3) stuff, and (4) systems. Specific to staff, one of the key components of preparedness requires that staff are appropriately trained and have the needed competencies. The major theme of this *JEN* special disaster issue is all-hazard disaster competency and training for emergency nurses around the globe. Imagine how preparedness would increase if every member of the emergency care team, at every level and in every role, reviewed the domains of focus (Figure 2, right column) and contributed to or felt ownership of disaster preparedness problem-solving ideas and actions within their scope of practice: case definitions, testing capability and logistics, personal protective equipment and isolation precautions, triage and cohorting, clinical protocols, staff health concerns and opt-out, clinician well-being, communication/coordination, surge planning, and scarce resource allocation.<sup>2</sup> The framework provides a useful mental model to address all of the listed domains of focus during acute surge (right column of Figure 2) to effectively respond to a patient volume surge of COVID-19 or other emerging infectious diseases.

### **In This Issue**

The editorial team is honored to contribute to supporting and elevating the specialty of emergency nursing in the midst of the COVID-19 pandemic with a special collection of all-hazard disaster content. This issue also contains a broad range of nondisaster manuscript topics. Here, I'd like to call the reader's attention to the manuscripts that address frontline nursing staff disaster preparedness and disaster competencies. Amberson et al<sup>6</sup> successfully delivered a 9-module ED-specific disaster preparedness curriculum. Rather than a didactic classroom approach alone, the authors used a creative, flexible, and pragmatic approach to deliver the educational material integrated into clinical workflow through daily huddles, staff meetings, staff e-mails, and a designated education board. The authors generously provided the curriculum and materials as online supplemental material for use in other settings. Disaster response in the emergency setting includes stressful incidents that can threaten mental health and well-being. Addressing a low-frequency, high-impact event in the Trauma Notebook section, McCall<sup>7</sup> explored the experiences of emergency nurses who cared for victims of a multiple casualty school shooting, psychosocial after-effects, and lessons learned. Pallas<sup>8</sup> provided a new idea for professional peer social support by combining technical team debriefing and after-action with psychosocial peer support and referral interventions. The newly developed program was well received at the author's practice site and provides a promising novel emergency clinician peer support idea for further development and rigorous testing. The program manual is included as online supplemental content for replication in other emergency departments. Nicholas et al<sup>9</sup> refocus us on the mental health of patients and a contemporary disaster with an even broader scope and scale than the current pandemic—climate change. The authors provided an overview of the key concepts for mental health impacts of climate change as an update for emergency nursing practice. Patient and clinician mental health and well-being are also major considerations in preparedness for infectious disease surges, and we welcome emergency clinician psychosocial intervention testing manuscripts in *JEN*.

An accurate baseline assessment of nurse disaster competency is essential to planning interventions that improve knowledge, skills, and perceptions on the topic. Marin et al<sup>10</sup> developed and tested a survey tool to measure general nursing disaster response competency. Readers can find references to 8 pre-existing surveys to measure nurses' knowledge, attitudes, and training in the manuscript's introduction. The newly developed survey was tested with nurses in southern Brazil on the basis of the International Council of Nursing's Framework of Disaster Nursing Competencies.<sup>11</sup> Further research and development are needed to address the limited perceptions of the disaster nurse's role in providing psychosocial support in addition to physical care. Extending our global perspective on disaster preparedness, Setyawati et al<sup>12</sup> assessed the knowledge, skills, and preparedness in 130 nurses in Indonesia. Their results replicated findings from similar studies around the globe, demonstrating only moderate disaster preparedness and a need for further preparation. The study by Setyawati et al<sup>12</sup> provides a special insight about the implications for interspecialty disaster preparedness professional development as the authors found no difference in preparedness among emergency, intensive care, and surgical unit nurses.

Nursing competency to respond to radiological or nuclear incidents includes distinct knowledge of disaster case

identification, countermeasures, clinical protocols, infection control, decontamination, and further irradiation and contamination prevention. A study of emergency nurses by Bowen et al<sup>13</sup> reveals sobering knowledge gaps and a demonstrated need for specialty-wide professional development and training in radiological and nuclear incident response. The authors have provided the test they used in the study as part of the manuscript for readers to review, as well as a table of resources and links for independent professional development. One of the coauthors of this manuscript, Dr Goodwin Veenema, has also authored and edited the definitive textbook for disaster nursing, which provides an excellent educational resource for nurse educators and emergency nurses seeking further information.<sup>14</sup> As emergency clinicians prioritize developing and improving their own preparedness for nuclear and radiologic events, there is also a need for injury prevention and discharge education to address the lack of household preparedness. In an annual survey conducted by the US Federal Emergency Management Agency in 2018, nuclear explosive events were listed as the lowest levels of household emergency planning (42%), followed by earthquake (43%) and flood (47%).<sup>15</sup> Emergency nurses are well poised to address this planning and knowledge deficit through injury prevention programs, community outreach work, and patient education.

Only 12% of US households have all recommended supplies, evacuation plans, and communication modalities recommended for all-hazard disaster preparedness.<sup>16</sup> Ready.gov, a US Homeland Security website provides all-hazard education and household disaster plans that can be provided to patients as part of patient education. The information is also useful for emergency clinicians to develop their personal household readiness plans and obtain supplies.

The COVID-19 pandemic resulted in rapid adoption and expansion of telehealth to improve social distancing and reduce viral transmission risks for nonurgent patients. A systematic review of the published literature by Nejadshafiee et al<sup>17</sup> reveals a surprising gap in evidence about telenursing in incidents and disasters. The authors highlight the priority need to disseminate novel telenursing models and feasibility, as well as research the efficacy and comparative effectiveness of telenursing compared with usual emergency care. *JEN* continues to welcome manuscripts on general telehealth and telenursing interventions. Furthermore, pandemic planning must include the potential to administer COVID-19 vaccines in the emergency department, once a vaccine is available. Although Ozog et al<sup>18</sup> did not study attitudes toward COVID vaccination, their study on health care provider attitudes toward an influenza vaccination in the emergency department has important and timely implications for the current pandemic. Most clinicians supported nurse-initiated protocols to enhance the efficiency of vaccine administration, as most were vaccinated themselves (91%) and were in favor of providing vaccination interventions (86%) when staffing and resources were sufficient for overall ED flow and function.

In summary, I wrote this editorial to honor the lives of our health care provider colleagues who have, sadly, succumbed to COVID-19, provide a brief overview of a surge planning framework with immediate clinical implications, and briefly introduce the collection of all-hazard disaster manuscripts in this issue of *JEN*. In addition to individual household preparedness resources at Ready.gov, several of the manuscripts and online supplemental content include resources that can be immediately translated into education and practice.<sup>6,14</sup> It is a distinct privilege to disseminate this and all the material in this issue to support and lift up the specialty of emergency nursing as we confront, draw together, and overcome in these challenging pandemic times.

## DETAILS

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# Caring for Patients From a School Shooting: A Qualitative Case Series in Emergency Nursing: JEN

[ProQuest document link](#)

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## ABSTRACT (ENGLISH)

### Introduction

Emergency nurses are at risk for secondary traumatic stress, compassion fatigue, and burnout as a result of witnessing the trauma and suffering of patients. The traumatic events perceived as being most stressful for emergency nurses involve sudden death, children, and adolescents. Multicasualty, school-associated shooting events are, therefore, likely to affect emergency nurses, and recent reports indicate an increase in multicasualty, school-associated shootings. This research is necessary to learn of emergency nurses' experiences of caring for patients from a school shooting event in an effort to benefit future preparedness, response, and recovery. This manuscript describes these experiences and provides opportunities for nurses, peers, and leaders to promote mental health and resilience among emergency nurses who may provide care to patients after such events.

### Methods

A qualitative case series approach, a theory of secondary traumatic stress, and the compassion fatigue resilience model guided the research. The emergency nurses who provided care to patients who were injured during a 2018 multicasualty, school-associated shooting in the Southeastern United States were invited to participate.

### Results

The themes identified by this research with 7 participants were preparation and preparedness, coping and support mechanisms, and reflections and closure.

### Discussion

The results identified through this research may be translated to policies and practice to improve emergency nurses' welfare, coping, resilience, and retention. Patient outcomes may also be improved through planning and preparedness.

## FULL TEXT

### Contribution to Emergency Nursing Practice

- The current literature on secondary traumatic stress indicates that emergency nurses may be affected by experiences with providing care to critically ill or injured patients. The situations that have been described as most distressing are those involving sudden death, children, or adolescents.
- This article contributes to the scientific knowledge of secondary traumatic stress among emergency nurses through the examination of experiences with providing emergency nursing care to patients from a multicasualty, school-associated shooting event.
- Key implications for emergency nursing practice found in this article are that self-care routines, peer-support activities, and subsequent optional formal debriefs may support emergency nurse welfare to promote coping and recovery after multicasualty, school-associated shooting events.

### Introduction

Secondary traumatic stress is the incidence of thought intrusions, heightened arousal, situational avoidance, and/or emotional numbing in those who witness traumatic events or provide care to critically ill or injured patients.<sup>1</sup> It is often associated with the development of compassion fatigue, defined as the impairment in a clinician's ability to

care for others effectively.<sup>2</sup> The presence of secondary traumatic stress among emergency nurses can negatively affect their resilience,<sup>3</sup> which may ultimately contribute to burnout and departure from the nursing profession.<sup>4</sup> Emergency nurses are frequently exposed to traumatic events through the delivery of care to injured patients. The types of events that have been identified as being most distressing to nurses are those involving sudden death, children, or adolescents.<sup>5-8</sup> Therefore, providing care to patients who are injured during school-associated shooting events is likely to be particularly stressful for emergency nurses. Although the rates of multicasualty, school-associated shootings declined from July 1994 to June 2009, the incidence rates increased between July 2009 and June 2018.<sup>9</sup> The study defined “multiple-victim” as including more than a single victim and reported that 38 of these events resulted in 121 youth homicides between July 1994 and June 2016.<sup>9</sup>

A recent study exploring nurses’ suicide rates in the United States identified that the rates among female and male nurse subpopulations were significantly higher than those in the general female and male populations, respectively.<sup>10</sup> Additional research to identify risk factors and effective interventions is needed to improve mental health and combat the prevalence of suicide among nurses. Moreover, nurse burnout and departure from the profession may exacerbate nursing shortages and staffing challenges, which may directly affect emergency departments. Therefore, research is indicated to identify how health care professionals who are tasked with providing medical care to the victims of school shooting events are affected mentally and emotionally. The benefits of this research include improved understanding of how these events may affect emergency nurses and identification of factors that may promote welfare, coping, resilience, and retention. The purpose of this study was to learn how emergency nurses describe their experiences to identify themes and findings that may translate to practices for improving the mental health and wellness of emergency nurses who care for patients from a multicasualty, school-associated shooting incident.

## Methods

A qualitative case series methodology using the data collection and analysis methods described by Yin,<sup>11</sup> which includes steps to plan, design, prepare, collect, analyze, and share, was used to guide this research. The study was performed after approval was received from the Vanderbilt University Institutional Review Board (IRB #190980). These methods include the use of structured interviews and reliance on theoretical propositions in the analysis.<sup>11</sup> The interviews were conducted approximately 18 months after the adult emergency department of a Level 1 trauma center received 5 patients by helicopter emergency medical transport from the scene of a school-associated shooting event. The emergency nurses who participated in the trauma resuscitations or assisted with the transition of these patients from the receiving helipad to the emergency department were eligible to participate. Ten registered nurses were identified by review of the ED daily assignment sheet, and their patient care roles were confirmed from patient electronic medical records. These nurses were invited to participate by e-mail distribution of a recruitment flyer. The processes and flow of the receiving emergency department were known to the researcher, who had more than 3 years of experience as a clinician in this department. The researcher did not have any personal experience with providing care to patients from a school-associated shooting event.

A list of available support services was provided to each participant at the time of their interview. Semistructured interview questions and analysis of the data were informed by a theory of secondary traumatic stress and the compassion fatigue resilience model,<sup>12</sup> as well as the professional quality of life model.<sup>13</sup> The conceptual variables identified in the compassion fatigue resilience model (Figure) and an examination of how those concepts related to the experiences described by these nurses benefited the development of the interview questions (Supplementary Appendix) and interpretation of the data.

The professional quality of life model defines professional quality of life as incorporating aspects of compassion



satisfaction and compassion fatigue. Although compassion satisfaction reflects positivity in helping others, compassion fatigue consists of the concepts of burnout and secondary trauma.<sup>13</sup> Burnout includes symptoms such as exhaustion and depression, whereas secondary traumatic stress represents negative symptoms that result from trauma experienced through work activities.<sup>13</sup>

The interviews were recorded with an audio recorder and transcribed verbatim by the researcher or a transcriptionist who had signed a confidentiality agreement. Field notes were recorded by the researcher at the end of the interview and reviewed before coding activities. Each transcript was reviewed by the researcher for accuracy. The framework method was used in the analysis of the data. This method uses stages of transcription, familiarization, coding, analytical framework development, analytical framework application, data charting into framework matrix, and data interpretation.<sup>14</sup> Key phrases and meaning units from the transcriptions were identified and coded by the researcher using NVivo 12 software (QSR International).<sup>15</sup> The categorization of codes generated themes that represented what the participants shared.

## Results

Seven nurses agreed to enroll and completed an informed consent. There was no verbal or written response from the 3 eligible participants who did not enroll. The participants' ages ranged from 30 years to 41 years, and 6 were female. Two of the participants shared that they were parents. The researcher was known to 4 of the participants before the interviews. It was anticipated that the interviews would last between 30 minutes and 60 minutes and the median duration was 37.7 minutes. The associate nursing officer for emergency services agreed to pay the 5 participants who remained actively employed by the health care institution for their interview time. Two participants had resigned from their positions and were compensated with a gift card at the expense of the researcher. A single interview with each participant was performed over a period of nearly 4 weeks. The interviews were conducted in private without the presence of nonparticipants. The interviews were conducted at a location identified by the participant, and 3 were performed by video conference owing to distance or participant availability. Although the participation of 7 eligible nurses limited the ability to ensure saturation, the identified themes and findings were consistent through the interviews.

## Preparation and Preparedness

The emergency nurses often reported being in "nurse mode" and described taking immediate actions to promote readiness of the receiving trauma bays. *Focusing on tasks allows you to kind of push the sadness and the trauma to the side so that you can complete your tasks successfully and give the best chance at living, or keeping their arm, or anything like that. We had to compartmentalize that [...] these were actually children and just focus on the job we knew we needed to do.*

The nurses described placing signage indicating the air ambulance service and unit number as well as age and known injuries for each corresponding patient on the door of each resuscitation room during the planning stage prior to the arrival of the patients. This planning was described as beneficial in that it allowed the emergency nurses to gather the supplies and equipment needed to effectively care for the patients.

*If my room is better prepared, I can take care of the patient better.*

The participants described the importance of being proficient in providing care to trauma patients. Although these patients were all transported to the receiving trauma center by helicopter, the limitations in air medical resources such as weather restrictions or ambulance availability could necessitate the stabilization of patients from multicasualty school shooting events in community departments where resources are likely to be more limited. These limitations may include bed capacity, number of available providers and staff, supplies and equipment, blood product availability, and access to support services. One participant indicated that nurses in community settings who

may face such a mass or multicasualty event should maintain trauma nursing certification to promote proficiency in trauma care. *Nurses that work in those community hospitals...my advice is to become TNCC [Trauma Nursing Core Course] certified.*

One nurse expressed concern regarding the frequency of these events, which underscored the need to maintain high levels of readiness. *I don't think it's going to get any better with time. I think it's going to get worse. I don't think that we're going to be able to stop it.*

Another participant predicted that community or critical access emergency departments receiving patients from a multicasualty school shooting event may experience even greater emotional challenges because these departments are more likely to have staff who may personally know the victims or their families.

Compounding variables may create unique challenges for teams and individuals who are providing care to these patients. These factors or limitations may include personal matters, interpersonal challenges, multiple simultaneous traumatic events, high patient censuses, and staffing or equipment constraints. For instance, 1 nurse recalled tension with a staff member from another department who was encountered during transition to the emergency department. Comprehensive trauma centers routinely experience high censuses and preparing to accommodate the influx of patients from a mass casualty can be daunting. Underlying personal or departmental issues may also compound the stresses associated with caring for these patients. Recognizing existing factors or limitations, and taking action to control these effects, may mitigate the stresses associated with potential external variables.

Some emergency nurses described an increased presence of hospital personnel coming to the department during the care of the patients. *Everybody who was anybody, administratively... whether they had anything to do with what we were actually doing there, was there.*

Two of the emergency nurses reported their disapproval of individuals who were not directly involved in patient care being present for the resuscitation efforts. One of the emergency nurses described the attendance of some individuals as their "just [wanting] to be enmeshed in that story, in that drama."

Another participant reflected on: *...the feeling of having people there who were just there to kind of watch this terrible thing and just kind of live...vicariously through us.*

In addition, this emergency nurse further described that when observers are present in a resuscitation that the nurse perceives as difficult, it may result in increased emotional or psychosocial challenges. *When it's really bad or it affects you personally, and there's someone in there looking at you, it's very hard, at least for me, to not feel just angry, or just disgusted by the whole thing.*

Some nurses found the attendance by individuals who were not directly participating in the care of the patient to be unhelpful and one described it as "inappropriate."

### **Coping and Support Mechanisms**

Most participating emergency nurses described the importance of maintaining a self-care routine to foster personal well-being and promote emotional recovery after such events. Coping and self-care strategies or routines that were described by the emergency nurses included cooking, exercising, walking, hiking, kayaking, humor, or talking with peers. One participant did admit that her usual mechanism after witnessing such trauma was to "bury it," but she found some benefit to participating in activities in the outdoors when needing to cope with a situation. The participants who offered that their significant other or spouse worked in a health care role identified the benefits of gaining their support after challenging patient situations. However, another shared previous challenges with discussing stressful work situations with a significant other who did not work in health care. None of the nurses discussed negative coping strategies or mentioned avoiding work or certain patient assignments after caring for these patients.

A formal debriefing event, taking place after the patients were transitioned from the emergency department to receiving operating rooms or units, was recalled by most participants. The emergency nurses offered varied perceptions of the formal debrief, and some questioned its effectiveness in promoting coping and recovery of the emergency nurses in attendance. Some participants indicated that the debrief focused on clinical assessment of the resuscitations rather than on the emotional components of being involved in the patients' care. *[They] talked about things that went well, and things that didn't go well.*

Some of the nurses discussed being unfamiliar with those who came to the department to lead the debriefing session. Some participants also reported limited perceived efficacy of the session. Reasons for this perceived limited efficacy included a lack of rapport with the debriefing session lead. One of the nurses admitted that she would not have voiced a perceived need for formal support during the debrief because she didn't "feel comfortable." Another nurse admitted being reluctant to share emotions with a group of people, many of whom she did not know, during the formal debrief after the resuscitations. *It was all these people, most of whom I had never seen before.*

One of the emergency nurses valued the availability of an employee assistance program but described that its resources would be most appropriate to provide to nurses after the acute phase of the incident. *I do think there's a benefit to having someone who's...objective and has been trained on how to be...an emotional mediator and [to] reflect things back at you...I do think that has its place. [But] I think maybe [when] it's in the moment...that it, it really doesn't fit.*

Therefore, the presence of employee assistance professionals in the affected emergency department may be most appropriate during the days or weeks that follow the multicasualty event to coordinate any desired individual appointments for counseling or resources.

One nurse shared: *I think if you want to safeguard the staff's emotions you should keep [it] in the family.*

The emergency nurses identified that peer-to-peer interactions after the event were beneficial for coping and recovery but indicated some reluctance in making immediate use of formal resources provided by individuals who had not participated in the care of these patients. They reported the perceived benefits of participating in peer-led activities to promote discussion and closure after caring for these patients. *They offered me services, but I feel like I got the most help from my coworkers.*

Some of the participating nurses expressed that they would have preferred peer-support sessions and informal conversations to the debriefing that occurred after the ED resuscitations. *I feel like the most effective way to have dealt with that, for me, would have been for us to have a conversation. Like the people involved.*

### **Reflections and Closure**

Despite the passage of 18 months between the event and the nurses' participation in the research interviews, each participant provided recollections of these patients and their interactions. Most admitted that having such vivid recollections of a patient after such a length of time was not common. *Every time I hear about a school shooting in the news, anything like that, I just remember [my patient] in my bay.*

The participating emergency nurses often described reflecting on the patients while they were away from work. One nurse admitted to thinking about the patients for months after the event. Another participant described nightmares that she experienced in the week after the event. *I did have a few nightmares that I was actually at the school and I was trying to save some kids through a gym and going behind the stairs.*

Media coverage of the school shooting event was described as providing a context for the incident but heightening thought intrusions. *It was all over the news that day...I was just looking at news reports to see what had been reported.*

Social media and the frequent sharing or posting of media information limited the ability to separate from the event

after the shift. *You can't escape, you may not be [seeking out] the articles on things, but...you're reading people posting the articles. And then they inevitably [add] their own commentary on it.*

The emergency nurses described a lack of closure because hospital policy prevented access to medical records after a patient's departure from the emergency department. *If they're not in the ER, we're not supposed to access them. I think about them often when I hear of school shootings and wonder how they are. We didn't get really good follow-up on them, actually, which I think might have been helpful.*

Two participants also expressed curiosity related to how these patients had recovered from the emotional trauma of the event.

The emergency nurses described the development of heightened situational awareness of potential acts of violence against themselves, family members, or friends as a result of being involved in the care of victims of acts of violence. Those nurses who identified themselves as parents described having increased thoughts of such situational awareness and acknowledged a concern for potential risks to their own children. *I was pretty emotional because I just thought of [my kids].*

This nurse later transitioned her children to home school after the incident. *I don't have to worry about someone coming in and shooting my kids at school.*

Another participant who did not identify as being a parent added: *I can't imagine having kids that are at that age and having to work something like that.*

The identified themes of preparation and preparedness, coping and support mechanisms, and reflections and closure were identified through an analysis of interviews with the emergency nurses. Within these themes were findings that may be translated to implications for emergency nurses (Table 1).

## **Discussion**

This study was conducted to examine the psychosocial effects of providing emergency nursing care to patients who were injured in a multicasualty, school-associated shooting event. In a discussion of the theory of secondary traumatic stress, Ludick and Figley<sup>12</sup> (p118) identified that "qualitative data offers targeted information and specific insights that unearth valuable, unique information and opens new lines of research." Because the events perceived as being most distressing to nurses involve sudden death, children, or adolescents,<sup>5-8</sup> qualitative research among emergency nurses who provided care to patients from a multicasualty, school-associated shooting may provide opportunities to learn how to best support nurse welfare and resilience among emergency nurses. The themes identified by this study include preparation and preparedness, coping and support mechanisms, and reflections and closure. These themes parallel the theoretical sectors and variables of empathic response, empathic concern, other life demands, self-care, detachment, social support, traumatic memories, sense of satisfaction, and secondary traumatic stress.<sup>12</sup>

This research aligns with the literature that has identified the prevalence of secondary traumatic stress among emergency nurses.<sup>16-20</sup> The symptoms identified among the nurses who participated in this study included the presence of vivid recollections 18 months after providing care to the patients from the multiple-victim, school-associated shooting. Some participating emergency nurses also discussed the presence of thought intrusions when not in the clinical or work setting. Although none of the participants reported avoidance of patient care situations in their clinical roles, some reported having increased situational awareness of the potential for violent acts that could directly affect them, family members, or friends.

Qualitative research studies among emergency nurses also provided themes consistent with those identified through this study. The importance of supportive relationships, which was described by participants in a study conducted by Alzghoul,<sup>6</sup> was also identified in this study. The findings also agree with results suggesting the importance of having

protective mechanisms for coping with working with trauma patients and that experience and proficiency are essential for trauma nursing.<sup>6</sup> The importance of having strategies to mitigate stress, such as talking with peers, was identified by Drury et al.<sup>21</sup> The participants from the study performed by Drury et al<sup>21</sup> also discussed being less likely to use external counseling services than pastoral or peer-support resources.

Positive emotions, as described by Alzghoul,<sup>6</sup> include the reward of seeing patients improve and may not be experienced by emergency nurses who care for these patients for only a short duration and are unable to learn of their outcomes. Differing opinions related to formal debriefs were also discussed by Morrison and Joy.<sup>20</sup> Experiences with “poly-stressor effect”<sup>20</sup> mirror the discussion of compounding variables that may affect the nurses’ ability to cope with such traumatic events. The themes and findings from this study and review of the available literature yield implications for emergency nurses that may mitigate the negative psychosocial effects of providing care to patients from multiple-victim, school-associated shootings.

Expanded research to include professionals from various health care disciplines and specialties is indicated to examine further the effects of caring for these patients and to identify those clinicians who are most at risk for secondary traumatic stress. The research efforts may also be broadened to include other clinical specialties in the emergency department such as emergency medicine physicians, trauma surgeons, paramedics, respiratory therapists, or social workers. Future research may expand beyond the emergency department and could include clinicians from the responding prehospital agencies, air medical transport services, operating rooms, trauma and surgical intensive care units, step-down units, mental health services, and rehabilitation facilities. Gathering data from community emergency departments that have received patients from multicasualty school shooting events is likely to further the understanding of how clinicians and departments without the vast resources of a trauma center are affected by these events and what unique challenges were experienced. Continued research efforts are also indicated to evaluate the effectiveness of interventions aimed at alleviating the symptoms associated with secondary traumatic stress, compassion fatigue, and burnout.

### **Implications for Emergency Nurses**

The implications for emergency nurses are applicable to the preplanning, response, and recovery phases associated with providing care to these patients. Emergency nurses, nurse leaders, and nurse educators should encourage positive coping skills and self-care routines to mitigate the incidence of secondary traumatic stress and related symptoms. These skills and routines may support effective recovery after the provision of care to patients from multicasualty school shooting events. Peer-focused sessions, which encourage open discussion and reflections, are likely to promote coping and recovery after caring for patients from these events. This aligns with research that identified debriefing with peers as being more effective, and recommending the facilitation of debriefings by a nurse.<sup>22</sup>

Actively promoting the use of employee assistance professionals may be essential to helping affected clinicians cope after such an event; however, these services should complement, rather than supplant, peer-to-peer support that occurs immediately after patient care. Nurse managers and hospital administration may consider providing paid administrative leave for clinicians immediately after patient resuscitations and subsequent dispositions to facilitate participation in peer conversations to promote coping and recovery. In addition to the implementation of peer-support mechanisms immediately after the event, comprehensive employee assistance services, which may include counseling or formal support services, may be appropriate to support clinicians involved in the care of these patients. Available resources that may mitigate secondary traumatic stress and promote mental health among health care professionals are provided in <sup>Table 2</sup>.

The restriction of nonessential staff in resuscitation rooms is likely a best practice to promote patient privacy and

confidentiality while alleviating some of the emotions described by these emergency nurses. Likewise, as the participating emergency nurses indicated that not learning how the patients had recovered prevented their gaining closure after the event, notification of patient outcomes in compliance with state and federal laws and regulations is likely to benefit the clinicians involved in the care of these patients. Although patient confidentiality is critical, individually sharing patient outcomes with the nurses, providers, and staff who were involved in the emergency care of these patients would likely prove beneficial and may be facilitated by gaining consent from parents or guardians. For those departments from which patients are transferred to other facilities for definitive care, the receiving facilities should perform outreach to the referring clinicians and their departments to inform them of patient outcomes to promote closure after the event.

Because research has identified barriers to obtaining trauma education among rural clinicians,<sup>23</sup> education and outreach by trauma centers to community facilities can improve clinical preparedness for mass and multiple casualty events while promoting wellness and self-care resources to lessen secondary traumatic stress. Such education and outreach efforts may include trauma nursing curricula, assistance with event simulations, provision of training with patient care scenarios, and facilitation of patient transfers through the creation of autoacceptance agreements. Assistance with mass casualty drills that include mock patients who may be pediatric is also likely to support preparedness for such events.

### **Limitations**

The study participants were emergency nurses who received these patients at a Level 1 comprehensive trauma center with vast resources, capacity, and personnel. The emergency nurses who participated in this study have access to employee assistance professionals, full-time social workers in their department, and clinical resources that include surgeons, surgical capacity, supplies, equipment, and blood products. Emergency departments and facilities with more limited resources are likely to experience greater challenges with accommodating the volume of patients from a multicaseualty, school-associated shooting event.

The participating nurses were from a single medical center and provided care to patients from 1 school shooting event. There may be some limitations in the transferability of these results to community ED settings with fewer specialty resources. In addition, the participating emergency nurses from the Level 1 comprehensive trauma center would be expected to have more experience caring for patients injured by gun violence. This experience is likely to afford clinical and emotional benefits that supported these nurses' abilities to cope during and after their roles in the care of the victims from this event.

### **Conclusions**

Emergency departments are typically the front line of hospital-based medical care. Multicasualty school shooting events often occur without warning and bring unique challenges to the clinicians and departments that are tasked with receiving and caring for these patients. Learning from emergency nurses who care for patients from a multicaseualty, school-associated shooting event may promote personal and departmental preparedness and improve coping and recovery among the involved clinicians. The identification of themes and the findings from this study translate to implications for emergency nurses that may improve patient outcomes through planning and preparedness while benefiting the welfare, resilience, and retention of emergency nurses who are likely to be emotionally affected by their roles caring for the victims of multicaseualty, school-associated shootings. Further research is indicated to explore the experiences of nurses after caring for patients from other school shooting events to better understand the psychosocial effects and define the most effective support methods.

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**Supplementary Appendix Interview questions**

Do you recall what your thoughts were when you learned that your department was going to be receiving victims from a school shooting?

Do you recall your feelings while you were preparing to receive these patients, providing care to them, or reflecting on your role as part of the involved health care team?

What was it like for you as you cared for these patients?

Do you recall if you experienced any increased stress while preparing for the patients' arrivals?

Do you recall reflecting on or thinking about those patients in the days, weeks, or months after the incident?

Were there family members, peers, or managers who you talked with about this incident?

Were any services provided by the medical center to help the emergency department team after this incident?

Did you feel that these services were sufficient and/or helpful?

Did you find yourself seeking more information from the media about the event?

Do you think that these patients affected you any differently than those trauma patients who you routinely care for?

Did you find yourself avoiding situations or patient care assignments where you may encounter similar patients?

Did you experience any disruptions in your normal routines, such as difficulty sleeping or concentrating on other tasks, due to thinking about those patients?

Do you think that you were "jumpy" or more aware of the potential for violent incidents which could affect you, a family member, or a friend?

Were there any activities that you found to be helpful as a coping mechanism after the incident?

If you have left your position at this medical center, do you feel that this event had an effect on your decision to leave?

Is there anything else that you would like to add that would help me understand the challenges that you experienced as a result of caring for these patients?

**Supplementary Data**

Supplementary data related to this article can be found at <https://doi.org/10.1016/j.jen.2020.05.018>.

Theme identified
Preparation and preparedness
Nurses felt that preparation, planning, and trauma nursing proficiency are essential.

Nurses stressed the importance of removing nonessential staff and unfamiliar contributors.
Compounding variables from professional and personal lives may worsen associated stress.
Coping and support mechanisms
The use of self-care routines fosters underlying nurse welfare.
Nurses shared varied perceptions and opinions related to the formal debrief.
Nurses discussed the benefit of peer activities to promote wellness and healing.
Reflections and closure
Nurses shared vivid recollections of the patients even after 18 months.
Nurses often described reflecting on the patients while away from work. One participant described nightmares experienced in the following week.
There was a lack of achieving closure because patient outcomes were often unknown.
Extensive media coverage and social media provided context for the incident but increased thought intrusions.
Heightened situational awareness was evident, particularly among those nurses who are parents.

