The Leader Behind. How Can Someone Who Is Behind Lead Effectively, You Ask? Well, Let Us Chat

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Professor Linda Hill[1] writes in the Harvard Business Review that "leading from behind does not mean abrogating your leadership responsibilities. The shepherd makes sure that the flock stays together." Shepherds nudge and prod if the flock strays.

"For leaders," she writes, "it's a matter of harnessing people's collective genius."[1] Such a leader encourages the flock—the team—to innovate by generating, sharing, and refining ideas with the whole group. Voila! The collective genius, as shepherded by the leader behind.

Still, the leader behind is probably one of the most misunderstood of the 5 coactive leader models presented by Karen and Henry Kimsey-House in their book, Co-Active Leadership: Five Ways to Lead.[2] All 5 styles (leader in front, beside, within, in the field, and behind) are vitally important for each leader to understand and be able to use.

As leaders, we have a directive to support and grow our teams, and that is important for keeping the engagement and environment moving forward. Being an effective leader behind is the key to innovation and solid teamwork. To an outsider, it may seem that organizations or teams led by a leader behind have no effective leader, but in fact, as with a shepherd, they are integral to the team's success. They hold everyone together, encourage innovation and idea sharing, and thus help the whole team soar with its collective wisdom.

Leaders behind know they matter. They know they facilitate great solutions and generate creative problem solving. They hold everyone together with just enough accountability and freedom to midwife expansive progress. Their shepherding of, listening to, acknowledging, and championing the ideas and efforts of others pay off in creating teams that feel empowered and part of the solution. I suppose you could say that coactive leaders behind give 100% for the betterment of advancing the project, group, or department.

In fact, I tend to think this way about my role as a director inside the emergency department. I am there to support my team in day-to-day work, ensuring that regulatory and other responsibilities are safely met. Best of all, my team knows they are encouraged to share and develop new thinking so that we can continuously improve. I hope to always support them so they can do their best work, bring forth creative ideas, and achieve even more for the emergency department and the hospital.

At the end of the day, we are only as good as the team that surrounds us, and every part of that team has the capacity to offer ideas, suggestions, innovations, and insights to keep us engaged and productive. Building a collaborative and empowered team means that, even when I am not there, it is already primed to use that collective genius. I trust that.

As a leader behind, I may not be in a direct spotlight, but when the team shines, it reflects on me as a leader—as well as on each one of them as leaders. Working together, we ease the workload for staff and hospital leadership.

One thing is clear to me: the leader behind values every team member and what each unique person brings to the table. That is something people never forget about being part of such a group.

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Where Is the Humanity for Nurses? A Love Letter to My Fellow Nurse

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Ask any nurse why they chose this profession and an altruistic vision to care for others usually follows or a heart-centered story is shared, yet the type of collateral paid in efforts to provide patient care often leaves nurses experiencing moral distress, post-traumatic stress disorder, burnout, and even suicide.[1,2] To cope, nurses learn how to shift into survival mode[1] through a process of depersonalization,[2] making way for feelings of numbness and emptiness. Particularly in emergency nursing, an endless barrage of patients, many critical and sometimes violent, leaves nurses in a consistent state of high alert that requires desensitization. Although this accepted professional practice of building walls of defense is deemed necessary, I grapple with questions surrounding how this affects our shared humanity.

During the indoctrination of nursing education and following us later into practice, nurses learn to take on a warrior-like approach to become successful; this is "equated with becoming a bit superhuman [causing us to leave] key parts of our humanity behind."[3] The super-nurse trope is favored and revered, whereas weakness is avoided at any cost. Many nurses and nursing students struggle with internal assaults of perfectionism, a behavior affirmed in usefulness when tested to gain entrance into nursing school.[4] This initial career achievement paves the way for subsequent use of perfectionism to advance within the profession, dominating our lives for decades—despite repercussions in unrealistic expectations, paralyzing fear, and isolation for nurses.[5]

In addition, our empathy, although a vital quality in the profession, can actually exacerbate our nursing practice when we confuse caring for others with carrying others.[6] We fall into expected roles of doer, fixer, giver, and helper that go beyond our means to our personal and professional detriment. Unsurprisingly, human exhaustion envelopes us when we embody this super-caretaker role—ready to be everything to everyone. An unsustainable practice, we cue a nursing huddle that offers a simplistic fix: nurses are heard everywhere echoing the mantra, "I do self-care so I can care for others."

Today, self-care is a trillion-dollar industry[7]—and although a trip to your local coffee shop, a bubble bath at home, or pizza delivered by your nurse manager is a great distraction, does it truly fulfill the care nurses need? The solution of providing self-care to enable working in the care industry is a professional myth that supports capitalism and the martyrdom of nurses in a female-dominated profession.[4,8] This lie has us believing that our selflessness is the most valuable thing we have to offer[6]; we care for ourselves only for the sake of others. We believe this notion so easily and readily, without question. Hence, I wonder, when will we stop believing that simply surviving is enough and be willing to dismantle our super-nurse guise to explore our vulnerability and beliefs surrounding worthiness?

I implore you to consider engaging in self-care, or rather, self-healing, because we are already worthy of it[6]—an act of care and love given freely to ourselves, unrelated to the tasks we complete or the care we provide others. There is a common misconception that self-care is self-indulgent[1] or even selfish.[6] However, I posit that this belief system likely stems from the social conditioning nurses receive from those who benefit from our overgiving and desire to maintain the status quo. Disrupting this false narrative by shifting away from a transactional system of care in all realms of our lives is not easy.

Via authentic reflexivity, nurses must awaken to the lack of humanity we unintentionally hold for ourselves. The figurative mask or armor nurses wear to protect ourselves, enabling us to provide care, often leads to disengagement

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with our patients.[6] Sato[7] reflected that this practice subsequently drives nursing care that is more task focused rather than care focused. In a defensive state of numbness, we move throughout the day mechanically, going through the motions, with little human connection or authentic presence. Furthermore, not only does this mask act as a barrier to protect us from others; it isolates us from ourselves.[6] A person who is fully selfless is a person with no self.[6] We allow the voices of others and their needs to drown out our own—to the point that we may even struggle to identify our own needs or sense of self. Who am I, if I am not a care *giver*?

According to the Nursing Code of Ethics, nurses must abide by the same commitment of care to self as given to others.[9] Likewise, in one of Watson's[10] Caritas Processes, the nurse theorist postulates that for patients to receive authentic care, nurses must learn to care and offer compassion for themselves. Nurses may know this from a theoretical and intellectual perspective, but how is this embodied and practiced? Where do we start—without blaming the nurse who is experiencing burnout for not taking on yet another care task?

I suggest that nurses lead with forgiveness and be gentle with themselves[10] rather than fall toward self-critique or judgment. The high standards we hold for ourselves are often inhumane—given that they are not usually parallel to the expectations we hold for others. Thus, I encourage us to embrace our flaws and vulnerability—what makes us most human—and begin a loving process of dissolving our perfectionism. The ability to connect authentically with our patients[3] and ourselves is worth a challenging process toward recovery. As a recovering perfectionist, I have found that as I shift toward an inner healing care practice that embraces real honesty, love, and care for myself, it often ripples out naturally toward others without intention or work. Would it not be incredible to experience a type of care like this that is authentically heart centered and feeds our humanity?[10]

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Nursing Considerations for Emergency Department Care of the Breastfeeding Dyad

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Contribution to Emergency Nursing Practice

- Little research exists on lactation knowledge among emergency nurses. General lactation research indicates lactation support from health care professionals is a protective factor for breastfeeding duration, and breastfeeding outcomes directly correlate with health care provider lactation knowledge.
- Prescribing providers and nurses get little education on lactation and lactation support in prelicensure programs or continuing education. Although postpartum dyads frequently present to the emergency department, treatment of the lactating patient and breastfeeding child is often driven by medical misconceptions. This article interprets evidence-based lactation information into the scope of practice of the emergency nurse.
- Key implications for clinical emergency nursing practice are the availability of safe, appropriate treatments for lactating individuals and the role of the emergency nurse in care of and advocacy for the breastfeeding dyad.

Abstract

Although postpartum dyads frequently present to the emergency department, treatment of the lactating parent and breastfeeding child is often driven by medical misconceptions. Incorrect advice about continuation or cessation of breastfeeding for medical reasons can lead to maternal and infant harm. In lactation, demand begets supply; missing a feed can be detrimental to short- and long-term breastfeeding outcomes. The purpose of this Clinical Nurses Forum article is to argue the importance of appropriate care of the breastfeeding dyad in the emergency department setting and to interpret current evidence-based information on lactation for the emergency staff nurse. High-quality care for the breastfeeding dyad requires knowledge of lactation physiology, contraindications for breastfeeding, and safe medications and diagnostic procedures. The well-informed emergency nurse must advocate for evidence-based care of the breastfeeding dyad within the emergency department.

Key words: Breastfeeding; Emergency department; Lactation

ED Care of the Breastfeeding Dyad

Almost 50% of all postpartum dyads, comprising a postpartum patient and their newborn, visit the emergency department in the first 6 weeks after delivery.[1] The care provided to dyads in the emergency department can have short- and long-term ramifications on the outcomes of their breastfeeding journey. Although few true contraindications to breastfeeding exist, health care providers often give incorrect advice to the lactating patient, leading to early weaning and infant or maternal harm.[2] This paper aimed to (1) convince emergency nurses of the monumental effect their care can have on lactation outcomes, (2) provide a usable resource for emergency nurses' reference while caring for the breastfeeding dyad, (3) educate emergency nurses on where to find evidence-based information on lactation, and (4) empower the emergency nurse to advocate for the lactating patient and breastfeeding child in the emergency department.

Lactation Language Used in This Article

For the purposes of this article, the words "breastfeeding," "breast," "mother," and "maternal" are used to reflect the terms used in the research supporting the article's content.

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Although these terms are used, the content of this article can be used in support of all lactating individuals.

Lactation Basics: Demand Begets Supply

Breastmilk production is stimulated by emptying the breast.[2] Milk production is an ongoing process in the lactating patient; skipping a feed inhibits breastmilk production through negative feedback.[2,3] Newborns should breastfeed 10 to 12 times a day, whereas older infants and toddlers may feed less often.[2]

Lactating patients may be inappropriately advised to skip feeds due to concerns about medications, radiographic imaging, or maternal or child illness.[4] Skipping a single feed may decrease breastmilk production, especially early in the breastfeeding journey when lactation patterns are less established.[3] Missing multiple feeds similarly inhibits lactation, decreasing breastmilk supply. For this reason, emergency nurses must be aware of true contraindications for breastfeeding to ensure lactating patients are receiving accurate advice.

TABLE 1
Contraindications for breastfeeding

Contraindications[2,6]	
Absolute	**Temporary**
Infant galactosemia	Maternal brucellosis infection
Maternal Ebola or rabies infection	Herpes simplex lesion on breast
Maternal HIV* or CMV† infection	Maternal infection of airborne disease (TB, chicken pox)‡
Maternal illicit drug use	Maternal nuclear medication studies§

CMV, cytomegalovirus; HIV, human immunodeficiency virus; TB, tuberculosis.
* Lactating individuals on antiretroviral therapy may be able to safely breastfeed.
† Lactating individuals may be able to safely breastfeed healthy newborns.
‡ Expressed milk may be fed to infant by alternate caregiver; lactating individual may be able to feed wearing a mask.
§ Safety of breastfeeding depends on isotope used; may require pumping and waiting to feed expressed milk to child until radiation level in milk is safe.

