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TABLE OF CONTENTS

TABLE OF CONTENTS

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

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.[1] 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.[2-4] 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.[5]

Rabies has the highest mortality rate among infectious diseases.[6,7] 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.[8] In Turkey, 93% of rabies-infected animals are domestic, with 59% of them being dogs.[9] 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.[10] 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).[9]

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.[10]

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.[6,11-13] 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.[14] This could be caused by children coming into contact with animals for the purpose of playing and the overall vulnerability of this age group.[5,14] In most of the studies in the literature, the highest risk of potential rabies contacts occurred between the ages of 19 and 60 years.[11-13] 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,[12] Karadağ et al,[15] and Balin et al[16] reported that rabies risk occurred most commonly during the summer season, whereas Kadıoğlu et al[6] reported that most occurred in the autumn and winter. Gülaçtı et al[17] 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.[8] This explains why rabies risky contacts in Turkey have mostly occurred in urban areas.[6,12,17,18] 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.[14,1920] 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.[20-22] Similar to our work, studies have shown that most of the rabies risky contacts originated from dogs, especially by Aydın et al[13] (84.7%), Taşdemir et al[21] (71.5%), Aker and Şahin (75.4%),[12] Balin and Denk (58.3%),[16] and Derinöz and Akar (73.4%).[2] Following the dog as the most common vector were cats (24.7%), cattle (1.4%), and other animals.[17,22] 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[12] reported that 180 (41.38%) of their cases were owned and nonvaccinated, and Taşdemir et al[21] 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.[2,15,20] 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 carries 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.[17] 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.[13] 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[22] have reported that 44.9% of the cases were in the lower extremities and 42.3% in the upper extremities; Ostanello et al[23] 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[16] 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.[16,23] 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.[5]

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.[24]

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 administrated. 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

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A Pivot to Palliative: An Interdisciplinary Program Development in Preparation for a Coronavirus Patient Surge in the Emergency Department: JEN

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.1 Because elderly patients with multiple comorbidities are at an increased risk of death,2,3 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.6 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.6 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.12 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.12 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.[1] Because elderly patients with multiple comorbidities are at an increased risk of death,[2,3] 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.[4] 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.[5] 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.[6] 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.[6]

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.[7] 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.[8] 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.[7]

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.[9] 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.[10] 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.[11]

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.[12] 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.[12] 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.[12]

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.[13] The Figure 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. Table 1 highlights each educational and support tool, its description, and access method. Our digital resources can be accessed online at www.pallicovid.app. The Supplementary Appendix provides an example of one of our clinical support tools to assist emergency nurses with EOL symptom management. Table 2 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.[16] Our work process further aligns with professional calls from the ENA and the Center to Advance Palliative Care.[9,10] The recruitment of our ED palliative care champions for the project proved extremely productive supporting the IPAL-EM toolkit recommendations.[12] 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.[17]

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.[18,19] The 24-7 palliative support model was also used in New York with positive outcomes as our program also experienced.[20] Educational and clinical support tools to address symptom management are a shared focus of other institutions working to support emergency nurses.[21]

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[19] 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.[22] 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.[18,19,23,24] 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[25] 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.[26] 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 pallicovid.app

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[14]	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[15]	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

Subject:	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

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.[1] The 2017-2018 Canadian influenza season involved 5,176 influenza-associated hospitalizations.[2] Influenza risk is lowered by vaccination,[3] 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).[4] In the 2016-2017 influenza season, only 35.8% of Canadians reported receiving the influenza vaccine.[5] 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.[5] 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,[5] 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[6,7] because of multiple system-wide issues contributing to increasing ED wait time.[8] 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.[9-11] Surveys of Canadian ED patients report 20% to 59.3% of eligible, unvaccinated patients expressing the willingness to be vaccinated.[12,13] 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.[11] Of the ED patients approached, 64% (n = 18) of unvaccinated patients were subsequently vaccinated by the pharmacist.[11] 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.[14] 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.[15] 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.[16]

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.[9-13] 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.[17] 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).[1] The second section of the questionnaire aimed to discern if vaccine mistrust, a commonly cited barrier to influenza vaccination,[18] 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.[19] This short scale was chosen because it has been used in past pediatric ED influenza surveys,[20] 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,[15] the responses given in past ED vaccination[9-13] and general influenza vaccine questionnaires.[5,18,21-23] 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.[6] 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.[24]

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[12] in a previous Canadian influenza vaccination study, G*Power software version 3.1.9.220[1] 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 (P**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 [Table 1] 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 ([Table 2]). There was a significant association between previous year vaccination status and willingness to receive the vaccination in the emergency department (χ^2 [1] = 23.78, *P* P

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 ([Table 3]). 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, χ^2 (1) = 6.3, *P* = 0.01. Nor was there a significant association between primary care provider access and 2017-2018 vaccination status, χ^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 ([Table 4]). 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 (χ^2 [2] = 44.90, *P* 2 [2] = 32.25, *P* 2 [2] = 27.34, *P* 2 [2] = 17.98, *P* 2 [2] = 11.38, *P*

= 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 [Table 5]. 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 [Table 6]. 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 [Table 7]. 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%.[9-13] 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,[25] but within the range found in past studies of ED influenza vaccination,[9-13] 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[9-13]; 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,[11] 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.[16,18,21,22] 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.[26]

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.[12,13] 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, $1\text{-}\beta \geq 0.80$) to find an effect,[27] 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.[28]

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[3] prevention method, available for free to Nova Scotians[29] 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[†]		Chronic medical concerns		
		No NACI high-risk medical concerns	117	77.5
No data		Lung disorders	14	9.3