URL
<a href="https://www.nimh.nih.gov/health/topics/coping-with-traumatic-events/index.shtml">https://www.nimh.nih.gov/health/topics/coping-with-traumatic-events/index.shtml</a>
<a href="https://safespace.org/secondary-traumatic-stress/">https://safespace.org/secondary-traumatic-stress/</a>
<a href="https://www.samhsa.gov">https://www.samhsa.gov</a>
<a href="https://www.traumagroup.org">https://www.traumagroup.org</a>
<a href="https://www.headspace.com/health-covid-19">https://www.headspace.com/health-covid-19</a>
<a href="https://www.calm.com/blog/health">https://www.calm.com/blog/health</a>

## DETAILS



<b>Subject:</b>	Emergency medical care; Trauma centers; Coping; Burnout; Traumatic stress; Nurses; Shooting; Resilience; Interviews; Patients; Quality of life; Fatigue; Clinical outcomes; Trauma; Stress; Health care; Nursing care; Traumatic life events; Vicarious trauma; School violence; Sympathy; Mental health; Sudden death; Murders & murder attempts; Welfare; Suicides & suicide attempts; Emergency services; Emergency preparedness
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<b>Document URL:</b>	<a href="https://www.proquest.com/scholarly-journals/caring-patients-school-shooting-qualitative-case/docview/2487205724/se-2?accountid=211160">https://www.proquest.com/scholarly-journals/caring-patients-school-shooting-qualitative-case/docview/2487205724/se-2?accountid=211160</a>

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# Disaster Knowledge, Skills, and Preparedness Among Nurses in Bengkulu, Indonesia: A Descriptive Correlational Survey Study: JEN

[ProQuest document link](#)

## ABSTRACT (ENGLISH)

### Introduction

Registered nurses have to adequately prepare to respond to disasters, as they have become increasingly frequent worldwide. The aim of this study was to identify the factors influencing registered nurses' disaster preparedness in Bengkulu, Indonesia.

### Methods

This study used a descriptive correlational study design. A total of 130 registered nurses working in 2 governmental hospitals in Bengkulu, Indonesia, were recruited by using a convenience sampling technique. A self-administered questionnaire, the Disaster Preparedness Evaluation Tool, was used to determine their current levels of registered nurses' disaster preparedness.

### Results

The registered nurses reported a moderate level of disaster knowledge, skills and preparedness. Their knowledge and skills were significantly correlated with disaster preparedness ( $r = 0.39-0.71$ ,  $P < 0.01$ ). Three significant factors associated with disaster preparedness were identified in this study: educational level, disaster knowledge, and disaster skills ( $R^2 = 0.31$ ,  $F = 12.60$ ,  $P < 0.001$ ).

### Discussion

Continuing disaster drills training and implementing a formal disaster educational program into nursing curriculum and professional development are recommended to achieve effective disaster preparedness in the hospital setting.

## FULL TEXT

### Contribution to Emergency Nursing Practice

- The current literature on disaster management indicates that most nurses were inadequately prepared with knowledge and skills for disaster response.
- This article contributes by identifying factors that contribute to nurses' lack of preparedness for disaster management.
- Key implications for emergency nursing practice found in this article are that the findings of this research study could be used as a needs assessment by nurse educators and nurse managers to better prepare nurses for disaster response, with a focus on bioterrorism response skills.

## Introduction

The Centre for Research on the Epidemiology of Disasters (Figure) defines disaster as “a situation or event, which overwhelms local capacity, necessitating a request to a national or international level for external assistance; an unforeseen and often sudden event that causes great damage, destruction, and human suffering.”<sup>1</sup> The frequency of different types of disasters was predicted to increase globally owing to the effects of climate change, urban planning, and industrial development.<sup>2</sup> In 2017, 335 natural disasters affected more than 95.6 million people, killing an additional 9,697 and costing a total of \$340 billion. This burden was not shared equally, with 44% of all disaster events, 58% of the total deaths, and 70% of the total people affected being reported in Asia.<sup>1</sup> Located on the Pacific Ring of Fire, so named for frequent earthquakes and volcanic eruptions, Indonesia has made global headlines because of devastating natural disasters. According to data from Badan Nasional Penanggulangan Bencana, Indonesia experienced 2,342 disasters in 2016, leaving 522 people dead or missing, 305 million people displaced, 69,287 houses and 2,311 public facilities damaged and resulting in material losses of \$5.6 billion.<sup>3</sup>

Disaster preparedness activities aim to save the maximum number of lives and livelihoods in any disaster situation, enabling the affected population to get back to normalcy within a short time. Disaster preparedness involves planning and preparation to effectively respond to any disaster situation, including implementing capacity development; coordinating the participation of responsible organizations, individuals, and volunteers; and ensuring that all personnel are equipped to respond.<sup>4</sup> Disaster preparedness and response planning have always been an important aspect of clinical nursing practice. Nurses must be well prepared to efficiently manage disasters and help reduce potential damage.<sup>5</sup> Previous studies have shown that most nurses are inadequately prepared for disaster response, and their knowledge and skills are not sufficient for an optimal response to disasters.<sup>6-10</sup> There are limited studies on assessing registered nurses' (RNs) knowledge, skills, and preparedness in disaster management in Indonesia. Thus, this study aimed to identify the factors influencing disaster preparedness among RNs working in government hospitals in Bengkulu, Indonesia. The results from this study may help the organization to design educational and training programs to enhance RNs' knowledge and skills regarding disaster preparedness in their clinical practice.

## Methods Design

A quantitative, descriptive, correlational, cross-sectional design was used to explore the perception of Indonesia's RNs about their knowledge, skills, and preparedness for disaster management.

## Sample and Setting

A convenience sample was recruited from 2 governmental hospitals in Bengkulu, Indonesia. The inclusion criteria were RNs who had at least a 3-month work experience, had at least a 3-year diploma or higher degree in nursing, and agreed to participate. RNs who worked in emergency rooms, in-patient surgical units (SUs), and intensive care units (ICUs) were invited to participate in this study from July to September 2017. The required sample size was estimated using G\*Power 3.1.2 software. On the basis of the linear multiple regression using fixed model  $R^2$  deviation from 0, the effect size was set at 0.15, type I error was 0.05, and power was 0.8 for a sample size of 127. Taking into account a possible dropout rate of 10%, a total of 140 paper-and-pencil, self-administered questionnaires were distributed.

## Ethical Considerations

The study was approved by the research committee from the involved hospitals (institutional review board: 503/08.65/2118/DPMPTSP/2017). Written informed consent was obtained from all participants.

## Questionnaire

The Disaster Preparedness Evaluation Tool (DPET) was originally developed by Tichy et al<sup>11</sup> to measure nurse practitioners' knowledge and skills regarding disaster response and management. The DPET has been widely used in previous studies with good reliability and validity. The original DPET was translated, modified, and validated by Al-Khalaileh et al<sup>12</sup> for assessing disaster preparedness among Jordanian RNs. The modified DPET was used to collect data in this study and was translated into Indonesian with the permission of Al-Khalaileh et al.<sup>12</sup> The modified DPET questionnaire included 68 questions, which were divided into 3 sections:

- (1) Knowledge (13 items), skills (12 items), and preparedness (22 items) in relation to disaster management. The responses of the participants were measured on a 6-point Likert scale (1 for strongly disagree and 6 for strongly agree). Higher scores represented better knowledge, skills, and disaster preparedness.
- (2) Education and training needs of RNs in disasters. This section comprised 11 items, which were designed to investigate RNs' previous experiences on disaster response and to explore the priority of disaster education and training needs of RNs.
- (3) Exploration of the demographics of the participants (10 items). Three experts assessed the content validity of DPET-Indonesia version. Each question had a content validity index value greater than 0.8. Cronbach's alpha for the Likert scale questions was 0.93 (original DPET),<sup>11</sup> 0.90 (DPET-Jordanian version),<sup>12</sup> and 0.88 (DPET-Indonesian version), indicating good reliability and validity.

### Statistical Analysis

Data were analyzed using SPSS version 22 (SPSS Inc, Chicago, IL). To address the research questions in this study, descriptive statistics, an independent sample *t* test, a 1-way analysis of variance, a Pearson product-moment correlation, and a multiple linear regression analysis were performed. Statistical significance was defined as *P*

### Results Demographic Characteristics of Participants

Of the 140 survey questionnaires distributed, 130 were returned for a 92.9% response rate. Table 1 summarizes the demographic characteristics of the participants. The RNs were aged 24-48 years (mean [SD], 32.09 [4.99]). Of the nurses, 58% were women, and 74.6% had a bachelor's degree. A total of 31.5% of the nurses worked in emergency rooms, 37.7% in SUs, and 30.8% in ICUs. More than half of respondents (54.6%) had more than 5 years of work experience.

### Disaster Knowledge, Skills, and Preparedness

Means (SD) were calculated for the DPET questionnaires (Tables 2-4). Weak preparedness for disaster management was defined as a mean between 1.00 and 2.99, moderate preparedness for disaster management was defined as a mean between 3.00 and 4.99, and strong preparedness for disaster management was defined as a mean between 5.00 and 6.00. Table 2-4 shows that the average score was 4.40 (SD = 0.70) for the knowledge subscale, 4.41 (SD = 0.58) for skills, and 4.13 (SD = 0.59) for disaster preparedness.

### Factors Related to the Disaster Preparedness

The results of univariate analysis revealed that education level ( $t = 2.13$ ,  $P t = -2.67$ ,  $P F = 6.25$ ,  $P$  Table 5). In addition, significant and positive correlations were found among disaster knowledge, skills, and preparedness ( $r = 0.39-0.71$ ,  $P$  Table 6). The results from the multiple linear regression analysis indicated that 31% of the variances in RNs' preparedness for disaster management were mainly explained by educational level and disaster knowledge and skills (Table 7).

### Discussion

As there is increasing worldwide concern regarding disaster and disaster consequences, this study was performed

to identify current levels of knowledge, skills, and preparedness for disaster management among RNs in Bengkulu, Indonesia. In this study, RNs reported a moderate level of knowledge, skills, and preparedness for disaster management. The finding is slightly different from that of a previous study by Al-Khalaileh et al<sup>12</sup> that used the same survey instrument. These researchers found low levels of disaster preparedness among RNs working in hospital settings. However, our result is consistent with a study by Husna et al<sup>13</sup> who conducted a survey to measure the levels of clinical disaster skills for RNs in Banda Aceh, Indonesia. They found that most of the respondents rated their disaster skills at a moderate level. For disaster preparedness, the finding was similar to that of previous studies, reporting that RNs had a low-to-moderate level of preparedness for disaster management.<sup>6,8,10</sup>

In the knowledge questionnaire, the lowest response item was “finding relevant information or literature about disaster preparedness and management.” This represents a serious obstacle to access to international literature regarding disaster preparedness for Indonesia’s RNs. Having limited access to internationally published studies, especially in many developing countries, may significantly affect effective disaster preparedness and management.<sup>14</sup> In the domain of skills, RNs in this study expressed a notable lack of skills regarding their preparation for responding to bioterrorism or biological attacks. This result is similar to that of an earlier survey that found that only 20% of physicians or RNs had previous training in bioterrorism preparedness, and less than 15% felt capable of responding effectively to a bioterrorism event.<sup>15</sup>

The level of preparedness for disaster management among RNs in Bengkulu, Indonesia, was revealed to be moderate. The findings are supported by a systematic review by Labrague et al,<sup>5</sup> indicating that nurses are not fully prepared for disaster response and that most of the research originated from Asian countries. A disaster is almost unpredictable and can occur anywhere. Therefore, more research originating from other countries that explores nursing preparedness could better inform nurses’ preparedness for disasters. RNs in this study did not feel confident of their ability to respond to biological and chemical attacks, manage patients with post-traumatic stress disorder, and to understand biological weapons. These findings indicate the need to improve RNs’ knowledge and the skills related to biological disasters and to ensure they have competencies to deliver effective post-traumatic stress disorder management after disaster.

This study identified important correlates of disaster preparedness, such as educational level, working experience, previous disaster training, and disaster knowledge and skills, which may be targets for interventions to improve RNs’ preparedness for disaster management. In addition, the study by Martono et al<sup>16</sup> indicated that education level, disaster training, and work experience can improve RNs’ preparedness for disaster management. RNs with higher education have more preparation for disaster management.<sup>17,18</sup> RNs who had previously attended disaster training had more confidence and were better prepared to manage the impact of a disaster incident.<sup>19</sup> Work experience may help RNs gain more disaster experience, knowledge, and skills.<sup>20</sup>

Future studies should adopt an experimental design to evaluate the effectiveness of disaster education programs in improving RNs’ disaster knowledge, skills, and preparedness. Other factors that have strong predictive relationships with disaster preparedness such as practice and performance should be investigated. The sample size and the range of subjects should be expanded to confirm these results in future studies. Finally, using a qualitative approach to explore RNs’ experiences, obstacles, and learning needs on disaster management may be helpful in designing efficient training and practice interventions.

### **Limitations**

This study was a cross-sectional study and used questionnaire surveys; therefore, the results cannot be used to infer causation. In addition, subjects for the study were limited to a convenience sample of RNs from 2 government hospitals in Bengkulu, Indonesia. The sample may not be generalizable to all populations. The results were based

on the self-report of preparedness and not confirmed with objective assessments.

### Implications for Emergency Nurses

A successful disaster response of RNs can be improved by preparedness of disaster management. To respond adequately during disaster situations, all RNs need to be familiar with the protocols or guidelines of disaster management and have adequate knowledge and skills to respond more appropriately.<sup>21</sup> Previous research results have shown that periodic realistic disaster exercises (such as actual mock drills, disaster simulations, first-aid training, life support training, and disaster planning) are effective and lead to significant improvements in participants' knowledge and competencies of emergency plans and response.<sup>22,23</sup> Our results indicated that there were no differences among emergency nurses, ICU nurses, and SU nurses in disaster preparedness. Thus, interspecialty education and training would be appropriate.

The results from this study showed positive associations of education in disaster management. Indonesia is one of the world's most disaster-prone countries. However, in some universities or colleges in Indonesia, disaster nursing is not included as a required subject.<sup>14</sup> Planning and designing comprehensive disaster education programs are necessary to enable nursing students to face disasters by enhancing their cognitive and learning skills and their ability to access international information.<sup>24</sup> Thus, developing local and national education programs (such as disaster prevention, first aid during disasters, and rehabilitation after disaster) for the nursing curriculum is crucial to ensure that all nurses receive standardized knowledge and skills to participate in any disaster incident.

### Conclusions

This study was conducted to identify the current level of disaster preparedness as perceived by RNs working in government hospitals in Bengkulu, Indonesia. The results indicated that RNs perceived themselves moderately prepared for disaster management. RNs' education level, work experience, and disaster knowledge and skills are identified as significant predictors of disaster preparedness. Periodic disaster drills training, participation in real disasters, and development of a disaster education program for the nursing curriculum are recommended as the most effective methods for successful disaster preparedness and management.

### Author Disclosures

Conflicts of interest: none to report.

Demographic factors	n	%
Age, y*	—	—
< 30	62	47.7
31–40	62	47.7
> 40	6	4.6
Sex		
Male	55	42.3

Female	75	57.7
Education level		
Diploma	33	25.4
Bachelor	97	74.6
Training for disaster management		
No	37	28.5
Yes	93	71.5
Training for disaster management		
No	37	28.5
Seminar	61	46.9
Workshop	19	14.6
Drill	13	10.0
Work experience, y		
0–5	59	45.4
> 5	71	54.6
Work department		
Emergency department	41	31.5
Intensive care unit	40	30.8
Surgical unit	49	37.7
Work position		
Registered nurse	110	84.6
Nurse manager	20	15.4

Items	Mean (SD)
I have a list of contacts in the medical or health community in which I practice. I know referral contacts in case of a disaster situation (eg, health department).	4.71 (0.79)
I would be interested in educational classes on disaster preparedness that relate specifically to my community situation.	4.68 (0.89)
I read journal articles related to disaster preparedness.	4.50 (0.98)
I participate in 1 of the following educational activities on regular basis: continuing education classes, seminars, or conferences dealing with disaster preparedness.	4.49 (1.15)
I know who to contact (chain of command) in disaster situations in my community.	4.49 (1.11)
I participate in disaster drills or exercises at my workplace (clinic, hospital, etc) on a regular basis.	4.47 (1.12)
I am aware of classes about disaster preparedness and management that are offered for example at my workplace, the university, or community.	4.43 (0.96)
In case of a disaster situation, I think that there is sufficient support from local officials on the county or state level.	4.40 (0.92)
I know where to find relevant research or information related to disaster preparedness and management to fill in gaps in my knowledge.	4.31 (0.96)
I have participated in emergency plan drafting and emergency planning for disaster situations in my community.	4.30 (1.01)
I find that the research literature on disaster preparedness is understandable.	4.21 (1.06)
I find that the research literature on disaster preparedness and management is easily accessible.	4.13 (1.10)
Finding relevant information about disaster preparedness related to my community needs is an obstacle to my level of preparedness.	4.07 (1.26)
Total items	4.40 (0.70)

Items	Mean (SD)
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I am aware of what the potential vulnerabilities in my community are (eg, earthquake, floods, terror, etc).	4.80 (0.75)
I know the limits of my knowledge, skills, and authority as an RN to act in disaster situations, and I would know when I exceed them.	4.76 (0.65)
I consider myself prepared for the management of disasters.	4.54 (0.82)
I have an agreement with loved ones and family members on how to execute our personal/family emergency plans.	4.48 (0.98)
I am familiar with accepted triage principles used in disaster situations.	4.46 (0.94)
I have personal/family emergency plans in place for disaster situations.	4.37 (0.93)
In a case of bioterrorism/biological attack, I know how to perform isolation procedures so that I minimize the risks of community exposure.	4.32 (0.95)
In case of a bioterrorism/biological attack, I know how to use personal protective equipment.	4.32 (1.08)
I am familiar with the local emergency response system for disasters.	4.31 (1.07)
In case of a bioterrorism/biological attack, I know how to execute decontamination procedures.	4.27 (1.00)
I would be considered a key leadership figure in my community in a disaster situation.	4.14 (0.98)
I participate/have participated in creating new guidelines, emergency plans, or lobbying for improvements on the local or national level.	4.10 (1.11)
Total items	4.41 (0.58)

Items	Mean (SD)
As an RN, I would feel confident in my abilities as a direct care provider and first responder in disaster situations.	4.60 (0.79)
I can identify possible indicators of mass exposure evidenced by a clustering of patients with similar symptoms.	4.59 (0.73)
I would feel confident providing patient education on stress and abnormal functioning related to trauma.	4.53 (0.68)

Some research showed that RNs felt constrained by medical malpractice concerns or license restrictions to respond to disasters. This is constraint for me as well.	4.53 (0.76)
I would feel confident providing education on coping skills and training for patients who experience traumatic situations, so they are able to manage themselves.	4.52 (0.70)
I am able to discern the signs and symptoms of acute stress disorder and PTSD.	4.49 (0.79)
I can manage the common symptoms and reactions of disaster survivors that are of affective, behavioral, cognitive, and physical nature.	4.47 (0.79)
I would feel confident working as an RN and setting up temporary clinics in disaster situations.	4.46 (0.88)
I am familiar with psychological interventions, behavioral therapy, cognitive strategies, support groups, and incident debriefing for patients who experience emotional or physical trauma.	4.46 (0.78)
I would feel confident implementing emergency plans, evacuation procedures, and similar functions.	4.44 (0.79)
I am familiar with what the scope of my role as an RN in a postdisaster situation would be.	4.43 (0.73)
As an RN, I would feel confident as a manager or coordinator of a shelter.	4.43 (0.94)
I am able to describe my role in the response phase of a disaster in the context of my workplace, the general public, media, and personal contacts.	4.43 (0.93)
I participate in peer evaluation of skills on disaster preparedness and response.	4.40 (0.81)
As an RN, I would feel reasonably confident in my abilities to be a member of a decontamination team.	4.37 (1.12)
I feel reasonably confident that I can treat patients independently without supervision of a physician in a disaster situation.	4.37 (0.92)
I am familiar with the organizational logistics and roles among local, state, and federal agencies in disaster response situations.	4.31 (0.87)
I am familiar with how to perform focused health assessment for PTSD.	4.27 (0.88)
I feel confident discerning deviations in health assessments indicating potential exposure to biological agents.	4.26 (1.14)
In case of a bioterrorism/biological attack, I know how to perform focused health history and assessment, specific to the bioagents that are used.	4.25 (1.03)

I feel confident managing (treating, evaluating) emotional outcomes for acute stress disorder or PTSD following disaster or trauma in a multidisciplinary way such as referrals and follow-ups, and I know what to expect in ensuing months.	4.21 (0.98)
I am familiar with the main groups (A, B, C) of biological weapons (anthrax, plague, botulism, smallpox, etc), their signs and symptoms, and effective treatments.	4.16 (1.18)
Total items	4.13 (0.59)

Variables	n	Mean (SD)	t/F
Age, y			0.72
< 30	62	92.21 (12.37)	—
31–40	62	89.42 (13.34)	—
> 40	6	91.67 (15.71)	—
Sex			1.16
Male	55	92.40 (13.18)	—
Female	75	89.72 (12.77)	—
Education level			2.92 <sup>†</sup>
Diploma	33	88.97 (12.10)	—
Bachelor	97	96.39 (13.98)	—
Training of disaster management			-2.07 <sup>†</sup>
No	37	87.16 (11.60)	—
Yes	93	92.32 (13.24)	—
Work experience, y			2.12 <sup>†</sup>
0–5	59	93.47 (10.30)	—
> 5	71	88.67 (14.53)	—

Work department			0.13
Emergency department	41	90.07 (12.45)	—
Intensive care unit	40	91.60 (16.73)	—
Surgical unit	49	90.90 (9.70)	—
Working position			0.58
Registered nurse	110	91.14 (13.12)	—
Nurse manager	20	89.30 (12.24)	—

Variables	Mean (SD), average per item	Variables	r value
Knowledge	4.40 (0.70)	Knowledge vs skills	0.71 <sup>†</sup>
Skills	4.41 (0.58)	Knowledge vs preparedness	0.39 <sup>†</sup>
Preparedness	4.13 (0.59)	Skills vs preparedness	0.40 <sup>†</sup>

Variables	B	Standard error
Education level	11.45 <sup>†</sup>	2.24
Training of disaster management	2.84	2.21
Work experience	-2.95	1.97
Disaster knowledge	0.33 <sup>†</sup>	0.15
Disaster skills	0.48 <sup>†</sup>	0.18

## DETAILS

<b>Subject:</b>	Emergency medical care; Educational programs; Hospitals; Validity; Regression analysis; Emergency preparedness; Academic achievement; Displaced persons; Demographics; Knowledge; Questionnaires; Disasters; Nurses; Likert scale; Nursing; Curricula; Education; Professional development; Disaster medicine
<b>Location:</b>	Indonesia
<b>Identifier / keyword:</b>	Disaster planning; Hospital; Emergency nursing; Surveys and questionnaires; Indonesia
<b>Publication title:</b>	Journal of Emergency Nursing;; JEN; Philadelphia
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# Telenursing in Incidents and Disasters: A Systematic Review of the Literature: JEN

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## ABSTRACT (ENGLISH)

### Introduction

Disasters of any kind can affect public health severely. A shortage of health care specialists, such as physicians and nurses, during a disaster is a challenge for health care systems. The use of technology is 1 emerging strategy for addressing the continually increasing demand for care. Moreover, nurses may use technology in their roles. Therefore, the purpose of this study was to identify the application of telehealth, and more specifically telenursing care, in incidents and disasters.

### Methods

This systematic review study was conducted on the basis of the Preferred Reporting Items for Systematic Reviews and Meta-Analyses guidelines. English language international databases (PubMed, Scopus, Embase, Web of Science, and Google Scholar) were searched through November 2018. The quality of the studies was assessed using the International Narrative Systematic Assessment tool.

### Results

Of the 5,759 titles identified in this search, 17 studies met the inclusion criteria. The important findings of this study were grouped into 3 main categories: clinical teams, disaster and communication types, and key outcomes of the telehealth programs used in disasters and incidents. We did not find any articles in the field of telenursing care during incidents.

### Discussion

Providing health care during a disaster is essential, and technology is of vital importance for such care. Because of the shortage of specialized nurses in disaster areas, the presence of such a group in the telehealth program will provide a new window for care. Thus, telenursing offers a means of improving health care response.

## FULL TEXT

### Contribution to Emergency Nursing Practice

- The current literature on telenursing in incidents and disasters indicates that the use of technology is seen as a significant strategy for addressing the continually increasing demand for care. However, in disaster management, this technology has not been implemented.
- This article contributes the main finding that because of the shortage of specialized nurses in disaster areas, the presence of this group in the telehealth program will provide a new platform for care. Thus, telenursing offers a means of improving disaster response that has not been well researched.

••The key implication for emergency nursing practice from this study is that telenursing may be helpful in cases such as wound management, trauma care, and triage during disasters.

## Introduction

A disaster is a serious disruption that causes a substantial amount of human suffering as well as community disturbance or critical health impacts in a relatively short time.<sup>1</sup> It is also important to note that disasters are not caused only by natural events, which occur around the world frequently, but also by human actions.<sup>2</sup> All nations in the world are exposed to threats from disasters.<sup>3</sup> The intensity and frequency of such events are recurring phenomena throughout the world,<sup>4</sup> and we have witnessed the lethal effects of disasters on humans.<sup>5</sup> According to a report by the Center for Research on the Epidemiology of Disasters, in 2017, 335 natural disasters affected more than 95.6 million people, killing an additional 9,697 people and causing losses worth \$335 billion.<sup>6</sup> Survivors of disasters are often left with injuries and disabilities, and must face the loss of property and loved ones, significantly affecting the physical, psychological, and emotional health of community members.<sup>7,8</sup>

Asia is one of the most vulnerable continents in terms of the number of deaths and disasters. Besides natural disasters, such as floods, earthquakes, and droughts, human-caused disasters, such as acts of terrorism, road accidents, and fires typically occur more often in developing countries.<sup>9</sup> Iran is at the forefront of disaster-affected countries because of its geographical location and vulnerability to climate change.<sup>10</sup> In recent decades, in addition to floods and local storms, significant earthquakes have occurred in Iran.<sup>11</sup> The earthquakes in Gilan Province in 1989, Bam in 2003, and Azerbaijan in 2012 caused thousands of deaths and irreparable socioeconomic damage.<sup>12-14</sup>

In recent years, providing care during disasters has become an increasing concern for health care professionals, especially nurses.<sup>15</sup> When an incident inevitably occurs, people have the right to receive an effective response from health care teams, and nurses play a vital role as part of disaster-response units.<sup>16</sup> Changes in disaster-response policies around the world have led to the establishment of specific nursing competencies in disasters.<sup>17</sup>

Improvements in the knowledge and skills of nurses provide holistic care for communities affected by a disaster.<sup>18</sup> The destruction of health-service delivery systems in large-scale disasters is of particular concern to health care providers. The 1988 earthquake in Armenia, the 2003 Bam earthquake, and the 2004 tsunami in the Indian Ocean provide clear examples of destruction of critical infrastructure and loss of human life.<sup>19,20</sup> In disasters, large numbers of injuries and limitations in health care workers and resources are observed, leading to delayed treatment and increased mortality rates.<sup>21</sup> Health care teams are faced with manifold challenges during disasters.<sup>22</sup> However, a reduction in injuries and deaths among victims of disasters and enhanced surge capacity can be achieved when information and communication technologies are integrated with disaster management.<sup>23</sup>

For successful disaster management, in addition to the application of the all-hazard approach, newly available technologies can be used.<sup>24,25</sup> In health-related media communications, terminology is assigned according to the focus of each scientific area, for example, in the terms telehealth, telemedicine, and telenursing.<sup>26</sup> Telemedicine has been defined by the World Health Organization (WHO) as the delivery of health care services by health care professionals using electronic communication when distance is a critical factor for the diagnosis, treatment, and prevention of disease as well as for research.<sup>27</sup> Telemedicine has changed health care delivery and nursing care fundamentally.<sup>28</sup> Telenursing is a component of telehealth that occurs when nurses meet the health needs of clients by using information, communication, and Web-based systems.<sup>29</sup> Telenursing includes all kinds of nursing care and services that can be provided from a distance, encompassing a wide range of communication technologies, such as phone, fax, e-mail, Internet, and video clips to overcome time and distance barriers and to provide better nursing care.<sup>30</sup> Telenursing can be considered an entry to health services and medical care, which can provide services with

greater safety, effectiveness, and acceptance by communities.<sup>31</sup>

Telehealth networks are essential during unforeseen events that occur in broad, mountainous areas with low population densities.<sup>32</sup> In disasters, telemedicine technology provides consultation and communication to specialized centers without the need for the transfer of all injured people.<sup>33</sup> The success of the disaster-response phase depends on the timely presence and delivery of relief and rescue actions. Therefore, the application of telehealth technology during incidents has enhanced the quality of care provided.<sup>34</sup> Over the past several decades, the integration of telemedicine programs into relief and rescue stages has demonstrated effectiveness in supporting populations during disasters.<sup>35</sup> Organized care in a health system damaged by a disaster is one of the benefits of using telemedicine in disaster incidents.<sup>36</sup> The first application of telemedicine in major events began in the mid-1980s. In the 1985 Mexico City earthquake, the National Aeronautics and Space Administration provided advanced satellite communications services for the international disaster response.<sup>37</sup> During the following decade, telehealth was used in various ways in response to natural disasters, such as earthquakes, tsunamis, and storms.<sup>38,39</sup> Because disasters are an inevitable part of life,<sup>40</sup> it is essential to combine nursing care with information and communication technologies to provide help to victims of disasters.

We sought to identify gaps in the published literature on telenursing care in incidents and disasters. The purpose of this study was to identify the application of telehealth, and more specifically telenursing care, in incidents and disasters with the following systematic review research questions:

1. Who has participated in telehealth programs? (Clinical team)
2. In which disasters have telehealth programs been used, and what communication types have been employed? (Disaster and communication types)
3. What were the key outcomes of these telehealth programs? (Key outcomes)

## Methods

This systematic review was based on Preferred Reporting Items for Systematic Reviews and Meta-Analyses guidelines.<sup>41</sup> A study protocol was developed to formulate the study question, define the inclusion criteria, develop a database search strategy, retrieve the relevant studies, extract the relevant data, appraise the retrieved studies, and synthesize and report the data. The protocol was reviewed by a committee at the Institute for Futures Studies in Health, Kerman University of Medical Sciences. This search was conducted through November 2018. The protocol was not publicly preregistered.

## Search Strategy

The systematic review involved a structured search of international databases, including PubMed, Scopus, Web of Science, Embase, and Google Scholar, through November 2018. We did not limit the publication year of the literature but did limit the search to articles written in English and those that specifically addressed telenursing in disasters. Furthermore, there was no limitation on the methods used in the studies. The search strategy was developed on the basis of a combination of key words related to the topic of research. To detect as many articles as possible, a selection of key words was done on the basis of a previous study, and MeSH terms were used. In this study, we used 3 groups of key words: (1) Telenursing, Teleconsultation, Telehealth, and Telemedicine; (2) Nursing; and (3) Earthquake, mass casualty incidents, emergency, catastrophe, and disaster. These key words were combined using the operators for the above-mentioned databases. The search strategy and key terms were as follows: (Telemedicine OR Telehealth OR Telenursing OR Teleconsultation) AND (Nursing) AND (Disaster OR Catastrophe OR Emergency OR "mass casualty incidents" OR Earthquake). These searches were performed in



abstracts, key words, and titles. Furthermore, a reference list of published studies was evaluated to increase the sensitivity of this research and to select more studies.

### **Data Collection**

The papers from the initial search and the retrieved titles were imported into EndNote software (Clarivate Analytics, Philadelphia, PA). After removing any duplicate titles, the remaining titles, abstracts, and the full text of the articles were screened by the first author (M.N.) and the third author (M.K.), who also reviewed the results to reduce the potential for bias introduced by a single reviewer. The method used to identify relevant articles for the review is shown in the <sup>Figure</sup>.

### **Study Eligibility Inclusion and Exclusion Criteria**

On the basis of the research goals, only studies in the fields of telemedicine and telenursing in disasters were selected. Articles were included for review if they met the following criteria: they were (1) published in English, (2) published through November 2018, and (3) original articles and conference papers. Systematic reviews, letters to the editor, editorials, and articles that did not investigate telenursing during disasters were excluded.