Contraindications for Breastfeeding

DISEASES AND DISORDERS

Contraindications for breastfeeding are rare.[2,5] However, although most maternal and pediatric medical conditions are compatible with breastfeeding, a few true contraindications for breastfeeding should be taken into consideration (Table 1).

MEDICATIONS

Administration of medications, education on medication safety, and advocacy for appropriate use of medications are within the emergency nurse's scope of practice. Many health care workers erroneously assume medications unsafe in pregnancy are also unsafe in lactating patients.[4] However, lactating mothers can receive most medications without clinically significant risk to themselves or their infants (Table 2).[2,5] Table 2 provides an overview of existing literature but does not consider individual patient conditions or needs. Judicious use of medications is recommended in lactating patients as in all patients; administration of any medication should involve evaluation of risks and benefits. The age of the breastfeeding child should be considered; many medications are considered safe for use in lactation with older infants but not in newborns.[2,7] Medications that can cause sedation should be limited to short-term or single-dose administration whenever possible.[2]

Note that 1 medication in a therapeutic or pharmacologic class does not indicate safety of all drugs in said class. Medication transfer to breastmilk is determined by a number of factors, including size of the molecule, whether the molecule binds to proteins or is lipid soluble, the medication pH, and the dose present in the maternal bloodstream.[2,4] However, lactation does not absolutely preclude pregnancy.[8] Emergency nurses must continue to screen patients of childbearing age for pregnancy—even if they are lactating—before any procedures or administration of drugs contraindicated in the pregnant client.

ED Concerns for Care of the Breastfeeding Child

DEHYDRATION

Barring contraindications for breastfeeding, breastmilk should be the first choice for oral hydration and nutrition in the ill breastfeeding child and should be continued during rehydration therapy if the child tolerates oral intake.[9,10] Children with gastrointestinal distress should be offered the breast more frequently to promote hydration and reduce vomiting.[10]

TABLE 2
Frequently used emergency department medications' safety in lactation

Medication category	Preferred	Generally safe (less preferred)	Generally safe but may reduce milk supply	Avoid
Anti-infectives	Acyclovir, cephalosporins, fluconazole, penicillins, vancomycin,	Clindamycin, fluoroquinolones, metronidazole	–	Azithromycin, nitrofurantoin, trimethoprim-sulfamethoxazole
Pain control	Acetaminophen, ibuprofen, local anesthetics	FentaNYL, HYDROcodone, morphine	–	Codeine, oxyCODONE, traMADol
GI medications	Famotidine, proton pump inhibitors, sucralfate	Metoclopramide, ondansetron	Promethazine	Dicyclomine
Blood thinners	Heparins, warfarin,	Aspirin*	–	Apixaban, clopidogrel†
HEENT	Nasal saline	Dextromethorphan, guaifenesin,	Antihistamines, pseudoephedrine	Benzonatate,‡ codeine,
Antiepileptics	Phenytoin	Valproic acid§	LevETIRAcetam	PHENobarbital
Sedatives/rapid sequence intubation	Etomidate, propofol, rocuronium, succinylcholine	Ketamine	–	–
Agitation/antipsychotics	LORazepam, midazolam, OLANZapine	Haloperidol, ketamine, risperiDONE	–	Ziprasidone†
Respiratory	Albuterol, inhaled corticosteroids, magnesium, predniSONE, terbutaline	Ipratropium	–	–
Migraines	–	SUMAtriptan	–	Acetaminophen-butalbital-caffeine

GI, gastrointestinal; HEENT, head, ears, eyes, nose, and throat.
Medications in this table are classified according to LactMed data. Differing recommendations from other sources are noted.
* Aspirin is generally considered safe for consumption by the lactating individual. However, some sources consider aspirin unsafe in lactation due to a theoretical risk of Reye's syndrome if the breastfeeding child has a viral illness.[7]
† Avoid due to a lack of safety data.
‡ No information from LactMed is available for benzonatate.[7] Black[2] recommends against use in the lactating patient.
§ Considered by some sources to be unsafe for use in lactation.[2] LactMed considers medication to be generally safe.[7]

CONGESTION

Although the breastfed child with severe congestion may experience difficulties feeding at the breast, congestion is not a contraindication for breastfeeding and can usually be managed with nasal suction, humidity, and a more upright breastfeeding position.[11,12]

When providing discharge education to parents of the congested child, it is important to include information on appropriate at-home treatments. Peppermint oil, camphor, and menthol are inappropriate for use in young children, and over-the-counter cough and cold medications are contraindicated—and ineffective—in children younger than 4 years.[12,13]

CONSTIPATION

Pediatric constipation is a frequent parental concern and is seen often in the emergency department.[14] However, in many cases, the breastfed infant is not experiencing

constipation. In an infant with a soft abdomen who is well appearing and urinating frequently, infrequent stooling is not a reason for concern.[15] When the stool is passed, it should be soft and easy for the child to excrete.[15] Infrequent stooling is common among breastfed infants and seldom requires medical intervention.[15,16] The emergency nurse can reassure parents in this scenario; a shift in terminology from "constipation" to "infrequent stooling" may be a helpful frame of reference shift for parents.

BREASTFEEDING AS ANALGESIA

Breastfeeding is an effective method of analgesia in young infants and can provide comfort for older children during painful or anxiety-inducing procedures.[17] Consider encouraging the lactating patient to breastfeed their child during invasive tests or treatments such as intravenous placement, intramuscular or rectal medication administration, phlebotomy, and heel sticks.

ED Concerns for Care of the Lactating Patient

MATERNAL ILLNESS

Most maternal illnesses are compatible with breastfeeding (Table 1), and breastfeeding in the case of maternal illness decreases the child's risk of contracting the illness due to passive immunity received through breast milk.[18]

DIAGNOSTIC IMAGING

In most cases, diagnostic imaging of the lactating mother does not pose a risk for the breastfeeding child.[2,19] X-rays, contrast and noncontrast computerized tomography, and magnetic resonance imaging with and without gadolinium all pose no clinically significant risk to the breastfed child.[2,19]

Safety of nuclear medicine studies depends on the isotope used.[2,19] Certain isotopes used in nuclear medicine studies may require the lactating mother to express milk instead of feeding the child directly at the breast.[2] In most instances, the expressed breastmilk can be fed to the child once radiation levels in the milk are below 1 millisievert.[2]

ANESTHESIA AND PROCEDURES

Breastfeeding is generally safe after maternal anesthesia. A lactating mother able to hold a child is safe to breastfeed the child.[2,20]

TABLE 3
Evidence-based lactation resources

Resource	Where to locate
LactMed	https://toxnet.nlm.nih.gov/newtoxnet/lactmed.htm
e-Lactancia	https://www.e-lactancia.org/
KellyMom*	https://kellymom.com/category/bf/can-i-breastfeed/illness-surgery/
Institute for the Advancement of Breastfeeding and Lactation Education*	https://trashthepumpanddump.org/
InfantRisk application† (paid subscription)	https://www.infantrisk.com/apps
Medications & Mothers' Milk (paid subscription)	https://medsmilk.com/

* Also appropriate as a resource for lay parents.
† The InfantRisk application has poor reviews on Android devices.

If the lactating patient and breastfeeding child must be separated for medical care or procedures, the nurse should encourage feeding before and after separation. Longer separations may require the lactating patient to pump to maintain an adequate milk supply. The emergency nurse should know where to locate breastmilk pumps and associated equipment within the health care facility. If necessary, the nurse should assist the lactating individual in planning for longer-term breastmilk storage per facility policy.

MASTITIS

Lactational mastitis is commonly caused by prolonged engorgement, or overfilling, of the mammary ducts and occurs most frequently in the first 6 weeks after delivery, although mastitis can occur at any time point during lactation.[21] Risk factors for development of mastitis include oversupply of breastmilk leading to engorgement; rapid weaning; maternal or pediatric illness, which may alter feeding schedules or maternal hydration status; and clogged mammary ducts.[21] Symptoms of mastitis include fever, breast pain and redness, myalgia, fatigue, and chills.[21]

Treatment of mastitis includes regularly emptying the breast.[21] If breastfeeding is too painful, the patient may elect to pump instead. Application of heat before feeds assists with breast emptying, and application of cold after feeds

reduces inflammation.[21] Nonsteroidal anti-inflammatory drugs may be used for pain and inflammation.[21] Antibiotics are required in the treatment of mastitis only if symptoms persist longer than 24 to 48 hours or if maternal condition worsens.[21] If antibiotics are prescribed, ensure they are compatible with breastfeeding (Table 2).

Resources for Evidence-Based Information on Lactation

Many high-quality resources on lactation are available for health care professionals and patients (Table 3). In addition to online and national resources, community resources may be available in your area.

Implications for Emergency Nurses

The emergency nurse can play an important role in support of the breastfeeding dyad, and the care received has short- and long-term impacts on breastfeeding outcomes. Appropriate, evidence-based care of the breastfeeding dyad in the emergency department requires the emergency nurse to be an informed, engaged advocate for breastfeeding. Advocacy may include requesting medication orders and prescriptions compatible with lactation, planning care to allow for breastfeeding whenever possible, ensuring the department has necessary supplies (such as breast pumps), and assisting the lactating patient in pumping when necessary.

Conclusion

Care of the breastfeeding dyad is within the scope of practice for the emergency nurse. To ensure the breastfeeding dyad receives high-quality, evidence-based medical care in the emergency department, nurses need basic knowledge on lactation and available resources. The nurse can use the information and evidence-based resources presented in this paper to advocate for continuation of breastfeeding outside the few true contraindications.

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Trauma Diamond of Death: Adding Calcium to the Lethal Triad

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Contribution to Emergency Nursing Practice

- The current literature on hypocalcemia in trauma patients shows that hypocalcemia significantly impacts morbidity and mortality.
- This article contributes to nursing practice by increasing emergency nursing knowledge of the causes and prevalence of hypocalcemia in trauma patients.
- Key implications for emergency nursing practice found in this article include early recognition and correction of hypocalcemia, which leads to better outcomes for trauma patients.

Introduction

In trauma patients, the triad of hypothermia, acidosis, and coagulopathy has been shown to cause an increase in morbidity and mortality. This lethal combination was first named the "bloody vicious cycle" in 1982 by the American Trauma Society when it was noted that the triad caused worsening hemorrhage and death.[1] The triad is now used as the basis for damage control resuscitation in critically ill trauma patients.