Metabolic disorders	7	4.6	Immune-compromising conditions	5
3.3	Anemia	4	2.6	Heart disorders
4	2.6	Morbid obesity	4	2.6
Brain/neurodevelopment conditions	3	2.0	Hemoglobinopathy	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	χ^2	P value	V	P value	Vaccinated	52
65.0*	18	25.4*	70						Unvaccinated	28
35.0*	53	74.6*	81	1	23.78	<0.001	0.40	< 0.001	Totals	80

Response	Vaccinated	Unvaccinated	Total	Test statistics	Effect size

n	%	n	%	n	df	χ2	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†		79†		148†	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	%	n	df	χ^2	P value	V	P value	Statement: “The flu shot is effective at preventing the flu.”
Disagreement	1	1.4†	22	27.2†	23					
Neutral	14	20.0*	38	46.9*	52					
Agreement	55	78.6†	21	25.9†	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†	29	35.8†	86					
Neutral	7	10.0*	22	27.2*	29					
Agreement	6	8.6†	30	37.0†	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*	16	19.8*	18					
Neutral	7	10.0*	27	33.3*	34					

Agreement	61	87.1†	38	46.9†	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†	26	32.1†	32					
Agreement	61	87.1†	45	55.6†	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*	27	33.3*	68					
Neutral	23	32.9	35	43.2	58					
Agreement	6	8.6*	19	23.5*	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: χ^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: χ^2 (2) = 18.0, P <0.001 Beliefs about vaccine efficacy: χ^2 (2) = 44.9, P <0.001 Beliefs about necessity of all adult vaccines: χ^2 (2) = 11.4, P = 0.003 Level of trust in vaccine information: χ^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

Subject:	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

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_2O to 12 cm H_2O. 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_2O 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).[1]

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).[2]

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).[3]

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).[4]

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).[5]

DETAILS

Subject:	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

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,[1] now renamed severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2).[2] On February 11, 2020, the World Health Organization (WHO) announced that NCP was named Coronavirus disease, abbreviated as COVID-19.[3] It had been listed as a public health emergency of international concern on January 30, 2020,[4] and on March 11, 2020, it was declared a pandemic.[5] COVID-19 is characterized as an acute respiratory infection with symptoms of fever, dry cough, and fatigue, although some patients have atypical symptoms.[6,7] In addition, a few patients with COVID-19 have nasal congestion, runny nose, sore throat, myalgia, and diarrhea.[6,7] 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.[7] 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.[2,8,9]

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.[10,11] 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.[12] 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.[12] In Shanxi province, 134 confirmed cases and 0 deaths were reported; 21 of the confirmed cases were in Taiyuan, a city in Shanxi province.[13] 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."[14] 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.[15] 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[16] and Colaizzi method of data analysis[17,18] 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.[17]

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.[19] 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.[20] 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;[21] 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).[17,18] 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.[22,23] 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 Table 2.

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.[24] *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),[7] 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.[25] 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.[26] 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.[27] 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.[28,29] 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.[30] 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.[31] 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.[30] 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.[32]

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.[33] Accordingly, each public health system was encouraged to plan its preparedness and response actions.[34] 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.[35]

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,[36] 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.[37] 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.[38-40]

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.[41] 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.[35,42] In addition, it indicated that the professional responsibility of nurses was related to their willingness to work.[37] 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.[35,42]

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.[42] 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.[35,42]

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.[35,43-45] 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.[43] 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.[43] 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.[30]

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

Moreover, a standardized system aiming to support institutional preparedness could also help to effectively communicate and align preparedness activities during a pandemic.[28]

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 mergency 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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Identifier / keyword:	Nurse; Coronavirus disease; Qualitative research; Emergency department; Preparedness
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Responding to the Severe Acute Respiratory Syndrome (SARS) Outbreak: Lessons Learned in a Toronto Emergency Department: JEN

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.1 The time from exposure to the onset of symptoms is 2 to 11 days.2 The cause of SARS is thought to be related to the coronavirus, the virus responsible for the common cold.3 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.4 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.6 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.5Controlling 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.[1] The time from exposure to the onset of symptoms is 2 to 11 days.[2] The cause of SARS is thought to be related to the coronavirus, the virus responsible for the common cold.[3] 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.[4] 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.[3,4]

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.[5] 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.[6] 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.[5]

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 classifed 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.[5]

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 Table 1 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.[4] 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.[5] 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.[3,7] 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

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[1] and Middle Eastern respiratory syndrome of 2012.[2] 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.[3] The evidence for indirect transmission is growing,[4] and there is ongoing debate about whether the virus undergoes "aerosol" transmission.[5] 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.[5] 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.[5,6] Another finding was that blood can also carry viral RNA in patients who are symptomatic, are asymptomatic, or have recovered from COVID-19.[7-9]

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.[10] 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.[6,11] The World Health Organization raised COVID-19 to "highest risk" on February 28, 2020[12] and declared it as a pandemic on March 11, 2020.[13] In the United States, travel restrictions were initiated on January 23, 2020[14] 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.[15] 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).[16] Obesity is another major predictor of poor prognosis, more so than many other "diagnosed" medical conditions.[17] High blood pressure, diabetes, heart disease, and lung disease are also predictors of poor prognosis.[18] Heart disease seems to confer more risk than lung disease.[18] In addition, smoking has been shown to be a minor risk factor in several studies.[19]

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,[20] though there is not great evidence to support this.[21] 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).[22]

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.[23] 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.[24] 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.[25] A report of babies born to mothers known to have COVID-19 showed that 3 of the 33 babies were positive.[26] 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.[27]