### **Quality Assessment, Data Extraction, and Analysis**

The quality of the included literature was assessed independently by 2 reviewers (K.B. and M.N.) using the International Narrative Systematic Assessment tool (<sup>Table 1</sup>).<sup>42</sup> This tool was implemented using 7 questions (with 1 point for every item). On the checklist, the maximum score was 7, and the minimum acceptable score was 5. Finally, the articles that obtained scores of 5 or above were selected and analyzed, allowing a comprehensive assessment of the quality (classified as high and low) (see <sup>Table 2</sup>). These results were reviewed by the third researcher (M.K.), and any differences identified were resolved through discussion. A data extraction form was designed according to the study goals as follows: author, year, study type, location, clinical team, disaster type, communication, and key outcomes. Data extraction was conducted by 2 separate researchers (K.B. and M.N.) to decrease the selection bias and increase the strength of research methodology, and it was confirmed that no studies had been excluded. All the extracted data were then checked by a fourth reviewer (M.N.-M.). A descriptive analysis of the final studies was conducted, and its results were categorized by relation to the study questions.

### **Results**

The initial search yielded 5,759 papers, of which 1,257 duplicate titles and 3,930 unrelated titles were removed. The abstracts of the remaining 572 titles were reviewed, and 68 articles were selected. Finally, 11 articles were included from the databases, and 6 studies were selected after a search of the reference lists of the retrieved articles.

The results of this review were organized by research question. The characteristics of each of the selected studies are presented in <sup>Table 2</sup>. The results showed that in Iran, only 1 study was noted as evaluating the use of telemedicine in unexpected disasters in Tehran. No studies were conducted on the use of telenursing during incidents, although the use of telemedicine during disasters was documented in other countries.

### **Who has Participated in Telehealth Programs?**

In most of the studies, physicians (14 papers) and nurses (8 articles) participated in the telehealth programs.<sup>33,38,43-55</sup> A medical team participating in a mission providing humanitarian aid to Africa and Pakistan was trained in the use of telecommunication equipment and in telemedicine concepts.<sup>54</sup> To ensure the feasibility of telemedicine in disaster triage, the physician had an audiovisual interface with the paramedic team and was able to observe the victims remotely.<sup>49</sup> In a rapid deployment of international tele-intensive care services to war-torn Syria, nurses were trained in presentation and to receive and implement telephone orders from distant providers.<sup>50</sup> After Hurricane Katrina, physicians and nurses provided diagnostic and therapeutic services via telemedicine to 450 patients.<sup>53</sup>

### **In Which Disasters Have Telehealth Programs Been Used and What Communication Types Have Been Employed?**

The results of the studies showed that 41% of the studies were about telemedicine programs for natural disasters, such as earthquakes and storms.<sup>38,48,53-56</sup> One article described the telemedicine program used during war,<sup>50</sup> and 5 articles described its use in exercise conditions.<sup>33,44,45,49,52</sup> After an earthquake in Pakistan, most of the teleconsultation for injured people was available for infectious diseases, burns, trauma, and intensive care.<sup>54</sup> A multinational telemedicine system for disaster response was developed and tested successfully by the Euro-Atlantic Disaster Response Coordination Centre in Ukraine in 2015.<sup>44</sup> Various types of consultation were provided for Syrian patients through the tele-intensive care unit (ICU) program launched in December 2012 and planned to support 10 more hospitals in early 2016.<sup>50</sup>

In this review, 70% of communication was implemented via the Internet and satellite.<sup>33,38,44,46,49-57</sup> The INMARSAT satellite was used in Najaf Shoal Hospital to provide care for people injured by an earthquake in Pakistan.<sup>38</sup> In the postdisaster Gulf Coast recovery initiatives via telehealth in the United States, the Internet was used to promote mental health needs.<sup>56</sup> The Syria tele-ICU program used satellite and the Internet to triage victims, manage postoperative care, provide orders to the nursing staff, and direct transfers among local hospitals or to Turkey.<sup>50</sup> In unexpected disasters in Tehran, information regarding those injured in the disaster area was transferred via satellite to the central hospital.<sup>33</sup>

### **What Were the Key Outcomes of These Telehealth Programs? Teleconsultation**

In most of the studies (52%), telemedicine was used to provide consultation for trauma, burns, ophthalmology, doses of drugs, radiology, and infectious diseases.<sup>33,38,44,48,50,54</sup> Teleconsultation was available for those injured during the Pakistan earthquake and suffering from diseases such as tetanus in infants, diphtheria, malaria, and sepsis in children with malnutrition.<sup>54</sup> Furthermore, the victims of a chlorine-gas attack in Idlib, Syria, who were experiencing acute respiratory distress were cared for by the tele-ICU program.<sup>50</sup>

### **Guidance During Disaster Triage**

One article focused on the role of telemedicine in disaster triage. The time taken and accuracy of triage of 2 groups of patients, with and without the use of telehealth, were compared.<sup>49</sup>

### **Treatment and Diagnosis**

Three articles reported that telemedicine influenced diagnosis and treatment.<sup>38,54,55</sup> Humanitarian support missions in Africa and Pakistan using telemedicine led to a change in the diagnoses and treatment of patients.<sup>54</sup> Among the patients referred to Najaf Shoal Hospital after the Pakistan earthquake, 21% of the diagnoses were altered.<sup>38</sup> Medical consultation via a telemedicine spacebridge after the earthquake was provided by remote specialists in Armenia and Russia, who gave noteworthy assistance to the on-site physicians.<sup>55</sup>

### **Unnecessary Referral Cases**

Three studies reported the use of telehealth with reductions in unnecessary patient transfers.<sup>33,38,52</sup> Unnecessary referrals after natural disasters were reduced by approximately 43% after the implementation of telehealth.<sup>38</sup> Furthermore, in simulated conditions, telehealth was very effective in reducing the average transportation time to specialized centers.<sup>52</sup> Telehealth was beneficial in preventing medical mistakes, increasing the preparedness of medical teams in central hospitals, encouraging the correct and faster treatment of injured people, and increasing their chances of survival.<sup>33</sup>

### **Discussion**

The occurrence of natural and human-caused disasters can result in a number of injured victims. Health care responses are often impeded by overwhelming numbers of patients and limited available personnel and resources.<sup>58</sup> Thus, telehealth can be applied to enhance the surge capacity of the health care system and the speed and effectiveness of medical and nursing responses.<sup>52</sup> Few studies have been conducted in this area, and, according to

the research aims and questions, our discussion of this study can be categorized as follows: (1) clinical team, (2) disaster and communication types, and (3) key outcomes.

### **Clinical Team**

A shortage of specialized clinicians, such as physicians and emergency nurses, at the time of an incident is a challenge for health care systems. Thus, information and communication technologies are valuable tools for the diagnosis and treatment of injured people.<sup>59</sup> The results of this systematic review showed that physicians and nurses play a crucial role in telehealth programs. In 47% of these articles, nurses participated in the implementation of programs. Various studies have been conducted on the impact of telenursing on care under normal conditions. However, we did not find 1 article in the field of telenursing care during disasters. Mead et al<sup>54</sup> reported that during the deployment of a telemedicine operation in support of humanitarian operations in Africa and Pakistan, military physicians provided health care. In a study by Doarn et al,<sup>44</sup> physicians, nurses, and paramedics participated in exercises for the Euro-Atlantic Disaster-Response Coordination Centre in Ukraine in 2015. In 24 minutes, the telemedicine field kit was assembled and a live audiovisual teleconference connection was established between a US Army physician and a Romanian physician. Maghroubieh et al<sup>50</sup> indicated that nurses were familiarized with telemedicine concepts.

There is a shortage of experienced health care workers during incidents, especially in under-resourced and impassable areas. Therefore, in such conditions, telenursing care can play a significant role in reducing physical, psychological, and spiritual injuries, and complications. Consequently, we propose the use of telehealth technology in remote areas where there is a shortage of nurses.

### **Disaster and Communication Types**

Natural and human-caused disasters have devastating effects on the lives of populations and infrastructure.<sup>44</sup> However, telehealth increases the speed, accuracy, and quality of care for injured people and decreases mortality.<sup>60</sup> Another finding of this review was that telehealth programs were implemented successfully after natural disasters, such as earthquakes. After the December 1988 earthquake in Armenia, the National Aeronautics and Space Administration established the first international telemedicine project.<sup>44</sup> Meade et al<sup>54</sup> described the successful implementation of a telemedicine project in a field hospital after the Pakistan earthquake of 2005. The deployment of the tele-ICU program in several Syrian hospitals was one of the most successful telemedicine technologies of the war.<sup>50</sup> Furthermore, Kim et al<sup>56</sup> reported that telepsychiatry was used during the postdisaster recovery of the Gulf Coast. As natural and human-caused disasters are an annual occurrence in most countries, producing grievous economic, social, and health costs, the use of modern technologies at different stages of the disaster management cycle becomes necessary.

Disaster management is feasible with the use of new communication technologies, especially the Internet and satellite.<sup>33</sup> During emergencies, communication with the outside world could be provided as simply as through a voice lifeline, or it could be more advanced.<sup>61</sup> The results of the present study show that in disasters, the Internet and satellite were the main communication technologies used for data transmission. The INMARSAT satellite was used in Najaf Shoal Hospital to provide care for earthquake victims.<sup>38</sup> A study by Maghroubieh et al<sup>50</sup> described the use of the Internet and mobile satellites to communicate and send images of the victims of the Syrian war. Furthermore, in a study by Ziadlou,<sup>33</sup> a variety of communication devices were described as being used in emergencies, and a satellite was used to send information from the field hospital to the specialized centers. In the fifth economic, development, and social program of Iran, telehealth technology was considered an opportunity for increasing community access to health care services.<sup>62</sup> Therefore, policymakers and disaster managers should attempt to improve the communication infrastructure in different parts of the country for better health management.

## Key Outcomes

Telehealth plays an important role in the phases of disaster management. For example, in the acute response phase, telehealth can assist with triage, relief, rescue, and logistic coordination.<sup>63</sup> The findings of the systematic review showed that various types of teleconsultation, the triage of the injured, reductions in unnecessary referrals and time-wastage, changes in the diagnoses, and treatment of the injured were the advantages of telehealth in disasters. As reported by Meade et al,<sup>54</sup> teleconsultation was available in a field hospital for those injured in the Pakistan earthquake and experiencing infectious diseases, burns, and trauma. It was possible to provide a variety of consultation for victims of war with multiple traumas with the deployment of a tele-ICU program in more than 10 Syrian hospitals.<sup>50</sup> After the unprecedented floods in Chennai in India, 130 patients suffering from vector-borne, water-borne, and airborne diseases were treated by telemedicine.<sup>48</sup> Jamal et al<sup>38</sup> showed that unnecessary referrals after natural disasters were reduced by approximately 43% after the implementation of telemedicine. Li et al<sup>45</sup> discovered that the success rate of nursing care using an intelligent robot is approximately 78% during the outbreak of contagious diseases, such as Ebola. Ziadlou<sup>33</sup> revealed that out of 20 injured people, 7 were treated at the site using telemedicine, and the preparedness of medical teams, along with the rate of lifesaving, was twice as high as for disaster relief provided without telemedicine. However, several telehealth challenges and barriers must be addressed before providing a disaster response. These include medico-legal issues, technical difficulties, and organizational cultures.<sup>64</sup>

## Limitations

This study, conducted to investigate telenursing care in disasters, has several important limitations: (1) The studies included for review were published in the English language, meaning that potentially relevant research published in other languages was excluded. (2) We did not have access to some databases, such as CINAHL. (3) Selecting articles for a systematic review involves at least some reviewer bias, as judgment is involved in screening and selection. We attempted to mitigate the effects of this bias by involving multiple reviewers, both for the selection and for the subsequent analyses. (4) In the course of conducting this study, we combined studies with different methods. Therefore, generalization of the results should be considered with caution.

## Implications for Emergency Nurses

The range of application of telehealth during disaster incidents is significant. The implementation of telenursing programs in chronic care has led to an improvement in the quality of the care. Therefore, telenursing is helpful in cases such as wound management, trauma care, and triage during disasters. As observed from the published studies, telemedicine and telenursing have the potential for greater use in many regions of the world. The research assessed here has shown the potential for nurses' involvement in telehealth to improve care, including in the emergency nursing specialty.

## Conclusions

Disasters and incidents are an increasing cause of crises in Iran and other countries all over the world. The integration and application of communication and information technologies in disaster management may not prevent disasters but offer a significant tool for responding to them for the public good. The present study shows that one of the best solutions to help the victims of disasters and to access health facilities when specialists are unavailable is telehealth. In the face of the shortage of specialized nurses in disaster areas, a telenursing program will provide a new window for care. Therefore, efforts should be made to encourage telenursing for effective and quality care. This review identified a gap in the published literature on telenursing care in disasters; hence, its results can be used in educational and clinical areas of the nursing curriculum and for further research.

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**Author Disclosures**

Conflicts of interest: none to report.

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Items	Response	
Yes	No	1.Backg round of the study clearly explained/state of the art
		2.Object ive is clear
		3.Descri ption/mo tivation of selectio n of studies
		4.Descri ption of the study characte ristics included is clear

		5. Presentation of results (paragraphs, tables, synthesizing of data)
		6. Conclusion is clear
		7. Conflict of interest is stated

Author name	Year	Article type	Sample size	Location	Medical staff	Disaster type	Communication	Key outcomes	Quality assessment
Stanescu et al <sup>4</sup>	2018	Original (Qualitative; program development)	536 (participants)	Romania	Physicians, nurses, and paramedics	Mass-casualty incident		Electronic system for large-scale events needs technical equipment, dedicated software, remote databases, and interlink capabilities.	H
Doarn et al <sup>4</sup>	2018	Original (No details; program evaluation)	No details	United States	Physician, nurse, and paramedics	Exercise	Satellite	MnTS in the Euro-Atlantic Disaster Response Coordination Centre's Exercise (Ukraine 2015) was operated and successfully tested.	H

Li et al <sup>4</sup>	2017	Conference paper (No details; program development)	No details	US	Nurse	Simulation		TRINA had been developed and its capabilities for performing standard nursing tasks were evaluated in the simulation laboratory of a nursing school.	H
Kazi et al <sup>4</sup>	2017	Original (case study; program development)	49,131 (outpatient encounters)	India	Physician	Mass-casualty incident	Internet	The use of mobile technologies for conducting disease surveillance and monitoring resource use at the Allahabad Kumbh Mela in India was evaluated successfully.	H
Sandre et al <sup>4</sup>	2016	Original (mixed methods; program evaluation)	6 (participants)	Canada	Physician and nurse			Refugees face considerable challenges to access health care services and telemedicine improved access.	H
Amar nath et al <sup>4</sup>	2016	Original (quantitative; program evaluation)	130 (victims)	India	Physician	Flood		Teleconsultation is a need for disaster preparedness and early warning alarms to the public to prevent disease transmission and outbreaks.	H
Cicer o et al <sup>4</sup>	2015	Original (quantitative; program development)	20 (patients)	US	Physician and paramedics	Exercise	Internet	The physician had an audiovisual interface with the paramedic team that could observe the victims remotely.	H
Mouh rabi eh et al <sup>5</sup>	2014	Original (No details; program evaluation)	No details	Syria	Physician and nurse	War	Internet and satellite	Early experience implementing the Syria tele-ICU program demonstrated that communication technology to provide clinical critical care from thousands of miles away is widely available.	L

Ziadiou <sup>33</sup>	2013	Conference paper (No details; program evaluation)	No details	Iran	Physician and nurse	Exercise	Satellite	In this research, for the first time in Iran, telemedicine devices and telecommunication systems had been verified and proposed for application in the structure of crisis management.	L
Lupu et al <sup>5</sup>	2013	Conference paper (No details; program development)	No details	Romania	Physician	Types of incidents	Internet	This telemedicine system consisted of 3 parts, and one of its main purposes was to provide a shorter and faster intervention.	L
Kim et al <sup>5</sup>	2013	Original (qualitative; program evaluation)	38 (patients)	US		Hurricane Katrina	Internet	Since 2005, the RCC at Morehouse School of Medicine supported telehealth to meet high service needs (eg, psychiatry).	H
Xiong et al <sup>5</sup>	2012	Original (simulation study; program evaluation)	2 (cases)	US	Physician and first responder	Exercise	Internet	Telemedicine hub model provided a useful planning and training platform for regional disaster response preparations and might improve the coordination of resources.	H
Arriaga et al <sup>5</sup>	2010	Original (retrospective study; program evaluation)	450 (patients)	US	Physician and nurse	Hurricane Katrina	Internet	A combined store-and-forward and real-time telemedicine delivery model for 450 patients was implemented after Hurricane Katrina.	H



Mead et al <sup>5</sup>	2007	Original (descriptive; program evaluation)	No details	Africa and Pakistan	Medical officer and trained medical personnel	Humanitarian operations and earthquake	Internet	In September 2005, a telemedicine program was successfully operated during a 3-week period for the civilian population. In addition, after the Pakistan earthquake, this team provided teleconsultation for injured people.	L
Jamal et al <sup>3</sup>	2007	Conference paper (case study; program development)	28 (patients)	Pakistan	Physician	Earthquake	Satellite	Telemedicine program after the Pakistan earthquake (2005) was used at the Najaf Shoal Hospital to provide health care services.	L
Sadiq et al <sup>5</sup>	2006	Conference paper (No details; program development)	No details	Japan		Types of incidents	Mobile satellite	Mobile telemedicine package can be carried and transported easily by vehicles to disaster-stricken areas. In addition, the type of incident, medical equipment, the type of vehicle, and the communication method were considered.	L
Houtchens et al <sup>5</sup>	1993	Original (report; program development)	209 (patients)	US	Physician and nurse	Earthquake	Satellite	In Telemedicine Spacebridge project, during 12 weeks of operations, 247 Armenian and Russian and 175 American medical professionals participated.	L

## DETAILS

**Subject:** Emergency medical care; Clinical outcomes; Health care; Databases; International languages; Systematic review; Public health; Telemedicine; Nursing care; Specialists; Earthquakes; Nurses; Teams; English language; Technology; Literature reviews; Disasters; Disaster medicine

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# The Impact of Bed Traffic Control and Improved Flow Process on Throughput Measures in a Metropolitan Emergency Department: JEN

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## ABSTRACT (ENGLISH)

### Introduction

ED crowding is a complex phenomenon that presents many challenges to patients, hospitals, and staff. Using Lewin's change model, we implemented an ED improvement plan, including an innovative bed traffic control and improved flow system. We hypothesized that this plan would reduce door-to-provider time and emergency medical service-offloading time, decrease the length of stay and number of patients leaving without being seen by a physician, and increase overall patient satisfaction.

### Methods

We examined the ED improvement plan's impact on institutional throughput metrics over a 4-year period (2015-2019). Data on door-to-provider time, door-to-discharge time, patient volume, leaving without being seen by a physician, and patient satisfaction by Press Ganey were analyzed.

### Results

Between 2015 and 2018, the median door-to-provider time decreased 56.9% and the median door-to-discharge time decreased 29.6%. Percentage of patients who left without being seen by a physician decreased 73.8%. In 2018, the patient satisfaction rank increased by 16 points (84.2% increase). Emergency medical services-offloading time decreased significantly, prompting a change of the 30-minute cutoff to 20 minutes. In 2018, 0.84% of patients had an offloading time of more than 20 minutes. Preliminary 2019 data show maintenance of this trend for all hospital metrics.

### Discussion

Implementing a pod system, with flow and bed placement managed by bed traffic control, reduced door-to-provider time, door-to-discharge time, leaving without being seen by a physician, emergency medical service-offload time, and increased patient satisfaction. Our results may provide a model for other emergency departments to effectively manage the challenges of crowding.

## FULL TEXT

### Contribution to Emergency Nursing Practice

- The current literature on hospital-based emergency care indicates that crowding in emergency departments has a negative impact on patient health; this practice improvement plan was implemented to improve ED hospital metrics and increase overall patient satisfaction by decreasing ED crowding.
- This article contributes to the effort to reduce ED crowding by presenting an improvement plan that successfully decreased door-to-provider and door-to-discharge times, decreased the number of patients who left without being seen by a physician, and increased patient satisfaction. Door-to-provider and door-to-discharge times met and exceeded the Centers for Medicare and Medicaid Services' guidelines.
- Key implications for emergency nursing practice found in this article are improved emergency medical service relations and nursing-staff retention.

## Introduction

ED crowding presents many challenges for patients, staff, and hospitals and affects the operation and patient care. According to the Institute of Medicine, crowding of emergency departments was considered a national epidemic in 2006.<sup>1</sup> A decade later, crowding continues to be a problem for emergency departments both nationally and globally.<sup>2</sup> Various studies have shown that prolonged ED wait times and long visit lengths correspond to reduced quality of care and increased adverse events for patients with serious illnesses.<sup>3-8</sup> Long wait times result in patients leaving the emergency department without being seen, an issue that not only can have a worrisome impact on patient safety but also can present negative implications on hospital revenue.<sup>9,10</sup> Many other issues are encountered as crowding and wait times increase, including employee turnover, which leads to overburdened staff and associated adverse cost effects;<sup>11</sup> inability to offload emergency medical services (EMS) in patients in a timely manner;<sup>12,13</sup> poor outcomes resulting from extended wait times,<sup>5,14-16</sup> increased medical errors and patient mortalities;<sup>16-19</sup> difficulty meeting patient satisfaction,<sup>20</sup> and increased hospital operating costs.<sup>21</sup>

Managing ED crowding is a multifaceted problem. The triage of critical care patients, assignment and identification of bed availability across the hospital, and constant relay of information regarding patient influx and treatment status present challenges to all emergency departments to ensure optimal throughput. Various methods have been employed at emergency departments across the United States to address the challenges of crowding. One common method is the fast-track approach, a triage-based system in which a designated area is created for low-acuity ED patients to be rapidly seen.<sup>20</sup> This concept is not new to emergency departments and has been shown to successfully reduce the length of stay, increase patient satisfaction, and improve overall ED throughput.<sup>20,22,23</sup> Other triage-based protocols and front-end approaches employ strategies such as the physician-first approach,<sup>24,25</sup> the vertical patient model,<sup>26</sup> the use of a physician in triage,<sup>27</sup> and immediate rooming.<sup>28</sup> Despite the positive results and efforts to implement these strategies, emergency departments often continue to experience difficulty in managing a high influx of patients, which leads to the negative downstream effects of crowding.

In addition, our adult-only emergency department has encountered the challenges that crowding presents. As a metropolitan emergency department, we experience a high volume of patients, closely approaching 100,000 visits per year, and we continue to see a steady increase in net volume from year to year. After observing several emergency departments, and after our unsatisfactory results to mitigate ED crowding with methods such as the physician-first approach, we recognized the need to change the intake process and overall management of patient flow. To improve hospital metrics, an improvement plan was implemented and investigated for an approximate 4-year period. The improvement plan included (1) rebuilding triage to allow for direct collaboration between triage nurses and registration; (2) the creation of a novel bed traffic control (BTC) to manage bed usage and placement to ensure even distribution of patients on the basis of medical needs; (3) the use of a new pod-organization system; (4) the implementation of Flow 1.0 for minimal-risk Emergency Severity Index (ESI) 4 and 5 patients and Flow 2.0 for upright ESI 3 patients.

## Methods Study Design

The ED improvement plan focused on patient management and intake restructuring. The plan was developed and implemented using Lewin's model (unfreezing, changing, and refreezing), which is widely accepted in psychology for implementing change.<sup>29</sup> During the unfreezing stage, the nurse management met with the ED team. The ED team recognized that there was a need for improvement on the basis of hospital metrics and inefficiency, long waiting-room times, and unbalanced workflow because of silos. The change phase took place in stages, with different processes being implemented at different times. Feedback from the ED team was requested throughout the change

stage. For the final refreeze stage, department work instructions and stable organization charts were created. The processes implemented have become the standard and require minimal leadership intervention. The end points for the ED improvement plan were time from door-to-provider, door-to-discharge, and percentage of patients who left without being seen by a physician (LWSP). Door-to-provider was defined as the duration of elapsed time in minutes for a patient to see an advanced practice provider (APP), including physician assistants and nurse practitioners, after they register. Door-to-discharge was defined as the duration of elapsed time in minutes for a patient to be discharged from the emergency department after they register. LWSP described the percentage of patients who registered but were not seen by a physician. Press Ganey was used to access and score patient satisfaction. The patient satisfaction survey used by Press Ganey is known as the Hospital Consumer Assessment of Healthcare Providers and Systems survey. Mean Press Ganey scores were compared and ranked against the Press Ganey database and emergency departments with 70,000 or more patient visits per year. The Press Ganey ranking system involves a percentage scale from 1 to 100, with 1 being the lowest and 100 being the highest rank. The hospital does not require institutional review board approval for process improvement projects. All patient data were deidentified, and Hospital Consumer Assessment of Healthcare Providers and Systems surveys for Press Ganey were anonymous and voluntary.

### **Rebuilding Front Triage Process**

Within the emergency department, the triage area was the only area that was physically rebuilt. Before the rebuilding, nurses were unable to efficiently use the triage space because of the lack of lobby visibility and crowding. During lobby rebuilding, the waiting room was not affected. The newly designed triage area combined the triage and registration areas into 1 front desk in the lobby, improving the nurses' ability to immediately view incoming patients and communicate seamlessly with registration. The triage area was composed of 3 rooms, set up as routine care rooms. Two of these rooms were used for the Flow 1.0 process (detailed in section "Flow 1.0"; <sup>Figure 1</sup>), and the remaining room was used for obtaining electrocardiograms, conducting physician consultations, or drawing blood during high-patient-volume periods.

### **Bed Traffic Control**

An innovative process in our emergency department, BTC, was first implemented in April 2016. No additional full-time employees were needed to support BTC; existing staff were reassigned. BTC was designed to function as the command center of the emergency department, where 1 designated charge nurse could effectively manage patient bed assignments for the entire emergency department. BTC was responsible for assigning each bed placement (except flow) for all patients entering the emergency department (including EMS), initiating an escalation plan if all beds were full, and tracking critical care patient placement (<sup>Figure 1</sup>). All communication related to patient care from physicians, APPs, nurses, and EMS came through BTC. As BTC directed patient placement in all pods, the designated BTC charge nurse used a laminated tracking tool to visually manage bed assignment, nurse assignment, and ESI level at 1 location. A tracker allowed BTC to distribute patients in the round-robin approach (equal assignment using a rotation method) to the nursing team. In addition, BTC used the round-robin approach for bed assignments for critical care patients to prevent overloading 1 nurse with multiple high-acuity patients. For example, if 2 high-acuity patients present to the emergency department, BTC charge nurse may assign 1 patient to the orange pod and the other to the green pod, depending on the current patient load. BTC will then track the progress of these high-acuity patients and bypass the additional placement of high-acuity patients in the orange and green pods until the patients have been provided necessary care. BTC is always aware of bed availability and patient load in each pod. If needed, BTC will initiate escalation plans if all pods are full or if a critical care patient comes into the emergency department and no beds are available.

## Pod System

Before the use of the pod system in April 2016, the emergency department used a system of separate zones of acute care, subacute care, and a lean track. The new pod system involved 5 different pods, differentiated by the following colors: yellow, green, blue, orange, and pink (Figure 1). Patients in ESI levels 1 to 3 could be cared for in any pod except in the pink pod. For the pink pod, patients in Flow 1.0 were with ESI levels 4 to 5 and patients in Flow 2.0 were with ESI level 3 (upright only). To ensure that patient workload was shared equally, patients were evenly distributed and adjusted accordingly by BTC in the round-robin manner among the yellow, green, blue, and orange pods. Each pod had an assigned physician and 4 nurses, and 1 charge nurse was assigned per 2 pods. The pod system required no construction, only redistribution of resources.

### Pink Pod

In January 2017, the leadership changed the ED pod flow process to include the pink pod. The main purpose of the pink pod was to prevent a bottleneck from occurring when high-acuity patients slow down the ability of the emergency department to quickly manage and discharge low-acuity patients. This outcome was achieved using 2 different flow processes for low-acuity patients in Flow 1.0 and Flow 2.0. If a patient in the pink pod presented with a higher-acuity need than what was originally assessed, the patient was reassigned to the appropriate pod (Figure 1).

### Flow 1.0

Flow 1.0, a provider-first flow model, used 2 triage rooms with APP coverage and nurses to effectively assess, treat, and discharge minor care (ESI 4 and 5) patients from the triage area. Patients were designated to this area on the basis of the initial triage assessment (ESI level). APPs and the nursing team performed assessment, care, and discharge from the same room. Patients were reassigned to an appropriate pod if they presented with a higher-acuity need than what was originally assessed (Figure 1).

### Flow 2.0

Flow 2.0 used 3 rooms inside the emergency department, flowing patients into the 12-chair results waiting area. Patients treated in this area were upright ESI 3 patients only. These 3 rooms were assigned 1 physician and 3 nurses (Figure 1). Although the lean care approach is similar to Flow 1.0, the patients coming to this area have a higher acuity. In a 12-hour shift, this area sees approximately 30 to 50 patients. Patients were reassigned to an appropriate pod if they presented with a higher acuity need than what was originally assessed (Figure 1).

## Statistics

Data from 2015 to April 2019 were collected in a single Microsoft Excel 2010 file. Data for 2019 were preliminary and were not included in statistical analyses. Data analyses were performed using the SPSS version 25 statistical software.<sup>30</sup> Year comparisons between the median door-to-provider times and door-to-discharge times were conducted using the Mann-Whitney U test. A *P* value of **Results**

Our emergency department experienced an 8.6% increase in inpatient volume from 2015 (88,431 patients) to 2018 (96,011 patients). The median door-to-provider time significantly decreased by 56.9% (32.5 minutes in 2015 vs 14 minutes in 2018; *z*-score = 4.13; *P* Table, Figure 2). Similarly, the median door-to-discharge time significantly decreased by 29.6% (197.5 minutes in 2015 vs 139 minutes in 2018; *z*-score = 4.13; *P* Table, Figure 3). The percentage of patients who LWSP showed an impressive decrease of 73.8% (1,892 patients [2.14%] in 2015 vs 534 patients [0.56%] in 2018) (Table, Figure 4). When hospital metrics from before BTC (2015) were compared with those after BTC (2017 and 2018), an improvement was noted across all parameters (Table). Preliminary data from 2019 showed continued improvement of hospital metrics and met Centers for Medicare and Medicaid Services' goals for all parameters (Figures 2-4).

Before 2015, our emergency department received an overall rating emergency room score of 77.4, placing the

hospital at the percentile rank 7 in the Press Ganey database. In hospitals documenting more than 70,000 patient visits, our emergency department received a percentile rank of 15. In 2018, the hospital received a score of 86.3, for a percentile ranking of 35 in the Press Ganey database. Out of the hospitals that documented more than 70,000 visits, the hospital earned a percentile rank of 57.

From August 2015 to March 2016, before BTC, the percentage of patients with an EMS offload greater than 30 minutes was between 7.6% and 14.4%. Beginning in April 2016, when BTC was first implemented, there was an 11.1% reduction in the EMS offload time of greater than 30 minutes. The reduction in the percentage of EMS offload greater than 30 minutes was maintained at fewer than 3.5% through December 2016 (Figure 5A). In the beginning of 2017, EMS offload time was expressed as offload times greater than 20 minutes rather than 30 minutes because of the drastic decrease in the EMS offload time, which made it impractical to use a 30-minute cutoff. By 2017, the greater-than-20-minute EMS offload percent hovered between 0.3% and 2.4%. There was continued improvement in 2018, and the greater-than-20-minute EMS offload percentage generally hovered between 1.0% and 0.3% throughout the year, with only 2 peaks above 1.0% at 1.9% in February and November. Similar offload times were maintained throughout the beginning of 2019 (Figure 5B).

## Discussion

Crowding is an issue that many emergency departments experience. Although crowding is a complicated phenomenon, at our emergency department, we have found that it can be managed to maximize throughput, thus minimizing the issues that can affect patient care, employee turnover, and patient satisfaction.