Recently, studies have shown that trauma patients with hypocalcemia have a marked increase in morbidity and mortality despite the severity of the injury sustained.[2] Calcium is required to produce adequate myocardial contractility, clot strength, and vascular tone, as well as activation of the clotting cascade. Trauma patients with hypocalcemia exhibit worsening hemorrhagic shock and have worse outcomes than patients with normal calcium level.[3]

Since hypocalcemia worsens each aspect of the lethal triad, it has been recommended that the lethal triad of hypothermia, acidosis, and coagulopathy should be re-termed the lethal diamond and include hypocalcemia.[2]

The Triad

ACIDOSIS

In the hemorrhaging trauma patient, progressive blood loss alters tissue perfusion due to a lack of oxygen-rich hemoglobin being transported to cells. Without oxygen, cells shift from aerobic to anaerobic metabolism, and lactic acid is produced, resulting in acidosis (pH $<$ 7.35).[4] In anaerobic metabolism, there is an even greater lack of perfusion to end organ tissues; therefore, acidosis worsens. The cell membrane then loses its strength, and the sodium-potassium pump fails, causing cellular death.[5]

The treatment of the trauma patient can also worsen acidosis. Intravenous crystalloids are frequently used in trauma patients initially to improve perfusion by increasing intravascular volume. Intravenous crystalloids can augment cardiac output by expanding intravascular volume; however, crystalloids are not able to carry oxygen to oxygen-deprived tissues. Lack of oxygen-carrying capability combined with the dilutional effect of crystalloids worsens acidosis.[6]

In critically ill trauma patients, acidosis causes a reduction in coagulation factor activity because clotting factors are pH-dependent. For the clotting cascade to be activated properly, there must be a normal pH. Acidosis also causes an increase in coagulation times.[2] Reduced clot strength is also noted in the presence of acidosis.[5]

In the hemorrhaging trauma patient, metabolic acidosis is the most common type of acidosis seen.[5] Because cardiac output is decreased related to a decrease in circulating blood volume, the circulatory system attempts to compensate by increasing the heart rate to maintain adequate cardiac output to perfuse tissues. Peripheral vasoconstriction then ensues in order to perfuse vital organs. With this attempt

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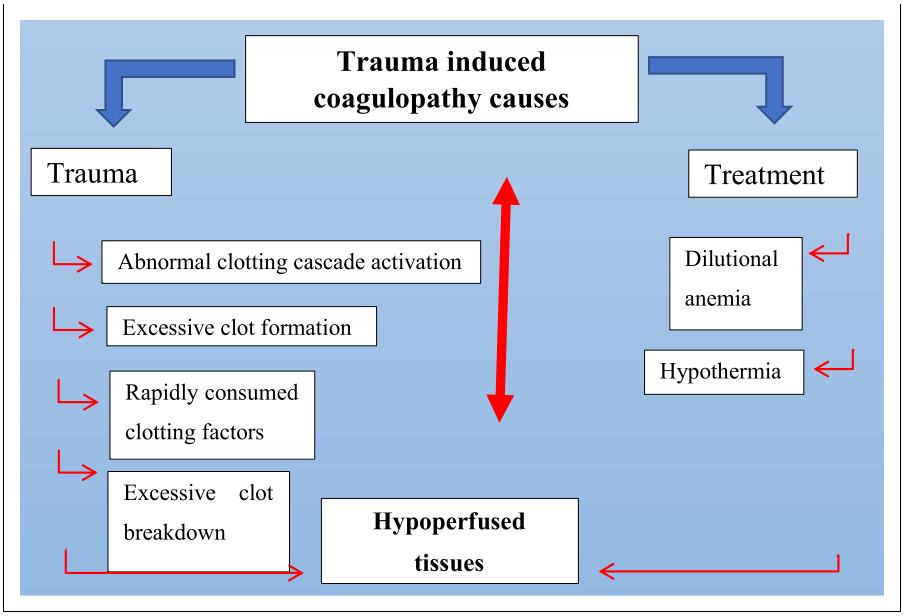

FIGURE 1
Causes of trauma induced coagulopathy.

to maintain perfusion to vital organs, lactic acidosis worsens due to lack of oxygen-rich blood to the extremities.[6]

COAGULOPATHY

Trauma-induced coagulopathy (TIC) (Figure 1) was first discussed in 1954 regarding patients who were wounded in the Korean War. Medical personnel were unable to stop the bleeding in wounded soldiers during that time. The study proposed that loss of clotting factors was the cause of coagulopathy.[1] TIC is caused by hemorrhage and tissue injury and has been shown to occur 30 minutes after a traumatic event. The clotting cascade is abnormally activated, causing excessive clot formation and breakdown of clots out of proportion to the actual injury. There is an imbalance between clotting, anti-coagulation, and fibrinolysis. This mechanism rapidly consumes clotting factors in bleeding trauma patients. TIC worsens as bleeding persists and tissues become more hypoperfused.[7]

TIC is worsened by the trauma itself and the treatment provided. Resuscitation-induced coagulopathy can be caused by using intravenous fluids that are acidic and dilute the body's natural clotting factors. The oxygen-rich hemoglobin that is needed to perfuse tissues is also diluted by acidic fluids. Through the use of intravenous fluids, acidosis worsens.[3]

Activation of the clotting cascade is not only pH-dependent, it is temperature dependent also. The clotting cascade is abnormally activated and unable to function properly when the patient is hypothermic. Therefore, hypothermia also worsens coagulopathy.[1]

TIC is associated with an increase in transfusion requirements, longer intensive care unit stays, and an increased occurrence of multiple organ dysfunction. Patients with TIC have a 3- to 4-fold increase in mortality compared to patients without TIC.[7]

HYPOTHERMIA

Hypothermia is defined as a core temperature below 35 degrees Celsius (95 degrees Fahrenheit).[5] Trauma patients are often hypothermic despite environmental temperatures. Traumatic brain injuries can cause an alteration in the patient's ability to thermoregulate. Excessive blood loss causes peripheral vasoconstriction, which results in a decrease in body temperature.[5]

Hypothermia causes a reduction in local vasoconstriction and a reduction of platelet aggregation at the site of injury.[5] Coagulation is dependent upon temperature and pH; therefore, hypothermia profoundly affects coagulation in the trauma patient. Hypothermia causes a leftward shift of the oxygen-hemoglobin dissociation curve, thereby reducing myocardial contractility and tissue oxygen. The end organ tissue needs more oxygen, but the body cannot deliver it; therefore, an increased state of oxygen debt and

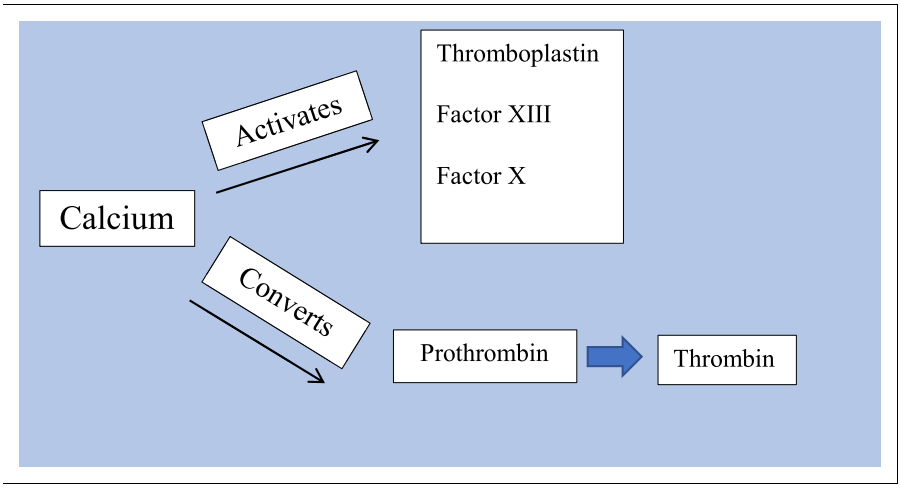

FIGURE 2
Role of calcium in coagulation.

acidosis worsens. Hypothermic patients have an increased mortality rate.[2]

Changing the Lethal Triad to the Lethal Diamond

CALCIUM

Calcium is an essential element in the body that is required to activate clotting factors II, VII, IX, and X, and proteins C and S (Figure 2). Calcium is necessary to promote platelet adhesion and thrombus formation as it aids in stabilizing fibrinogen and platelets. Calcium is necessary to convert prothrombin to thrombin.[8] Calcium is also required for adequate myocardial contractility and smooth muscle cell contractility.[9]

CALCIUM ROLE IN COAGULATION

Typically, there are 2 ways to measure calcium in blood samples.[9] (Table 1 Ionized calcium is biologically active; therefore, it is a more accurate test, but results are often not quickly available. The normal range for ionized calcium is 1.1 to 1.35 mmol/L. Severe hypocalcemia is classified as an ionized calcium below 0.9 mmol/L.[9]

Serum calcium is another blood test that can be used to measure calcium. This lab test is readily available in most institutions. Total serum calcium can be falsely low if the patient has low albumin because calcium is transported by albumin.[9] Half of the calcium in blood is bound to albumin; consequently, albumin values must be taken into consideration when using serum calcium levels.[9] The normal range for serum calcium in adults is 8.9 to 10.1 mg/dL. Severe hypocalcemia is classified as serum calcium less than 8.0 mg/dL.[9]

WHAT CAUSES HYPOCALCEMIA IN TRAUMA PATIENTS

Hypocalcemia is often found in trauma patients. As patients bleed, serum calcium drops. This drop in serum calcium causes coagulopathy to worsen and acidosis to progress further. The acidic environment and lack of ability to clot appropriately causes hemorrhage to worsen. In critically ill patients, calcium homeostasis is impaired, thus leading to hypocalcemia.[10]

Hypocalcemia is also caused by the treatment provided to trauma patients. Hemorrhaging trauma patients require resuscitation with blood products. Three grams of citrate is used as a preservative in each unit of packed red blood cells and fresh frozen plasma. Citrate functions as a preservative but chelates calcium in the blood.[11] Citrate is metabolized in the liver and converted into bicarbonate. In healthy patients, citrate is easily metabolized; 3 grams of citrate can be metabolized in 5 minutes or less. Critically ill trauma patients often have hypothermia and decreased perfusion, which causes decreased liver function. The body is unable to metabolize citrate efficiently; consequently, calcium continues to be stripped from circulating blood volume and is unavailable for usage. One unit of blood can drop calcium levels. Trauma patients often require multiple units of blood products for stabilization, which causes a steep decline in calcium levels.[9]

TABLE 1
Calcium laboratatory measurement classifications

	Ionized calcium	Total serum calcium
Normal	1.1-1.35 mmol/L	8.9-10.1 mg/DL
Hypocalcemia	Less than 1.0 mmol/L	Less than 8.5 mg/dL
Severe hypocalcemia	Below 0.9 mmol/L	Below 8.0 mg/dL

THE IMPACT OF HYPOCALCEMIA IN TRAUMA PATIENTS

Hypocalcemia in trauma patients causes an increase in morbidity and mortality regardless of the injury severity score.[10] Injury severity score is a numeric scoring system used to evaluate traumatic injuries and predict mortality. In the setting of hypocalcemia, clots are weak, and vascular tone is poor. Cardiovascular function is impaired, resulting in narrowing pulse pressures, decreased ventricular activity, dysrhythmias, and hypotension caused by decreased vascular resistance.[9]

Many studies have shown that patients who arrive at a treatment center with severely low calcium have an increase in mortality (Table 2). Cherry et al[12] published a study that included 396 patients. The mortality rate in the severely hypocalcemic group (Ca+ <1.0) was 26.4% compared to the mortality rate of 16.7% in the normal calcemic group. Magnotti et al[13] produced similar results in a study of 591 patients. The mortality rate in the severely hypocalcemic group (Ca+ <1.0) was 15.5% compared to the mortality rate of 8.7% in the normal calcemic group. Vasudeva et al[10] confirmed with a group of 226 patients that patients with a severely low calcium (Ca+ <1.0) had a mortality rate of 25.6% compared to 15% with those with normal calcium.[10]

Studies have also shown an increase in the amount of blood products required for resuscitation in patients with low calcium. In the study by Magnotti et al,[13] 17.1% of patients with low calcium required more than 5 units of blood products, whereas only 7.1% of those with normal calcium required more than 5 units. Of the patients with low calcium in this study, 8.2% needed more than 10 units of blood products, whereas only 2.2% of those with normal calcium needed this amount of resuscitation. Vasudeva et al[10] showed that 62.5% of patients with low calcium required resuscitation with blood products. Only 37.5% of those with normal calcium required blood product administration.