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.[28] 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.[29]

Congregate settings have emerged as niduses of outbreaks,[30] particularly nursing homes,[31,32] but also homeless shelters[33] and jails.[34,35] 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%).[18,36-38] Other flu-like symptoms of sore throat, headache, and stuffy nose are also known but less common.[37] Cough seems to be the most common first symptom.[36] As few as 44% of patients will have a documented fever on arrival, with 80% to 90% developing a fever during hospitalization.[39] 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,[7,40] but up to 70% of patients will develop some gastrointestinal symptoms (nausea, vomiting, diarrhea, anorexia, abdominal pain, gastrointestinal bleeding).[41] Loss of smell (anosmia) and loss of taste (ageusia) are also known presentations of COVID-19.[42]

The viral incubation (time from exposure to symptoms) is typically 2-14 days.[36,43] 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.[38,44] After admission, the small percentage of patients who develop critical illness will do so remarkably rapidly.[39] 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.[45] CDC has also released a recommendation regarding mask sterilization,[46] 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.[47] 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 congregate 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.”[48] 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.[49] In general, patients with COVID-19 have bilateral findings on examination. Skin findings (rashes and “COVID toes”)[50,51] and neurologic findings (altered mental status, dizziness, headache, and loss of taste/smell)[52] 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.[53] Sensitivity is as low as 65% to 70%, and repeat testing for patients who are high risk may be needed.[54,55] There is no practical human data on test specificity, though it is thought to be highly specific.[56]

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.[54] 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[49,57] 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.[58] 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.[59] There are typically marked elevations in ferritin and inflammatory markers such as C-reactive protein.[58] D-dimer is often elevated in severe disease and may or may not be associated with deep venous thrombosis or pulmonary embolism.[59] Troponin elevation is associated with myocarditis and poor prognosis.[60,61] 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.[62]

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.[63]

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.[64] The World Health Organization, in contrast, recommends that patients stay isolated for 14 days after symptoms resolve.[65] 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[64] but has been relaxed for other essential employees in endemic areas.[66] Most patients will no longer be carrying the virus 2 to 3 days after symptoms resolve,[67,68] but a small percentage can carry the virus for several weeks.[58] 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.[63] Initially, authorities recommended early intubation of patients with increasing oxygen demands (above 6 liters per minute nasal cannula).[69] 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.[70] 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.[71] 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.[72] Ventilator settings should be low tidal volume to avoid lung injury.[73] The ideal level of positive end-expiratory pressure (PEEP), though, continues to be debated, even among experts.[73] 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.[74] 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,[75,76] 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.[77,78] 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).[79] 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.[82] 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.[83]
Convalescent plasma is a treatment that has garnered much attention for the treatment of patients who are critically ill with COVID-19.[84] Convalescent plasma has been around since the 19th century and was used for infections before antibiotics. It was also trialed in previous viral outbreaks.[85,86] 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.[87] 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.[88,89] Intravenous vitamin C is an antioxidant that has controversial evidence in septic shock and is being studied for COVID-19.[90] Vitamin D and melatonin have also been hypothesized to be helpful and are also being studied.[91,92]

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.[93,94] Patients have microthrombi found on autopsy[95] but also have overt deep vein thrombosis and pulmonary emboli.[96] 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,[94] 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.[97] 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.[98,99] 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.[100] 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[101,102] and universal do-not-resuscitate orders in some areas.[103-105] 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

DETAILS

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Nursing of Patients Critically Ill With Coronavirus Disease Treated With Extracorporeal Membrane Oxygenation: JEN

ABSTRACT (ENGLISH)

According to the Extracorporeal Life Support Organization, in January 2015 the survival rate of patients with viral pneumonia on ECMO was 65%.5 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,7 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

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

ABSTRACT (ENGLISH)

Children younger than 6 years per 1,000 children accounted for 37.7% of these exposures.3 One- and 2-year-old children had the highest incidence of poisoning overdose.3 According to the National Poison Statistics Data 2018, unintentional ingestion accounted for 99.4% of children younger than 6 years.3 Teens accounted for 48.3% of intentional suspected suicide gesture, whereas only 4% in children aged 6 to 12 years were intentional ingestion.3 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.4 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.4 Acetaminophen, which is known as N-acetyl-p-aminophenol, and paracetamol, is the most common pain reliever and antipyretic for children worldwide.1 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).1,2,5-7 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.4 Fortunately, pediatric patients who experience acetaminophen overdose rarely develop acute liver failure compared with adult patients.1,2,5,6 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.1,2,5,6 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.1,2,5-7 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.1,2,5,6 Late signs of acetaminophen overdose presentations may include hypovolemia, coagulopathy, acute renal failure, hypoglycemia, and jaundice.1,2,5,6 The child's current medications are important to know because herbal medication, antiepileptics and antituberculosis medications can increase the risk for liver injury.1.2,5,6 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.1,2,5,6 In the patient who is malnourished, acetaminophen metabolism converts to a toxic byproduct after acetaminophen overdose.1,2,5,6 Underlying liver disease, Gilbert syndrome, and other genetic predispositions in children can contribute to increased acetaminophen toxicity during an acetaminophen overdose.1,2,5,6 It is important to know nutritional status and medical conditions because during acetaminophen metabolism, available glucuronidation products are dependent on carbohydrate stores.1,2,5,6 Children younger than 6 years seem to be less susceptible to acetaminophen toxicity owing to protection by increased supply and regeneration of gluthione and better enzyme activity.1,2,5,6Acetaminophen 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).1,2,5,6 The toxic dose of acetaminophen in children varies. Experts suggest that in children a minimal toxic acetaminophen acute ingestion is 150 mg/kg.1 If the child is younger than 6 years, then an acute acetaminophen overdose is when greater than 200 mg/kg is ingested.1 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.1,2,5,6 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.[1-3] 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.[3] One- and 2-year-old children had the highest incidence of poisoning overdose.[3] According to the National Poison Statistics Data 2018, unintentional ingestion accounted for 99.4% of children younger than 6 years.[3] Teens accounted for 48.3% of intentional suspected suicide gesture, whereas only 4% in children aged 6 to 12 years were intentional ingestion.[3] 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.[4] 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.[4]