At our adult-only emergency department, crowding led to environmental chaos and, in turn, high employee turnover. Before process improvements, because of the inability to fill vacancies, 25% of our ED staff comprised travel and agency nurses. In 2015, with a net volume of 86,539 patients, our crowding issue was evident because of median door-to-provider time at 32.5 minutes, door-to-discharge time at 197.5 minutes, and 1,892 (2.14%) patients who LWSP. In addition, our emergency department was ranked in the seventh percentile for overall patient satisfaction. Our improvement plan was crucial to successfully change and improve our ED metrics. Nurse management first met with the ED team to discuss the state of affairs. The ED team recognized a need for change to improve hospital metrics and inefficiency, long waiting-room times, and the unbalanced workflow from using silos that created an unsafe and chaotic environment. The new ED improvement plan was presented at several staff meetings, and leaders ensured that the implementation of the plan would be a collaborative effort. Using Centers for Medicare and Medicaid Services' goals, initial efforts to improve crowding were implemented. Before the use of the pod system in April 2016, the provider-first approach model was used as well as a system of separate zoning of patients into acute care, subacute care, and lean-track zones. These initial changes demonstrated some success but still proved inadequate and inconsistent. Indeed, the pod system, particularly the pink pod, was developed after the observation of several emergency departments and our unsuccessful attempt at the provider-first approach.

The primary problem we encountered with the provider-first approach and traditional zoning system was the creation of bottlenecks. When the provider only performed an initial assessment and order placement for a patient before moving the patient to another area for treatment within the ED zones, bottlenecks consistently occurred. In addition, at times, the primary provider and the treating physician were not in agreement, further adding to the bottleneck effect. Although this approach allowed a patient to be seen by a physician in a timely manner, it did not improve the timeliness of discharge. Thus, the initial intent of the provider-first approach to optimize time and properly allocate patients on the basis of need was often thwarted. Consequently, the pink pod was formed to provide all care for ESI 4 to 5 (Flow 1.0) and ESI 3 (upright only, Flow 2.0) patients and discharge from the same room (Figure 1). The other pods in the pod system were designed to have an equal distribution of ESI 1 to 3 patients. We found that when the

low-acuity patient population was isolated from the interior of the emergency department, bottlenecks were eliminated, and the provider-first approach became effective.

Another major issue we encountered was high EMS patient offloading times. After BTC implementation, EMS offload times decreased significantly and were expressed as offload times greater than 20 minutes because it was impractical to use a 30-minute cutoff. From August 2015 to March 2016, the percentage of patients with EMS offload greater than 30 minute was between 7.6% and 14.4%. After implementing BTC in April 2016, the high-EMS-offload time percentage was reduced to 2.0%, and although variable, high EMS-offload-time percentage was maintained at low levels (Figure 5A). In addition, in 2017, the high EMS-offload-time (Figure 5B). In 2018 and 2019, the trend of low offload times continued, with the percentage of offload time greater than 20 minutes hovering at fewer than 1.9%. This approach has improved relations with our community EMS partners by improving turnaround time and creating an environment in which EMS chooses our hospital.

An additional challenge we encountered was the management of ED bed placement. Before BTC implementation, patient placement was the duty of multiple charge nurses with various competing responsibilities. We have found that assigning 1 charge nurse with the sole responsibility of overseeing BTC is more effective, ensuring that patient flow and bed usage are optimized. In addition, a structure of constant oversight has allowed for equal distribution of patients on the basis of severity and direct bedding for all patients arriving through EMS.

Although we saw noticeable improvements in EMS offload time with the initial implementation of BTC and the pod system in April 2016, it was not until we had combined several strategies in our processes that an impressive improvement in our metrics was observed. In January 2017, all processes, including the pod system, BTC, and the pink pod, with Flow 1.0 and Flow 2.0, were in place. In addition, the triage space was rebuilt to be used for Flow 1.0 and to improve the viewing and intake of patients. These combined processes led to a surge of improved performance in the emergency department that has since been maintained (Figures 2-5). As of 2019, our emergency department is no longer staffed by travel- and placement-agency nurses, and there is a standard cycle of staffing. Furthermore, hospital rank increased to 35th in Press Ganey database. Despite the net volume of patients increasing from 86,539 (2015) to 95,477 (2018), we observed a significant decrease of 56.9% in the median door-to-provider time, a significant decrease of 29.6% in the median door-to-discharge time, and an impressive decrease of 73.8% in the percentage of patients who LWSP (1,892 [2.14%] patients in 2015 vs to 534 [0.56%] in 2018).

### **Limitations**

One limitation of the study is that this process improvement plan has only been tested in one metropolitan hospital ED. This system may not improve metrics for all hospitals due to structural differences. In addition, this improvement plan was implemented through a novel combination of changes, making it difficult to conclude what change resulted in improved metrics.

### **Implications for Emergency Nurses**

The environment of the emergency department is often characterized as chaotic and unpredictable by both patients and nursing staff. As crowding continues to overwhelm emergency departments, the need for nurses to seek alternative strategies has never been greater. The implementation of the processes presented herein, including the use of our novel BTC and updated pod system, may not only improve patient throughput but also increase patient and employee satisfaction. Exploring processes similar to the ones we implemented and studied may provide flexible strategies to nurses in other emergency departments experiencing the negative effects of crowding.

### **Conclusions**

The combination of rebuilding triage and creating our novel BTC and updated pod system to manage bed usage and placement may have facilitated an improvement in our hospital metrics (door-to-provider time, door-to-discharge



time, LWSP, EMS offload time, and patient satisfaction). Because of our positive results, our process improvements may provide a model for other emergency departments seeking to manage the challenges that crowding presents.

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### Author Disclosures

Conflicts of interest: none to report.

Parameter	2015	2016*	2017†	2018	Mean change (2015 vs 2017)	% Change (2015 vs 2017)	Mean change (2015 vs 2018)	% Change (2015 vs 2018)
Volume	88,431	89,536	94,217	96,011	5,786	6.5	7,580	8.6
Net volume	86,539	87,391	93,517	95,477	6,978	8.1	8,938	10.3
Door-to-provider (min)	37	28	17	15	-20	-54.1	-22	-59.5
Door-to-discharge (min)	204	199	147	140	-57	-27.9	-64	-31.4
LWSP	1,892	2,145	709	534	-1,183	-62.5	-1,358	-71.8
LWSP% of patients	2.14	2.40	0.75	0.56	-1	-65.0	-2	-73.8

## DETAILS

**Subject:** Emergency medical care; Patient safety; Hospitals; Patient satisfaction; Crowding; Traffic control; Physicians; Emergency services; Registration; Length of stay; Nursing; Departments; Nurses; Health services; Critical care

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# Prevention of Fogging of Protective Eyewear for Medical Staff During the COVID-19 Pandemic: JEN

[ProQuest document link](#)

## ABSTRACT (ENGLISH)

In China, there have been 84,338 cases and 4,642 deaths.<sup>4</sup> As of February 29, 2020, an estimated 42,000 medical personnel have served as frontline staff and have been indispensable during this worldwide pandemic.<sup>5</sup> More than 3,000 personnel in Hubei Province, China, were infected during the early stage of the pandemic because knowledge pertaining to the prevention and control of the virus was lacking.<sup>6</sup> One medical staff member became infected despite wearing protective equipment and an N95 mask; the initial manifestation was unilateral conjunctivitis, which was followed by fever a few hours later.<sup>7</sup> Many studies have noted the importance of wearing goggles to protect the eyes from severe acute respiratory syndrome coronavirus 2 infection when in contact with patients.<sup>8-11</sup> Through interviews with the medical staff at our hospital in Wuhan, China, we learned that the fogging of goggles was a problem when caring for COVID-19 patients. Maokang (Maokang Medical),<sup>12</sup> Blue Moon (Blue Moon [China] Co Ltd),<sup>17</sup> and Jiemiejing (Wuhan East Lake Star Technology Co, Ltd).<sup>18</sup> Five articles reported that antifogging sprays were used;<sup>12-15,17</sup> in 4 of these studies, a spray designed for swimming goggles or car headlights was used, but the brand was not specified.<sup>12-15</sup> Five articles reported that an iodophor could be used to prevent fogging.<sup>12,14-17</sup> One article reported that the antifogging effect of iodophor was better than that of an antifogging spray designed for swimming goggles.<sup>12</sup> However, in some cases the iodophor turned the goggle lenses brown, thus impairing the vision of the medical staff.<sup>12</sup> In addition, an iodophor generally takes longer than antifogging sprays (approximately 10 minutes) to dry completely. Three articles reported the following disadvantages of antifogging sprays: higher cost and the potential for damage to the eyes if sprayed incorrectly.<sup>12,13,15</sup> Two articles reported that using a film could prevent fogging.<sup>13,15</sup> However, this method has the disadvantages of high cost, curling of the film (causing discomfort to the wearer), tearing of the film (potentially damaging the skin of the wearer), and the possibility of allergic reaction.<sup>13</sup> Other studies used gels in a small number of subjects.<sup>16,17</sup> In conclusion, using washing-up liquid<sup>12,13,15,18</sup> or hand sanitizer<sup>12,15,17-18</sup> is the most effective method for preventing goggles from fogging.

## FULL TEXT

Dear Editor:

The coronavirus disease (COVID-19) has caused huge harm worldwide.<sup>1</sup> COVID-19 is transmitted from person to person and spreads very quickly.<sup>2,3</sup> Globally, 2,810,325 cases of COVID-19 have been confirmed by the World Health Organization, including 193,825 deaths, as of April 26, 2020. In China, there have been 84,338 cases and 4,642 deaths.<sup>4</sup> As of February 29, 2020, an estimated 42,000 medical personnel have served as frontline staff and have been indispensable during this worldwide pandemic.<sup>5</sup> More than 3,000 personnel in Hubei Province, China, were infected during the early stage of the pandemic because knowledge pertaining to the prevention and control of the virus was lacking.<sup>6</sup>

One medical staff member became infected despite wearing protective equipment and an N95 mask; the initial manifestation was unilateral conjunctivitis, which was followed by fever a few hours later.<sup>7</sup> Many studies have noted the importance of wearing goggles to protect the eyes from severe acute respiratory syndrome coronavirus 2 infection when in contact with patients.<sup>8-11</sup> Through interviews with the medical staff at our hospital in Wuhan, China, we learned that the fogging of goggles was a problem when caring for COVID-19 patients. Fogging impairs vision, thus hindering work efficiency when nurses collect blood, for example. This may lead to failure to collect blood properly or even to injury to patients. Furthermore, fogging may delay tracheal intubation and deep vein catheterization. However, washing and reusing goggles increases the chance of infection.

To help ED health care staff overcome the problem of fogging, we retrieved papers from the China National Knowledge Infrastructure, Wanfang Data, and SinoMed databases, and interviewed medical staff in our hospital who were caring for COVID-19 patients. Four methods to overcome fogging were commonly employed: using washing-up liquid or hand sanitizer, and application of antifogging agents or iodophors<sup>12-18</sup> (Table).

Three articles reported how washing-up liquid can prevent fogging;<sup>12,13,15</sup> in one of these studies, the Whitecat brand (Shanghai Hutchison Whitecat Co Ltd) was used.<sup>12</sup> Four articles reported that hand sanitizer was used to prevent fogging;<sup>12,15,17,18</sup> in 3 of these studies, the brand of hand sanitizer used was reported: Maokang (Maokang Medical),<sup>12</sup> Blue Moon (Blue Moon [China] Co Ltd),<sup>17</sup> and Jiemiejing (Wuhan East Lake Star Technology Co, Ltd).<sup>18</sup> Five articles

reported that antifogging sprays were used;<sup>12-15,17</sup> in 4 of these studies, a spray designed for swimming goggles or car headlights was used, but the brand was not specified.<sup>12-15</sup> Five articles reported that an iodophor could be used to prevent fogging.<sup>12,14-17</sup> One article reported that the antifogging effect of iodophor was better than that of an antifogging spray designed for swimming goggles.<sup>12</sup> However, in some cases the iodophor turned the goggle lenses brown, thus impairing the vision of the medical staff.<sup>12</sup> In addition, an iodophor generally takes longer than antifogging sprays (approximately 10 minutes) to dry completely. Three articles reported the following disadvantages of antifogging sprays: higher cost and the potential for damage to the eyes if sprayed incorrectly.<sup>12,13,15</sup> Two articles reported that using a film could prevent fogging.<sup>13,15</sup> However, this method has the disadvantages of high cost, curling of the film (causing discomfort to the wearer), tearing of the film (potentially damaging the skin of the wearer), and the possibility of allergic reaction.<sup>13</sup> Other studies used gels in a small number of subjects.<sup>16,17</sup> In conclusion, using washing-up liquid<sup>12,13,15,18</sup> or hand sanitizer<sup>12,15,17-18</sup> is the most effective method for preventing goggles from fogging. We hope that these findings will help ED staff overcome the problem of fogging of protective eyewear and improve their work efficiency when treating patients with COVID-19.—*Yuli Hu, MSc, Lan Wang, BSc, Sanlian Hu, MSc, and Fang Fang, BSc, Shanghai Jiao Tong University Affiliated Sixth People's Hospital, Shanghai, China; E-mail: liuliu9027@163.com [Sanlian Hu]*

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Yuli Hu, Lan Wang, and Fang Fang contributed equally to this work.

Method	Details	Fog-free duration (hours)
Using washing-up liquid <sup>12-13,15</sup>	Wipe the goggles evenly using gauze, toilet paper, or cotton swabs, dry, and use.	4-6 <sup>12</sup>
Using hand sanitizer <sup>12,15,17,18</sup>	Wipe the goggles evenly using gauze, toilet paper, or cotton swabs, dry, and use.	2-4, <sup>12</sup> ≤4, <sup>17</sup> 5-8 <sup>18</sup>
Application of antifogging agents <sup>12-15,17</sup>	Spray antifogging agent evenly, dry, and use.	≤2, <sup>12</sup> 1-3 <sup>17</sup>
Application of iodophor <sup>12,14-17</sup>	Pour iodophor on goggles directly or apply with cotton swabs, smear evenly, dry, and use.	≤2, <sup>12</sup> 4-6, <sup>16</sup> ≤4 <sup>17</sup>

## DETAILS

<b>Subject:</b>	Severe acute respiratory syndrome; Cotton; Severe acute respiratory syndrome coronavirus 2; Equipment; Hospitals; Eyes; Sanitizers; Washing; COVID-19; Conjunctivitis; Prevention; Discomfort; Pandemics; Respiratory diseases; Medical personnel; Technology; Coronaviruses; Motion pictures; Swimming; Disease transmission
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# COVID-19 Curve Guides India's Health Infrastructure Growth Needs: JEN

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## ABSTRACT (ENGLISH)

Economic slowdown has caused large-scale migration from the urban pockets, which in turn has led to an increase in the COVID-19 curve in India. [...]the government has started relaxing the lockdown to start various organized and unorganized economic sectors and to ease the movement of people in a bid to give relief to the ones in need. The other method is by natural infection where a sizable portion of the community is exposed to the virus in a controlled manner such that they develop antibodies in response and become immune to the disease.<sup>6</sup> In such natural infections, the major point to consider is the life span of the developed antibodies. The life span of antibodies developed against other coronavirus strains such as Severe Acute Respiratory Syndrome is 2 years whereas for Middle East Respiratory Syndrome, it is 4 years.<sup>7</sup> Although there are a few COVID-19 re-infection cases reported in South Korea, nothing conclusive has come out yet.<sup>7</sup> Easing of lockdowns in various countries without a vaccine in sight is building a case for naturally developed herd immunity.<sup>8</sup> The threshold population to reach herd immunity is linked to the reproductive rate of a disease ( $R_0$ ). Figure 2 shows a plot of the CDGR of total cases and active cases plotted from March 25 to May 25, 2020. Since March 25, 2020, India has had 4 lockdowns.<sup>16-19</sup> The first (March 25–April 14) and second (April 15–May 3) lockdowns had severe restrictions on the movement of people, and all nonessential services and activities were closed.

## FULL TEXT

Dear Editor:

The coronavirus disease 2019 (COVID-19) crisis has brought the entire world to a standstill over the past 4 months. Major countries across the world, including the United States, Spain, the United Kingdom, Italy, France, Germany, Russia, India, Iran, and Brazil have been prominent victims, with each country crossing the 100,000 mark for COVID-19 cases and the US going beyond 1.8 million cases.<sup>1</sup> Lockdowns, along with behavioral changes such as physical distancing, using face masks, frequently washing hands with soap, following respiratory etiquette, and updating self-health awareness are proving to be effective measures in slowing the COVID-19 curve in many countries. With the world staring at a potential economic recession, many countries across the world have slowly and steadily started easing their respective lockdowns in the hope that the aforementioned measures will prevent an uncontrollable rise in COVID-19 cases. In this letter, we discuss why the cases may keep on increasing, especially in countries with high population density pockets, analyze the growth rate of COVID-19 cases, define metrics leading to flattening of the COVID-19 curve, and also discuss the rate at which countries should scale up their health infrastructure in the coming months. Although the analysis is generic and could be applied to other countries as well, we have taken the example of India, which has conditions such as high population and population density, a large economically vulnerable population owing to multiple lockdowns, and developing health infrastructure. Multiple lockdowns since March 25, 2020 have helped slow the COVID-19 curve in India immensely and have given

much needed time to the central and state governments to scale up health infrastructure as well as to sensitize the population on various preventive measures, which will go a long way in keeping the curve within control in the coming months. Economic slowdown has caused large-scale migration from the urban pockets, which in turn has led to an increase in the COVID-19 curve in India. Thus, the government has started relaxing the lockdown to start various organized and unorganized economic sectors and to ease the movement of people in a bid to give relief to the ones in need. Such relaxations, coupled with the large population and population density, are likely to increase the number of COVID-19 cases in the coming months.

Highlighting the federal government structure in India, the COVID-19 containment strategy has been implemented state-wise. Various Indian states are adopting a strategy of 14 days of quarantine for any individual coming from outside the state. But the number of individuals coming from outside these states is huge. For example, Bihar is expecting a total of 2.7 million migrants to come back.<sup>2</sup> Institutional quarantine has its own infrastructural limitations. Home quarantine seems to be a possible option for asymptomatic and mildly symptomatic cases, but should be strictly implemented. The social fabric and the culture of joint (extended) families can help in the successful implementation of the home quarantine scheme. The states are aggressively ramping up the number of COVID-19 tests per day so as to comb through and detect, at least in the hotspots, all the positive cases that are already inside the state and are mostly asymptomatic owing to India's young population.

Combing through the entire population is an extremely difficult and nearly impossible task. India is currently carrying out more than 100,000 tests per day.<sup>3</sup> Even if India scales up to 400,000 tests per day (nearly what the US is doing right now), it will take 3,425 days (9.3 years) to test its population of 1.37 billion.<sup>3</sup> Even if we focus on combing only the hotspots, the high number of asymptomatic cases will keep on causing more hotspots at different locations, and further, a person tested today might get infected tomorrow because of easing of the lockdown norms.

The disease incidence usually decreases only when herd immunity is reached in a community. Herd immunity is a phenomenon where a considerable size of a community becomes immune to a particular communicable disease, thereby reducing the number of disease carriers.<sup>4,5</sup> Usually vaccination assists in achieving herd immunity but a vaccine for COVID-19 is still far away. The other method is by natural infection where a sizable portion of the community is exposed to the virus in a controlled manner such that they develop antibodies in response and become immune to the disease.<sup>6</sup> In such natural infections, the major point to consider is the life span of the developed antibodies. The life span of antibodies developed against other coronavirus strains such as Severe Acute Respiratory Syndrome is 2 years whereas for Middle East Respiratory Syndrome, it is 4 years.<sup>7</sup> Although there are a few COVID-19 re-infection cases reported in South Korea, nothing conclusive has come out yet.<sup>7</sup>

Easing of lockdowns in various countries without a vaccine in sight is building a case for naturally developed herd immunity.<sup>8</sup> The threshold population to reach herd immunity is linked to the reproductive rate of a disease ( $R_0$ ). The reproductive rate of a disease is the number of new individuals infected by an already-infected individual. If  $R_0 \geq 1$ , for COVID-19 is predicted to be between 2 and 3.<sup>9-11</sup> Thus, according to the equations given below, the threshold population to reach herd immunity should be between 50% and 66.66%.<sup>7,9</sup>

$$Y = \{(R_0 - 1)/R_0\} \times 100$$

thus, for  $R_0 = 2$ ,

$$Y = \{(2-1)/2\} \times 100 = 50\%$$

and for  $R_0 = 3$ ,

$$Y = \{(3-1)/3\} \times 100 = 66.66\%$$

In a country like India, with a population of 1.37 billion,<sup>12</sup> the threshold to reach herd immunity will be 913.2 million. The COVID-19 curve will flatten either when the total number of COVID-19 cases approaches the threshold herd immunity population or when all the current cases (both symptomatic and asymptomatic) are strictly isolated and no new cases are allowed into the population. Both conditions are extremely difficult to achieve, making it clear that COVID-19 is going to stay for a very long time.

The compounded daily growth rate (CDGR) calculated over 7 days, from January 28, 2020 to May 25, 2020, for India, US, Brazil, and Spain is plotted in <sup>Figure 1</sup>. The initial spikes are majorly due to a small number of cases, but a

generic trend observed in the plot is that lockdowns have played a significant role in slowing down the CDGR of the countries. The CDGR for countries such as the US and Spain over 7 days was 1.44% and 0.23% as of May 25, 2020, whereas in other countries such as India and Brazil, the CDGR over 7 days was 5.4% and 6.03% as of May 25, 2020. <sup>Figure 2</sup> shows a plot of the CDGR of total cases and active cases plotted from March 25 to May 25, 2020. Since March 25, 2020, India has had 4 lockdowns. <sup>16-19</sup> The first (March 25–April 14) and second (April 15–May 3) lockdowns had severe restrictions on the movement of people, and all nonessential services and activities were closed. From the third lockdown, norms were eased and movement of people was allowed in a graded manner. The major highlight of the third lockdown was the government's initiative to send back willing and in-need interstate migrants to their respective home states. Approximately 4.4 million migrants were sent back by train until May 25, 2020. <sup>20</sup>

Certain restrictions on movement, activities, and services will become a norm of the society until a vaccine is developed for COVID-19. The rate of increase in total cases, active cases, and recoveries during the third (May 4–May 17) and fourth (May 18–May 31) lockdowns shall give us an approximate idea on how the COVID-19 curve will progress in India and how India should scale up its health infrastructure in time. As seen in <sup>Figure 2</sup>, the CDGR of total cases and active cases show an excellent correlation across all stages of lockdown. The correlation across the 4 stages of lockdown is 0.99825 whereas the correlation across the third and the fourth lockdown is 0.841. The CDGR of total cases calculated from third lockdown onwards is approximately 5.32% whereas the CDGR of active cases over the same period is 4.26%. Active cases represent the total cases minus the total recovered and the total dead cases. This means that the Indian government has to scale up the health facilities for cases, which are increasing at a daily rate of 4.26%. It means supplies such as beds, ventilators, oxygen supplies, hospital staff, gloves, and personal protective equipment have to be scaled up accordingly.

On the basis of the severity of the cases, the patients are kept in COVID-19 health centers, COVID-19 care centers, and COVID-19 hospitals. Separate quarantine facilities are also available. Those with mildly symptomatic and asymptomatic corona cases are put on home care treatment routines as well. As of May 17, 2020, India has 916 dedicated COVID-19 hospitals with 180,473 beds (161,169 isolation beds + 19,304 intensive care unit [ICU] beds). In addition, there are 2,044 dedicated COVID-19 health centers with 128,304 beds (117,775 isolation beds + 10,529 ICU beds). Further, there are 9,536 quarantine centers and 6,309 COVID-19 care centers with 564,632 beds. <sup>21</sup> As of May 17, 2020, 3.1% patients needed ICU, 2.7% needed oxygen support and 0.45% needed ventilators. <sup>21</sup> These percentages have remained mostly stable across the course of COVID-19 in India. Taking these numbers into consideration, the <sup>Table</sup> shows the health infrastructure needs in the coming 3 months in India. India needs to focus all its might on reducing the CDGR of health infrastructural needs to as close to 0 as possible. At 0, the need of scaling up the health infrastructure will cease to exist.

The average of the daily percentage of new cases to the total active cases from May 4 to May 25, 2020 (since third lockdown) is 9.71% with a variance of 1.02. Similarly, the average of the daily percentage of recoveries and deaths to the total active cases over the same period is 3.82% with a variance of 0.88. If the daily new cases become equal to the daily recovered plus death cases, the CDGR of active cases becomes 0. Thus, another straightforward target is to bring the percentage of daily new cases to as close to the percentage of daily recoveries and deaths as possible. These numbers are averaged out and represent a macro level analysis. A similar regional analysis should be performed to frame policy guidelines. Similar analysis can be carried out for other countries as well.

With the lockdown being eased, it looks more prudent to focus on containing the spread within manageable limits. The government should focus on bringing the CDGR of active cases close to 0 or to bring the percentage of daily new cases as close to the percentage of daily recoveries and deaths with respect to the total active cases. This will reduce the health infrastructure growth needs of India. Virus containment efforts will be assisted by strategies including localized lockdowns; use of face mask; frequent hand sanitization; physical distancing of 6 feet; touchless, foot-controlled water dispensers; management policies on the basis of crowd density; promotion of work from home; adoption of digital payment; segmentation between patients in hospitals; sanitization of standard operating practices for public places including hotels, restaurants, taxis, and utilities; and sanitized handling of home food delivery.—



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Date	CDGR of active cases: 4.26%				CDGR of active cases: 1%			
Active cases/beds	ICU beds	Oxygen support	Ventilators	Active cases/beds	ICU beds	Oxygen support	Ventilators	
80,070	2,482	2,162	360	80,070	2,482	2,162	360	05-25-2020
98,641	3,058	2,663	444	84,155	2,609	2,272	379	05-30-2020
156,081	4,839	4,214	702	93,888	2,911	2,535	422	06-10-2020
236,880	7,343	6,396	1,066	103,712	3,215	2,800	467	06-20-2020
359,505	11,145	9,707	1,618	114,562	3,551	3,093	516	06-30-2020
545,610	16,914	14,731	2,455	126,548	3,923	3,417	569	07-10-2020
								07-20-2020

828,055	25,670	22,357	3,726	139,787	4,333	3,774	629	07-30-2020
1,310,250	40,618	35,377	5,896	155,957	4,835	4,211	702	08-10-2020
1,988,527	61,644	53,690	8,948	172,275	5,341	4,651	775	08-20-2020
3,017,927	93,556	81,484	13,581	190,300	5,899	5,138	856	08-30-2020
4,580,217	141,987	123,666	20,611	210,209	6,516	5,676	946	08-31-2020

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# Do No Harm: A Multifactorial Approach to Preventing Emergency Department Falls—A Quality Improvement Project: JEN

[ProQuest document link](#)

## ABSTRACT (ENGLISH)

### Introduction

Patient falls in the emergency department are a unique patient safety issue because of the often challenging nature of the environment. As there are a variety of potential causative factors for patient falls in the emergency department, this project employed a multifactorial approach to prevent patient falls in a Level 1 trauma center

emergency department (adult only) in an urban tertiary care teaching hospital.

### **Methods**

This project was a single-unit quality improvement intervention that compared postintervention monthly unit-level data to historic monthly rates on the same unit. The intervention was multifaceted with patient-level, nurse-level, and unit-level interventions employed. A task force was convened to review and identify specific departmental gaps related to fall prevention, complete a retrospective review of departmental patient falls to determine causative factors, and implement interventions to reduce ED falls. A comprehensive program consisting of an ED-specific fall risk assessment tool, remote video monitoring (RVM), stretcher alarms, and a robust patient safety culture, among other interventions, was implemented. Patient falls and falls with injuries were tracked as an outcome measure.

### **Results**

After data driven analysis of causation, selection of key interventions, staff education, and sustained focus for 2 years, the department experienced a 27% decrease in falls and a 66% decrease in falls with injuries.

### **Discussion**

A multifactorial approach was an effective strategy to decrease patient falls in the emergency department.

## **FULL TEXT**

### **Contribution to Emergency Nursing Practice**

- The current literature indicates that emergency department falls may be difficult to prevent and predict, however there is a significant gap in available research on this topic.
- This article contributes to the existing literature by describing a unique, multifactorial approach to emergency department fall prevention to include data review, fall risk assessment, remote video monitoring, exit alarm strategy, fall prevention culture, and communication.
- Key implication for emergency nursing practice found in this article: a multifactorial fall prevention program is necessary, as no single intervention can address all potential causes of patient falls in the emergency department.

### **Introduction**

Patient falls are a safety concern for emergency departments across the country. These events contribute to hospital admissions, increased patient morbidity and mortality, and in addition, to increased health care costs.<sup>1,2</sup> High patient volumes and the wide variety of patient acuities in the emergency department make it difficult to predict and prevent patient falls. Additional factors that have been implicated in ED falls include long distances to restrooms, acute illness states, intoxication, and departmental crowding.<sup>1,2</sup> As there are a wide variety of factors potentially leading to ED falls, it stands to reason that there could be a wide variety of interventions that may aid in preventing ED falls. Unfortunately, most fall prevention literature is related to inpatient falls, with limited ED-related literature and available screening tools.

The purpose of this article was to provide an example of how a comprehensive, ED-based fall prevention initiative was created and implemented, including the following components: triage-based fall risk assessment, application of new monitoring technologies, improved post event analysis, and awareness and recognition activities.

### **Background**

The National Database of Nursing Quality Indicators defines a patient fall as a sudden, unplanned descent to the floor (or other unintended surface), with or without injury.<sup>3</sup> The organization tracks and reports both falls and fall-related injuries to National Database of Nursing Quality Indicators as part of its quality improvement efforts. In the inpatient setting, both falls and falls with injury (FWI) rates are reported as the number of events per 1,000 patient days (number of events/patient days x 1,000).<sup>3</sup> In the emergency department, fall and FWI rates are reported as the number of events per 1,000 patient visits.<sup>3</sup>

This quality improvement project was conducted in an adult emergency department, Level 1 trauma center in an urban tertiary care teaching hospital that sees approximately 89,000 adults (aged 18 years and older) per year. It is part of a 3-hospital system with 3 additional stand-alone emergency departments and a separate children's emergency department. As the largest emergency department within the system, this emergency department's policies and clinical practices serve as the basis for much of the entire organization's ED operations.

Although systemwide efforts to eliminate preventable hospital-acquired adverse events had resulted in some success in reducing patient falls and FWI, a unit-level analysis identified emergency departments as a significant contributor of fall events for the organization. From October 2014 through September 2016 (Figure 1) the adult emergency department averaged 62 falls per year for a rate of 0.75 falls per 1,000 visits with approximately 15% of these falls resulting in injury (FWI rate 0.09 injury falls/1,000 visits). During this time, falls from patients in emergency departments across the organization contributed 8.4% of the total system falls.

Reducing the number of ED falls was identified as a critical focus for reducing overall system falls and improving patient safety outcomes. Given the relative size and patient volume of the adult emergency department in comparison to the other emergency departments within the system, unit-level leadership decided that initiating a quality improvement project within the adult emergency department would provide the best opportunity for program implementation and evaluation of outcomes.