Hypocalcemia and Its Impact on the "Diamond"

Hypocalcemia profoundly impacts each part of the lethal diamond.[10] Coagulopathy is worsened in the presence of hypocalcemia. Clotting cascade pathways must have

TABLE 2
Effects of hypocalcemia in trauma patients receiving blood transfusion

Study author	Patients	Mortality (Ca+ <1.0)	Mortality (normal Ca+)	Transfusion
Cherry et al[12]	396	26.4%	16.7%	?
Magnotti et al[13]	591	15.5%	8.7%	>5 units 17.1% Low Ca+ 7.1% Normal Ca+ >10 units 8.2% Low Ca+ 2.2% Normal Ca+
Vasudeva et al[10]	226	25.6%	15%	62.5% Low Ca+ 37.5% Normal Ca+

adequate amounts of calcium in the blood to be activated properly. In the presence of hypocalcemia, the clotting cascade is not activated to its fullest potential. The receptors in the clotting cascade that require calcium can be obstructed by hydrogen ions in the presence of acidosis and prolonged clot formation.[2] Hypothermia decreases the liver's ability to metabolize citrate, therefore, more calcium is bound in the blood and unavailable for use. Acidosis is also worsened by hypocalcemia. Cardiac contractility is decreases in the setting of hypocalcemia, which causes a decrease in systemic perfusion. This lack of perfusion causes an increase in lactic acid production.[2]

Calcium Replacement

Calcium replacement recommendations vary in regard to dose, timing, and use of calcium gluconate versus calcium chloride.[4] Calcium gluconate contains 8.9 mg/mL of elemental calcium whereas calcium chloride contains 27.2 mg/mL.[4] Calcium gluconate may not be readily available in prehospital settings. Calcium chloride is more widely available in prehospital settings but should be given through a central line if possible to prevent tissue necrosis.[11]

Kyle et al[2] studied the impact of prehospital calcium given with blood products. The study included 297 military combat trauma patients who received an average of 4 units of blood products prehospital. In the treatment group, patients received 10 mL of calcium chloride and blood products. The treatment group rate of hypocalcemia on arrival to the treatment center was 28.3%. The non-treatment group received blood only and arrived at the treatment center with a hypocalcemia rate of 70%.[2]

Other studies include Dickerson et al, that recommended 4 g of calcium gluconate for every 2 to 4 units of packed red blood cells given. Giancarelli et al[4] recommends 2 g of calcium chloride for every 2-4 units of packed red blood cells given. The Joint Trauma System US military protocol clinical practice guideline[14] recommends giving 1 g calcium (20 mL of 10% calcium gluconate or 10 mL 10% calcium chloride) to patients in hemorrhagic shock during or after the first unit of blood. Calcium is given again after 4 units of blood products are transfused.[14]

Although calcium replacement protocols varied in the studies mentioned, they all agreed that hypocalcemia is detrimental to the trauma patient and should be corrected to avoid worsening coagulopathy, acidosis, and hypothermia. The European Guideline on Management of Major Bleeding and Coagulopathy in trauma[12] recommends monitoring ionized calcium levels during massive transfusion. It is also recommended that hypocalcemia be corrected to within normal limits.[10]

Limitations/Discussion

Hypocalcemia in trauma patients has been shown to worsen the effects of hemorrhagic shock, thus increasing mortality. Therefore, hypocalcemia in trauma has become an emerging area of research in the care of trauma patients. Research seeks to advance trauma care by discovering the correlation between hypocalcemia and the outcomes of trauma patients.

Trauma Nursing Core Course (TNCC) acknowledges that hypocalcemia in trauma patients worsens the trauma triad of death. However, there are no recommendations for calcium replacement protocols in the text.[5]

Kronstedt et al[3] reviewed 7 studies related to hypocalcemia being the predicting factor for increased risk of mortality and the need for blood product transfusion. All 7 papers showed that hypocalcemia was an independent predictor of mortality. Kronstedt et al[3] also concluded that calcium replacement protocols vary because there is a lack of clinical research comparing the effectiveness of protocols during resuscitation.

Implications for Emergency Nurses

As more blood products are given, calcium levels continue to drop. Of trauma patients who receive a massive blood transfusion, 97% have hypocalcemia within 24 hours of transfusion.[9] Many hospitals do not have a calcium replacement protocol built into the massive transfusion protocol. In this instance, it is imperative for the emergency nurse to recognize how resuscitation of the critically ill trauma patient can worsen hypocalcemia. With knowledge regarding the effects of the lethal diamond, the emergency nurse can be prepared to advocate for calcium replacement.

Conclusion

Hemorrhage is the most common preventable cause of death in trauma patients. In years past, the trauma triad of death, including acidosis, coagulopathy, and hypothermia, has been the basis for resuscitation of the bleeding trauma patient. However, trauma remains the leading cause of death and disability. Hypocalcemia in trauma patients has

been shown to increase morbidity and mortality. Well over half of the trauma patients arriving at the emergency department arrive hypocalcemic. Hypocalcemia causes each leg of the lethal triad to worsen. Therefore, the triad should be modified to include hypocalcemia, thus becoming the lethal diamond.

Author Disclosures

Conflicts of interest: none to report.

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Local Anesthetic Systemic Toxicity (LAST): More Common Than You Think

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Abstract

The number of anesthetic body procedures in the United States is rapidly increasing, with many being performed on an outpatient basis. These procedures are advertised as being safe, and many times the serious complications may not be discussed. Although local anesthetic systemic toxicity is a rare complication, it is associated with an increase in morbidity. The emergency department staff should be aware of the possibility of this rare complication, as well as the variety of resulting symptoms (from minor to severe), potential sequelae, and appropriate management for patients who have undergone an outpatient anesthetic body procedure. Multiple factors contribute to the development of local anesthetic systemic toxicity, resulting in life-threatening effects on the neurologic and cardiovascular systems. Also, the site of administration, along with the local anesthetic agent used, can impact the risk of the development of local anesthetic systemic toxicity. To minimize the risk and ensure the best possible outcome for these patients, emergency department staff must be highly aware of the mechanisms, risk factors, prevention, and management/treatment of local anesthetic systemic toxicity.

Key words: Local anesthetic agents; Lidocaine toxicity; LAST; Local anesthetic systemic toxicity

Introduction

The number of aesthetic body procedures being performed in the United States is rapidly increasing. According to Michas,[1] there were over 405,000 liposuction procedures performed throughout the United States in the last year. Over the last 2 years, there has been an increase of 63% in aesthetic body procedures, such as abdominoplasty and liposuction.[2] These procedures may be advertised as minor procedures, but they have potentially fatal consequences associated with them. When receiving patients who have undergone outpatient anesthetic body procedures, emergency department staff must be aware of these possibilities, the variety of presenting symptoms (ranging from mild to serious), and management and treatment of these procedural consequences. Several of these presenting symptoms may contribute to the development of a rare complication known as local anesthetic systemic toxicity (LAST), which can affect the neurologic and cardiovascular systems. Additionally, the site of administration, along with the local anesthetic agent infiltrated into local tissue, can also impact the risk of the development of this rare complication.[3-5] Patients undergoing any aesthetic body procedure in hopes of long-term benefits must be informed of the potential life-threatening complications that may result from these therapeutic interventions.[4,5]

Case Presentation

The patient, a middle aged female, presented to the emergency department from where she was being prepped for an abdominoplasty at an outpatient surgery center. Prior to arriving at the surgery center, the patient's husband reported that she had been prescribed ALPRAZolam and oxyCODONE (dosing information was not provided to us), as well as 1 mg of ALPRAZolam, 5 mg of oxyCODONE, acetaminophen (2 tabs unknown strength), and cephalexin (unknown strength). During the preparation process, the surgeon began injecting the patient with 20 mg/kg of lidocaine with EPINEPHrine in an unknown concentration. It was observed that the patient experienced severe chest pain and headache, as well as numbness and tingling in the perioral area during the injection of the first area of the procedure.

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At that time, the injections were discontinued, and Emergency Medical Services was called.

On arrival of Emergency Medical Services, the patient was found to be pale, diaphoretic, and hypotensive, with what they described as an abnormal appearing electrocardiogram (ECG). She was then transported to the emergency department, and on arrival, the physical exam revealed an ill-appearing, pale female with oxygen saturation of 80%, improving with placement of a non-rebreather mask. Blood pressure was noted to be 122/105 mm of mercury (mm Hg), with a heart rate of 99 bpm on arrival. Within 20 minutes of arrival, the patient's blood pressure dropped to 78/62 mm Hg, and heart rate increased to 100 bpm. A 12 lead ECG revealed diffuse ST segment depression in the inferior and lateral leads with ST elevation in lead aVL. At that time, heparin and norepinephrine drips were initiated due to the appearance of cardiogenic shock believed to be secondary to LAST. Her airway, breathing, and circulation were being supported, and an intravenous lipid emulsions (ILE) bolus was administered. The patient was then transferred to the intensive care unit (ICU), where a catheter-based ventricular assist/support device (Impella heart pump) was placed, allowing the left ventricular time to rest while aiding in hemodynamic stabilization due to her cardiogenic shock.[6] Once in the ICU, a family member provided a more thorough history. She noted that the patient had been receiving "regular" iron infusions for iron deficiency, and the patient had "some kind of cardiac problem" that the patient had been told was related to her alcohol-use disorder. The family member noted that the patient consumed at least a 12-pack of White Claw Hard Seltzer daily. The relative also reported an additional list of medications that the patient took daily; amphetamine/dextroamphetamine (Adderall) and sertraline.

Lidocaine and Other Local Anesthetics

The emergency nurse plays a pivotal role in the assessment, treatment, and management of individuals who present to the emergency department after undergoing ambulatory/outpatient body anesthetic procedures that utilize large doses of local anesthetics. Lidocaine and bupivacaine are the most widely used local anesthetic agent.[7-9] As a local anesthetic, lidocaine works at the cellular level by preventing the opening of sodium (Na^+), potassium (K^+), or calcium (Ca^+) channels, thus preventing nerve depolarization. By inhibiting the inflow of Na^+, and blocking the Na^+ channels, depolarization of action potential occurs, thus inducing anesthesia.[10] If these local anesthetic concentrations become excessive, the local anesthetics act on each of these channels and interfere with intracellular and transmembrane cell signals.[8,9] In an aesthetic dosing, lidocaine is believed to mostly target the central nervous system, which may then manifest to hypotension in higher doses.[9] Bupivacaine and ropivacaine are more likely to manifest symptoms that target the cardiac system, such as dysrhythmias that may lead to shock and death.[9,11]

The maximum dose recommended dose for any local anesthetic (plain with no vasoconstrictor such as EPINEPHrine) is 4.5 mg/kg with a maximum dose, depending on the concentration, not to exceed 300 mg.[5,7] The maximum dose with a vasoconstrictor (ie, EPINEPHrine) is 7 mg/kg, not to exceed 500 mg.[5,7] Certain areas of the body with more fibrous tissue, such as the upper abdomen and flanks, require higher concentrations of lidocaine.[12] Systemic toxicity may occur from administration of local anesthetics and is related to the serum concentration of the drug as it is absorbed into the circulation, which is influenced by the dose, site, and method of drug administration.[5,7,9]