Acetaminophen, which is known as N-acetyl-p-aminophenol, and paracetamol, is the most common pain reliever and antipyretic for children worldwide.[1] 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).[1,2,5-7] 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.[4] Fortunately, pediatric patients who experience acetaminophen overdose rarely develop acute liver failure compared with adult patients.[1,2,5,6] 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.[1,2,5,6] 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.[1,2,5-7]

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.[1,2,5,6] If the acetaminophen is the immediate relief formula, the plasma levels peak around 4 hours after ingestion.[1,2,5,6] Patients with liver dysfunction who ingest acetaminophen can have a half-life that lasts 17 hours.[1,2,5,6] 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.[1,2,5,6] A liver transplant will be required if, in the rare occurrence, liver failure occurs.[1,2,5,6]

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.[1,2] 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%.[1,2] 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.[1,2,5,6]

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.[1,2,5,6] Children younger than 5 years, especially when they start crawling, are at a high risk for unintentional drug overdose.[1,3,4,7] 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.[1,3-6] 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.[1,7]

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.[1,2,5,6] Late signs of acetaminophen overdose presentations may include hypovolemia, coagulopathy, acute renal failure, hypoglycemia, and jaundice.[1,2,5,6] The child's current medications are important to know because herbal medication, antiepileptics and antituberculosis medications can increase the risk for liver injury.[1,2,5,6] 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.[1,2,5,6] In the patient who is malnourished, acetaminophen metabolism converts to a toxic byproduct after acetaminophen overdose.[1,2,5,6] Underlying liver disease, Gilbert syndrome, and other genetic predispositions in children can contribute to increased acetaminophen toxicity during an acetaminophen overdose.[1,2,5,6] It is important to know nutritional status and medical conditions because during acetaminophen metabolism, available glucuronidation products are dependent on carbohydrate stores.[1,2,5,6] Children younger than 6 years seem to be less susceptible to acetaminophen toxicity owing to protection by increased supply and regeneration of gluthione and better enzyme

activity.[1,2,5,6]

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]).[1,2,5,6]

The toxic dose of acetaminophen in children varies. Experts suggest that in children a minimal toxic acetaminophen acute ingestion is 150 mg/kg.[1] If the child is younger than 6 years, then an acute acetaminophen overdose is when greater than 200 mg/kg is ingested.[1] 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.[1,2,5,6]

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.[1] Contraindications to activated charcoal are gastrointestinal obstruction, unprotected airway, sedated patients, or altered mental status.[1] 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]).[1,2,5,6]

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.[8] 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.[8]

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.[1,2] 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.[1,7] The child should be weighed with documentation of weight in kilograms to ensure an accurate weight-based emergency treatment.[7] 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]).[1,2,5,6]

Pediatric emergency nurses need to know how they are going to administer NAC.[1,5,6] Oral and IV are the 2 routes in which NAC is able to be given. NAC has a foul egg taste and odor.[1,5,6] The oral dosing of NAC requires 18 doses given 4 hours apart, which requires 72 hours of treatment.[1,5,6] It is often much easier to give the IV form of NAC because it only requires 20 hours of treatment.[6] 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.[1,2] 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.[1,2] 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.[1,2,5,6] 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).[1]

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.[1,5,6] 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.[1,2,5,6] 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.[1,2,5,6] If unmetabolized acetaminophen is present in patients with late presentation who demonstrate liver injury, the Poison Control center could direct you to administer NAC.[1,5,6]

How NAC is administered is complex and pediatric emergency nurses should carefully follow the 3-dose regimen (Table 2).[1] A rare case of compartment syndrome has occurred after NAC IV extravasation into the surrounding tissues.[9] 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).[8] 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.[1,2,5,6] If NAC is given within 8 hours of ingestion, it fully protects the liver against toxicity from the acetaminophen overdose.[6] If the patient has concurrent renal failure, hemodialysis may be an effective treatment.[1,2,5,6]

When Should Emergency Nurses Apply Acetaminophen Overdose Treatment?

It is important for pediatric emergency nurses to know when the acetaminophen ingestion occurred.[1] 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.[1,2,5,6] During the second stage (18-72 hours), the patient may complain of right upper abdomen pain, vomiting, and hypotension.[1,2,5,6] In the third stage (72-96 hours), there is significant liver dysfunction, renal failure, metabolic acidosis, coagulopathies, and encephalopathy.[1,2,5,6] During the third stage, gastrointestinal symptoms return and death most commonly occurs.[1,2,5,6] Finally, stage 4 (4 days to 3 weeks) is when recovery occurs.[1,2,5,6]

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.[1,2,5,6]

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.[9]

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.[1,10] 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.[10] 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.[10] Teachings should include how to read medication labels carefully and double check for proper dose.[10] 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/homeandrecreationalsafety/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