### **Review of Key Evidence**

In emergency departments, falls may be difficult to predict and prevent with the acute nature of patient visits and the brief, episodic encounters.<sup>4-6</sup> A review of the current literature surrounding ED fall incidence and ED fall prevention revealed a significant gap in the research surrounding this topic. Most of the research done on the topic of fall prevention has been focused on inpatient hospital settings, including the design of fall risk assessment tools and recognition of fall prevention interventions.<sup>2,5,7</sup> In many hospitals, these inpatient tools have been applied to the ED setting despite lack of validation in these populations owing to lack of an ED-specific alternative.<sup>8</sup> It has only been in the last few years that small-scale and retrospective studies have been conducted in ED populations resulting in new insight and potential screening tools specifically for the ED setting.<sup>8,9</sup>

Recommendations for effective fall prevention programs generally include key elements such as (1) population identification, (2) risk factor screening, and (3) an individualized, comprehensive plan of care.<sup>8,10,11</sup> In addition, programs are encouraged to incorporate a multifactorial approach, working to address individual risk, environmental considerations, and staff knowledge and engagement along with policies and equipment that support fall prevention activities.<sup>10,12</sup>

Recent ED-based studies and improvement projects seem to indicate that modified versions of inpatient fall prevention tools and policies can be effective in the ED setting but there is a strong need for high-quality research on (1) at-risk populations in the emergency department, (2) ED-specific fall risk prevention activities, and (3) application of new technologies for screening, monitoring and preventing falls in the emergency department.<sup>4,7</sup>

### **Methods**

This project was a single-unit quality improvement intervention that compared postintervention monthly unit-level data to historic monthly rates on the same unit. The intervention was multifaceted with patient-level, nurse-level, and unit-level interventions employed. Statistical analysis of the pre and postintervention fall rates was conducted to establish if the changes were statistically significant ( $\alpha = 0.05$ ). As this work was consistent with a quality improvement project and was not considered research, the work was exempt from Institutional Board Review. At the start of this project, a fall prevention task force was convened, composed of emergency management, emergency nurses, and other emergency staff. The objectives of the task force were to (1) conduct a comprehensive

review of adult ED falls to identify trends, (2) identify the ED-specific gaps/needs related to fall prevention, and (3) implement interventions to reduce ED falls and FWI. The team worked with a clinical nurse specialist (CNS) with expertise in patient safety and fall prevention to provide consultation and to assist with the improvement initiative. The ED fall prevention task force met biweekly in addition to several small group meetings with ED clinical staff to better understand the unique challenges and current gaps in the ED fall prevention practices. An in-depth, retrospective review of fall data helped the task force to better identify the specific characteristics of the ED falls (eg, age, sex, diagnosis, timing, fall risk). A tour of the adult emergency department was conducted with the task force and CNS consultant to review concerns and challenges related to the environment and workflow. These findings were summarized and presented to ED leadership, the system falls committee, and adult ED nursing staff as an initial step to generate interest in the topic and encourage engagement from clinical staff.

The key fall prevention barriers identified by the task force were (1) departmental volume and acuity, (2) unit layout and flow (eg, line of sight, shared bathrooms), and (3) the lack of an ED-specific fall risk assessment tool. In addition to these challenges, the task force recognized the need for a strong fall prevention culture on the unit, backed by an engaged and supportive leadership team. Given the varied factors identified and recommendations found in fall prevention literature, a multifactorial approach to preventing falls, including risk assessment, unit culture, electronic medical record (EMR) updates, and novel patient monitoring interventions was initiated.

### **Interventions Data Review**

Although chart review and data analysis may not be thought of as an intervention, the success of this fall prevention initiative depended heavily on the initial analysis of ED falls data. Though many patients are identified as being “high risk” for falling, the reality is that most do not fall. Having additional information may aid staff to better predict falls. In addition to establishing baseline fall rates for the adult emergency department, chart reviews were completed to identify common factors and trends related to the falls. Where appropriate, findings were used to guide changes to care and operations based on identified factors. For example, although no significant time-of-day trends were noted, it was found that a disproportionate number of intoxicated patients had fallen, which highlighted the need for changes to the monitoring and bed assignment for these patients.

### **Fall Risk Assessment**

During the retrospective chart review it was calculated that the Morse Fall Scale (MFS)<sup>13</sup> had a specificity of 91% (low rate of false negatives) but only a 23% sensitivity (high fall risk score and went on to fall). Given the poor sensitivity of the MFS for patients in this emergency department, a literature search was conducted by the CNS to identify available ED-specific fall risk assessment tools. At the time, only 2 validated fall screening tools had been created for the ED environment—the KINDER 1<sup>8</sup> (Figure 2) and the Memorial ED Fall Screening Tool.<sup>9</sup> There were no published studies reporting the sensitivity or specificity of either tool, but adult ED leadership and key clinical staff reviewed both tools for potential use in the organization and the KINDER 1 was selected as a potential replacement for the MFS for adult patients in emergency departments across the system.

### **Remote Video Monitoring**

Although still a relatively new technology, video monitoring has been effective in reducing falls in the inpatient setting.<sup>14-17</sup> Remote video monitoring (RVM) was identified as a potential means to address the department’s challenging layout and to assist with the high volume and acuity. The organization had recently introduced 36 RVM devices to the inpatient setting, and following discussions with nursing leadership, 2 were assigned to the adult emergency department. These devices (Avasys TeleSitter, Avasure, Belmont, MI) were nonrecording, mobile video cameras that were monitored remotely by hospital staff (max 12:1 monitor-to-staff ratio). The devices had the capability to communicate directly with the patient or staff via a speaker in addition to the ability to sound a local

alarm if needed. RVM could be initiated without physician order on any patient that was identified at high risk for falling. The 2 RVM devices allowed for monitoring 400 to 450 patients per month (20%-25% of high fall-risk patients). Patient selection was based on the KINDER 1 score along with evaluation of the clinical team and nursing leadership and consideration of patient risk factors (eg, age, diagnosis, bed placement), staffing, and department acuity.

### **Exit Alarm Technology**

Bed (or stretcher) alarms are an intervention with mixed fall prevention effectiveness<sup>18</sup> and can contribute to alarm fatigue.<sup>19</sup> However, with the bay-based nature of the ED layout and challenges with patient monitoring, bed alarms were identified as a potential benefit for a comprehensive fall prevention program. At the time of this improvement project, the organization was in the process of purchasing new stretchers (Stryker Prime Series, Stryker, Kalamazoo, MI) and integrated bed exit alarm technology was a feature that was considered and ultimately purchased. Following equipment introduction and staff education, bed alarms were then incorporated into the plan of care for those patients identified as a fall risk during triage.

### **Fall Prevention Culture**

Although a successful fall prevention program requires policies and resources, it is the engagement, knowledge, and commitment of the staff and leadership that will sustain improvement. There were a variety of actions that were used to engage staff and generate buy-in and excitement regarding fall prevention. One activity was the creation of the "Catch a Falling Star" recognition program to recognize staff who had played a vital role in preventing a patient fall or injury. Staff were nominated by their peers or management team and were recognized on a unit display board, presented with a certificate, and given a small token of appreciation. In addition, milestone celebrations were held on the unit and signage that indicated the date of the last fall event was placed in the department and visible to staff, patients, and families.

### **Communication**

Poor communication is one of the most common contributors to adverse patient safety events.<sup>20</sup> Documentation of the KINDER 1 began the communication about fall risk between the triage nurse and the primary nurse and triggered a fall prevention plan of care. In addition, changes were made to the existing EMR to better communicate fall risk and fall history. Flowsheets were created for documenting the specifics of a patient fall, which then triggered an alert within the EMR in the form of a red banner across the top of the chart alerting staff that the patient had fallen during their current encounter. On subsequent encounters, the alert would populate to notify staff that the patient had fallen during a previous encounter.

### **Results**

With regard to fall risk assessment, screening of patients was consistent at more than 95% compliance using both the MFS (preimprovement) and the KINDER 1 (postimprovement). These assessments were all completed during the initial triage or by the primary registered nurse in the case of a direct ED admission. During the year following the change to KINDER 1, more than 80,000 patients were assessed with KINDER 1 with 31% reported as positive (ie, high fall risk). This was compared to the 10% of MFS screens that resulted in a high-risk assessment. Using these results and the patient fall data, the organization's KINDER 1 sensitivity was calculated at 68% (pre-MFS = 23%) and the specificity 68% (pre-MFS = 91%).

Outcome measures included both the adult ED fall rate (adult ED falls per 1,000 patient visits) and the adult ED FWI rate (adult ED injury falls per 1,000 patient visits). Baseline data were reported for the 8 quarters (January 2015 to September 2016) before the project's implementation. The implementation timeframe was identified as January 2017 to June 2017. The postimplementation time period was identified as July 2017 to June 2019. A *t* test (equal

variance, 2-tailed) was conducted on the pre- and postintervention data (fall rate and FWI rate) to determine the statistical significance ( $\alpha = 0.05$ ) of the changes in fall rates following the improvement program.

Figure 3 displays the results of the adult ED fall rate over these time frames. Figure 4 displays the adult ED injury fall rate for the same time. Following implementation of the improvement project, the fall rate decreased from 0.73 falls per 1,000 visits (pre) to 0.55 falls per 1,000 visits (post), representing a 25% decrease ( $t = 1.41$ ,  $P = 0.18$ ). The injury rate decreased from 0.09 FWI per 1,000 visits (pre) to 0.03 FWI per 1,000 visits (post), which was a 66% decrease in injuries ( $t = 2.29$ ,  $P$ ). These decreases represented 27 fewer falls and 10 fewer injuries over the 24-month postimplementation period despite a 3% increase in adult ED volume over this time frame.

## Discussion

As previously noted there has been a distinct lack of literature related to ED-specific fall prevention programs and interventions. Available fall risk assessment tools have either been inpatient-specific (not been validated for use in the emergency department) or ED-specific tools that have not been fully validated. As a result of this lack of evidence, this patient safety initiative incorporated interventions that were previously studied for use in the inpatient setting. However, by incorporating these interventions into a multifactorial fall prevention program to address the unique nuances of the ED setting we hope to fill this need for ED-specific fall prevention literature.

Understanding the underlying trends and patient safety gaps found in the fall events was a crucial initial step in this initiative. This knowledge laid the foundation for an effective fall prevention program. Once the key implicating factors were identified, interventions were chosen from the existing literature and implemented.

The use of RVM, although not new to the organization, was a new approach in the emergency setting. The utilization of RVM provided nurses with an additional means of ensuring that high-risk falls patients were still visibly monitored and communicated with, and that the nurse was alerted when needed. Use of RVM was encouraged for patients determined to be at risk for falling, such as intoxicated or altered patients or any patient who might benefit from continuous monitoring. If all RVMs were in use, exit alarms were available on all ED stretchers as were constant-observer staff, providing nurses with multiple monitoring strategies.

Implementation of the KINDER 1 not only enabled staff to assess patients with an ED-specific tool, but also contributed to the overall fall prevention culture. Staff appreciated the fact that the KINDER 1 allowed for nursing judgment, and it reinforced the belief that staff were empowered to assess for and prevent patient falls. By selecting "nursing judgment" on the KINDER 1, triage staff were able to identify patients who they felt were most in need of additional monitoring during their visit. By implementing this methodology, nurse leaders were able to keep the RVM in use and prioritize the needs of patients with the highest risk for falling.

Creation of a unit-based culture of fall prevention in a high-volume, high-acuity emergency department can be difficult and requires commitment and constant vigilance and encouragement from the department's leaders. With strong organizational and unit-based leadership support this project was implemented and ingrained into the culture of the adult emergency department. This culture was fostered and encouraged by the Catch a Falling Star Program, implementation of the KINDER 1, and unit-based celebrations when milestones such as a year without FWI were achieved.

As the fall rate within the department began to decline, staff recognized that ED falls were indeed more preventable than they previously believed, which further reinforced the fall prevention culture. Although the reduction in falls (27 less falls,  $t = 1.41$ ,  $P = 0.18$ ) may not be statistically significant, the impact of this program can be measured by other means. For example, without a fall, you cannot have a fall-related injury. Although it may be difficult to quantify, avoiding the associated legal and financial costs, in addition to the increased morbidity and mortality associated with fall-related injuries, is a significant and positive impact for this patient safety initiative.



## Financial Considerations

The purpose of this article was not to make a business case for a particular set of interventions but rather to explore a potential multifactorial approach to fall prevention in a setting not often studied. Two technologies (RVM and exit alarm technology) were included in this discussion, both representing significant potential cost to an organization. In the case of RVM, organizations would need to consider the potential up-front cost of the video monitors, software licensing, and ongoing payroll for monitoring staff. Although exit alarms on stretchers may represent significant additional expense, there are a variety of companies that produce portable, single patient-use exit alarms that could be implemented in the emergency department. Regardless of the initial and ongoing financial investment, organization savings were found to be present in costs associated with reduction of falls and FWI<sup>21</sup> in addition to far more significant savings related to reduced constant observer (or “sitter”) personnel costs.<sup>14,15</sup>

## Limitations

There were limitations to this project that could restrict generalizability and replication in other organizations. The potential for unreported or unobserved falls, in addition to misclassification of fall events may affect data reliability. Staff education regarding the fall prevention initiative and interventions was disseminated, however no measurement of the effect of this education on staff perception of patient falls and project engagement was collected. The lack of validated, tested ED-specific fall prevention tools and interventions was a limiting factor in the creation of this program. The type of emergency department (adult only Level 1 trauma center) may be a limiting factor in the generalizability of the findings to other ED populations.

## Key Implications for Emergency Nursing Practice

Patient falls in the emergency department can be difficult to anticipate and prevent owing to the challenging ED setting and patient population. In order to create an effective ED fall prevention program, a thorough investigation into unit-specific contributing factors is imperative. Once contributing factors are identified, appropriate interventions can be determined and implemented. Given the multiple factors present in most falls, a multifactorial approach to fall prevention is necessary. Fostering a robust fall prevention culture is of utmost importance to ensure staff buy-in and program sustainability. The continued success of this particular program is attributed to the fact that fostering a strong fall-prevention culture remains a high priority item for unit leadership, with continued emphasis on staff education and celebrations of unit successes.

## Conclusion

Preventing falls and fall-related injuries in the ED setting is of high importance owing to the implications of increased admission rates, length of stay, health care costs, and morbidity and mortality rates.<sup>1,7,8,12</sup> Patients present to the emergency department to get better, not to experience further injury or harm. However, nurses often consider patient falls in the emergency department to be an unavoidable occurrence related to the unpredictable, fast-paced nature of the setting. A closer analysis of patient fall events shows that many of these events could have been prevented with the appropriate screening, staff knowledge, and available equipment and resources. This improvement project demonstrated that a multifactorial fall prevention approach may allow emergency departments to better address this complicated problem. By closely examining the existing adult ED fall data, targeted interventions were implemented to improve the staff and department capabilities related to patient safety and fall prevention. These efforts resulted in a 27% decrease in adult ED patient falls and a 66% decrease in FWI. Novel interventions and technologies such as RVM, stretchers with exit alarms, and EMR updates coupled with staff education and the creation of a culture of fall prevention awareness created a sustainable fall prevention program.

## Author Disclosures

Conflicts of interest: none to report.

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# Reflecting on Our Duty as Nurses This Year: JEN

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## ABSTRACT (ENGLISH)

Hospitals that receive government funding from the Centers for Medicare and Medicaid Services must have certain emergency preparedness requirements in place to include 4 key areas: risk assessment, communication plan, policies and procedures, and training and testing.<sup>1,2</sup> These requirements are necessary for addressing the mitigation and preparedness phase. Whatever the volume of COVID-19 cases has been in our area, we all have had training on our new protocol(s) with isolation, what equipment we are using for personal protection equipment, and how/where we will be treating patients. During this phase of a disaster, we also focus on the mental health and well-being of those who have responded to ensure they are doing okay.

## FULL TEXT

This year has been a roller coaster ride for emergency departments across our country and internationally. As we reflect on what 2020 has been, most of us think about the global pandemic of coronavirus disease (COVID-19). However, many emergency departments have faced additional disasters both before COVID-19 and also while dealing with COVID-19.

Whatever emergency arises, you will find emergency nurses there taking on the challenge. This year, emergency departments have responded to disasters that have ranged from wildfires, earthquakes, and volcanoes to tornadoes and floods, to name just a few. We have always known that the world can change in a second in the emergency department and that we must be prepared for the unexpected. However, 2020 has certainly made this more apparent.

When we talk about disasters, we talk about the lifecycle of a disaster, which includes 4 categories: mitigation, preparedness, response, and recovery. The mitigation phase of a disaster is the phase in which we attempt to minimize the exposure/impact of the event. Preparedness is when we plan for the event from a training perspective and gather the list of supplies that we will need during the event. Response is the phase when the disaster has hit, and our normal operations have stopped. Recovery is the last of the 4 phases and is when we resume our "normal" operations. The cycle however is a circle, and so it continues, and we go right back to the first step of mitigation again.

As I reflect on 2020 and what we have faced from a disaster perspective, I believe we all have gone through or are in the process of going through all 4 phases. Hospitals that receive government funding from the Centers for Medicare and Medicaid Services must have certain emergency preparedness requirements in place to include 4 key areas: risk assessment, communication plan, policies and procedures, and training and testing.<sup>1,2</sup> These requirements are necessary for addressing the mitigation and preparedness phase. Whatever the volume of COVID-19 cases has been in our area, we all have had training on our new protocol(s) with isolation, what equipment we

are using for personal protection equipment, and how/where we will be treating patients.

We all have responded to the pandemic in 1 way or another. Some of us have had extra staff because of the increased surge of patients, some of us have had to create alternative treatment spaces to handle the volume, and others have had their shifts reduced owing to the overall ED volume being down. As in all disaster scenarios, each location faces different challenges and so requires different responses.

Recovery, the last phase of the cycle of a disaster, is when normal operations resume, and we rebuild. Yes, many places are reopening and patient volumes in the emergency department are leveling, and we are adjusting to our new "normal." During this phase of a disaster, we also focus on the mental health and well-being of those who have responded to ensure they are doing okay. One could argue that this is likely one of the most critical aspects and is yet sometimes overlooked.

This year was designated to be the Year of the Nurse and Midwife by the World Health Organization and is also the 50th Anniversary of the Emergency Nurses Association. This year, we knew, was to be a big year for our celebrating; what we could not have envisioned was how the role of the nurse would be displayed this year to the public, and how the public would get a glimpse into what we face. As emergency nurses, we are always ready to answer the call from the communities in which we serve. I challenge us all to ensure that we are not forgetting about the mental health and well-being of our colleagues and ourselves as we face these unprecedented times. We must also not forget that the cycle of disaster continues, so we must continue to strive to be prepared and to face the next challenge that will present itself to us. I am confident that as emergency nurses we will be ready to respond.

## DETAILS

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# Exploring National Nursing Readiness for a Radiological or Nuclear Incident: A Cross-Sectional Study: JEN

[ProQuest document link](#)

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## ABSTRACT (ENGLISH)

### Introduction

As the largest component of the United States health care workforce, nurses will play a critical role in radiological or nuclear disaster medical response. Despite this, the United States' schools of nursing are not currently providing radiation content (75% teach zero or <1 hour), and much of the current nursing workforce may not have received adequate response education and training. Nurses working in emergency departments and those who work at hospitals within the Radiation Injury Treatment Network will be relied on heavily, but little is known about whether these nurses possess the knowledge and skills needed to care for and protect patients after a radiation emergency. Current federal and state radiological/nuclear preparedness plans may be built on false assumptions of readiness, which would have serious implications for national preparedness and the National Health Security Strategy. The purpose of this study was to assess nurses' knowledge and skill in emergency radiological or nuclear response and determine their willingness to use mobile technology for education and training in response to a large-scale radiation event.

### Methods

Descriptive cross-sectional survey of registered nurse members of the Emergency Nurses Association and/or those employed at Radiation Injury Treatment Network centers.

### **Results**

Knowledge scores were low for all respondents. Prior attendance at a Radiation Emergency Medical Management course, use of online resources, and having a preparedness plan were associated with higher scores. Experience with a radiation emergency was associated with the highest score. Nurses are willing to use mobile technology during a radiological or nuclear disaster response.

### **Discussion**

Key nurses may not possess adequate knowledge or clinical competence to participate in radiation response activities. The results of this assessment identified educational gaps and areas to strengthen nursing education and clinical skills.

## **FULL TEXT**

### **Contribution to Emergency Nursing Practice**

- The current literature indicates that nurses do not possess the knowledge, skills, and abilities to care for and protect patients after a radiological or nuclear event.
- This article contributes the finding that emergency nurses and nurses employed at Radiation Injury Treatment Network hospitals, that is, those who will be relied on most heavily in the initial phases of the response to a radiological or nuclear event, do not have adequate knowledge on how to care for and protect patients affected by a radiological or nuclear event.
- Key implications for emergency nursing practice found in this article are that nurses are willing to use mobile technology to enhance their ability to respond to a radiological or nuclear event.

### **Introduction**

Current federal and state radiological/nuclear preparedness plans may be built on false assumptions of workforce readiness, which would have serious implications for national preparedness and the National Health Security Strategy.<sup>1,2</sup> As the largest component of the United States health care workforce with more than 3.1 million registered nurses<sup>3,4</sup> (a number expected to grow by more than 200,000 annually),<sup>5,6</sup> the nursing profession will play a critical role in response to any public health emergency. Nurses will be crucial to the effective response to a disaster resulting from the large-scale release of radioactive materials into the environment. Emergency nurses and nurses employed within the Radiation Injury Treatment Network (RITN), a group of hospitals and health care centers that are prepared to care for mass casualties with marrow toxic injuries, will be relied on to respond. In addition, these nurses must be cognizant of their own safety and that of their colleagues. Patients who have been radiologically exposed pose no danger to health care providers or their environment, but these are the patients who may be at higher risk for serious medical sequelae. Patients who have been radiologically contaminated often do not become critically ill, but care must be taken to mitigate and contain the contamination while caring for these individuals. Current geopolitical tensions and the increased proliferation of nuclear weapons have raised concern about an impending targeted radiological or nuclear event. At the beginning of 2020, the Science and Security Board warned that nuclear warfare and climate change are the most prominent threats to humanity, and at a higher degree than ever seen before.<sup>7</sup> In addition, risks of nuclear events and injuries from radiological exposure increase with the expansion of nuclear power and industrial use of radiation. Outside of malicious attacks, radiological sources are ubiquitous in our communities, ranging from consumer products to larger radiological sources used by hospitals, university research labs, industry, and construction sites. Nearly 3 million Americans live within 10 miles of an active

nuclear power plant.<sup>8</sup> Although abundant safeguards exist surrounding the use of these sources, inadvertent events may pose a risk to the populace. Many patients with radiation injury from a large-scale radiation release will be treatable if they receive the proper care needed to address these injuries, especially in the case of patients with acute radiation syndrome (ARS). Regardless of the source, the capacity for radiation-related illnesses and injuries is unprecedented at this time in the US. Nurses will be an integral part of the response to these types of events. Nurses participate in almost every aspect of the health system and will be involved in both immediate and long-term care after a radiological or nuclear incident. Registered nurses will be expected to swiftly provide emergency care to triage and stabilize patients, treat thermal burns with or without radiation cutaneous injuries, maintain fluid status, survey contaminated casualties, and provide decontamination. They will also be called on to allocate scarce resources, administer medical countermeasures, prevent secondary infections, and provide mental health services.<sup>1, 9-11</sup> Effective response will require the coordinated collaboration of nurses with varied health care specialties and backgrounds. Integration of care will be necessary among those with expertise in emergency medicine, radiation medicine, intensive care, hematology, medical and surgical oncology, burns/wound care, psychiatry, and case management.

However, formal education in the response and care of patients suffering from radiation-related injuries and illnesses is not a standard in nursing school curricula nor in continuing education for specialty nurses. Recent reviews suggest that nurses are not well-prepared to respond in this capacity<sup>1,12</sup> and, because the content is not routinely presented in educational settings, little is known about whether nurses possess the knowledge, skills, and abilities they need to care for and protect patients after a radiological or nuclear emergency. This apparent knowledge deficit and level of unpracticed skill may have grave implications for patients involved in a radiological or nuclear incident. Without a thorough understanding of the needs of these patients or the roles that nurses are required to fill in these scenarios, patients may experience significantly delayed care, inappropriate care responses, breakdown in care continuity, and significantly interrupted emergency medical services.

The Emergency Nurses Association (ENA) is the American professional organization that represents emergency. Consisting of approximately 50,000 members, ENA examines issues relevant to emergency care, publishes professional guidelines, and issues a peer-reviewed journal. In the 1970s, the group helped establish the Board of Certification in Emergency Nursing, which sponsors examinations for specialty certifications in emergency and pediatric emergency nursing, trauma nursing, flight nursing, and transport nursing.

The US National Marrow Donor Program (Be The Match), the US Navy's Office of Naval Research, and the American Society for Transplantation and Cellular Therapy (formerly the American Society for Blood and Marrow Transplantation) collaboratively developed RITN in 2006.<sup>13</sup> RITN is composed of 74 hospitals, academic medical centers, and cancer treatment centers with expertise in the management of bone marrow failure and other medical complications (eg, pancytopenia, anemia, neutropenia, nausea/vomiting, dermal burns, pain, and mucositis) that result from the treatment of various malignancies. These capabilities will be essential when caring for patients with ARS after a mass casualty disaster. RITN nurses, with their specialty knowledge and experience, will be critical to the effectiveness of the response to a large-scale radiological or nuclear event.

Members of the research team established partnerships a priori with ENA and RITN to conduct this study. This project sought to articulate the current knowledge of key nurses most likely to be initially involved in the response to radiological or nuclear incidents and to ascertain specific knowledge gaps to be addressed when developing just-in-time educational offerings related to this subject matter. The purpose was to assess (1) the current level of knowledge in the nursing workforce as it relates to the emergency response to radiological and nuclear events, (2) the current level of nursing abilities in participating in a radiation emergency response, and (3) nurses' willingness to

use mobile technology for just-in-time education and training.

## Methods

This quantitative study used a cross-sectional survey design. Qualtrics Research Suite Software (Qualtrics LLC) supported an online survey of registered nurse members of the national ENA and registered nurses employed at RITN centers. Members of the research team derived the survey from previously published survey instruments.<sup>14,15</sup> National subject matter experts at the Radiation Emergency Assistance Center/Training Site (REAC/TS) in Oak Ridge, TN, reviewed and revised the survey questions for validity. Many of the survey questions originate from REAC/TS testing material. The survey was pretested with graduate nursing students at the Johns Hopkins School of Nursing to determine reliability. The final survey was disseminated to the target respondents via an e-mail that included a direct web link to the Qualtrics Research Suite. The respondents agreed to participate in the research study and provided consent before starting the survey. Participation was voluntary, responses were anonymous, and all surveys included information detailing the purpose of the study and contact information for the research team. The e-mail invitation was sent via the ENA monthly newsletter STATLink twice over a period of 4 weeks and was sent 3 times by the study team to the RITN nursing workforce. The research team obtained Oak Ridge Associated Universities Institutional Review Board approval before starting the study.

The first 15 questions on the survey were multiple-choice, single-answer prompts employed to evaluate the respondents' knowledge of concepts related to a response to radiation events. The survey questions and answers are provided in <sup>Table 1</sup>. The survey questions evaluated demographic information (gender, age, education, and work experience), previous experience with emergency preparedness/radiation emergency management, personal preparedness, expected response, and willingness to use mobile digital resources.

Descriptive statistics were used to summarize the responses to each survey question. A total score was calculated for the 15 knowledge questions by recoding each knowledge question into a new, dichotomous variable coded as correct or incorrect. A summary score was calculated for each participant representing the sum of correct responses to knowledge questions, and a grade out of 100% was calculated for each respondent.

Chi-square tests assessed the relationship among categorical variables. Independent sample *t* tests determined if there were differences in mean knowledge scores among the levels of dichotomous variables. One-way analysis of variance, followed by a Tukey post hoc test, was used to determine if there were differences in the mean knowledge scores among different levels of categorical variables. All tests of statistical significance were 2-tailed, with significance determined at  $\alpha = 0.05$ . Data were analyzed using IBM SPSS Statistics for Windows, version 26.0.<sup>16</sup>

## Results

A total of 420 people responded, 244 respondents answered both knowledge questions and demographic and experience questions and were included in this analysis. <sup>Table 2</sup> displays demographic information for the respondents. Most (84%) of the respondents were women, and a large proportion (71.4%) were between the ages of 30 years and 60 years. Most (65.2%) of the respondents held a bachelor's degree and worked in a hospital setting (84.0%). Nearly half (46.5%) were members of the ENA, 23% were RITN affiliate members, 2.1% were ENA members at an RITN affiliate institution, and 28.4% declined to report their affiliations. Most (62.7%) had never attended a radiation emergency management course, and only 2.5% had personal experience with a radiation emergency.

## Findings

The mean knowledge score was 47.17 (SD = 17.89); <sup>Table 3</sup> displays the scores for all questions. The proportion of respondents who answered questions correctly ranged from 20.9% to 83.6%. The respondents demonstrated passing performance on 2 knowledge questions (80% or more answered the questions correctly) related to determinants to evaluate the risk of radiation dose received and earliest symptoms for a 2-Gray acute whole-body



exposure. The scores for the difference between irradiation and contamination, and clinical care of a patient with hematopoietic subsyndrome of ARS revealed that 73% and 76.6%, respectively, of the nurses answered correctly. The respondents performed poorly on the remainder of the knowledge questions, with correct responses ranging from 20.95% to 58.2% (Table 3).

Analysis of variance revealed that there was a significant effect on the scores of the knowledge questions on the basis of previous attendance at a radiation emergency management course ( $F [3, 58.264] = 4.082, P = 0.01$ ). A Tukey post hoc test revealed that the knowledge test score was statistically significantly lower for those who reported never attending an emergency radiation emergency management course (44.75 [14.92],  $P$

Table 4 displays the total test score responses evaluated on the basis of radiological material engagement. The participants who had a personal plan and who prepared for a radiological or nuclear event scored significantly higher than those who did not (52.36 vs 45.67, respectively,  $P P P P = 0.03$ ). The number of years working full time did not seem to have any relationship with overall scores on knowledge testing ( $P = 0.20$ ).

A chi-square test of independence showed that there was a significant association between “none” and “some” with regard to prior attendance at a radiation emergency management course and existence of a personal preparedness plan,  $\chi^2 (1, N = 243) = 10.89, P 2 [15] = 18.73, P = 0.22$ ).

Table 5 displays the findings from the radiological educational materials engagement questions included in the survey. Overall, most (68.9%) of the respondents said that they would find an online or downloadable just-in-time education and training application to be very valuable. Only 3.7% reported that the electronic information would not be valuable, and a very small number (2.1%) reported that they would not use mobile technology. More than half (54.3%) of the respondents reported that after a large-scale radiation release or nuclear event, they would shelter inside and stay tuned for further instruction, whereas 21.4% would contact their supervisor before reporting to work. A small number (13.2%) would immediately evacuate. The smallest number of respondents (11.1%) reported that they would immediately report to work and don personal protective equipment and begin to work. As expected, most (77.4%) of the respondents did not report having a personal preparedness plan for a radiological or nuclear incident, and most (76.5%) had not previously used online resources for response preparation.

## Discussion

Concern regarding the capacity of our national health care system to respond to a major event involving the accidental or deliberate release of ionizing radiation is of paramount importance to both the US Office of the Assistant Secretary for Emergency Preparedness and Response<sup>17</sup> and the US Department of Homeland Security.<sup>18</sup> The government’s heightened concern revolves around the ever-present and ever-evolving risk of several potential disaster scenarios, including radiological dispersal devices, subversive assault on national energy sources such as nuclear power plants, large-scale industrial releases, and surreptitious placement of radioactive materials. The intentional or unintentional release of radiation will unquestionably create demands on a region’s, and possibly the nation’s, health care system and, subsequently, on the health care workforce. Nurses constitute the largest sector of the health care workforce and their knowledge and skills related to radiation emergency medical response will have an impact on their participation in these events. Emergency nurses and RITN nurses in particular will be on the front line of the clinical response to these events. Lives can and will be saved if these nurses have the knowledge, skills, and willingness to not only engage, but also lead in the health system’s response.

The findings from this study reveal low levels of knowledge related to this subject matter. Overall, the mean score for the 15-item radiation response and knowledge assessment was 47.17%, a failing grade by academic standards. The nurses scored highest in areas pertaining to clinical signs and symptoms and clinical care, showcasing knowledge likely obtained by clinical experience. This idea that current knowledge is based on prior experience is bolstered by

the findings that those who have a personal preparation plan and have previously used online resources for response planning had higher scores on the assessment. Importantly, the findings from this study suggest that attendance at a Radiation Emergency Medical Management course was correlated with higher scores on the knowledge assessment. Attendance at these courses seems to have a dose-dependent effect on the knowledge scores: those who attended more courses had higher scores.