Tumescent Local Anesthesia

A local anesthesia technique known as tumescent local anesthesia is frequently used during abdominoplasty and liposuction procedures[3-5] During a tumescent anesthesia procedure, the maximum dose of local anesthetic is increased to 35 to 65 mg/kg as compared to the 4.5-7 mg/kg of lidocaine with other procedures.[3,4,8] Tumescent anesthesia utilizes a large volume, up to 4 liters, of dilute lidocaine or bupivacaine and EPINEPHrine (1 g/L of each), infiltrated subcutaneously into the surgical site until firm and tense to minimize surgical bleeding while improving pain control following liposuction.[4,5,7] These concentrations have been widely studied in liposuction, with maximum dosages ranging between 35 and 65 mg/kg being routinely used.[7,8,13] It has been found to be relatively safe, with excellent safety records, when used as recommended.[7,13] Studies have noted the safety related to the anesthetic used in this procedure is absorbed slowly and is suctioned during the procedure, limiting the amount absorbed systemically.[7-9]

While the tumescent technique has been touted as a safer alternative to traditional liposuction, tumescent liposuction has been associated with lidocaine toxicity.[7,13] There is a narrow margin between therapeutic and toxic doses. A toxic administered dose (1 that is quickly absorbed) of these local anesthetics can lead to symptoms of LAST and even cardiac arrest[8,11] (Table 1). Because patients have distinct ways of describing the same thing, symptoms may be vague, subtle, or ambiguous. Additionally, it has been

TABLE 1
Presenting signs and symptoms of Local Anesthetic Systemic Toxicity (LAST) (Varying levels of potency may influence levels of toxicity)

Initial signs and symptoms (Can be subtle, ambiguous)	CNS symptoms (May precede or be seen simultaneously with cardiac symptoms) Seen more frequently with the use of Lidocaine	Cardiovascular toxicity symptoms (These symptoms are seen more likely with Bupivacaine)
Drowsiness, confusion	Seizures, tremors	Arises concurrently with CNS symptoms– especially with seizures
Dizziness	Agitation and confusion Psychosis	Arrhythmias–bradyarrhythmia most common
Hypertension and tachycardia	Loss of consciousness	Hypotension
Tinnitus	Obtunded	Chest pain with ST segment changes
Perioral numbness, slurred speech, difficulty swallowing	Coma	QRS widening
Metallic taste		Ventricular tachycardia or ventricular fibrillation
Nausea and vomiting		Asystole

Adapted from Weinberg et al,[8] On'Gele et al.[11]
CNS, Central Nervous System.

demonstrated that these large concentrations of lidocaine/bupivacaine have been found to pose a risk if they are absorbed too rapidly or metabolized too slowly.[7,8] These dangers can manifest quickly when patients present with any of these risk factors: diabetes, extreme age (infants or older adults), ingestion of medications that inhibit the cytochrome P450 3A4 and 1A2, low serum protein concentrations (ie, malnutrition), hypoxia, acidosis, or if surgery is cancelled before the procedure can be completed[8,9,11] (Table 2).

LAST

There are rare complications associated with many common anesthetic body procedures that are performed daily. The importance of how and why these complications occur is crucial to treating their adverse effects. It is the reason that emergency department staff should be aware of the most life-threatening systemic complications caused by the syndrome labeled Local Anesthetic Systemic Toxicity (LAST). LAST can be a life-threatening adverse event that may occur after the administration of a large subcutaneous tumescent anesthetic.[3,8] Some authors believe this is a systemic complication of the tumescent anesthetic due to an allergic reaction or medication toxicity to this local anesthetic, which inhibits several components of the oxidative phosphorylation pathway leading to anaerobic metabolism.[8,9] Due to the heart and brain's inherently low tolerance for anaerobic metabolism, LAST can then occur. In the early stages of this toxicity, the central nervous system may exhibit vague symptoms such as shivering, numbness of the

TABLE 2
Risk factors for Lidocaine Anesthetic Systemic Toxicity

Extreme of ages (elderly but also infants)
Female sex
Specific medication used and amount of drug
Drug interactions that impair cytochrome P450 1A2 and 3A4 thus affect and reduce drug metabolism/clearance (erythromycin, sertraline, fluconazole or ciprofloxacin, propofol)
Diabetes
Pregnancy
Frailty–malnourished
Heart disease–coronary artery disease, low cardiac output, pre-existing conduction disorders
Hepatic or renal dysfunction
Carnitine deficiency (ie, due to genetic mutation, malnutrition, or use valproic acid)

Adapted from: Weinberg et al,[8] Long et al,[9] On'Gele et al.[11]

TABLE 3
Lipid emulsion 20% therapy/administration or ILE

Bolus dosing and administration
≤70 kg: bolus dose: 1.5 mL/kg IV over 2-3 minutes
>70 kg: bolus dose 100 mL IV over 2-3 minutes min
Followed by
ILE infusion
≤0.25 mL/kg/min over 30-60 minutes
>70 kg 200-250 mL IV over 15-20 minutes
Bolus could be repeated 1-2 times at the same dose for persistent asystole (at 5-minute intervals)
The infusion rate may be doubled if cardiovascular instability continues
Dosing limit is 12 mL/kg
Propofol, which is reconstituted in 10% lipid emulsion, is not an acceptable intravenous lipid emulsion therapy alternative for Local Anesthetic Systemic Toxicity
- A much larger volume of 10% lipid emulsion would be needed to match the effects of the more concentrated 20% emulsion.
- Cardio depressant effects of propofol would worsen hemodynamic instability.

Can be administered during active cardiac arrest

Adapted from the American Society of Regional Anesthesia (ASRA) and Pain Medicine Guidelines for LAST.[24]
IV, intravenous; ILE, intravenous lipid emulsion; kg, kilogram; mL, milliliters; mL/k g, milliliters per kilogram; mL/kg/min, milliliters per kilogram per minute.

TABLE 4
Considerations when administering intravenous lipid emulsion

Adverse reactions are rare, but when recommended doses are exceeded, most adverse reactions occur
Maximum dose should not exceed 12 ml/kg
Amount of lipid emulsion should be carefully considered in patients with lipid metabolism and storage disorders (ie, hypertriglyceridemia)
Common adverse reactions after intravenous lipid emulsion administration include:
- Hypertriglyceridemia
- Fat embolism
- Infection
- Local venous irritation
- Acute pancreatitis
- Electrolyte imbalance

Contraindicated in patients with severe egg allergies.

Adapted from Liu et al.[8]

tongue, or restlessness.[3,6] These symptoms quickly progress to decreased motor activity, altered mental status, apnea, or seizures.[3,6,14] Consequently, the cardiovascular system can also be affected, manifesting as hypertension and tachycardia initially, that progress to peripheral dilatation, hypotension, sinus bradycardia, ECG changes seen as a prolonged QTc, and widened QRS that then leads to ventricular arrhythmias and cardiac arrest.[3,6,14,15] It should be noted that these signs and symptoms usually correlate with the serum concentration of the local anesthetic, however they do not necessarily progress in a predetermined order and may lead to seizures or cardiac arrest if an excessive amount of local anesthetic is absorbed at once (eg, accidental intravascular injection).[6,12,14] A prompt diagnosis, management, and treatment of LAST are essential to reducing life-threatening complications.

Treatment of LAST consists of managing/securing the airway while considering intubation. If intubation is imminent, agents such as propofol or a benzodiazepine (ie, midazolam) have been utilized for sedation in conjunction with hyperventilation and prevention of acidosis.[14,16,17] Other management considerations that provide cardiovascular support are the use of inotropes to improve contractility, vasopressor to induce vasoconstriction and improve the mean arterial pressure (MAP), seizure control with the use of a benzodiazepine (ie, diazePAM or midazolam) in conjunction with enhanced elimination techniques (such as ILE).[14,16,17]

The enhanced elimination technique of choice for LAST is ILE.[14,16] This enhanced elimination technique is intended to improve the rate of removal of the toxic agents, thereby reducing the severity and duration of LAST. Treatment of LAST with ILE (Intralipid) has been proven to be safe and effective.[18-20] Therapy consisting of a 20% intravenous fat emulsion that has been found to treat severe cardiotoxicity caused by a fat-soluble drug effectively .[18-20] There is widespread support for the use of ILE to reverse LAST.[17,19] It is felt that the use of ILE's effects protects cardiac and central nervous system tissue from ischemia thus leading to improved tissue perfusion.[18,20]

Local anesthetic systemic toxicity develops with a highly variable clinical presentation, making it difficult to establish a mechanism for its occurrence. As a result, there are 2 schools of thought regarding how ILEs function. First, is the "lipid sink" theory.[10,21] According to this theory, ILE works by removing the local anesthetic from plasma and storing it in fat as a "sink." This "sink" or depot is a static lipid compartment for the lipophilic substances (in this case the anesthetic agent) to be cleared from tissues and organs where the drugs are being deposited, thereby improving cardiovascular and neurological function.[10,21]

A second theory is known as the lipid shuttle. Instead of functioning as a static lipid compartment, ILE works as a scavenger of the local anesthetic toxins. This scavenger searches for these toxins that are depositing in high blood flow organs, such as the heart and brain, and redistributes them to the liver for detoxification and muscles for storage.[10,22,23]

The American Society of Regional Anesthesia and Pain Medicine[24] published guidelines for LAST, including recommendations for ILE therapy for cardiotoxic overdoses when standard resuscitation measures have failed[13,24-26] (Table 3). Table 3 defines the loading and infusion dosing of ILE therapy, along with repeated dosing of this drug. Please refer to this table for ease of administration. Table 4 outlines the precautions that should be taken to ensure safety during ILE administration.

Conclusion of the Case Study

In the emergency department, the patient was found to be hypoxemic and hypotensive with systolic blood pressures of 80 mm/Hg, along with requiring intubation to protect her airway. Troponins were elevated, peaking at 7.52 nL/mL (normal 0-0.4 nL/mL). Beta natriuretic peptide (BNP) initially 84 pg/mL, (normal is <100 pg/mL), and on admission to the ICU it was 544 pg/mL. The patient's lactate continued to trend upward until the next morning, when it peaked at 6 mmol/L, with normal being 0.5 to 1 mmol/L.

The ECG ischemic changes were validated by a bedside echocardiogram, which revealed global hypokinesis/straining with a left ventricle dilation and an ejection fraction moderately decreased, 30% to 35%, and a moderately reduced right ventricular systolic function. A computed tomography angiography scan did not show a pulmonary embolism (PE) as once had been suspected.

In the ICU, the patient required increasing vasopressor requirements utilizing norepinephrine (Levophed) and EPINEPHrine. To assist with her cardiogenic shock, a catheter-based miniaturized ventricular assist device was placed as a temporary mechanical circulatory support. This device was used for three days until hemodynamic stability was achieved in the patient. At that time the device was discontinued, and she required only 1 pressor agent for an additional day. She remained intubated for a total of 5 days with a total stay of 7 days in the ICU. She was then transferred to the medical floor on day 8. On the medical floor she continued to improve with continuous occupational and physical therapy, and finally, on day 15, she was transferred to an acute rehabilitation facility.

Implications for Emergency Nurses

Emergency nurses must understand the risks that patients face when having any type of anesthetic body procedure utilizing local anesthetics. Undergoing any type of body anesthetic procedures, especially when tumescent local anesthesia is utilized, may result in some level of harm to patients. LAST is a life-threatening adverse event related to tumescent local anesthesia. Recent advances in understanding the pathophysiology of this condition have improved patient safety, but the complications still exist. Understanding these risks, as outlined above, will facilitate the early identification of local anesthetic systemic toxicity (LAST) and its adverse effects. It is essential for emergency department staff to recognize these symptoms and begin treatment early so that the hemodynamic and central nervous system effects of LAST can be minimized. Improving outcomes is related to improvement of hemodynamic stability with the early use of ILE therapy. The treatment has been shown to be safe and effective in treating LAST and reducing adverse cardiovascular effects.