Analgesic, nonopioid OTC	Acetaminophen*	Oral: tablet, caplet, extended-release tablet, chewable tablet, dispersible tablet, liquid, dissolve packs, gels. Rectal: suppository	•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.•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.○identify the quantity of medication ingested.○verify dosage form was taken.•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.○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.•Combination medication overdose with antihistamines and decongestants may show signs of lethargy, bradycardia, seizure, and hypertension.•Patients presenting with poisoning from combination medications with dextromethorphan or opioids may show signs of respiratory depression or coma.
Cold preparations, OTC	Acetaminophen, antihistamines, antitussives, decongestants, ethanol*	Oral: caplet, liquid caplet and liquid	Analgesic, opioid (prescription)

Medication	Dose/Route/Duration	Nursing notes

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.† 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)	•NAC for oral use can be prepared using the injectable or nebulizer formulation.•Oral solution theoretically enters portal circulation making it a good option for patients that have no contradictions to taking PO medications.•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.•Readminister dose if patient vomits within 1 h of administration.•May be administered via NG tube if patient cannot tolerate by mouth.

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

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.3 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.9 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.[1] 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[1]; explored the use of verbal, electronic, and visual cues[2,3] as reminders for patient hand hygiene; evaluated product usability[4,5]; and have measured outcomes through pathogen transmission,[6,7] observations,[8] and product consumption.[3] 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.[3] 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.[9] 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.[10] 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 Figure 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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DETAILS

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

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.[1] 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.[2] 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.[3] 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.[1,4-6] 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 (Figure 1). 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.[3]

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.[7] 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.[8] The PCP (targeting PCP) screen can result positive by reacting with dextromethorphan.[9] The tetrahydrocannabinol (THC) screen can be made positive by some nonsteroidal anti-inflammatory drugs (in laboratories without up-to-date capabilities),[10] as the TCA screen commonly turns positive in the presence of diphenhydrAMINE[11] and other similarly structured drugs,[12,13] and the cocaine screen can turn positive with the ingestion of coca tea.[14] 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. Figure 2 illustrates an example of structural similarity resulting in a false positive. A more complete list of common false positives is shown in Table 1.

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.[15] 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.[16] 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).[17] A patient could present to the emergency department having taken a cornucopia of drugs, including a phenethylamine-substituted 2-C drug,[18-20] an amphetamine-like cathinone “bath salt,”[21] a synthetic cannabinoid,[22,23] a synthetic opioid U-47700,[24] and ALPRAZolam,[17,25] and still have a UDS “negative” for amphetamines, THC, opioids, and benzodiazepines. Figure 3 illustrates a structural example of dissimilarity within the same drug effect classification. A more inclusive list of false negatives is shown in Table 1. 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[26] and QUEtiapine, because they are not targeted to do so.[27] 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.[3] The UDS will stay positive for lengths of time that vary depending on the particular drug for which the test is positive. Table 2 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.[3]

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.[7] 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.[15] 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.[16] 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[28] and fentNYL analogs[29] for heroin,[30-32] many institutions have added a fentaNYL immunoassay to their standard UDS.[32] 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.[33] 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.[34]

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.[1] 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.[4,35-41] In addition, many psychiatrists tend to ignore the results even if they have them.[4]

(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.[3]

(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.[5] 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.[40,41]**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, dilTIAZem, 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, HYDROmorphone, 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
Benzoylecgonine	5
LSD	
Lysergic Diethylamide	< 1
2-oxo-3-hydroxy-LSD	5
Opioids Natural	
Heroin	3
Morphine	3
Codeine	3

Semisynthetic	
HydroCODONE	3
HYDROmorphone	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

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 (β = 0.180, *P*=.01), organizational learning–continuous improvement (β = 0.170, *P*=.04), age (β = 0.160, *P*=.02), and implementation of domestic and foreign accreditation (β = 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

DETAILS

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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

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.[1,2] One cause of this biopsychosocial emotion is an invasive medical procedure.[3,4] 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.[1,5-7] 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.[8] 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.[9-13] 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.[13] Distraction, a nonpharmacological method, is one of the easiest and most effective methods, which is used in 2 ways: active and passive distraction.[9,11,12,14-16] 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.[9,11,12,14,15] A national survey across 15 pediatric emergency departments identified distraction as a procedure that could be easily implemented to manage children's pain.[6] In addition, distractions used during medical procedures are effective in reducing procedural pain and anxiety in children in emergency departments.[2,4,5,7] 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[17] 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.[10] 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.[18] 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.[19] The Turkish validity and reliability study was conducted by Aydın et al.[19] The Cronbach's alpha coefficients of the scale ranged from 0.73 to 0.93.[19]

Wong-Baker Faces Pain Rating Scale

This scale was developed by Wong and Baker[20] 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.[20] The Cronbach's alpha coefficient of the scale was 0.93.[21]

Children's Fear Scale

This scale was developed by McMurtry et al[22] 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.[23] The Cronbach's alpha coefficient of the scale was 0.89.[23]

Research Procedures

The CONSORT 2010 report[24] 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.[25] 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* P 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* 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* P 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* 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,[26] but it may turn into a painful and stressful experience for children when adequate pain control cannot be achieved.[27] 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,[7,9,12,26] there are studies suggesting that passive distraction is more effective in pain relief than active distraction.[10,11] 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.[9,26,27] 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.[15,28] 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.[15] 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,[9,10] whereas some others found that they had similar effects.[2,7,11,26] There are also studies examining only one of these methods.[2930] 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,[27] so they direct their attention to a pleasant and exciting process and away from anxiety-inducing stimuli through a game-playing experience.[9,26,29]

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,[2] bubble-blowing,[2] distraction kits,[4] parental involvement and parental presence,[5] Buzzy,[7] distracting cards, and balloon-inflating.[7] 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.[31] 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.