A reassuring finding from this study is that nurses who will be involved in the response to a large-scale radiological or nuclear event reported that they find value in the use of mobile education and training applications, either downloadable or available on an online platform. Most (94.2%) of the respondents said that they would find this to be somewhat or very valuable. Furthermore, only 5 (2.1%) of the respondents said that they would not use mobile information for education or clinical training for a response.

This education value result is buttressed by the findings from recent participant surveys conducted during on-site radiation emergency management courses at REAC/TS. When asked to rank their level of concern for providing care to patients during a radiological or nuclear incident, the 98 respondents, 18% of whom were registered nurses and 7% of whom were nurse practitioners, reported significant changes before and after the REAC/TS educational offering, indicating an increased willingness to respond if appropriate education was provided.<sup>19</sup> Conclusions have been drawn from this REAC/TS data that appropriate educational offerings may mitigate disaster staffing shortages and increase staff willingness to come to work during a radiological or nuclear event. Without access to this knowledge and information, health care systems may be at a grave deficit during such a crisis.

The findings of this assessment provided valuable information to assist the project team in the development of an innovative, user-friendly educational mobile technology application that will contribute to increased national nursing workforce preparedness in the US. The creation of online/downloadable just-in-time educational programming that is continually accessible to nurses (eg, available 24 hours, 7 days a week through remote access) will have great value, especially in the event of a radiological or nuclear emergency that results in unanticipated patient surge. Sustainable educational programming that optimizes existing mobile technology can increase nursing knowledge of radiological and nuclear event emergency response strategies.

### **Limitations**

This study relied on self-reported data and is subject to the limitations associated with survey research. The overall response rate to this survey was indeterminate owing to the lack of an accurate denominator from the ENA or RITN databases. Despite the lack of an available sample denominator, the 2 sample groups were selected because they are most likely to be heavily relied on during a radiation/nuclear disaster and are best suited to be representative of nursing. The overall scores on the knowledge questions were rather low, suggesting that the respondents did not look up answers and that these findings are an accurate assessment of current knowledge.

### **Implications for Emergency Nurses**

It is difficult in times of fiscal constraints and other disasters and public health emergencies for hospitals to consider workforce preparedness for low-frequency, high-impact events such as radiological or nuclear mass casualty events. Our historic experience with radiological or nuclear events has been limited, yet the potential for one to occur is not zero. Our study reinforces existing research that nurses do not currently possess the knowledge, skills, and abilities to care for and protect patients after a radiological or nuclear event. This finding has implications for emergency health care system sustainability and for the safety and well-being of emergency nurses and their patients. Key implications for emergency nursing practice are that nurses need more education and training and that they are willing to use mobile technology to enhance their ability to respond to a radiological or nuclear event. Resources relevant to emergency nurses are provided in <sup>Table 6</sup>.

## Conclusion

Emergency nurses and nurses employed at RITN centers may not possess adequate knowledge or skills to participate effectively in radiation emergency response actions. Currently, many of these nurses may not be comfortable or proficient providing clinical care during a radiological or nuclear event. However, importantly, our findings suggest that nurses are very willing to receive information regarding radiological response through mobile information formats and that repeated exposure to this material is associated with improved scores. The results of this study have helped identify nursing educational gaps and strengthen the range of educational offerings and materials developed by REAC/TS and Johns Hopkins School of Nursing. These resources will be made available to assist nurses in preparing to care for patients affected by a radiological or nuclear disaster.

## Author Disclosures

This work was performed under the sponsorship of Oak Ridge Associated Universities. Conflicts of interest: none to report.

Question Number	Question	Answers
1	The difference between irradiation and contamination is:	a.Irradiation is planned exposure to radiation and contamination is accidental.b.Irradiation is done in a special facility, while contamination can occur anywhere.c.Contamination is more harmful than irradiation.d.Irradiation is the absorption of radiation energy; contamination is the presence of radioactive material in an undesirable location.
2	One of the earliest symptoms of a 2 Gray acute whole body exposure (penetrating radiation) is:	a.Infectionb.Bleedingc.Vomitingd.Epilation (hair loss)
3	Which of the following would be evident within minutes after an acute, local, high dose radiation exposure?	a.Severe pain in the areab.Sensation of burningc.Blister formation in the involved aread.No obvious abnormality
4	A 40-year-old man was located 1 mile downwind from ground zero of a ground-level detonation of a 10-kiloton improvised nuclear device. Which of the following statements is correct?	a.The patient is definitely internally contaminated with radioactive materialb.Vomiting between 7 and 8 hours after detonation can be a sign of radiation exposure dose to the whole body that is between 5 and 6 Grayc.Serial absolute lymphocyte counts every 2 hours for 24 hours are necessary to estimate the radiation dose received by this patientd.Geographic location of the patient relative to the detonation, location after the detonation, and whether the person was in a shelter for a period of time are all important determinants of radiation dose received

5	A fully clothed, heavily contaminated patient is in hemorrhagic shock. Which should be done first?	a. Quickly flush off contaminants b. Expose patient and treat for shock c. Survey and record contaminated areas d. Monitor to determine need for radiation protection
6	A 24-year-old male patient is injured in a dirty bomb explosion. He is brought to the Emergency Department by a bystander. On auscultation, no breath sounds are heard on the left side of his chest. He has an altered level of consciousness, a weak pulse, and is in severe respiratory distress. His clothes appear covered in dirt and dust from the explosion. Which of the following statements is correct?	a. The patient should be surveyed for contamination with radioactive material prior to bringing him into the resuscitation room and inserting a life-saving chest tube b. The patient should be wrapped in sheets and taken immediately to the resuscitation room for an emergent chest tube insertion c. The patient should be rapidly decontaminated with soap and water prior to resuscitation d. Providers can protect themselves from radiation emitted from the patient's contaminated body by wearing lead aprons
7	Choose the priority (order) in which decontamination should occur.	a. Wounds, areas around body orifices, and intact skin b. Face, body, and extremities c. Intact skin, face, and wounds d. Areas around body orifices, body, and extremities
8	Which of the following measures is correct when caring for a patient with hematopoietic acute radiation syndrome?	a. The patient diet does not need any special modifications b. Check that blood products have been irradiated and leuko-reduced prior to transfusion c. There is no concern with the use of rectal thermometers, suppositories, and enemas d. There is no need to use dedicated equipment such as stethoscope and thermometer
10	When caring for a patient with cutaneous radiation injury (CRI), the nurse should expect care to include all the following except:	a. Topical antihistamines b. Pain control c. Topical steroids d. Chelation therapy
11	The nurse has been asked to draw blood for a dicentric chromosome assay (DCA). Which of the following is true about this test?	a. Dicentric chromosome formation are affected by age and gender b. Dicentric chromosome assay is sensitive for radiation exposure up to 10 Gray c. Dicentric chromosome assay is particularly useful in local radiation exposure events d. Dicentric chromosome assay results take approximately 96 hours
12	To gauge the body's early response (first 24 hours) to a whole body absorbed radiation dose, the nurse should expect to draw which of the following labwork:	a. Complete blood count (CBC) with differential b. Dicentric chromosome assay (DCA) c. Prothrombin time (PT) d. Blood cultures

13	Which of the following tests should be ordered for the internally contaminated patient to assess the effectiveness of chelation therapy?	a.Dicentric chromosome assay b.Hematological studies c.Body excreta assays d.Analysis of wound swabs &swipes
14	Community Reception Centers (CRCs) established in the aftermath of a large radiological event are designed to serve all of the following purposes except:	a.Evaluate people with acute emergency conditions such as trauma b.Provide radiological screening for uninjured or minorly injured people c.Provide decontamination when necessary d.Refer those with likely internal contamination for medical countermeasures
15	The accepted method for treating a person internally contaminated with plutonium is:	a.Administration of potassium iodide (KI) b.Administration of diethylenetriaminepentaacetic acid (DTPA) c.Administration of prussian blue (Radiogardase) d.Administration of sodium bicarbonate (NaHCO <sub>3</sub> )

Demographics	n	%
Gender		
Male	205	84.0
Female	38	15.6
Unanswered	1	0.4
Age, y		
18–29	34	13.9
30–39	62	25.4
40–49	56	23.0
50–59	56	23.0
60–69	35	14.3
≥70	0	0.0

Unanswered	1	0.4
Highest level of education		
Associate degree	25	10.2
Bachelor's	159	65.2
Master's	54	22.1
Doctorate	6	2.5
Full-time work experience, y		
<5	35	14.3
5–10	51	20.9
≥10	158	64.8
Practice setting		
Hospital	205	84.0
Hospital-affiliated clinic	28	11.5
Private clinic/practice	1	0.4
Other	10	4.1
Affiliation		
RITN affiliate	56	23.0
ENA member	113	46.5
Both RITN and ENA	5	2.1
None of the above	69	28.4
Prior attendance at radiation emergency management course		
None	153	62.7
Any	91	37.3

1 (during initial training)	20	8.2
1 (outside initial training)	38	15.6
2 or more	33	13.5
Personal experience with radiation emergency		
Yes	6	2.5
No	235	97.5

Question	n	%
Difference between irradiation and contamination		
Incorrect	66	27.0
Correct	178	73.0
One of the earliest symptoms of a 2-Gray acute whole-body exposure (penetrating radiation)		
Incorrect	40	16.4
Correct	204	83.6
Symptoms evident within minutes after an acute, local, high-dose radiation exposure		
Incorrect	164	67.2
Correct	80	32.8
Determinants to evaluate risk of radiation dose received		
Incorrect	44	18.0
Correct	200	82.0
Immediate clinical intervention for hemorrhagic shock in potentially contaminated individual		
Incorrect	158	64.8

Correct	86	35.2
Approach to immediate resuscitation of a patient contaminated by a dirty bomb		
Incorrect	193	79.1
Correct	51	20.9
Priority of decontamination of body areas		
Incorrect	161	66.0
Correct	83	34.0
Clinical care of a patient with hematopoietic acute radiation syndrome		
Incorrect	57	23.4
Correct	187	76.6
The accepted method for treating a person internally contaminated with uranium		
Incorrect	183	75.0
Correct	61	25.0
Care for a patient with cutaneous radiation injury		
Incorrect	106	43.4
Correct	138	56.6
Dicentric chromosome assay testing		
Incorrect	179	73.4
Correct	65	26.6
Laboratory analysis to gauge early response (first 24 h) to a whole-body absorbed radiation		
Incorrect	125	51.2
Correct	119	48.8



Laboratory monitoring for internally contaminated patient to assess the effectiveness of chelation therapy		
Incorrect	190	77.9
Correct	54	22.1
Function and purpose of community reception centers in the aftermath of a large radiological event		
Incorrect	102	41.8
Correct	142	58.2
The accepted method for treating a person internally contaminated with plutonium		
Incorrect	166	68.0
Correct	78	32.0

Question	Mean	SD	Point Estimate	P
Personal preparation for radiation or nuclear event				
Have personal plan	52.36	15.89	F(3,241) = 1.61	<0.05
Do not have plan	45.67	14.31		Prior use of online resources for response preparation
				Yes
54.15	15.59	t(241) = 4.20	<0.001	No

44.98	14.06		Full-time work experience, y	
			0-4	45.52
14.77	F(3,241) = 1.61	0.20	5-10	44.44
12.56		>10	48.40	15.53
	Prior attendance at radiation emergency management course			
	None	44.75	14.92	$\chi^2(1, N=243) = 10.89$
<0.05	Some training	51.21	14.02	
Personal experience with radiation emergency				
Yes	60.00	17.89	t(239) = 2.16	0.03

Question	n	%
Value of an online or downloadable education and training app		
Very valuable	166	68.9
Somewhat valuable	61	25.3

Not valuable at all	9	3.7
Would not use mobile technology	5	2.1
Immediate response to large-scale radiation release or nuclear event		
Report to work as soon as possible, use PPE	27	11.1
Call my supervisor before reporting to work	52	21.4
Get inside, stay inside, stay tuned	132	54.3
Evacuate the area as soon as possible	32	13.2
Personal preparation for radiation or nuclear event		
I have a personal preparedness plan	55	22.6
I do not have a personal preparedness plan	188	77.4
Prior use of online resources for response preparation		
Yes	57	23.5
No	186	76.5

Website	URL
CDC (Centers for Disease Control and Prevention)	<a href="https://www.cdc.gov/nceh/radiation/emergencies/index.htm">https://www.cdc.gov/nceh/radiation/emergencies/index.htm</a>
FEMA (Federal Emergency Management Agency)	<a href="https://www.fema.gov/radiological-emergency-preparedness-program">https://www.fema.gov/radiological-emergency-preparedness-program</a>
HHS ASPR/TRACIE (US Department of Health and Human Services Assistant Secretary for Preparedness and Response Technical Resources, Assistance Center, and Information Exchange)	<a href="https://asprtracie.hhs.gov/technical-resources/32/radiological-and-nuclear/27">https://asprtracie.hhs.gov/technical-resources/32/radiological-and-nuclear/27</a>
IH/OS (Industrial Hygiene/Occupational Safety)	<a href="https://orau.org/ihos/tech-topics/radiation-protection.html">https://orau.org/ihos/tech-topics/radiation-protection.html</a>

OSHA (Occupational Safety and Health Administration)	<a href="https://www.osha.gov/SLTC/emergencypreparedness/radiation/additional_resources.html">https://www.osha.gov/SLTC/emergencypreparedness/radiation/additional_resources.html</a>
REMM(Radiation Emergency Medical Management)	<a href="https://www.remm.nlm.gov/">https://www.remm.nlm.gov/</a>
REAC/TS (Radiation Emergency Assistance Center/Training Site)	<a href="https://orise.orau.gov/reacts/">https://orise.orau.gov/reacts/</a>
RITN (Radiation Injury Treatment Network)	<a href="https://ritn.net/">https://ritn.net/</a>

## DETAILS

<b>Subject:</b>	Emergency medical care; Workforce; Clinical skills; Injuries; Hospitals; Disease management; Competence; Nurses; Climate change; Nuclear power plants; Casualties; Skills; Medical education; Health care; Emergency preparedness; Professional knowledge; Professional training; Adequacy; Knowledge; Nursing care; Radiation; Portable computers; Technology; Clinical nursing; Education; Clinical assessment; Emergency services
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# Challenges Confronting the Future of Emergency Nursing: JEN

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## ABSTRACT (ENGLISH)

In 1981 only 1% of hospitals nationwide reported that they were unable to fill emergency nursing positions.<sup>1</sup> Moreover, hospitals in selected areas report the existence of 12- to 18-month waiting lists for nurses in emergency departments. [...]the 60,000 emergency nurses practicing today<sup>2</sup> appear to be sufficient to meet the demand in the approximately 6,500 acute care facilities in which they are employed. [...]only 5% of visits to hospital emergency departments at present are made for life-threatening problems; the proportion is, of course, much higher in shock-trauma centers and many teaching hospitals.<sup>6</sup> On a national scale approximately 15% to 20% of all ED visits are for urgent problems, with the remaining 75% to 80% of total visits for nonurgent problems.<sup>6,7</sup> The end result is a health facility that is used extensively, inefficiently, and expensively. National Challenges to Emergency Nursing Practice Table 1 presents the five major challenges that will influence the future role and scope of emergency nursing. [...]the population aged 65 years and over will double in the next 50 years. Three states—New York, Maryland, and Massachusetts—operate their own prospective hospital payment systems and are currently exempt from DRG requirements, and three other states—Alaska, Connecticut, and Michigan—are attempting to establish hospital reimbursement systems using DRGs for all non-Medicare third-party payers.<sup>15</sup> (New Jersey, the state with the prospective payment system that served as the model for the Medicare DRG program, has had its waiver terminated effective December 31 unless the Health Care Financing Administration reverses its decision.)<sup>16</sup> In addition, in at least 25 states private insurance companies are participating in some type of medical cost containment program, many switching their reimbursements from retrospective to prospective.<sup>17</sup> One impact that cost-containment

programs have had on hospitals has been the trend to cut services in various departments.

## FULL TEXT

•This article was originally published in *JEN* in the January/February issue of 1985;11(1):16-21.

The changes confronting this nation's health care industry at present and those predicted for the future are cause for concern about professional survival, not only for emergency nurses, but also for nursing in general, as well as the other health professions. The article will examine the status of emergency nursing today; discuss the societal forces that will influence the demand for, supply of, and characteristics of the role of the emergency nurse; and present recommendations to enable emergency nurses to maximize the opportunities presented by the challenges of the future.

### Status of Emergency Nursing in the 1980s

The supply and demand for emergency nursing is at an equilibrium at best and is probably tending toward surplus levels in many areas. In 1981 only 1% of hospitals nationwide reported that they were unable to fill emergency nursing positions.<sup>1</sup> Moreover, hospitals in selected areas report the existence of 12- to 18-month waiting lists for nurses in emergency departments. Thus the 60,000 emergency nurses practicing today<sup>2</sup> appear to be sufficient to meet the demand in the approximately 6,500 acute care facilities in which they are employed.

Emergency nurses as a whole are not well represented in their professional organization, with only 22%, or approximately 13,000 nurses, who are members of the Emergency Nurses Association.<sup>3</sup> Compare these figures with an estimated 75% of emergency physicians who belong to the American College of Emergency Physicians.<sup>4</sup>

The status of emergency nurses must also be examined in relation to the major employment setting, the hospital emergency department. During the 1970s and the first part of the 1980s emergency departments experienced increasing utilization, moving from slightly more than 70 million visits in 1975 to approximately 83 million visits in 1982.<sup>5</sup> It is important to note, however, that not all these visits were of an emergency or even an urgent nature. In fact, only 5% of visits to hospital emergency departments at present are made for life-threatening problems; the proportion is, of course, much higher in shock-trauma centers and many teaching hospitals.<sup>6</sup> On a national scale approximately 15% to 20% of all ED visits are for urgent problems, with the remaining 75% to 80% of total visits for nonurgent problems.<sup>6,7</sup> The end result is a health facility that is used extensively, inefficiently, and expensively.

### National Challenges to Emergency Nursing Practice

Table 1 presents the five major challenges that will influence the future role and scope of emergency nursing. Each trend will be analyzed for its implications for the profession.

#### Aging of the population

The changing age distribution of the national population will be the single most significant factor influencing the pattern of future health care delivery and the roles of health practitioners during the next 50 years. Both the number and the proportion of the total population who are elderly have increased dramatically since the turn of the century. This trend will continue to the year 2030, with the most rapid growth of the elderly segment of the population projected to occur between the years 2010 and 2030, when the baby boom population reaches the age of 65 years.<sup>8</sup> In 1983, the percentage of Americans who were 65 years of age or older was 11.3%; by the year 2030 the elderly will represent an estimated 20% of the U.S. population. Thus the population aged 65 years and over will double in the next 50 years. Most important to those in the health care industry will be the growth among the segment of the population aged 75 years and over—the "old-old" population. This group is expected to represent the majority of elderly persons by the year 2040.<sup>8</sup>

Although sickness is not inevitable in old age, it is statistically prevalent,<sup>9</sup> and the use of health services by elderly persons reflects this fact. Individuals aged 65 years and over utilize 25% of all prescription drugs dispensed, spend 30% of the total U.S. health care budget, account for more than 50% of federal health expenditures, and account for 40% of bed days in acute care hospitals.<sup>10</sup>

The effect of the growing number of elderly persons on nursing will be to increase the demand for nurses, especially in nursing homes, home health care agencies, hospices, and alternative delivery systems such as adult day care programs. For emergency nursing the most pronounced effect will be a change in the ED case mix. A far greater proportion of patients visiting emergency departments in the future will be elderly, and their problems will dominate health service demands. The focus of service, then, will be on cardiopulmonary and neurologic problems, cerebrovascular accidents, and trauma caused primarily by falls.<sup>11</sup>

In addition, emergency nurses must modify their assessment expectations and health goals to serve an elderly population whose response to acute disorders differs from that of younger people. For example, "atypical" responses characteristic of elderly persons include painless myocardial infarction, nonbreathless pulmonary edema, silent pulmonary embolism, afebrile pneumonia, apathetic thyrotoxicosis, drug intoxication with minimal doses, and painless surgical abdomen.<sup>12</sup> Moreover, older people frequently experience several pathologic entities simultaneously, such as congestive heart failure, renal impairment, ischemic heart disease, diabetes mellitus, mental impairment, venous insufficiency of the legs, arterial insufficiency, osteoarthritis, osteoporosis, depression, chronic constipation, and sleep disturbance.<sup>12</sup> If treatment of an acute disorder is initiated without consideration of simultaneous associated problems, the likely outcome is acceleration of decline rather than improvement. With a growing elderly patient load in the emergency department, a new nursing specialty, geriatric emergency nursing practice, should evolve. Practitioners will be emergency nurses educated specifically in the emergency care of older persons. They will be the essential link in assisting older patients through the acute event and referring them to community resources that will continue to provide care in the long term.

### **Cost containment**

Since 1965 the cost of health care, after adjustment for inflation, has doubled to a staggering \$350 billion a year.<sup>13</sup> This sum reflects, in part, the increased availability of health care services, the growing costs of medical technology, and rising labor costs. These rising costs have had an impact on everyone involved in health care, including consumers, private insurance carriers, and the federal government. Medicare, in particular, has borne the brunt of rising health care costs. Medicare costs have doubled every 4 years since the inception of the program in the 1960s, and most experts predict that unless some major change occurs in the immediate future, the program will be bankrupt by 1990 or soon thereafter.<sup>14</sup>

In an effort to hold down Medicare costs, prospective payment based on diagnosis related groups (DRGs) was implemented by the federal government beginning in October 1983. This system is expected to save Medicare approximately \$5 billion a year.<sup>14</sup> Although at present the DRGs apply only to Medicare reimbursements to hospitals (part A), there is a movement to expand its scope to include all Medicare payments to health care providers. State governments and private insurers are also moving toward the adoption of prospective health care reimbursement. Three states—New York, Maryland, and Massachusetts—operate their own prospective hospital payment systems and are currently exempt from DRG requirements, and three other states—Alaska, Connecticut, and Michigan—are attempting to establish hospital reimbursement systems using DRGs for all non-Medicare third-party payers.<sup>15</sup> (New Jersey, the state with the prospective payment system that served as the model for the Medicare DRG program, has had its waiver terminated effective December 31 unless the Health Care Financing Administration reverses its decision.)<sup>16</sup> In addition, in at least 25 states private insurance companies are participating in some type of medical

cost containment program, many switching their reimbursements from retrospective to prospective.<sup>17</sup>

One impact that cost-containment programs have had on hospitals has been the trend to cut services in various departments. The emergency department has not been exempt from this trend. In Massachusetts, for example, proposed new regulations affecting Medicaid reimbursement prohibit reimbursement for elective or routine care or for care of minor illness provided in a hospital emergency department.<sup>18</sup> With the large proportion of ED visits that fall into these categories, the impact of such legislation could be substantial. In another example, economic pressures on the University of South Alabama Medical Center have forced that institution to close its emergency department on weekends.

Cuts in services necessarily require cuts in hospital staff; indeed, labor is the most expensive hospital budget item and will receive a great deal of scrutiny as the economic squeeze is felt by hospitals. In general, however, nurses should fare well in this situation, with their lower cost compared with that of physicians. Some hospital departments may adopt a policy of labor substitution, with hospital administrators choosing to have nurses assume some of the clinical responsibilities of physicians. Such a policy would especially affect nurse anesthetists, certified nurse midwives, critical care nurses, coronary care nurses, and emergency nurses. This type of policy may not be implemented in the short run, however, because of the surplus of physicians, which will be discussed in the next section.

### **Physician surplus**

An estimated 455,000 physicians practiced medicine in the United States in 1980, and this number is projected to exceed 700,000 by the year 2000, a 54% increase.<sup>19</sup> Many analysts predict a physician surplus in the near future, and many others contend that a surplus already exists. By specialty, however, a shortage of emergency physicians has been predicted, even in light of a continuing increase in the total number of physicians.<sup>20</sup>

A growing supply of physicians will have a variety of effects on the health care system. First, more physicians will affiliate with hospitals, multispecialty groups, and health maintenance organizations, and they will be attracted by the job security, pension plans, regular hours, and prepaid malpractice premiums offered in these environments. In fact, this trend has already begun to establish itself: in 1980 just over one fourth of all nonfederal physicians were affiliated with group practices, and 15% participated in health maintenance organizations.<sup>21</sup>

Physicians will be competing, first and foremost, among themselves. They will stiffen restrictions and licensure requirements, especially for foreign medical graduates; close memberships on hospital medical staffs; and attempt to restrict practice privileges.

Physicians will also begin to assume many of the health care functions that they previously relinquished to nonphysician health practitioners. This will be a reversal of the situation in the 1960s, the decade of physician shortage, when nurses were encouraged to add sophisticated skills to their professional armamentarium. The 1980s will witness physicians' attempting to "take back" responsibilities and/or engage in traditionally nonphysician activities. In our opinion, U.S. taxpayers should not be required to pay for the education and training of physicians in roles that do not reflect their preparation and skills and for which studies demonstrate that nonphysician practitioners give the same quality of care at lower cost.<sup>22,23</sup> In the long run the move toward cost containment will drive some physicians out of the clinical care sector and force them to seek other opportunities, such as biomedical technology research, computer technology, management of for-profit health facilities, and stock market investment.

In the hospital setting, stringent cost-containment measures, in combination with an increasingly elderly patient load, will mitigate much of the negative effect of the physician surplus on the demand for nurses. Hospitals will become huge intensive care units, and doctors will not replace nurses in providing critical care to patients. Although more physicians may be attracted to the emergency department because of its security as a revenue-producing



department, the current and predicted shortage of emergency physicians and the well-established role of emergency nurses in this setting will maintain a strong demand for nurses in the hospital emergency department. Emergency nurses offer benefits to the hospital that physicians do not offer: they provide continuity in the day-to-day functioning of the emergency department, provide total care to patient and family throughout the emergency visit, have the skills to do telephone follow-up for continuity of care, and are skilled in coordinating the services of the hospital with the community.

### **Emergency medical technicians**

Emergency medical technicians (EMTs) and paramedics have been used to perform nursing functions in some emergency departments across the nation in recent years. For example, the Pennsylvania Nurses' Association reported that EMTs have administered controlled substances, as well as other medication, for which registered nurses are required to sign.<sup>24</sup> Ohio nurses reported that in some emergency rooms, paramedics have been inserting nasogastric tubes, performing health counseling, and administering medications, sometimes under the supervision of a registered nurse and sometimes not.<sup>24</sup> At its fourteenth annual Scientific Assembly, ENA issued a position paper that took the stand that EMT-paramedics should not be hired in emergency departments. In view of the fact that 25% of hospital emergency departments surveyed utilized or planned to utilize these practitioners, ENA also generated a list of limitations on the EMT-paramedic's role in the hospital and developed a definitive code of responsibility among ED staff.<sup>25</sup>

Cost-containment measures may encourage hospital substitution of EMT-paramedics for emergency nurses in hospitals, especially in trauma rooms. Thus emergency nurses may find themselves squeezed between paramedics, who are cheaper personnel but who are more narrowly skilled, and physicians, who have tradition, political power, and fiscal resources on their side.

### **Freestanding emergency centers**

Freestanding emergency centers (FECs) are important to the future of emergency nurses because they draw patients away from hospital emergency departments and therefore provide an alternate setting for employment. Research in Akron, Ohio, indicated that although FECs did not reduce the number of patients going to hospital emergency departments for major illness or injury, they did draw patients with minor illnesses and injuries away, with a resulting decrease in the census of the hospital emergency department.<sup>26</sup> With the large proportion of ED visits that are of a nonemergency nature, the impact of FECs on ED utilization nationwide will be dramatic.

The growth of FECs in recent years suggests that they have become an acceptable setting for health care among the American public. In 1983 a total of 500 FECs were operational. By 1984 this number more than doubled to 1,100. It is projected that 2,500 FECs will be open by 1985, and there will be 4,500 by 1990.<sup>27</sup>

The rapid growth of FECs as a mode of ambulatory care is due, in large part, to the fact that they are often more convenient, less time consuming, and cheaper than hospital emergency departments. Many FECs boast a 30-minute or faster patient turnaround time, and a recent study by the National Association of Freestanding Emergency Centers (NAFEC; now the National Association for Ambulatory Care [NAFAC]) showed that FEC charges were 40% to 80% less than ED charges for five common treatments: simple arm fractures, influenza with fever, corneal abrasion, laceration and suture of arm, and upper respiratory infection and/or bronchitis.<sup>27</sup> A survey conducted in Chicago in 1983 found that 99% of patients who had sought care at an FEC would do so again, and more than 40% indicated that they would return to an FEC for all their health care needs.<sup>28</sup> In another study 85% of the respondents said they would go to an FEC instead of a hospital emergency unit, and 57% said they would go to an FEC rather than make an appointment with their regular physician.<sup>29</sup>

### **Recommendations for Emergency Nursing**

Recommendations for emergency nursing are listed in <sup>Table 2</sup> according to professional, organizational, research, and educational roles. They are presented to help emergency nurses overcome the barriers to their optimal utilization and maximize their opportunities in the labor market of the future.

Emergency nurses wishing to ensure a bright future with adequate opportunities must remain alert for trends that impact on health care, must adapt to the trends in the best interests of the profession, and must educate and market themselves to meet their responsibilities vis-à-vis the social, demographic, and technologic imperatives. The future will belong to those who prepare for it.

Aging of U.S. population Health care cost escalation and cost-containment measures Physician surplus Increasing utilization of EMT-paramedics Growth of freestanding emergency centers

#### Professional role

The professional role of emergency nursing must be expanded beyond that of a proficient clinical and/or technical nurse to innovator, leader, and change agent involved in community education and service, research and publication, public speaking, and lobbying for health policies related to nursing practice and emergency care. This effort will prepare the emergency nurse to accomplish the following:

- 1.Improve the public image of emergency nursing among policymakers, other health care professionals, and the general public
- 2.Market themselves to hospital administrators not only as skilled clinicians but also as valuable patient recruiters to the emergency department
- 3.Negotiate for the implementation of varying fee structures in the hospital emergency department according to the acuity of illness in order to enhance the emergency department's competitive edge in the battle with FECs
- 4.Lobby for an expanded nurse practice act to reflect trend-responsive independent-interdependent responsibilities of nurses in relation to physicians
- 5.Lobby for the appointment of qualified registered nurses to peer review organizations
- 6.Become active members in the National Association for Ambulatory Care and negotiate for qualifications of care givers and standards of care
7. Lobby for health policy directed toward prevention of injuries, such as child restraints, seat belts, drinking age restrictions, and so on.

**Organizational role** Emergency nurses must unite as a professionally organized, politically viable group. This goal would be facilitated if emergency nurses worked to accomplish the following:

- 1.Renew the ENA recruitment program to increase membership by at least 100%
- 2.Take a united position with ENA on the limited utilization and restricted responsibilities of EMT-paramedics in hospital emergency departments
- 3.Maintain a more complete data base on the numbers of emergency nurses, their distribution by employment setting, hospital vacancy rates, and so forth.

**Research role** Emergency nurses must become more active in research. Examples of timely studies are as follows:

- 1.Cost-effectiveness and safe standard of care provided by emergency nurses compared with EMTs and physicians
- 2.Relationship of a nursing triage system to patient outcomes
- 3.Effectiveness of nursing interventions on elderly patients with hip fractures
- 4.Development of classification tool for acuity of patients
- 5.Impact of emergency nurses' community services on patient referrals to the emergency department
- 6.Impact of a discharge emergency nurse's services on patient outcomes after discharge from the emergency department

**Educational role**

- 1.Educators must alter the emergency nursing curriculum to respond to demographic, social, and technologic trends, incorporating timely content, including care of elderly patients, use of computers, lobbying skills, health policy issues, leadership, benefits and costs of nursing services, and allocation of nursing resources.
- 2.Emergency nurses must reach consensus on educational preparation for entry into practice. The BSN degree represents minimal preparation for the clinical nurse, and graduate education is essential for the nurse leader-researcher.