Conclusion

Local anesthetics are generally safe and effective. Local anesthetic systemic toxicity may occur with any use of local anesthetics if copious amounts of anesthetics are infiltrated into highly vascular tissues. In procedures using large amounts of local anesthetics, it is essential to be aware of LAST, a rare but potentially fatal condition affecting the central nervous system and the cardiovascular system. Early recognition and the initiation of intralipid emulsion therapy can improve outcomes for the hemodynamically unstable patient.

Author Disclosures

Conflicts of interest: none to report.

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Development and Implementation of a Pediatric Nursing Emergency Behavioral Health Assessment Tool

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Contribution to Emergency Nursing Practice

- Pediatric patients with mental and behavioral health concerns frequently present to the emergency department. Since the onset of coronavirus disease, the magnitude of the pediatric mental and behavioral health crisis has changed ED RN practice. No clinical pediatric ED nursing acuity assessment tools captured the dynamic acuity levels of mental and behavioral health patients.
- To improve nursing practice and pediatric care, the Emergency Behavioral Health Assessment Tool was developed. The tool provides nurses with the ability to capture acuity levels of children in the emergency department. This paper describes the interprofessional development and implementation processes this team used to develop the tool.
- For clinical ED RN practice, this project represents an emergency nursing-centric solution to assess mental and behavioral health patient acuity levels in pediatric emergency departments.

Abstract

Introduction: The national pediatric mental and behavioral health crisis dramatically increased emergency department mental and behavioral health visits and changed emergency nursing practice. Acuity assessment determines patient severity level and supports appropriate resources and interventions. There are no established nursing tools that assess pediatric mental or behavioral health acuity in the emergency department setting. Our goal was to develop and implement the novel pediatric emergency nurse Emergency Behavioral Health Acuity Assessment Tool.

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Methods: This quality-improvement project used the plan, do, study, act model to design/refine the Emergency Behavioral Health Acuity Assessment Tool and a non-experimental descriptive design to assess outcomes. The setting was a 47-bed urban level 1 pediatric trauma center with more than 60,000 annual visits. The team designed the tool using published evidence, emergency nurse feedback, and expert opinion. The tool objectively captured patient acuity and suggested acuity-specific nursing interventions. Project outcomes included acuity, length-of-stay, restraint use, and patient/staff injuries. Analyses included descriptive statistics and correlations.

Results: With over 3000 annual mental/behavioral-related visits, the emergency department had an average daily census of 23 mental and behavioral health patients. Implementation occurred in August 2021. The Emergency Behavioral Health Acuity Assessment Tool dashboard provided the number of patients, patient location, and acuity. Length-of-stay did not change; however, patient restraint use and patient/staff injuries declined. Number of restraints positively correlated with moderate acuity levels ($r = 0.472$, $P = 0.036$).

Discussion: For emergency nurses, the Emergency Behavioral Health Acuity Assessment Tool provided an objective measure of patient acuity. Targeted interventions can improve the care of this population.

Key words: Emergency nursing; Emergency department; Mental health; Patient acuity; Pediatrics; Behavioral medicine

Introduction

The Declaration of a National Emergency in Child and Adolescent Mental Health by the American Academy of Pediatrics, the American Academy of Child and Adolescent Psychiatry, and the Children's Hospital Association[1] placed national attention on a critical issue in pediatrics. Pre-COVID, declines in community-based support for pediatric mental and behavioral health (MBH) increased the utilization of emergency departments for pediatric MBH care.[2,3] In children and adolescents, depression and anxiety,[4] suicidality,[5] and deterioration in mental health outcomes have increased.[6] Pediatric MBH ED visits have risen significantly since the pandemic began and remain at a critical high.[7-9] MBH patients require a significant amount of resources in already strained pediatric emergency departments.[3] Limited availability of pediatric psychiatric inpatient beds, prolonged ED stays, and patient boarding in the emergency department have worsened MBH patient outcomes.[3,10,11] The Emergency Nurses Association, American College of Emergency Physicians, and American Academy of Pediatrics have called for improved resources for pediatric MBH patients seeking care in the emergency department, including targeted MBH assessment tools for pediatric patients.[12] Some of the recommendations to improve care for MBH patients have been to improve prehospital/community services, provide ED staff with resources to recognize and care for children with MBH concerns, to support an ED culture that embraces caring for youth with MBH, and to design supportive environments for mental health care.[12] There is a high prevalence of health disparities related to mental health care for children and youth from socioeconomically disadvantaged backgrounds.[13,14] Of particular concern are disparities amongst diverse racial and ethnic groups[15] and youth who identify as LGBTQIA+.[16]

Acuity assessment and screening of MBH patients is important[17] and allows nurses, providers, and other members of the health care team to objectively assess and identify appropriate patient resources and interventions. Throughout an ED visit, the pediatric MBH population may demonstrate evolving acuity levels and care needs.[18] The Emergency Severity Index (ESI) is a static assessment completed during triage[19] that captures only suicidality as opposed to other MBH factors. At the time of this project's inception, there were no well-established, valid, and reliable pediatric acuity assessment tools for MBH patients in the emergency department.[6] Acuity assessments help to provide indications for nursing workload and interventions at the appropriate level of care in response to patient status changes.[20] These tools may support decreased ED length-of-stay (LOS) and improved care for pediatric MBH patients.[11] The ultimate goal of this quality improvement project was to provide equitable and optimal care for children with MBH emergencies.

PROBLEM DESCRIPTION: LOCAL PROBLEM

Prior to the COVID-19 pandemic, the pediatric emergency department had consistent annual growth in the number of children seeking emergency MBH care. Since the onset of COVID-19, this emergency department continues to see large volumes and high acuity of MBH patients. In Connecticut, the mental health crisis continues to evolve, due to the over-taxed pediatric MBH care system. This results in prolonged wait times for inpatient placements and subsequent increased needs for patient boarding in the emergency department. The average ED LOS for medical patients was 3 to 5 hours as opposed to 14 to 20 hours for MBH patients. At times, the average LOS for MBH

Connecticut Children's

Emergency Behavioral Health Acuity Tool (eBHat)

	0	1	8	25	Patient Score
Suicidal Ideation/Homicidal Ideation	Denies SI/HI and no provider or RN concern for safety; Negative ASQ screen	SI/HI thoughts without a plan to act; Non-acute positive ASQ screen, OR acute positive ASQ screen earlier in this hospitalization but now denies SI/HI	SI/HI with a plan that cannot be carried out in the hospital; Acute positive ASQ screen, Hx of harm to self or others while in the hospital, OR provider or RN concern for safety	SI/HI with a plan that can be carried out in the hospital; Acute positive ASQ screen	
Flight Risk	Stays in the room and follow directions.	Occasionally exits room or stands in the doorway	Despite redirection, frequently attempts to exit the room OR constantly standing in the doorway	Constantly attempting to exit the room or elope from the unit.	
Physical Aggression/Hypersexualized Behavior	No aggression or hypersexualized behavior	Physical aggression greater than 24 hours ago	In the last 24hrs patient grabbing staff, pinching, scratching or attempting to make physical contact with others/inappropriate touching, OR past history of hypersexualized behavior	Attacking staff or other patients, punching, kicking, spitting, biting, OR witnessed hypersexualized behavior	
Verbal Aggression	No aggression	History of verbal aggression greater than 24hrs ago, OR occasionally talks back to staff, uses foul language or threating statements but is able to be redirected	Frequently makes threats to staff or patients, foul language, OR threatening statements requiring frequent redirection	Continuously threatening others, yelling, cursing, or verbally disrupting the unit. Unable to be redirected	
Agitation	Asleep or normal activity	Mild (fidgety and restless)	Moderate agitation observed by patient's body language (arms crossed, heavy breathing, eye rolling)	Pacing back and forth, OR constantly thrashes about (above baseline agitation)	
Auditory or Visual Hallucinations	No hallucinations	Mild/moderate harshness of sounds or light appears to be too bright or different color than normal	Frequently hearing sounds that are not there or seeing things that are disturbing that are not there, OR appears to be responding to internal stimuli	Continuous hallucinations, OR continuously appears to be responding to internal stimuli	
Predictability	Behaves in an expected way	Occasionally deviates from expected behavior for a situation	Frequently has unexpected behavior for the situation or is well behaved and then has unexpected outburst, OR the patient has not completed a supervised clothing change/skin assessment	Behavior is completely unpredictable	
				Total Patient Score	

Risk Score	No Apparent Risk	Low Risk	Moderate Risk	High Risk
Scoring Guideline	0	1-7	8-24	Greater than or equal to 25
Observation Intervention	No additional observation	Every 15 min checks if in locked unit or Constant Observation if outside the locked unit	Constant Observation	1:1 Observer if high risk of suicide. Other high risk consider 1:1 but must be at least Constant Observation.
Medication Intervention	No additional recommended intervention	No additional recommended intervention	Consider obtaining an order for PRN medication to have in case of escalation	Consider medicating the patient
Safety Intervention	Standard safety precautions	Standard safety precautions	Consider seclusion for patient and/or staff safety	Consider restraint or seclusion for patient and/or staff safety
Environmental Intervention	Place patient outside of locked unit in any medical space	Initiate distraction and/or soothing environment (child life, play games, TV, dim the lights). Initial de-escalation techniques. The patient may be placed outside of the locked unit.	De-escalation techniques. Consider moving to the locked unit. Consider a private room. If moderate risk for aggression the patient must have a private room.	De-escalation techniques. Move patient to locked unit and consider a seclusion room as soon as possible. If High Risk for suicide, the patient must be inside locked unit for safety.. The patient must have a private room.

FIGURE 1

Emergency Behavioral Health Acuity Tool (eBHat) scoring and recommended acuity-specific interventions.
SI, suicidal ideation; *HI*, homicidal ideation; *RN*, registered nurse; *ASQ*, ask suicide-screening questions; *Hx*, History; *hrs*, hours; *min*, minutes; *PRN*, as needed.

patients exceeded 50 hours. Extended LOS alters the ED nursing model when care shifts beyond stabilization and immediate crisis management.

Existing practice at the institution included use of ESI triage scores at the time of arrival.[19] In addition, nurses (RNs) documented a 1-item acuity assessment on admission and each shift that consisted of subjectively selecting a MBH-related acuity category (eg, high risk, moderate risk, or low risk). This acuity level, based on nursing judgment, lacked concrete objective criteria. The RNs working in the pediatric emergency department faced challenges when caring for MBH patients, and many felt ill-prepared to care for this population.

RATIONALE/SPECIFIC AIM

The lack of objective evidence-based emergency nursing acuity assessment tools for pediatric MBH patients is a significant problem. This project aimed to use an interprofessional approach to develop a novel objective nursing acuity assessment of pediatric ED patients requiring treatment for MBH conditions. This paper describes the development, implementation, and outcomes related to the Emergency Behavioral Health Acuity Tool (eBHat) (Figure 1).

Methods

CONTEXT

In a busy, 47-bed urban pediatric emergency department in the Northeastern US, with 11 MBH-designated beds, the need to capture pediatric MBH patient acuity level was recognized. In 2019, over 3700 of 60,000 annual ED visits were MBH-focused. Improving care for this special patient population while meeting individualized needs for specialized services was the impetus for this project. The pandemic and ensuing pediatric MBH crisis advanced this work to a high organizational priority.