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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 X^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	23
(31.9)	27	(37.5)	20	(27.7)	University and above	16	(22.2)	22

Blood sampling experiences	Control group (n = 72) n (%)		Passive distraction group (n = 72) n (%)		Active distraction group (n = 72) n (%)		Test statistics X^2	P value
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)	11 or more	15
(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 y ago	14
(20.0)	17	(24.3)	11	(15.7)	Fear of blood sampling			
Yes	36	(50)	36	(50)	36	(50)	<.001	0.99
No	36	(50)	36	(50)	36	(50)	Previous hospitalization	
Yes	32	(45.7)	27	(38.6)	28	(38.6)	0.81	0.60
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	Parent
During blood sampling	5.51 (2.08)	6.00 (1.73)	6.46 (1.63)	4.649	<0.05	AD >CG*; P <0.05	During blood sampling
7.99 (1.93)	2.81 (1.72)	2.04 (1.20)	261.098	<0.001	CG >PD >AD; P <0.001	Researcher	During blood sampling
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

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

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%.[1] 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.[2] 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.[3] 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.[4] 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.[5] 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.[6] The algorithm is adaptable, having been modified for MERS, mumps, measles, and Zika; a similar algorithm was developed specifically for emergency medical services (EMS).[7-11]

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.[12] 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.[12] 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 Figure 1. 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 Figure 2. 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 (Supplementary Figure 2): (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.[13] 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.[14] 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.

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

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

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

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 (β = 0.27, *P* <0.001) and self-efficacy (β = 0.17, *P* <0.01) significantly predict emergency nurses' proactive protection motivation, whereas perceived vulnerability (β = 0.26, *P* <0.001), response cost (β = 0.19, *P* = 0.001), and knowledge (β = −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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Document 21 of 34

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: chunge03@nyu.edu.***Figure**Nurse with a candle. (Figure courtesy of Patricksmercy @ flickr.)

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Pneumothorax: JEN

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.[1] A secondary spontaneous pneumothorax can be caused by a variety of lung diseases such as chronic obstructive pulmonary disease, infective etiology, and cancer.[2]
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.

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One Person Can Truly Make a Difference: JEN

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ABSTRACT (ENGLISH)

The first case diagnosed in the United States was on January 20, 2020, in Washington state.2 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.3 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.[1] 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.[2] 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.[3]

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.[4] 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!"

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

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 the 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.[1,2] 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.[1,3,4] 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.[5-7] 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.[8,9] 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.[10,11] 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.[1,2]

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.[12] 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.[12-16] In addition, the Emergency Nursing Association position statement asserts that TSOs are useful in improving flow, increasing patient safety, and expediting care.[17] 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.[16,18]

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.[19,20] 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.[21] The QI team consisted of emergency urses, 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).[22] This survey assessed nurses' awareness of TSO availability and eligibility criteria in June 2017.[23] 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.[24-26] 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.[27] 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.[28] 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.[28-30] 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.[29] 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,[32] 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%.[28]

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* 33 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.[34] 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.[11,24,35-37] 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.[38]

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

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.1 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.[1] 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,*[2] 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.

DETAILS

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Infection Control and Vaccine Hesitancy in the Emergency Department: JEN

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.1 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 pneumonia* 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 [Appendix]. 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.[1] 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.[2] This *JEN* issue also includes 7 COVID-19–specific manuscripts.[3-9] 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[7] 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.[8] The authors Xia et al[8] 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,[6] whereas Hu et al[4] 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[5] 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[3] 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[9] 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.[10-12] 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.[9] This issue of *JEN* also includes infectious disease–related manuscripts on topics of Ebola,[13] HIV,[14] rabies,[15] and PPE,[8,13] vaccine,[16] antibiotic,[17] antipyretic,[18] and phlebotomy[19] 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.[20] 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.[21] 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.[22] 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.[23] 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.[24] 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.[25] 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.[26] 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.[25,26] 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.[20,27]

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.[1] 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.[1,25,28-31]

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.[32] 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.[16] 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).[33] 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,[29,34] and in many instances vaccine-hesitant parents can be highly educated.[35] 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.[31] 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.[26] 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[25] 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.[36]

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.[37] 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.[38] 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.[39] 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.[40] 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.[41] 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.[26]

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)	https://vaccine-safety-training.org/home.html
Centers for Disease Control and Prevention	Immunization education and training	https://www.cdc.gov/vaccines/ed/index.html
Government of Canada	Immunization tools and resources for health professionals	https://www.canada.ca/en/public-health/services/immunization/health-professionals.html
Immunization Action Coalition	Handouts for patients	https://www.immunize.org/handouts/view-all-patient.asp

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Assessment of Emergency Triage Directives and Wait Times: JEN

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.[1] 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,[2,3] 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*

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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

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

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The Effect of Implementing Bar-Code Medication Administration in an Emergency Department on Medication Administration Errors and Nursing Satisfaction: JEN

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.[1] 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.[2] 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%.[3-7] However, limited studies have been reported on implementing these systems in emergency departments to reduce medication errors.[8,9] Medication administration in the emergency department differs greatly from that in the inpatient setting.[10] 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[8] 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,[9] 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[11] 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[12] 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.[8,9] 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[8] 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[8] 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.[8,9] The trained observers were blinded to the medication orders. In contrast to the study by Bonkowski et al,[8] 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.[8]