## DETAILS

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# Response to “Nursing Skills Fair in an Austere Military Environment”: JEN

[ProQuest document link](#)

## FULL TEXT

Dear Editor:

I have the highest regard for military nurses caring for our service members who place themselves in harm's way at our nation's request. As a retired Deputy Commander, Nursing/Chief Nurse of a combat support hospital who spent a year in Iraq (2006-2007), I read with great interest the article by Ogle and Harville<sup>1</sup> in the January 2020 *Journal of Emergency Nursing*, “Nursing Skills Fair in an Austere Military Environment.” Their efforts show the resourcefulness, initiative, creativity, and problem-solving abilities of military nurses that are needed to overcome challenges in a deployed setting. Their article is a testament to a job well done, and I hope they were recognized by their command for their accomplishments.

However, having had similar experiences, I wonder why some of these training shortfalls were not anticipated before deployment and some of the equipment they were to “fall in on” was not available at their mobilization site for practice and eventual competency. The stakes are already high when you must accomplish your clinical mission and deal with the soldier survival skills of practicing in an austere, and often hostile, environment. Adding new equipment training to that puts an unnecessary burden on clinical staff who should already be familiar with the tools needed to perform their job. Perhaps they can pass this along as a lesson learned to the follow-on units so that this training deficit need not be repeated.—*Joseph S. Blansfield, MS, NP, TCRN, COL (ret) US Army Reserve; E-mail:*

*joebeeone@gmail.com*

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# Emergency Nurse Perceptions of Naloxone Distribution in the Emergency Department: JEN

## ABSTRACT (ENGLISH)

### Introduction

Emergency department encounters are an opportunity to distribute naloxone kits to patients at risk of opioid overdose. Several programs cite mixed uptake and implementation barriers including staff education and burden. Emergency nurses can facilitate many approaches to naloxone distribution (eg, prescription, overdose education, dispensing take-home naloxone). To evaluate acceptance, we investigated nurse perceptions about take-home naloxone, describing potential barriers to program implementation.

### Methods

This qualitative study enrolled 17 emergency nurses from an urban trauma center emergency department and affiliated community emergency department. During the study period, nurses in both sites could distribute take-home naloxone kits stocked in the medication dispensing system. We conducted 12 individual, in-depth interviews and 3 distinct focus groups involving 12 nurses in aggregate. A semistructured interview guide was used with a range of topics surrounding pain management, addiction, opioid overdose, and emergency care. We employed conventional content analysis to enable thematic analysis of transcripts.

### Results

Six component themes emerged as part of the overarching theme "mixed feelings about naloxone—morally distressing." One positive theme identified naloxone as an opportunity for discussion. Negative themes included (1) Addiction is a choice, why can't we help other diseases? It's unfair; (2) Providing naloxone enables and condones the behavior; (3) Emergency departments cannot treat social issues; (4) Patients can't give it to themselves; it's wasting money; and (5) Moral distress.

### Discussion

Perceptions and moral distress may be a barrier to ED-based take-home naloxone programs. Development of interventions targeting naloxone misperceptions and addiction stigma should be a goal of expanded implementation efforts.

## FULL TEXT

### Contribution to Emergency Nursing Practice

- The current literature on ED-based naloxone distribution programs indicate they are feasible and may reduce opioid overdose deaths, but there are many barriers to implementation.
- This article contributes findings of moral conflict emergency nurses perceive in the distribution of naloxone kits to patients, and the barrier these perceptions may impose on the implementation of ED-based naloxone programs.
- Emergency nurses can deliver life-saving medications and education allowing laypersons to administer naloxone in the community, thus reducing potential opioid overdose death.

### Introduction

Emergency nurses are on the front lines of the opioid epidemic because emergency departments commonly encounter patients at risk for and affected by opioid use.<sup>1-3</sup> Countless patients with overdoses arrive at the emergency department daily,<sup>4</sup> numbers of patients with complex, infectious consequences from injection drug use are skyrocketing,<sup>5</sup> and increasing regulations are limiting pain management options.<sup>6-8</sup> More than 50% of ED visits are directly or indirectly related to substance use,<sup>9,10</sup> and many are calling on emergency care providers to develop interventions and stop overdose deaths.

One method of opioid overdose death prevention now more frequently implemented in emergency departments is

naloxone distribution.<sup>11-13</sup> Emergency care providers are often charged with prescribing or distributing take-home naloxone kits to patients who are at risk for opioid overdose. ED naloxone distribution programs have been met with mixed success, often citing operational barriers such as time constraints in the ED environment.<sup>14-16</sup> Nonetheless, successful implementation of interventions requires nursing participation and innovation, and emergency nurses should be incorporated into future intervention development for programs such as these.

The <sup>Figure</sup> depicts a logic model of an ED-based, nurse-driven naloxone distribution project. Nurses are a key component to the successful implementation of the project, and acceptability of a practice change is vital to project success.<sup>17</sup> We sought to examine emergency nurses' knowledge, attitudes, beliefs, and perceptions as a qualitative evaluation of acceptance of an ED naloxone distribution program. We hypothesized that emergency nurses may have perceptions surrounding naloxone that pose as a barrier to successful distribution of take-home naloxone in the emergency care environment.

## Methods

To understand the acceptability and adoption of the project, we conducted a qualitative analysis of nurse perceptions of naloxone distribution in the emergency department, leveraging the RE-AIM framework.<sup>18</sup> This process evaluation was embedded in a larger study using a naturalistic inquiry approach to a qualitative research design,<sup>19,20</sup> allowing for the data to be collected directly from the participants' voice. This approach allowed the investigators to examine the perceptions of individuals within a group (such as emergency nurses) and better understand their points of view.<sup>19</sup> This study was approved by the institutional review board of University of Cincinnati (2019-0467).

## Setting and Sample

The recruitment sites were 2 emergency departments: an urban, academic, trauma center and an academic, community emergency department. Both emergency departments were currently distributing take-home naloxone kits from a health department–led program. A protocol for naloxone distribution was created with an interprofessional team of physicians, nurses, and pharmacists, whereas the nurse-driven program allowed for emergency nurses to dispense naloxone to patients who were at risk for opioid overdose. The distribution did not require real-time physician prescription, and documentation was facilitated through templates and shortcuts to remove barriers within the electronic medical record. Emergency nurses were enrolled in the study between August and September 2019 by e-mail invite and snowball sampling. To be included in this study, participants must have been a frontline emergency nurse for at least 6 months and currently practicing in the ED setting described; there were no study exclusion criteria.

## Data Collection

Before the interview began, the study procedures including risks and benefits were explained, participant questions were answered, and informed consent was obtained. Participants completed a demographic survey describing years of practice, education level, and personal or family history of substance use disorder. A semistructured interview guide (<sup>Supplementary Appendix</sup>) was employed for interviews and focus groups; therefore, participants could respond to similar questions. The interviews were all in English, lasted between 45 and 90 minutes, were audiotaped, and were professionally transcribed.

## Data Analysis

Thematic analysis was achieved through conventional content analysis with line-by-line coding. This method was chosen to critically examine the transcripts and allow the themes to emerge from the voice of the participants.<sup>20</sup> Two of the authors (B.E.P. and S.S.) independently read through the interviews and focus group transcripts using open coding technique while exploring nurse perceptions of naloxone.<sup>21</sup> The coders made notes in the right margin of the transcript. This is referred to as the first cut, developing coding categories.<sup>19</sup> Next, the data analysis team met, and



important statements were grouped to develop the first level of coding. The team agreed on the first level of coding, grouping codes and eliminated redundancies to develop a coding schema. Line by line, each transcript was analyzed and coded per the schema, continually comparing with previous transcripts. In the next phase of the analysis, each code was sorted into abstract categories and agreed on by the team. Data saturation was considered as achieved if after reviewing all transcripts no new themes emerged after the focus groups and the interviews. The analysis team evaluated each category, and together determined emerging themes from the data. Themes evolving from the analysis are depicted in the graphical abstract.

## Results

A total of 17 nurses participated in the interviews and focus groups. We conducted 12 individual, in-depth interviews, and 12 nurses participated in 3 distinct focus groups (7 participated in both interview and focus group discussions). The results of the demographic survey are detailed in the <sup>Table</sup>.

From the analysis of the 24 transcripts, 6 themes emerged from the data, all contributing to the overarching theme of the sample “mixed feelings about naloxone –morally distressing.” The following themes emerged from the data: (1) Opportunity for discussion and intervention. (2) Addiction is a choice, why can’t we help other diseases? It’s unfair. (3) It enables and condones the behavior. (4) Emergency departments cannot treat social issues. (5) Patients can’t give it to themselves; it’s wasting money. (6) Moral distress.

### Theme 1: Opportunity For Discussion And Intervention

Emergency nurses stated that handing out take-home naloxone along with education on how to use it allowed an opportunity to discuss a patient’s risk for overdose with them and safety planning, as well as potentially discuss treatment. Harm reduction planning such as clean needles, ensuring a noninjecting friend is with them, and naloxone availability reduces the likelihood of morbidity and mortality surrounding injection drug use. *“Even if they aren’t ready now, maybe eventually...[naloxone] is an opportunity to allow someone another chance at recovery.”*

### Theme 2: Addiction is a Choice, Why Can’t We Help Other Diseases? It’s Unfair

This theme describes several examples of nurses’ thoughts surrounding passing out a take-home antidote for opioid overdose. Many nurses expressed frustration with dispensing naloxone for free when they were unable to dispense life-saving medications to other patient populations. Examples of medications and disease processes described included insulin and glucose tabs for diabetes, *“I don’t carry glucose tabs if my diabetic friend crashes”*; epinephrine, *“Decide between groceries and [epinephrine injector]”*; inhalers for asthma, *“I think it’s [unfair]. We can hand out [naloxone], but you can’t send somebody home with [an] inhaler?”*; defibrillators, *“We don’t hand out defibrillators to everyone”*; and concern with where tax dollars are being spent. Finally, there was concern with the patient’s personal spending habits, *“You know, if you can afford the drug but we’re giving you the free antidote, it’s just kinda –it just doesn’t feel quite right.”*

### Theme 3: It Enables and Condone the Behavior

Emergency nurses described a moral conflict with distributing naloxone. The nurses described thoughts that they believed as a health care worker, nurses should be hindering patients from misusing opioids, and passing out free naloxone felt as though they were enablers to the problem and gave patients permission to use again. *“It’s like telling your kids not to use drugs but giving them supplies,” “When do we just let them suffer the consequences of their choice,” “Why are we even encouraging them?...If they are going to overdose, that’s what they want to do.”* However, naloxone for persons with a chronic condition may be more acceptable, *“I can see handing [naloxone kits] out to cancer patients [on] long-term [narcotics] because they are dealing with their cancer or whatever.”*

### Theme 4: Emergency Departments Cannot Treat Social Issues

One theme related to the discussion was that of addiction as a long-term social issue and that the emergency

department was not the place to treat social issues such as opioid use disorder. The nurses stated that patients with opioid use disorder require a follow-up appointment and longer-term interventions; therefore, addiction and overdose prevention should not be managed in the emergency department: *"It's a long-term thing. Like quitting smoking for most people does not happen right now. So, when you are talking about something...that needs to be managed by a primary care doctor who can follow up, who can make these kinds of prescriptions, who can give this kind of guidance...but we're not a follow-up, we're not a primary care."*

#### **Theme 5: Patients Can't Give It To Themselves; It's Wasting Money**

Several nurses expressed beliefs that the take-home naloxone was a waste of money because they did not think the patients wanted it: *"Chances of patient throwing away the [naloxone] are high."* They also believed that patients are high-risk users and would not ensure that others could give them the naloxone: *"They don't shoot up with people around"* and *"You can't give [naloxone] to yourself."* Nurses had a belief that most patients would simply overdose with the naloxone inaccessible to save their life: *"Just to have nasal [naloxone] in a heroin addict's pocket is a waste of money...because it's not being utilized. It'd be different if their friend [would save them]. But they're living high-risk lifestyles. They're not going to be using it."*

#### **Theme 6: Moral Distress**

A theme of moral distress emerged from the nurses' statements that described the large volume of overdose victims as well as nurses feeling unappreciated by the patients: *"[We] just saved your life and you're calling me [names] and I'm supposed be nice to you...[It] creates a really hard situation...to remain even professional in."* Other nurses noted that they recognized that the patients may be experiencing symptoms of withdrawal and now must go out and find money for drugs to avoid withdrawal symptoms, *"doing [who knows] what to get those drugs"*; however, even with that they still found the verbal abuse as difficult. *"It upsets me, you know? It makes me angry, actually, to be honest...there's a part of me that's very compassionate for her life...but by the same token, it made me angry that she was essentially yelling at us for saving her life because she would have died without the [naloxone]."*

#### **Discussion**

Our results describe emergency nurse perceptions of an ED-based naloxone distribution program for take-home kits provided free to patients who are at risk of an opioid overdose. The themes described an awareness of the benefit of the program, citing that naloxone distribution is an opportunity to discuss treatment. However, many of the themes described a moral conflict toward a free distribution of an opioid reversal medication when emergency nurses are unable to provide other life-saving medications. In addition, nurses discussed an overwhelming number of patients with opioid use disorder and overdose and a lack of appreciation for the work that the nurses do.

ED- and community-based naloxone distribution programs are increasing in frequency across the country and have had success demonstrating feasibility and in slowing rates of overdose deaths;<sup>16,22-27</sup> however, many are met with barriers to implementation. Often, barriers to implementation are cited as a lack of time, resources (<sup>Figure</sup>), and patients who were not interested in the medication.<sup>16,22-27</sup> However, our results reflect a potential lack of enthusiastic participation in the distribution program by emergency nurses owing to a moral conflict about distribution of free naloxone. This parallels a study analyzing social media perceptions of the opioid crisis in which nurses showed a tendency toward burnout and negative stigma in relation to the opioid epidemic and naloxone.<sup>28</sup>

Community-based opioid overdose prevention programs that include education and distribution of take-home naloxone demonstrate success in overdose reversal, mostly by opioid users,<sup>29</sup> and can significantly reduce overdose death rates.<sup>30</sup> This evidence of the benefit of naloxone distribution to at-risk persons must be conveyed to frontline health care workers to combat myths and misperceptions, and to facilitate implementation of this public health intervention. Applying principles of the Adult Learning Theory,<sup>31</sup> in which emergency nurses must understand the

“why” through experiences, the delivery of naloxone education by a survivor of opioid overdose may create the learning initiative to change behavior; however, this requires future study. An emphasis must be placed on the theme that naloxone is an “opportunity for discussion and intervention.”

### **Implications for Practice**

Emergency nurses interact with persons who are the most at risk for opioid overdoses on a daily basis, and this may be their only interaction with a health care provider. It is the position of the Emergency Nurses Association to deliver respectful and compassionate care, as well as education on prevention to families and persons at risk for overdose.

<sup>32</sup> Yet, emergency nurses can also deliver life-saving medications and education to allow laypersons to administer naloxone in the community thus reducing potential morbidity and mortality from opioid overdose.<sup>33</sup>

### **Limitations**

Although thematic saturation was achieved, our results may not be representative of other settings. Our sample size included 17 unique nurses with an average of 14 years of emergency nursing experience. Additional limitations were noted with this sample including that most were white females from 2 hospitals, all spoke English, and all were currently living in the Midwestern United States. Finally, participants in the focus groups may not have voiced a dissenting opinion from their peers. Expanding this qualitative study to additional sites with varying demographic backgrounds would aid transferability.

### **Conclusion**

We conducted a qualitative evaluation of the acceptance of a take-home naloxone distribution program administered by emergency nurses. Attitudes, beliefs, knowledge, and perceptions have been cited as implementation barriers in other clinical-based programs; however, our results also reflect a moral judgment call about giving a free medication to persons at risk for opioid overdose and death. The development of interventions to increase access to naloxone for persons at most risk should examine the underlying perceptions of the persons distributing naloxone to rebalance the scale (graphical abstract) and increase naloxone access to those who are most at risk of overdose.

### **Author Disclosures**

This work was funded by a grant received from the Emergency Nurses Association Foundation. MSL and CEF received an investigator-initiated grant support paid to the institution from Brightview Foundation of Recovery (sourced in part from ADAPT Pharma, Inc). The other authors have no conflicts to disclose.

### **Supplementary Appendix Semistructured interview/focus group guide**

The interviewer used this as a guide for the interview/focus group; however, the specific questions may have been adapted based upon the responses of the participant.

#### *Focus Group Guide Questions:*

- How do you feel about assessing a patient’s pain at the bedside?
  
- What about during triage?
  
- Tell me about asking about domestic violence at triage.
  
- How do you feel about asking patients about their addictions while they are in the emergency department?
  
- How do you feel about screening for addictions in triage?
  
- How do you feel about screening for addiction risk factors at triage?

- Do you feel like you know enough about addiction treatment to help your patient?
- What are your thoughts about handing out naloxone in the emergency department?
- Would you ever recommend a needle exchange service to your patients?

*Interview Guide Questions:*

- Tell me your thoughts about opioid addiction.
- Do you think it is possible to prevent opioid addiction?
- Tell me your thoughts about pain management in the emergency department.
- Do you ever feel conflict between patients' pain and addiction?
- Describe your experience with patients who did not have their request for pain management met.
- Tell me your thoughts about people with opioid use disorder.
- Tell me about treating pain of those with opioid use disorder.
- Describe your experience with treatment of a patient who has overdosed on opioids.
- How did that make you feel?
- What was the interaction with the patient like?
- How do you feel other providers treat patients with opioid use disorder?
- Do you think the emergency department contributes to addiction?
- Do you think the emergency department manages acute pain for patients well?
- Do you think emergency department providers manage chronic pain well?
- Describe your thoughts about treatment of patients in opioid withdrawal.
- Do you think the emergency department can prevent addiction?
- Do you think emergency care providers can do anything to prevent opioid addiction?
- How do you feel about screening for addictions?
- How do you feel about screening for addiction in triage?
- Tell me your thoughts about naloxone in the emergency department.

\*Note: This interview was not specifically intended to discuss naloxone distribution as it covered a range of topics surrounding pain management, addiction, opioid overdose, and emergency care.

**Supplementary Data**

Supplementary data related to this article can be found at <https://doi.org/10.1016/j.jen.2020.05.006>.

Characteristic	n (%)
Total participants	17
Age, mean (range), y	43 (23–66)
Female sex	16 (94)
White/Caucasian	16 (94)
Married	13 (76)
Years of practice, mean (range)	16 (1–44)
Years of emergency nursing, mean (range)	14 (1–40)
Personal or family history of SUD	6 (35)

## DETAILS

**Subject:** Emergency medical care; Barriers; Pain; Demographics; Content analysis; Intervention; Opioids; Data analysis; Emergency services; Naloxone; Interviews; Nurses; Narcotics; Patients; Drug overdose; Drugs; Addictions; Stigma; Focus groups; Perceptions; Drug use; Implementation; Primary care; Uptake; Social issues; Enrolled nurses; Departments; Money; Education; Psychological distress; Qualitative research

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Assessment of rabies prophylaxis cases in an emergency service: JEN. (2020). *Journal of Emergency Nursing*, 46(6), 907-913. doi:<https://doi.org/10.1016/j.jen.2020.03.014>

**Introduction**The aim of the present study was to evaluate the demographic characteristics, exposure features, and prophylactic care aspects of cases that presented to the emergency department of 1 state hospital in Turkey between 2013 and 2017 because of the risk of rabies contact.**Methods**Data from the retrospective cohort study were obtained from ED records of Erzurum Palandöken State Hospital between August 2013 and June 2017 regarding patients presenting to emergency service after the risk of rabies contact. Evaluation forms included demographic characteristics of the patients, contact type, contacted animal, exposure features, and the status of prophylaxis. Descriptive analysis, with frequency and percentage, was used.**Results**A total of 691 records were analyzed. The mean age of the patients was 29.2 years (SD = 0.65). Of those, 547 (79%) were male, and 144 (21%) were female. Regarding location, 506 (73%) of the 691 cases were from urban areas, and 185 (27%) from rural settings. Of the cases, 515 (74%) were bite injuries, 159 (23%) were scratches, and 22 (3%) were contact. Of the contacted animals, 483 (70%) were dogs, 171 (25%) were cats, 11 (2%) were foxes, 14 (2%) were horses, 2 (< 1%) were sheep, and 10 (1%) were cattle. A total of 16 animals were vaccinated, however the vaccination status of 675 cases were not known by the patients.**Discussion**It would be beneficial to increase the number of studies regarding animal control, make correct and complete mandatory reporting, properly maintain the risky contact record, and create better pet vaccination cards in Turkey. The training deficiencies of related personnel at risk for contact with rabies are a major public health problem.

A pivot to palliative: An interdisciplinary program development in preparation for a coronavirus patient surge in the emergency department: JEN. (2020). *Journal of Emergency Nursing*, 46(6), 760-767.e1. doi:<https://doi.org/10.1016/j.jen.2020.08.003>

While numbers are still emerging, the demographics of patients with COVID-19 in Massachusetts are overrepresented by patients from nursing homes, those older than 70 years, and those with racial and ethnic minority identities.<sup>1</sup> Because elderly patients with multiple comorbidities are at an increased risk of death,<sup>2,3</sup> an extreme demand on our local health care system was anticipated with this influx of patients potentially needing end-of-life (EOL) care. The program, program tools, and program development process are provided here to serve as a guide for emergency clinicians, palliative nurses, nurse practitioners (NPs), and nursing leadership looking to establish similar programs within their institutions.**Background** Palliative care is specialized health care for people with serious illnesses. Despite this shared goal, a knowledge gap exists regarding the optimal delivery of palliative care in the emergency department.<sup>6</sup> Models of palliative care delivery differ between institutions depending on department size and volume, and currently, optimal models of department-based palliative care have not been rigorously studied.<sup>6</sup> The priority focus of emergency nursing has traditionally been geared toward lifesaving and life-sustaining interventions. An integrative program has been developed called The Improving Palliative Care in Emergency Medicine (IPAL-EM) project, which guides ED providers to incorporate palliative care into standard practice.<sup>12</sup> Aligning with the IPAL-EM basic and advanced integration categories, we sought out ways through our program to connect emergency and palliative care clinicians with shared a common goal by means of novel processes and protocols.<sup>12</sup> Our work group's overarching goal was to support emergency nurses during a surge in the number of patients with COVID-19 in providing compassionate patient care (both palliative and EOL) through the development and implementation of educational and clinical support tools.**Methods** In anticipation of a surge in the number of patients with COVID-19, ED and palliative care leaders (nurses, NPs, physicians, and social workers) identified the need for swift collaboration between the 2 departments.

Attitudes toward influenza vaccination administration in the emergency department among patients: A cross-sectional survey: JEN. (2020). *Journal of Emergency Nursing*, 46(6), 802-813. doi:<https://doi.org/10.1016/j.jen.2020.05.017>

**Introduction**Influenza is a serious, vaccine-preventable illness. The current vaccination rates in Canada are below target rates, highlighting the potential need for more convenient ways to receive vaccinations. Wait times to be seen in Canadian emergency departments are escalating, and using the time spent waiting to offer and administer an influenza vaccine could potentially improve ease of access to immunization for some Canadians.**Methods**The aim of this cross-sectional study was to gauge public interest and identify perceived barriers and facilitators to influenza vaccine availability in a Canadian emergency and trauma center. Anonymous questionnaires were completed by a convenience sample of adult patients classified as low acuity (n = 151) as 1 arm of a 2-arm study.**Results**Of the unvaccinated patients, 34.6% expressed willingness to be vaccinated in the emergency department. The patients who had received a vaccine in the previous year were significantly more willing to accept the vaccine in the emergency department ( $\chi^2 1] = 23.78, P < 0.001$ ). The 3 top factors associated with having received vaccination in the previous year include trust in vaccine information ( $\chi^2 2] = 27.34, P < 0.001$ ), immunity preferences ( $\chi^2 2] = 32.25, P < 0.001$ ), and beliefs about efficacy ( $\chi^2 2] = 44.90, P < 0.001$ ).**Discussion**Patients classified as low acuity were supportive of ED influenza vaccination. In addition, some of the unvaccinated participants had unmet education needs (ie, regarding trustworthy sources of vaccine information, immunity, and vaccine efficacy) that would require addressing before they would likely consider receiving influenza vaccination in future during their ED visit.

Emergency nursing review questions: November 2020: JEN. (2020). *Journal of Emergency Nursing*, 46(6), 892-894. doi:<https://doi.org/10.1016/j.jen.2020.05.010>

A. Intravenous (IV) dextrose 5% water with 40 mEq of potassium over 8 hours B. Calcium chloride slow IV to lower sodium level C. 3% sodium chloride IV infusion with a calculated rate D. Two liters of sodium chloride IV infusion over 4 hours. 5. Dextrose 5% water will reduce serum sodium (A). Because this sodium level demonstrates extreme hyponatremia, efforts would be focused to slowly elevate the sodium level (B). The classic history of pyloric stenosis includes the pediatrician suspecting GERD, taking reflux precautions (burp often and leave undisturbed with head elevated for 30 minutes after feeds), and changing the baby's formula to a non-milk-based option without any resolution of the symptoms.

Preparedness of our emergency department during the coronavirus disease outbreak from the nurses' perspectives: A qualitative research study: JEN. (2020). *Journal of Emergency Nursing*, 46(6), 848-861.e1. doi:<https://doi.org/10.1016/j.jen.2020.07.008>

**Introduction**This study explores the preparedness of our emergency department during the COVID-19 outbreak from the nurses' perspectives, providing a reference and basis for our emergency department's response to public health emergencies.**Methods**Using qualitative research methods, semistructured interviews were conducted with 12 emergency nurses who met the inclusion criteria, and Colaizzi analysis was used for data analysis, summary, and induction.**Results**A cluster of 4 themes that involved preparedness of the emergency department during the COVID-19 outbreak was extracted: organizational preparedness, personal preparedness, patient and family preparedness, and deficiencies and challenges.**Discussion**Organizations, individuals, patients, and family members were actively prepared to respond to novel coronavirus pneumonia outbreak in the emergency department. The emergency nurses said that the trusted organization guaranteed personal preparedness, and the active cooperation from patients and families was a motivator for personal preparedness. In addition, our study showed that there were deficiencies in both multidisciplinary collaboration efforts and efforts to rapidly diagnose and treat patients with fever in critical condition.

Responding to the severe acute respiratory syndrome (SARS) outbreak: Lessons learned in a Toronto emergency department: JEN. (2020). *Journal of Emergency Nursing*, 46(6), 742-747. doi:<https://doi.org/10.1016/j.jen.2020.04.010>

**The Context** SARS is an atypical pneumonia characterized by a fever of 100.4°F (38°C) or higher, myalgia, headache, malaise, chills, a dry, nonproductive cough, and shortness of breath or difficulty breathing.<sup>1</sup> The time from exposure to the onset of symptoms is 2 to 11 days.<sup>2</sup> The cause of SARS is thought to be related to the coronavirus, the virus responsible for the common cold.<sup>3</sup> Epidemiologic evidence indicates that transmission of the



illness occurs with close person-to-person contact (to household members, health care workers, or nearby patients who were not protected by contact or respiratory isolation precautions) and through droplet secretions.<sup>4</sup> Because coronaviruses can survive for several hours on inanimate objects, direct contact with contaminated objects potentially represents another mode of transmission. On April 10, 19 patients with suspected or probable cases of SARS had been treated, and 11 of those patients were health care providers.<sup>6</sup> To date, 51% of SARS cases in the GTA are nurses and physicians, and 77% of the total cases of SARS are the result of exposure within the hospital setting.<sup>5</sup>

**Controlling the Spread in the Emergency Department** In an effort to deal with the transmission and onset of illness within health care and community settings, the province of Ontario designated a Provincial Operations Centre (POC), which was responsible for issuing directives to hospitals about patient care and infection control practices. Even patients with minor lacerations or complaints of abdominal pain who come to the emergency department are triaged to negative pressure isolation rooms if they have any of the symptoms of or possible contacts with the illness.

**Controlling Traffic** In an effort to prevent exposure and transmission of SARS, we have virtually eliminated visitors to the hospital. There is now only one possible entrance to the emergency department with a security guard posted there, around the clock, to manage traffic, inform visitors of the new policy, provide patients with an N95 mask, have them apply a disinfecting hand wash, and direct them to the triage nurse.

Emergency nursing care of patients with novel coronavirus disease 2019: JEN. (2020). *Journal of Emergency Nursing*, 46(6), 748-759. doi:<https://doi.org/10.1016/j.jen.2020.07.010>

Novel coronavirus disease 2019 is the disease caused by the novel coronavirus originally from Wuhan, China. Its pathophysiology is poorly understood, but it is known to be contagious and deadly. Multiple symptoms and complications from the disease have been described, with the most common complaints being respiratory. Nursing care of patients with novel coronavirus disease 2019 is largely supportive, but it should include a strong focus on mitigating the spread of infection to staff, other patients, and the community.

Nursing of patients critically ill with coronavirus disease treated with extracorporeal membrane oxygenation: JEN. (2020). *Journal of Emergency Nursing*, 46(6), 862-868.e2. doi:<https://doi.org/10.1016/j.jen.2020.07.006>

According to the Extracorporeal Life Support Organization, in January 2015 the survival rate of patients with viral pneumonia on ECMO was 65%.<sup>5</sup> Among the 3 patients who received ECMO therapy, 2 patients recovered, and ECMO was discontinued successfully, whereas 1 patient died. Human immunoglobulin, human albumin, and thymalfasin were used to strengthen the immune system, and methylprednisolone was administered to inhibit excessive inflammatory reactions, whereas biapenem was combined with moxifloxacin for anti-infective therapy. ...]the patients were administered lipid emulsion, amino acids, and glucose in terms of nutritional support.

**Special Therapy** All 3 patients underwent invasive mechanical ventilation through oral endotracheal intubation for respiratory support as well as right femoral vein cannulation through percutaneous puncture for blood drainage. According to the Guidelines for Prevention and Control of Novel Coronavirus Infection in Medical Institutes (First Version) released by the National Health Commission,<sup>7</sup> clinical staff should wear 12 items of personal protective equipment (PPE), including fission-type work clothes; disposable medical hoods; disposable surgical masks (or KN95 or N95 masks); coveralls; goggles; face shields or full respiratory protective devices or positive-pressure hoods; disposable fluid-resistant shoe covers; rubber boots; isolation gowns; disposable surgical masks; and 2 pairs of latex gloves. ...]the staff should take a bath, put on clean clothes, leave the isolation area, and return to the resting room.