INTERVENTIONS AND TEAM

An interprofessional model for the development and implementation of a pediatric MBH acuity tool provided a collaborative, holistic approach to developing and implementing the eBHat. The team, co-led by the ED nurse manager and the medical director of emergency mental and behavioral health services, included the lead-ED-MBH RN, the ED assistant nurse manager, a nurse scientist, an injury prevention researcher, and a research manager. Additional experts consulted throughout the course of this project included a pediatric psychiatrist, emergency department leaders, case managers/social workers, advanced practice psychiatric nurses, emergency care providers, and other ED staff members. The team developed the tool using the best available evidence and PDSA cycles.

INITIAL STEPS AND MODIFICATIONS

At project inception, a literature review occurred, including any available MBH acuity assessment tools. These mostly targeted adult ED patients or were intended for adult or adolescent use within inpatient psychiatric settings.[21] Several existing tools served as important sources of evidence to support the development and refinement of our pediatric-specific tool. These included the Australasian Triage Tool,[22] the Canadian Triage Acuity Scale,[23,24] the HEADS-ED,[25,26] a publically available acuity tool from Vanderbilt University Psychiatric Hospital,[27] and a pediatric behavioral health acuity tool from Cohen Children's.[28]

The lead ED-MBH RN conducted initial testing of the draft eBHat tool. They made suggestions and recommendations for change based on real-time assessments and interventions of MBH patients with varying levels of acuity. The initial iterations of the eBHat were on paper, not a part of the permanent medical record, and were tested by the lead ED-MBH RN, followed by 3 ED-MBH staff RNs. Process measures included a feedback survey that asked about the feasibility and utility. The team integrated RN responses into evolving iterations of the eBHat for several PDSA cycles. Simultaneously, expert consultations elicited feedback from providers who were well-versed in pediatric mental health. With each iteration, nurses working in the MBH area of the emergency department retested the tool to understand its application to real-life situations. Nurses trialed frequency of assessment that included standard assessments every 4, 8, and 12 hours and with patient status changes as needed. PDSA cycles continued with trialing the eBHat modifications, expert input, and re-trialing. Once the lead ED-MBH RN and the project leaders believed the eBHat was an accurate and useful product, it was integrated into the electronic medical record (EMR). This improvement ensured timely and consistent eBHat documentation (Figure 2).

APPLICATION OF THE EBHAT

The RN completes the eBHat for all MBH patients on admission, with any change in behavior, and/or at a minimum of every 8 hours (Figure 1). The estimated nurse time to complete the eBHat is less than 1 minute. The

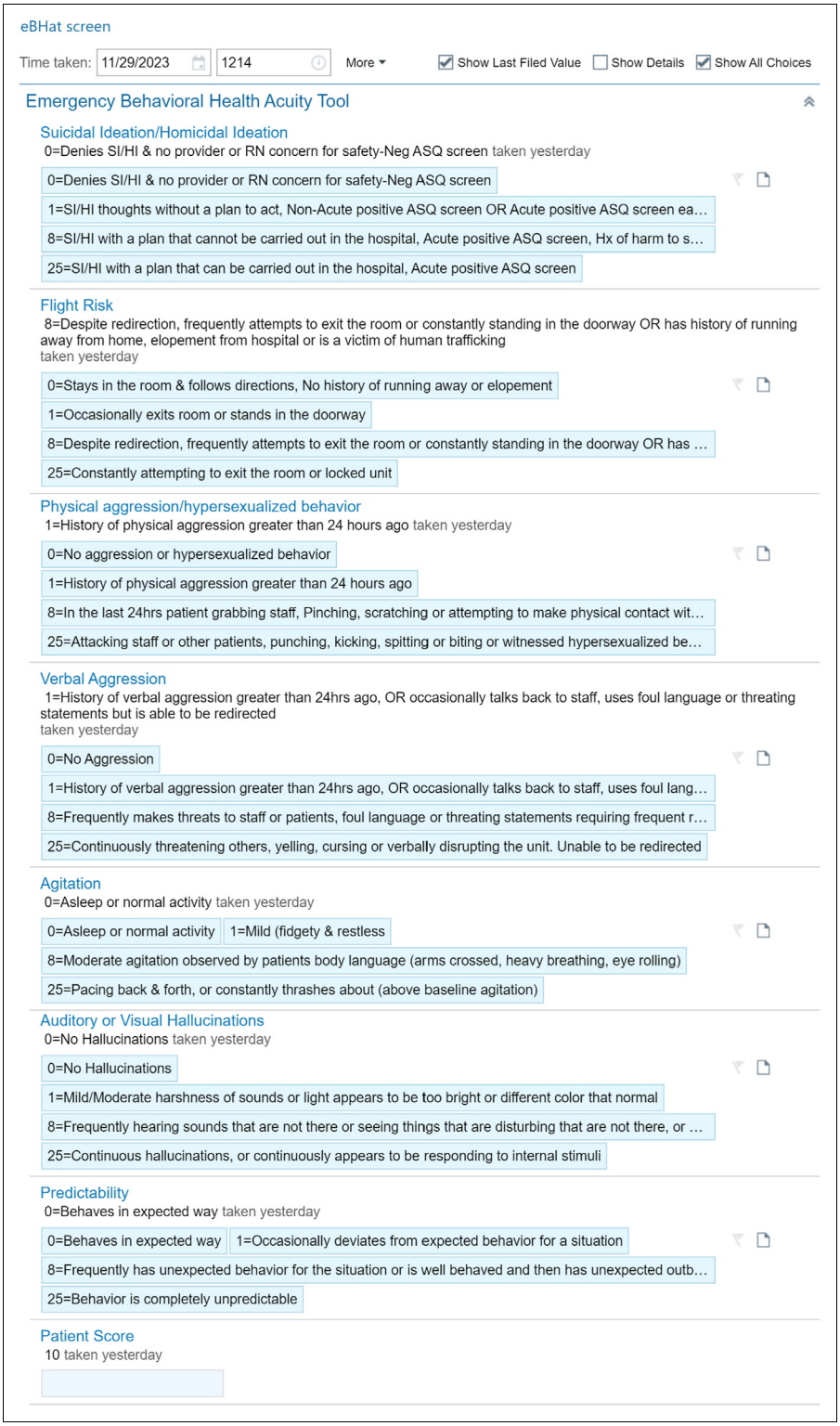
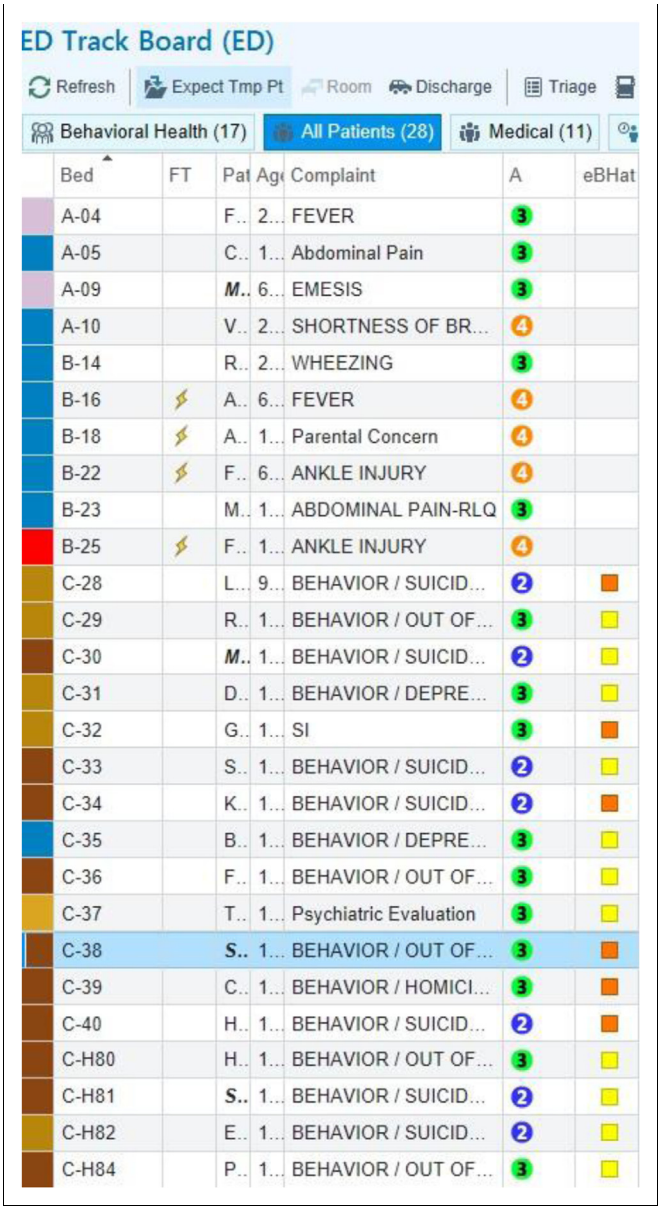


FIGURE 2

Screenshot of Emergency Behavioral Health Acuity Tool (eBHat) nursing documentation screen in electronic medical record.



Bed	FT	Pat	Age	Complaint	A	eBHat
A-04		F..	2...	FEVER	3	
A-05		C..	1...	Abdominal Pain	3	
A-09		M..	6...	EMESIS	3	
A-10		V..	2...	SHORTNESS OF BR...	4	
B-14		R..	2...	WHEEZING	3	
B-16	⚡	A..	6...	FEVER	4	
B-18	⚡	A..	1...	Parental Concern	4	
B-22	⚡	F..	6...	ANKLE INJURY	4	
B-23		M..	1...	ABDOMINAL PAIN-RLQ	3	
B-25	⚡	F..	1...	ANKLE INJURY	4	
C-28		L...	9...	BEHAVIOR / SUICID...	2	
C-29		R..	1...	BEHAVIOR / OUT OF...	3	
C-30		M..	1...	BEHAVIOR / SUICID...	2	
C-31		D..	1...	BEHAVIOR / DEPRE...	3	
C-32		G..	1...	SI	3	
C-33		S..	1...	BEHAVIOR / SUICID...	2	
C-34		K..	1...	BEHAVIOR / SUICID...	2	
C-35		B..	1...	BEHAVIOR / DEPRE...	3	
C-36		F..	1...	BEHAVIOR / OUT OF...	3	
C-37		T..	1...	Psychiatric Evaluation	3	
C-38		S..	1...	BEHAVIOR / OUT OF...	3	
C-39		C..	1...	BEHAVIOR / HOMICI...	3	
C-40		H..	1...	BEHAVIOR / SUICID...	2	
C-H80		H..	1...	BEHAVIOR / OUT OF...	3	
C-H81		S..	1...	BEHAVIOR / SUICID...	2	
C-H82		E..	1...	BEHAVIOR / SUICID...	2	
C-H84		P..	1...	BEHAVIOR / OUT OF...	3	

FIGURE 3

Emergency department dashboard with emergency severity index and behavioral health acuity levels.
Note: The column labeled "A" represents the Emergency Severity Index (ESI) score. The column labeled "eBHat" is the mental/behavioral health acuity level (eBHat score). The eBHat score color code is as follows: green is no current risk, yellow is low, orange is moderate, and red is high.

eBHat is comprised of various categories that have numerical scores, the EHR sums total scores to determine the level of acuity for MBH patients (Figure 2). Acuity levels include no risk, low risk, moderate risk, and high risk. Recommended interventions for each acuity level provide nurses with care suggestions. RNs use these scores and/or risk levels to communicate and collaborate with other RNs, ED team members, and clinicians to ensure optimal patient care. The eBHat data populates a viewable dashboard that uses color codes to designate patient acuity/risk level (Figure 3). For example, green is no current risk, yellow is low, orange is moderate, and red is high.