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.”[11,12] 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[11] 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[8] and an expected error reduction of 50%, 748 medication administrations were needed in each study period to show an effect at α 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. [Table 1] 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* 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) ([Table 2]). 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.[3-8] 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.[8] 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[9] 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 α 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
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	2.60 (39)	0.75	2.29 (46)	0.66	2.00
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

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.[1]

The HIV burden in the South drives the US HIV epidemic.[2] 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.[3,4] 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%.[5] 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.[6,7] 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.[8,9] 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 (Figure 1), revealing peak screening rates between 2009 and 2011, with a resurgent increase in screening rates from 2018 to the present. Figure 2 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 Figure 1, we observe a decrease in screenings between 2016 and 2017 in comparison with the previous and following years. This decrease is also visible in Figure 2, 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.[10,11] 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.[12-18] As of 2009, 22.0% of emergency departments engaged in universal HIV screening, with far fewer using an opt-out–approach protocol.[19-21] A decade later, a quantitative report was developed on the basis of data provided by the HHD, 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 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.[22]

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.[23] 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.[22] 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.[12] 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.[24] As such, the nurses estimated the HIV prevalence by percentage at 3 levels: 1) in their hospital, 2) in Houston, TX,[25,26] and 3) in the United States.[22] 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.[27] 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[22,28-31] 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,[22,28-31] and in Figure 1 of the study by Schechter-Perkins et al[22] in which the frequencies of concerns by nurses and physicians were compared before and after an HIV testing program was implemented.[22] 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).[11,32] We found only 2 other ED-based studies that assessed the perspectives of emergency nurses regarding routine opt-out HIV screening.[10,22] 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.[22] 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.[22] Importantly, although ED physicians were more supportive of ED HIV testing than emergency nurses, neither group was overwhelmingly supportive of the program.[22] 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).[11] Leblanc et al[33] 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.[11] 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.[33] 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.[23] 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.[23] 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.[11] Younger providers have been reported as offering the HIV test more frequently than older providers.[11] In other studies, the average nursing experience among emergency nurses leading universal HIV screening protocols was 16 years.[10] 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.[11] 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.[10] 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.[22]

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.[18] In particular, missed screening opportunities occurred during times of ED high crowding.[33,34] 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."[10] In addition, providers sometimes exhibited testing resistance because of their own perceived barriers to a testing program.[30,35,36]

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.[18] Whalen et al[18] 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.[10] 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.[35] 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.[22] 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 taper 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[22] was piloted with clinicians who were not involved in the study before the start of their data collection in 2011. Schechter-Perkins et al[22] 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.[22]

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.[10] 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	Somewhat disagree	Strongly disagree	Missing	N

%	N	%	N	%	N	%	N	%	N	%	HIV testing should be offered to all patients in the emergency department.	40

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

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

92.0	3	6.0	0	0.0	0	0.0	0	0.0	0	0.0	I would support HIV testing offered by physicians.	44

88.0	4	8.0	1	2.0	0	0.0	1	2.0	0	0.0	I would support HIV testing offered by nurses.	44

88.0	3	6.0	2	4.0	1	2.0	0	0.0	0	0.0	I would support HIV testing offered by counselors who did not interfere with my ability to perfor	46

											musualpatientcare.	

92.0	2	4.0	1	2.0	0	0.0	0	0.0	1	2.0	I support HIV testing offered by emergency nurses, as it is currently practiced in our emergenc	40

											ydepartment.	

80.0	7	14.0	0	0.0	1	2.0	2	4.0	0	0.0	The current EDrapid HIV testing programhas been successful in testing patients for HIV.	32

64.0	9	18.0	4	8.0	4	8.0	1	2.0	0	0.0	The current EDrapid HIV testing programis beneficial to patients.	39

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 EDrapid HIV testing program.	37

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 US citizens?	39

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

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 in an ED setting is a good idea?	40

Variables	Y in practice	<0.5%		0.5%–5.0%		>5.0%		Actual HIV prevalence	Chi-square	P value
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

N	N	N	%	N	%	Estimated HIV prevalence in local hospital population		5	10.0	34
68.0	11	22.0	<0.5 %	2.86	0.83		RN	0	0.0	8
23.5	2	18.1					BSN, RN	5	100.0	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					BSN, RN	2	100.0	15
62.5	20	74.1					BSN, MSN, RN	0	0.0	0
0.0	1	3.7					BSN	0	0.0	1
4.8	0	0.0					Missing	0	0.0	1
4.8	0	0.0				Estimated HIV prevalence in the United States		3	6.0	27
54.0	20	40.0	0.5%–5.0%	6.01	0.42		RN	2	66.6	4
14.8	4	25.0					BSN, RN	1	33.3	20
74.1	16	0.8					BSN, MSN, RN	0	0.0	1
3.7	0	0.0					BSN	0	0.0	1
3.7	0	0.0					Missing	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

Subject:	Hispanic Americans; Emergency medical care; Barriers; Human immunodeficiency virus--HIV; Medical tests; Hospitals; High risk; Epidemics; Polls &surveys; Ethnicity; Enrolled nurses; Nursing; Nurses; Disease control; Diagnostic tests; Disease prevention; Emergency services; Medical screening
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Response to Kayauchi Letter: JEN

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.3 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.”[1] 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.[2] 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.[3] 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.leveille@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

ProQuest document link

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.[1,2] The infection has spread worldwide.[1-3] COVID-19 can cause pneumonia and damage the kidneys, heart, and other organ systems,[4,5] with a mortality rate of approximately 3.2% among 51,857 cases of COVID-19 as of February 16, 2020.[6] As of March 3, 2020, 80,270 confirmed and 520 suspected cases of COVID-19 in China had been recorded.[7]

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.[8,9] Suicidal behavior after the imposition of quarantine has prompted patients and others to threaten lawsuits over quarantine policies.[10,11] 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)[12] 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.[12] Suspected COVID-19 was defined as an epidemiological history and any 2 clinical manifestations, or no clear epidemiological history and 3 clinical manifestations.[12]

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 (YL.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. Table 1 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%; Table 2). The treatment for fever is summarized in Table 3.