Hidden danger: Pediatric acetaminophen overdose unintentional and intentional emergencies: JEN. (2020). *Journal of Emergency Nursing*, 46(6), 914-922. doi:<https://doi.org/10.1016/j.jen.2020.06.015>

Children younger than 6 years per 1,000 children accounted for 37.7% of these exposures.<sup>3</sup> One- and 2-year-old children had the highest incidence of poisoning overdose.<sup>3</sup> According to the National Poison Statistics Data 2018, unintentional ingestion accounted for 99.4% of children younger than 6 years.<sup>3</sup> Teens accounted for 48.3% of intentional suspected suicide gesture, whereas only 4% in children aged 6 to 12 years were intentional ingestion.<sup>3</sup> The 2017 Annual Report of Poison Control Centers reported that acetaminophen overdoses that required N-acetylcysteine (NAC) were provided intravenously to 196 children younger than 5 years, 287 children aged 6 to 12

years, and 6,228 children aged 13 to 19 years.<sup>4</sup> Acetaminophen overdoses that were treated with oral NAC included 30 children younger than 5 years, 36 children aged 6 to 12 years, and 928 children aged 13 to 19 years.<sup>4</sup> Acetaminophen, which is known as N-acetyl-p-aminophenol, and paracetamol, is the most common pain reliever and antipyretic for children worldwide.<sup>1</sup> Acetaminophen is extremely safe when administered appropriately to children. Opioids, diphenhydramine, and cough and cold formulations are examples of common combination medications that include acetaminophen (Table 1).<sup>1,2,5-7</sup> The 2017 Annual Report of the American Association of Poison Control Centers' National Poison Data System: 35th Annual Report stated analgesics (the category acetaminophen is in) are still the most common drugs identified in pediatric poisonings.<sup>4</sup> Fortunately, pediatric patients who experience acetaminophen overdose rarely develop acute liver failure compared with adult patients.<sup>1,2,5,6</sup> The speculation on why pediatric patients have better outcomes after acetaminophen overdose is that children have large hepatic cell masses that have the capacity to metabolize acetaminophen in a nontoxic manner.<sup>1,2,5,6</sup> Typically, children do not have underlying liver damage and their liver tissue can regenerate rapidly, which accounts for their rarely developing liver failure after acetaminophen overdose.<sup>1,2,5-7</sup> The basic pathophysiology of acetaminophen metabolism is a rapid absorption after ingestion from the stomach and small intestine. The presentation of the child's symptoms is important because acetaminophen overdose may appear up to 12 hours after ingestion with nausea, vomiting, diarrhea, abdominal pain, irritability, loss of appetite, generalized weakness, altered mental status, convulsions, and coma.<sup>1,2,5,6</sup> Late signs of acetaminophen overdose presentations may include hypovolemia, coagulopathy, acute renal failure, hypoglycemia, and jaundice.<sup>1,2,5,6</sup> The child's current medications are important to know because herbal medication, antiepileptics and antituberculosis medications can increase the risk for liver injury.<sup>1,2,5,6</sup> Pediatric emergency nurses should ask about other diagnoses or if the child is fasting or has malnutrition because these increase the susceptibility of acetaminophen overdose that may induce liver disease.<sup>1,2,5,6</sup> In the patient who is malnourished, acetaminophen metabolism converts to a toxic byproduct after acetaminophen overdose.<sup>1,2,5,6</sup> Underlying liver disease, Gilbert syndrome, and other genetic predispositions in children can contribute to increased acetaminophen toxicity during an acetaminophen overdose.<sup>1,2,5,6</sup> It is important to know nutritional status and medical conditions because during acetaminophen metabolism, available glucuronidation products are dependent on carbohydrate stores.<sup>1,2,5,6</sup> Children younger than 6 years seem to be less susceptible to acetaminophen toxicity owing to protection by increased supply and regeneration of glutathione and better enzyme activity.<sup>1,2,5,6</sup> Acetaminophen Overdose Management Acetaminophen overdose management includes oral decontamination with activated charcoal and administration of NAC, which is the antidote for acetaminophen overdose, if the child arrives within 4 hours of ingestion (Table 2).<sup>1,2,5,6</sup> The toxic dose of acetaminophen in children varies. Experts suggest that in children a minimal toxic acetaminophen acute ingestion is 150 mg/kg.<sup>1</sup> If the child is younger than 6 years, then an acute acetaminophen overdose is when greater than 200 mg/kg is ingested.<sup>1</sup> Cases of sustained-released preparations of acetaminophen or other coingestion of agents may slow gut motility such as opioids, diphenhydramine, and anticholinergic agents, which may indicate activated charcoal should be given even if ingestion was greater than 4 hours.<sup>1,2,5,6</sup> The emergency nurse (or health care provider) should contact the Poison Control center to receive recommended treatment on each child arriving with any concern for overdose.

Amplifying infection prevention self-management among patients and people in the community: JEN. (2020). *Journal of Emergency Nursing*, 46(6), 727-730. doi:<https://doi.org/10.1016/j.jen.2020.08.002>

Often, before an infection is diagnosed, health care workers and the public are exposed, and the condition of patients can go from minimal signs and symptoms to severe within a matter of minutes, hours, or days. ...[an infection requires early recognition and containment. ...]my science primarily focuses on innovative strategies that will engage patients in infection prevention self-management. Through our work, we know that patients are able and willing to practice hand hygiene if they are reminded and if their hand hygiene products are conspicuously placed and easy to use.<sup>3</sup> I learned from one of my studies that most patients perceive health care worker hand hygiene to be more important than their own, and that the hand hygiene products in the hospital are intended for health care workers, not for patients.<sup>9</sup> Even after our continual effort at exploring innovation that put forth unconventional interventions in acute care settings, I wanted to know more about how pathogens transferred among surfaces and about people's hand hygiene behaviors in various settings, including the emergency department. Mandates and

requirements put in place by governing and accrediting bodies primarily focus on hospital settings, and are major drivers of the public's dependence on the health care system to prevent and mitigate germ transmission even in the communities in which they live.

2020 tribute and thank you to journal of emergency nursing editorial team members: JEN. (2020). *Journal of Emergency Nursing*, 46(6), 723-724. doi:<https://doi.org/10.1016/j.jen.2020.09.001>

Urine drug screens in the emergency department: The best test may be no test at all: JEN. (2020). *Journal of Emergency Nursing*, 46(6), 923-931. doi:<https://doi.org/10.1016/j.jen.2020.06.003>

The manuscript purpose is to provide a resource for clinicians on the functionality and pitfalls of the rapid urine drug screen for clinical decision making. Many providers remain under-informed about the inherent inaccuracies. The rapid urine drug screen is the first, and often only, step of drug testing. In the majority of emergency departments the urine drug screen is a collection of immunoassays reliant on an interaction between the structure of a particular drug or metabolite and an antibody. Drugs in separate pharmacologic classes often have enough structural similarity to cause false positives. Conversely, drugs within the same pharmacologic class often have different enough structures that they may result in inappropriate negatives. This lack of sensitivity and specificity significantly reduces the test utility, and may cause decision-making confusion. The timing of the drug screen relative to the drug exposure also limits accuracy, as does detection threshold. Confirmatory steps following the initial immunoassay include chromatography and/or mass spectrometry. These are unavailable at many institutions and results rarely return while the patient is in the emergency department. In addition, institutional capabilities vary, even with confirmatory testing. Confirmation accuracy depends on a number of factors, including the extent of the catalog of drugs/metabolites that the facility is calibrated to detect and report. In summary, the standard emergency department urine drug screen is a test with extremely limited clinical utility with multiple properties contributing to poor sensitivity, specificity, and accuracy. The test should be used rarely, if ever, for clinical decision making.

CE earn up to 8.0 contact hours: JEN. (2020). *Journal of Emergency Nursing*, 46(6), 941. doi:[https://doi.org/10.1016/S0099-1767\(20\)30346-9](https://doi.org/10.1016/S0099-1767(20)30346-9)

Board of directors: JEN. (2020). *Journal of Emergency Nursing*, 46(6) doi:[https://doi.org/10.1016/S0099-1767\(20\)30307-X](https://doi.org/10.1016/S0099-1767(20)30307-X)

The influence of patient safety culture and patient safety error experience on safety nursing activities of emergency nurses in south korea: JEN. (2020). *Journal of Emergency Nursing*, 46(6), 838-847.e2. doi:<https://doi.org/10.1016/j.jen.2020.05.019>

**Introduction**The unique nature of the space and environment of emergency departments is a threat to patient safety. Enhancing patient safety and minimizing safety-related issues are important tasks for ED health care staff. The purpose of this study was to examine the relationships among patient safety culture, patient safety error, and safety nursing activities of emergency nurses in South Korea.  
**Methods**A convenience sample of 200 emergency nurses working in 12 general hospitals in South Korea were surveyed for safety nursing activities using the Hospital Survey of Patients' Safety Culture, a 4-item questionnaire for patient safety error and ED safety management items in the Guidelines for Patient Safety (seventh revision).  
**Results**Hierarchical regression analysis revealed that the potential factors associated with safety nursing activities were safety training experience ( $\beta = 0.180$ ,  $P=.01$ ), organizational learning–continuous improvement ( $\beta = 0.170$ ,  $P=.04$ ), age ( $\beta = 0.160$ ,  $P=.02$ ), and implementation of domestic and foreign accreditation ( $\beta = 0.147$ ,  $P=.03$ ).  
**Discussion**To improve patient safety, it is essential to identify problems in medical institutions, determine areas of improvement, and improve the organization's patient safety activity system on the basis of patient safety error experience reports. After training the emergency nurses for continuous improvement, the effect of patient safety activities must be analyzed.

Active and passive distraction interventions in a pediatric emergency department to reduce the pain and anxiety during venous blood sampling: A randomized clinical trial: JEN. (2020). *Journal of Emergency Nursing*, 46(6), 779-790. doi:<https://doi.org/10.1016/j.jen.2020.05.004>

**Introduction**Distraction is a method that is easy to use in emergency departments and effective in relieving procedural pain and anxiety. This study aimed to determine the effect of 2 new distraction methods—1 active distraction (rotatable wooden toy) and 1 passive distraction (toy wristband)—on procedural pain, fear, and anxiety in children during venous blood sampling.**Methods**This study was a randomized controlled experimental study. The sample consisted of 216 children aged 6 years to 12 years. They were divided into 3 groups using the block randomization procedure: active distraction group (n = 72); passive distraction group (n = 72); and control group (n = 72). The levels of pain and anxiety in the children were measured before and during the blood sampling by the children themselves, their parents, and the researcher using the Visual Analog Scale, the Wong-Baker FACES Pain Rating Scale, and the Children's Fear Scale.**Results**The children and their parents included in the control and experimental groups had similar sociodemographic characteristics. The active distraction group had lower levels of procedural pain, fear, and anxiety than the other groups (children's visual analog scale score,  $F = 134.22$ ;  $P < 0.05$ ; Wong-Baker FACES Pain Rating Scale score,  $F = 137.54$ ;  $P < 0.001$ ; and Children's Fear Scale score,  $F = 92.44$ ;  $P < 0.001$ ).**Discussion**Both the toy wristband and rotatable wooden toy interventions can be used to reduce procedural pain, fear, and anxiety in children during blood sampling in emergency departments.

Can you catch it? lessons learned and modification of ED triage symptom- and travel-screening strategy: JEN. (2020). *Journal of Emergency Nursing*, 46(6), 932-940. doi:<https://doi.org/10.1016/j.jen.2020.03.006>

**Introduction**Efficient identification and isolation of patients with communicable diseases limits exposure to health care workers, other patients, and visitors. In August 2014, our team developed and implemented an algorithm to triage suspected cases of Ebola virus disease in a midwestern United States emergency department and outpatient clinics based on patient travel history and symptoms. Here, we present the lessons learned and modifications to update the tool.**Methods**Two strategies were developed and utilized to properly identify, isolate, and inform on patients with suspected highly hazardous communicable diseases: 1) a robust electronic symptom and travel screen with decision support tools in the electronic medical record, and 2) the availability of workflow protocols for Ebola virus disease, Middle East Respiratory Syndrome (MERS), and coronavirus 2019 (COVID-19) once a person under investigation is identified. After action reports provided opportunities to modify the algorithm and improve the identification and isolation processes.**Results**Since our screening and travel electronic medical record inception 5 years ago, modifications changed iteratively to further enhance the screening process. Since 2018, staff have identified 5 patients at risk for MERS; in all cases, identification occurred during the check-in process. Exposure investigations in the emergency department decreased significantly after algorithm implementation in January 2019, from 30 in 2018 to 0 in 2019.**Discussion**Although highly hazardous communicable diseases like Ebola virus disease and MERS are of concern due to their mortality rates and limited treatment options, these same concepts may be applied to the early identification and isolation of patients suspected of having more common communicable diseases like measles and influenza, emphasizing the importance of protocol-based screening in the healthcare environment.

Development, diagnostic sensitivity, and prognostic accuracy of the Adult-Difficult venous catheterization scale for emergency departments: JEN. (2020). *Journal of Emergency Nursing*, 46(6), 827-837. doi:<https://doi.org/10.1016/j.jen.2020.06.013>

**Introduction**Difficulty in accessing peripheral veins in emergency departments increases patients' discomfort and impedes their diagnosis. The objective of this study was to develop and test the prognostic accuracy of an easily applied scale to measure difficult venous access to peripheral veins in emergency departments, called the Adult-Difficult Venous Catheterization scale.**Methods**This prospective observational study was conducted in adults from the hospital catchment area attending the emergency department. Using the Delphi technique, 5 experts reached a consensus regarding a 3-item scale scored from 0 to 5. Concurrent validity and predictive validity were analyzed using a numeric rating scale and the number of access attempts, respectively. Internal consistency and interobserver reliability for 3 independent observers were analyzed using Cronbach alpha and Cohen kappa, respectively.**Results**In 392 participants, the concurrent and predictive validity scores pointed to positive relationships with the numeric rating scale ( $r = 0.82$ ;  $P < 0.001$ ) and the number of access attempts ( $r = 0.5$ ;  $P < 0.001$ ), respectively. The odds ratio for 1 to 2 access attempts versus more than 2 access attempts in relation to the

Adult–Difficult Venous Catheterization scale score was 2.76 (95% confidence interval 1.86, 4.08;  $P < 0.001$ ). Sensitivity and specificity values for the Adult–Difficult Venous Catheterization scale were good, at 93.75% and 78.99%, respectively, as were internal consistency (Cronbach alpha 0.81) and interobserver reliability (Cohen kappa 0.75). Discussion The Adult–Difficult Venous Catheterization scale is a valid and reliable instrument for predicting difficult venous access in emergency departments.

Editorial board: JEN. (2020). *Journal of Emergency Nursing*, 46(6) doi:[https://doi.org/10.1016/S0099-1767\(20\)30306-8](https://doi.org/10.1016/S0099-1767(20)30306-8)

A cross-sectional examination of the factors related to emergency nurses' motivation to protect themselves against an ebola infection: JEN. (2020). *Journal of Emergency Nursing*, 46(6), 814-826. doi:<https://doi.org/10.1016/j.jen.2020.05.002>

Introduction The 2014-2016 West African Ebola outbreak impacted the United States. Owing to the sporadic occurrence of the Ebola infection, there is insufficient research regarding how US emergency nurses provide care to patients potentially infected with the Ebola virus and the nurses' motivation to protect themselves when providing care to these patients. This study aimed to investigate the predictors of emergency nurses' protection motivation. Methods A cross-sectional design was employed. A survey developed based on a modified Protection Motivation Theory was administered to randomly selected members of the Emergency Nurses Association. Descriptive statistics, nonparametric Kruskal-Wallis H test (as well as post hoc Dunn-Bonferroni test), Spearman rho correlation, and stepwise multiple linear regression were conducted for data analysis. Results Protection motivation was found in 2 components: proactive and passive protection motivation. Regression analysis indicated that response efficacy ( $\beta = 0.27$ ,  $P < 0.001$ ) and self-efficacy ( $\beta = 0.17$ ,  $P < 0.01$ ) significantly predict emergency nurses' proactive protection motivation, whereas perceived vulnerability ( $\beta = 0.26$ ,  $P < 0.001$ ), response cost ( $\beta = 0.19$ ,  $P = 0.001$ ), and knowledge ( $\beta = -0.15$ ,  $P < 0.01$ ) significantly predict emergency nurses' passive protection motivation. Discussion The results indicate the need for interventions to improve emergency nurses' response efficacy, self-efficacy, and knowledge, while simultaneously reducing the nurses' perceived vulnerability and response cost. Such interventions would be expected to proactively motivate nurses to protect themselves when providing care to patients who exhibit the signs and symptoms of an Ebola infection and reduce their passive protection motivation.

A song for frontline nurses: JEN. (2020). *Journal of Emergency Nursing*, 46(6), 740-741. doi:<https://doi.org/10.1016/j.jen.2020.06.010>

Pneumothorax: JEN. (2020). *Journal of Emergency Nursing*, 46(6), 895. doi:<https://doi.org/10.1016/j.jen.2020.04.012>

A 40-year-old man presented to the emergency department complaining of a sudden onset of right-sided chest pain and dyspnea after a motor vehicular accident (Figure). He denied any medical problems and was not taking any medications. He spoke in short sentences as he answered the questions. His vital signs were as follows: blood pressure, 110/60 mm Hg; heart rate, 94 beats per minute; respiratory rate, 18 breaths per minute; and oxygen saturation by pulse oximetry, 90% in room air.

One person can truly make a difference: JEN. (2020). *Journal of Emergency Nursing*, 46(6), 725-726. doi:<https://doi.org/10.1016/j.jen.2020.08.007>

The first case diagnosed in the United States was on January 20, 2020, in Washington state.<sup>2</sup> Just 11 days later, WHO issued a statement for a Global Health Emergency, and on March 11, 2020, WHO declared coronavirus disease 2019 a pandemic. Two days later the US would declare a national emergency.<sup>3</sup> Throughout the pandemic, nurses, especially emergency nurses, continue to be on the front line caring for our communities. Not only are we facing a global pandemic this year, we are also facing demonstrations highlighting the social injustices our Black and brown brothers and sisters have faced for centuries in the US.

Triage standing orders decrease time to antibiotics in neonates in pediatric emergency department: JEN. (2020). *Journal of Emergency Nursing*, 46(6), 768-778. doi:<https://doi.org/10.1016/j.jen.2020.06.008>

Introduction Infants aged 0 days to 28 days are at high risk for serious bacterial infection and require an extensive evaluation, including blood, urine, and cerebrospinal fluid cultures, and admission for empiric antibiotics. Although there are no guidelines that recommend a specific time to antibiotics for these infants, quicker administration is presumed to improve care and outcomes. At baseline, 19% of these infants in our emergency department received antibiotics within 120 minutes of arrival, with an average time to antibiotics of 192 minutes. A quality improvement team convened to increase our percentage of infants who receive antibiotics within 120 minutes of arrival. Methods The team evaluated all infants aged 0 days to 28 days who received a diagnostic evaluation for a serious bacterial infection and empiric antibiotics in our emergency department. A nurse-driven team implemented multiple Plan-Do-Study-Act cycles to improve use of triage standing orders and improve time to antibiotics. Data were analyzed using statistical process control charts. Results Through use of triage standing orders and multiple educational interventions, the team surpassed initial goals, and 84% of the infants undergoing a serious bacterial infection evaluation received antibiotics within 120 minutes of ED arrival. The average time to antibiotics improved to 74 minutes. Discussion The use of triage standing orders improves time to antibiotics for infants undergoing a serious bacterial infection evaluation. Increased use, associated with nurse empowerment to drive the flow of these patients, leads to a joint-responsibility model within the emergency department. The cultural shift to allow nurse-initiated work-ups leads to sustained improvement in time to antibiotics.

Beyond the horizon: Pathways to our vision: JEN. (2020). *Journal of Emergency Nursing*, 46(6), 896-897. doi:<https://doi.org/10.1016/j.jen.2020.04.001>

While searching for guidelines to present before the committee, I began to develop a proposal for a preceptorship course that would standardize and upgrade the level of education and intervention for emergency nurses. "Oh, I know, I'll contact my friend in the continuing education department at the university." In the fall of 1972, an editor from RN magazine wrote an article about the certification course.<sup>1</sup> This publicity led to the acceptance of the Certified Emergency Department Nurse certification by the emergency departments of many local hospitals.

Table of contents: JEN. (2020). *Journal of Emergency Nursing*, 46(6) doi:[https://doi.org/10.1016/S0099-1767\(20\)30305-6](https://doi.org/10.1016/S0099-1767(20)30305-6)

Information for readers: JEN. (2020). *Journal of Emergency Nursing*, 46(6) doi:[https://doi.org/10.1016/S0099-1767\(20\)30308-1](https://doi.org/10.1016/S0099-1767(20)30308-1)

Infection control and vaccine hesitancy in the emergency department: JEN. (2020). *Journal of Emergency Nursing*, 46(6), 731-738. doi:<https://doi.org/10.1016/j.jen.2020.09.003>

At the time of writing this editorial, severe acute respiratory syndrome coronavirus 2 vaccines are being tested in clinical trials, and it remains uncertain if the ED setting will have a crucial role in a mass vaccination campaign as part of the ongoing pandemic response. However, we do anticipate that the emergency nurse will have a crucial role in assessing and addressing pandemic-related delays in routine childhood vaccinations in pediatric emergency settings.<sup>1</sup> In this timely context, the purpose of this editorial is to introduce a collection of infectious disease manuscripts published in this issue of the *Journal of Emergency Nursing* (JEN) and briefly introduce a framework of vaccine hesitancy relevant to emergency clinical practice.

Assessment of emergency triage directives and wait times: JEN. (2020). *Journal of Emergency Nursing*, 46(6), 739. doi:<https://doi.org/10.1016/j.jen.2020.05.005>

The physical and psychological effects of personal protective equipment on health care workers in wuhan, china: A cross-sectional survey study: JEN. (2020). *Journal of Emergency Nursing*, 46(6), 791-801.e7. doi:<https://doi.org/10.1016/j.jen.2020.08.004>

**Introduction**The purpose of this study was to rapidly quantify the safety measures regarding donning and doffing personal protective equipment, complaints of discomfort caused by wearing personal protective equipment, and the psychological perceptions of health care workers in hospitals in Wuhan, China, responding to the outbreak.  
**Methods**A cross-sectional online questionnaire design was used. Data were collected from March 14, 2020, to March 16, 2020, in Wuhan, China. Descriptive statistics and  $\chi^2$  analyses testing were used.  
**Results**Standard nosocomial infection training could significantly decrease the occurrence of infection (3.6% vs 13.0%,  $\chi^2 = 4.47$ ,  $P = 0.03$ ). Working 4 hours (62.2% vs 39.2%,  $\chi^2 = 9.17$ ) led to more complaints about physical discomfort or increased occurrence of pressure sores (all  $P < 0.05$ ). Psychologically, health care workers at designated hospitals (60.0% vs 42.1%,  $\chi^2 = 4.97$ ) or intensive care units (55.9% vs 41.5%,  $\chi^2 = 4.40$ ) (all  $P < 0.05$ ) expressed different rates of pride.  
**Discussion**Active training on infection and protective equipment could reduce the infection risk. Working for long hours increased the occurrence of discomfort and skin erosion. Reducing the working hours and having adequate protective products and proper psychological interventions may be beneficial to relieve discomfort.

The effect of implementing bar-code medication administration in an emergency department on medication administration errors and nursing satisfaction: JEN. (2020). *Journal of Emergency Nursing*, 46(6), 884-891. doi:<https://doi.org/10.1016/j.jen.2020.07.004>

**Introduction**Bar-code medication administration has been shown to reduce medication errors in inpatient settings with limited studies on its use in emergency departments. In addition, no studies have evaluated nursing satisfaction with implementing bar-code medication administration in an emergency department. This study was designed to determine the impact of implementing bar-code medication administration in an emergency department on medication errors and nursing satisfaction.  
**Methods**This is a before-and-after study, with no control group, of a bar-code medication administration intervention conducted in a community hospital emergency department. Direct observation was used to compare medication error rates before and 3 months after implementing bar-code medication administration. The Medication Administration System—Nurses Assessment of Satisfaction survey was used to assess the impact on nursing satisfaction before and 1 month after bar-code medication administration implementation.  
**Results**A total of 676 medication administrations were observed in the period before bar-code medication administration implementation and 656 after. The medication administration error rate preimplementation was 2.96% with “wrong dose” errors being the most common. After bar-code medication administration implementation, the medication administration error rate fell to 0.76%, a relative reduction of 74.2% (Fisher exact  $P < 0.01$ ). The average (SD) Medication Administration System—Nurses Assessment of Satisfaction score preimplementation was 2.60 (0.75) and improved to 2.29 (0.66) ( $t = 2.00$ ,  $P = 0.05$ ) 1 month post implementation.  
**Discussion**Implementing bar-code medication administration in a community emergency department was associated with a decrease in medication administration errors and an improvement in Medication Administration System—Nurses Assessment of Satisfaction scores. The results of this study suggest a benefit of bar-code medication administration in reducing medication administration errors and improved nursing satisfaction in the emergency department.

An assessment of emergency nurses' perspectives on nurse-driven human immunodeficiency virus testing in the emergency department: JEN. (2020). *Journal of Emergency Nursing*, 46(6), 869-883. doi:<https://doi.org/10.1016/j.jen.2020.05.020>

**Introduction**Engaging emergency clinicians in universal human immunodeficiency virus screening is paramount to achieving goals of reengaging human immunodeficiency virus–positive persons into care, identifying new human immunodeficiency virus cases, and linking them to care. The study aim was to identify beliefs and barriers towards opt-out human immunodeficiency virus testing among emergency nurses.  
**Methods**A cross-sectional study used Qualtrics software to deliver a survey on a tablet device to emergency nurses in a private Level 1 trauma hospital in Houston, Texas during downtimes of their clinical shifts. The survey evaluated perspectives on human immunodeficiency virus screening and knowledge relative to rapid screening and human immunodeficiency virus prevalence rates locally and nationally.  
**Results**Fifty emergency nurses were enrolled. Few nurses accurately identified human immunodeficiency virus prevalence rates at the local hospital and city level (10% and 42%, respectively). Most (54%) of nurses correctly estimated human immunodeficiency virus prevalence rates nationally.

Nearly half of the nurses (42.0%) correctly predicted the cost of a rapid human immunodeficiency virus test with accuracy and most were willing to offer rapid human immunodeficiency virus testing all the time (60.0%). Eighty-eight percent of nurses were supportive of facilitating universal human immunodeficiency virus screening. However, 92.0% strongly supported human immunodeficiency virus testing for high risk patients only when compared to 80.0% support of testing for all eligible patients. Qualitative data revealed time constraints and follow-up concerns as barriers. Discussion Emergency nurses reported barriers that sometimes prevented application of Centers for Disease Control and Prevention recommendations to human immunodeficiency virus screening. Strategies to overcome these barriers are instrumental to programmatic success. Solutions can corroborate the importance of emergency nurses to the nation's Ending the HIV Epidemic plan.

Response to kayauchi letter: JEN. (2020). *Journal of Emergency Nursing*, 46(6), 739-740.  
doi:<https://doi.org/10.1016/j.jen.2020.07.002>

...]this should be interpreted with caution because we were only able to compare nursing triage protocols and could not investigate other variables owing to the study design. Because our results show a decreased time to disposition among the admitted patients, whom we would assume to be in need of the most urgent care, we can infer that this is due to the FN protocol's statement to "notify physician immediately if patient is deemed neutropenic." ...]although we agree that C-reactive protein and procalcitonin levels are useful markers in assessing inflammation and that assessment criteria can help sepsis screening, our study was limited to its focus on the FN and sepsis nurse-initiated protocols. ...]we hope that future research assesses nurse-initiated protocols prospectively. Because it would be unethical to randomize patients to one protocol over another, we suggest using a prospective noninferiority design to detect if there is no difference in wait times.<sup>3</sup> Therefore, 276 patients (138 per group) would be required to be 80% sure that the lower limit of a one-sided 95% confidence interval will be above the noninferiority limit of -0.6 (based on the effect size obtained from our post hoc analysis).

Facility-level case report of nursing care processes for patients with suspected 2019 novel coronavirus disease in shanghai, china: JEN. (2020). *Journal of Emergency Nursing*, 46(6), 898-906.  
doi:<https://doi.org/10.1016/j.jen.2020.08.001>

Introduction Coronavirus disease emerged in Wuhan, China, on December 31, 2019, and spread rapidly worldwide. Few studies have described the nursing care provided to patients in isolation between suspicion of having the disease and a confirmed diagnosis. The purpose of this study was to describe the treatment of, and nursing care processes for, patients suspected, but not yet confirmed, of having coronavirus disease at 1 facility in Shanghai, China. Methods For this retrospective facility case review and patient health record study, data were collected on all patients with suspected coronavirus disease who were treated between January 22, 2020, and February 29, 2020, at 1 hospital. The facility's nursing care processes were described in detail. Results A total of 119 patients were suspected of having coronavirus disease on the basis of the screening criteria. Nine (7.6%) patients had confirmed coronavirus disease and were transferred to a higher level of care. The remaining 110 (92.4%) were treated and discharged. No cross-infection between patients and hospital staff or other patients was detected. The patients' symptoms included fever (n = 98, 82.4%), cough (n = 79, 66.4%), dizziness (n = 28, 23.5%), headache (n = 26, 21.8%), fatigue (n = 26, 21.8%), myalgia (n = 16, 13.4%), rhinorrhea (n = 6, 5.0%), diarrhea (n = 5, 4.2%), severe nasal congestion (n = 4, 3.4%), and dyspnea (n = 1, 0.8%). Discussion Coronavirus disease is very contagious. Nurses need to understand the symptoms and treatment of the disease as well as nursing procedures, and learn how to cut off transmission routes, control transmission sources, and use protective equipment correctly to prevent transmission of the disease within the hospital.

The acute incident response program: A framework guiding multidisciplinary responses to acutely traumatic or stress-inducing incidents in the ED setting: JEN. (2020). *Journal of Emergency Nursing*, 46(5), 579-589.e1.  
doi:<https://doi.org/10.1016/j.jen.2020.05.016>

Background Clinicians working in the ED setting are exposed to traumatic and stress-inducing incidents, which may increase the incidence of psychological sequelae, including burnout and acute stress disorders. The purpose of this



project was to develop and implement a novel debriefing program as an early intervention for acutely stress-inducing events in the emergency department. **Methods** The 2-stage Acute Incident Response program was developed and implemented in the emergency department of the John Hunter Hospital to guide an interprofessional response to acutely stress-inducing incidents. This psychological support framework draws on existing concepts of critical incident stress management along with elements of contemporary “hot debriefing” models to create a concise, clinician-led response program incorporating elements of both work group peer support and clinical team performance improvement. The Acute Incident Response program is novel in its concurrent focus on both salient clinical factors and emotional responses of affected clinicians. **Results** The developed Acute Incident Response program framework predominantly focuses on the wide dissemination of a peer-driven debriefing model. When additional support is deemed necessary by trained clinical champions after the Hot Acute Incident Response process, escalation to a central response coordinator ensures targeted secondary support follow-up for all affected team members. This program has been introduced at 1 site and warrants further targeted investigation to determine its efficacy and utility in a broad range of clinical contexts. **Conclusion** The Acute Incident Response program is an accessible and meaningful model to guide a functional, clinician-led response to acute incidents in the ED setting. The model could feasibly be applied in a wide variety of clinical contexts.

Tackling burnout with team science: Nursing and physician collaborations on improving psychological well-being among emergency clinicians: JEN. (2020). *Journal of Emergency Nursing*, 46(5), 557-559.  
doi:<https://doi.org/10.1016/j.jen.2020.05.009>

Prolonged exposure to stressful environments has been associated with the development of adverse psychological outcomes, including the development of burnout.<sup>1,5,6</sup> Burnout is characterized by emotional exhaustion, physical fatigue, and cognitive weariness, which may lead to feelings of depersonalization and reduced accomplishment.<sup>7</sup> Nearly half of the nearly 900,000 practicing physicians in the United States report symptoms of burnout, with emergency physicians reporting the highest rates of burnout.<sup>1</sup> Similarly, 2 recent systematic reviews on burnout in emergency nurses also found high rates of nurse burnout (eg, 31%).<sup>2,5</sup> Alarming, these elevated rates of burnout are seen even among early career clinicians and trainees, suggesting that the impact of burnout is significant even to early career individuals.<sup>8</sup> The negative impact of burnout on clinicians is broad, including increased risk for depression, anxiety, and substance abuse among nurses and physicians.<sup>9-11</sup> Burnout has also been associated with poorer delivery of medical care, including clinician-reported patient care, less empathetic communication, job absenteeism, and increased medical errors.<sup>12,13</sup> The combined impact on patients interacting with burned-out physicians practicing in highly stressful acute care environments represents a near perfect storm leading to dissatisfaction and risk of poorer outcomes.<sup>14</sup> Although a recent systematic review of interventions for physician burnout concluded that institutional interventions were most effective, none focused on burnout in acute care clinicians, as well as a core clinical partner in the emergency department (eg, nurses).<sup>15</sup> An understanding of both the unique and common variables associated with nursing and physician burnout would shed new light on the development and management of clinician well-being. Nurses and physicians are key partners in the acute management and stabilization of patients in the emergency department, with shared environmental stressors and risk factors for the development of burnout.<sup>16</sup> Furthermore, the unique dynamic of the nurse-physician relationship in the emergency department may interact with clinician burnout, while also having immediate and more sustained effects on patient care. Future interventions for acute care clinicians could include work cycles/schedules that optimize staffing models to adjust for real-time changes in factors such as crowding, which may simultaneously improve clinician well-being, patient outcomes, and even health care costs.

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