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.[13] 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).[12] 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.[14,15] 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.[14] 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.[14] The air, water, and means of transportation in the patient's environment were disinfected according to national policies.[14] 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[14] and WHO guidelines[15] 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.[14] 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.[12] 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.[16] 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°F),[17] 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,[12] 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,[18] we treated the fever (Table 3 shows the treatments).[18] 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,[18] 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).[18] 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).[19] 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.[20,21] One summarized the experience of nursing care provision to 26 critical patients with COVID-19.[20] The other study described the experience of providing nursing care to 9 critical patients with COVID-19 using extracorporeal membrane oxygenation.[21] Our study was similar to the previous 2 studies[20,21] 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),[22] 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.[23,24] 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.[25] 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.[26] Some studies revealed that patients with COVID-19 showed symptoms of depression, anxiety, and posttraumatic stress disorder.[27,28] 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.[29] 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).[30-32] Most patients with anosmia or ageusia recovered within 3 weeks.[30] However, many viral infections and upper respiratory tract infections can cause anosmia and ageusia through damage to the olfactory epithelium.[33,34] Nevertheless, anosmia and ageusia have emerged as important symptoms to consider in the early diagnosis of COVID-19 since we initiated our screening processes.[30]

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.[35,36] 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.[4,36] 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.[36] For people with low bleeding risk, low–molecular-weight heparin is recommended to be injected subcutaneously.[37] 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.[38]

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.[12] 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.[39-41] 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.[39-41] Extracorporeal membrane oxygenation can initially be used to ensure oxygenation; tracheal intubation or tracheotomy can then be performed with the patient under anesthesia.[42]

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,[43,44] 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[12,14] and advocated by the WHO,[13,15,29] 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[12 *,†,‡]
Moderate fever	Oral[12 *,†,‡, 18#]
High fever	Oral[12 *,†,‡] Intravenous[18 **] Rectal administration[18 ††]

DETAILS

Subject:	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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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

IntroductionThe 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.MethodsData 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.ResultsA 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.DiscussionIt 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.1 Because elderly patients with multiple comorbidities are at an increased risk of death,2,3 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.6 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.6 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.12 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.12 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

IntroductionInfluenza 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.MethodsThe 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.ResultsOf 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, $P < 0.001$).DiscussionPatients 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

IntroductionThis 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.MethodsUsing 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.ResultsA 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.DiscussionOrganizations, 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.1 The time from exposure to the onset of symptoms is 2 to 11 days.2 The cause of SARS is thought to be related to the coronavirus, the virus responsible for the common cold.3 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.4 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.6 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.5Controlling 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%.5 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,7 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.3 One- and 2-year-old children had the highest incidence of poisoning overdose.3 According to the National Poison Statistics Data 2018, unintentional ingestion accounted for 99.4% of children younger than 6 years.3 Teens accounted for 48.3% of intentional suspected suicide gesture, whereas only 4% in children aged 6 to 12 years were intentional ingestion.3 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.4 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.4 Acetaminophen, which is known as N-acetyl-p-aminophenol, and paracetamol, is the most common pain reliever and antipyretic for children worldwide.1 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).1,2,5-7 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.4 Fortunately, pediatric patients who experience acetaminophen overdose rarely develop acute liver failure compared with adult patients.1,2,5,6 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.1,2,5,6 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.1,2,5-7 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.1,2,5,6 Late signs of acetaminophen overdose presentations may include hypovolemia, coagulopathy, acute renal failure, hypoglycemia, and jaundice.1,2,5,6 The child's current medications are important to know because herbal medication, antiepileptics and antituberculosis medications can increase the risk for liver injury.1.2,5,6 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.1,2,5,6 In the patient who is malnourished, acetaminophen metabolism converts to a toxic byproduct after acetaminophen overdose.1,2,5,6 Underlying liver disease, Gilbert syndrome, and other genetic predispositions in children can contribute to increased acetaminophen toxicity during an acetaminophen overdose.1,2,5,6 It is important to know nutritional status and medical conditions because during acetaminophen metabolism, available glucuronidation products are dependent on carbohydrate stores.1,2,5,6 Children younger than 6 years seem to be less susceptible to acetaminophen toxicity owing to protection by increased supply and regeneration of gluthione and better enzyme activity.1,2,5,6Acetaminophen 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).1,2,5,6 The toxic dose of acetaminophen in children varies. Experts suggest that in children a minimal toxic acetaminophen acute ingestion is 150 mg/kg.1 If the child is younger than 6 years, then an acute acetaminophen overdose is when greater than 200 mg/kg is ingested.1 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.1,2,5,6 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.3 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.9 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

Board of directors: JEN. (2020). Journal of Emergency Nursing, 46(6) doi: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

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

IntroductionDistraction 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.MethodsThis 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.ResultsThe 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, $F = 92.44$; $P < 0.001$).DiscussionBoth 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

IntroductionEfficient 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.MethodsTwo 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.ResultsSince 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.DiscussionAlthough 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.e2. doi:https://doi.org/10.1016/j.jen.2020.06.013

IntroductionDifficulty 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.MethodsThis 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.ResultsIn 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).DiscussionThe 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