IMPLEMENTATION IN THE ED BEHAVIORAL HEALTH AREA AND BEYOND

Once the eBHat was ready for implementation and dissemination in the MBH area of the emergency department, training for all ED nurses (including non-MBH RNs) occurred. Training methods included in-person staff education from the lead ED-MBH nurse, 3 clinical nurses from the behavioral health team (ED-MBH champions), and advanced practice nurse champions. Discussions in shift huddles and 1:1 education with the nurse manager occurred. For non-nursing roles, such as MBH technicians, social work, and child life, eBHat education included an overview of the tool, acuity scoring, and care suggestions based on risk level. The physician co-lead completed provider education. The electronic eBHat went live on August 4, 2021. With EHR documentation, the management team tracked eBHat completion and compliance and provided real-time education to staff who had opportunities for improvement. Continuous reinforcement included reminders in huddles, ED nurse leader encouragement, staff meetings, and email reminders in weekly updates.

Following implementation, further changes included the addition of physical aggression categories that addressed hypersexualized behaviors, as suggested by the psychiatry team. As of February 2022, RNs also complete the eBHat on non-MBH ED patients with a known or suspected history of MBH conditions on admission and as needed. Nursing judgment guides whether or not an eBHat is appropriate for those with potential MBH risk factors and concerns. Training related to the eBHat is a standard part of orientation and annual education for all ED nurses.

ETHICS

The institutional review board determined this was a minimal-risk study.

OUTCOMES

Outcome measures assessed the relationship of the implementation of the eBHat on patient and staff-related variables. Patient-specific outcomes included MBH patient

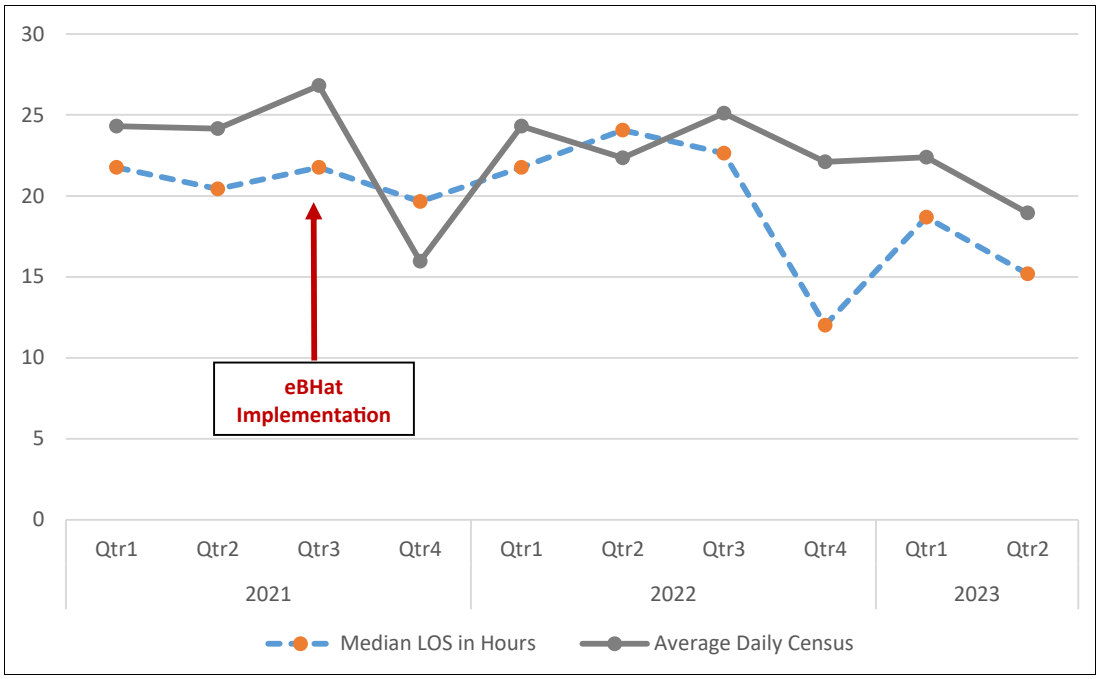


FIGURE 4

Average daily census of mental/behavioral health patients and median length of stay (hours) in the pediatric emergency department mental health area.
LOS = *Length of stay,* Q = *quarter*
Note: Average daily census is the average number of mental/behavioral health patients in the pediatric emergency department per day. Median LOS is reported in hours.

acuity, LOS, restraint use, seclusion occurrences, and patient self-harm events. In this organization, self-harm events are patient behaviors that cause harm to self (eg, picking, cutting, hitting, and autistic self-stimulating behaviors) without the intention of committing suicide. Staff outcomes included staff injuries. Another outcome was the creation and implementation of a dashboard embedded in the EMR, which shows the real-time acuity levels of all MBH patients currently in the emergency department (Figure 3).

Nurse champions rolled out the eBHat, staff training, and abstraction of data from the EMR and other databases (staffing, staff injury reports, patient harm reports). Data abstraction via software eliminated potential errors from manual data entry. Finally, changes to the institutional policy, *Patient Presenting with Risk of Harm to Self or Others Policy*, reflected the integration of eBHat into clinical nursing practice.

DATA ANALYSIS

Data were explored with descriptive statistics. Pearson correlations and linear regression analyses examined relationships between restraint use and acuity level. Data were analyzed using Excel, IBM SPSS Statistics (Version 22.0), and R (R version 4.2.1).

Results

There were 2787 visits for MBH in 2020, 3336 MBH visits in 2021, and 3465 MBH visits in 2022. In the MBH area of the emergency department, the average daily census in 2021 and 2022 was approximately 23 patients (Figure 4). Median LOS has trended downward since Quarter 4 (Q4) 2022 (Figure 4). External factors, such as limited pediatric and adolescent psychiatric beds in specialty facilities and limited availability of intensive-in-home treatment programs, increased patient LOS as many patients were unable to be discharged.

Since February 2022, ED leadership has reported the number of patients and respective acuity levels each day in an organization-wide daily huddle for leadership awareness and staffing purposes. The dashboard provides nurse leaders and ED staff with real-time tracking of the MBH census, patient acuity level, and patient location (Figure 3). Clinical ED RNs working in the 11-bed

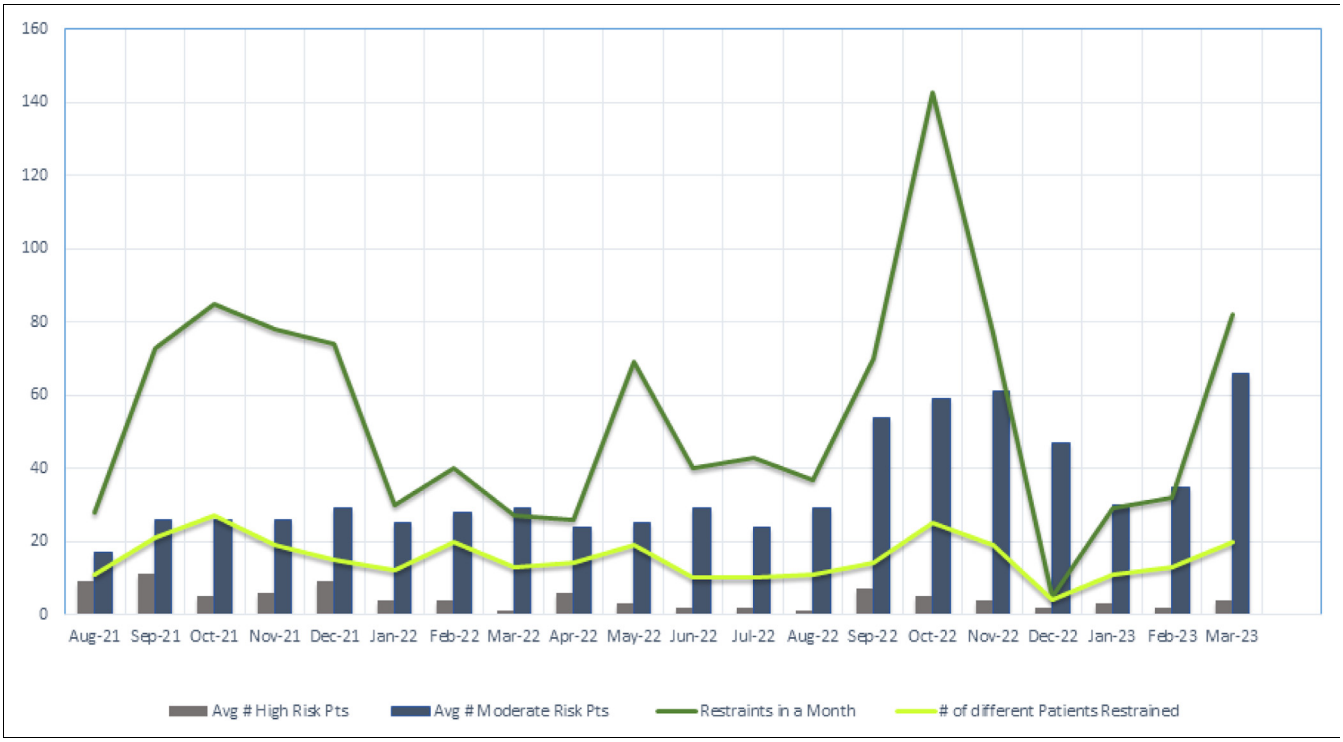


FIGURE 5

Patient acuity and restraint use with EBHAT implementation from August 2021 through March 2023.
Avg. = *Average;* # = *Number,* Pts = *Patients*

MBH area use acuity as a basis for nursing assignments and to assign patient rooms based on type of acuity (eg, low, moderate, high) with consideration for those who might invoke a trauma response in another patient.

Since October 2021, restraint and seclusion chair use trended downward (apart from October/November 2022), while acuity levels have varied widely (Figure 5). When examining the relationship between acuity level and restraint use, there was a positive relationship between the number of moderate-risk acuity patients and restraint use ($r = 0.47$, $P = .04$). No other acuity levels (no risk, low risk, or high risk) correlated with restraint use.

Since 2022, patient self-harm injuries have declined except for Q1 2023 (Figure 6). Patient acuity was higher in Q1 2023. Prior to the 4th quarter of 2021, staff injuries were reported for the entire emergency department. Injuries specific to the MBH area of the emergency department were higher than those in the medical emergency department. Except for Q1 2023, staff injuries have remained fewer than 10 occurrences since Q1 2022, however, work to decrease workplace violence events is also ongoing (Figure 6).

Discussion

An interprofessional team co-led by the nurse manager of the emergency department and the medical director of emergency mental and behavioral health services, coupled with invested leaders and MBHED RNs, ensured successful eBHat implementation. While this project began pre-COVID-19, the pandemic's impact on pediatric MBH accelerated integration into clinical nursing practice. The PDSA framework guided the development and implementation of the eBHat to support care in this special patient population.

The success of this project reflected ED nursing commitment and support from the entire ED team, along with collaborations and input from multiple disciplines and professionals. Having a dedicated area in the emergency department for MBH care, a lead ED-MBH RN, and clinical ED-MBH RNs were essential to move the project forward. Improved insight into the acuity of pediatric patients presenting with MBH concerns led to better outcomes and resource utilization in the pediatric emergency department. Quantifying acuity levels improved the

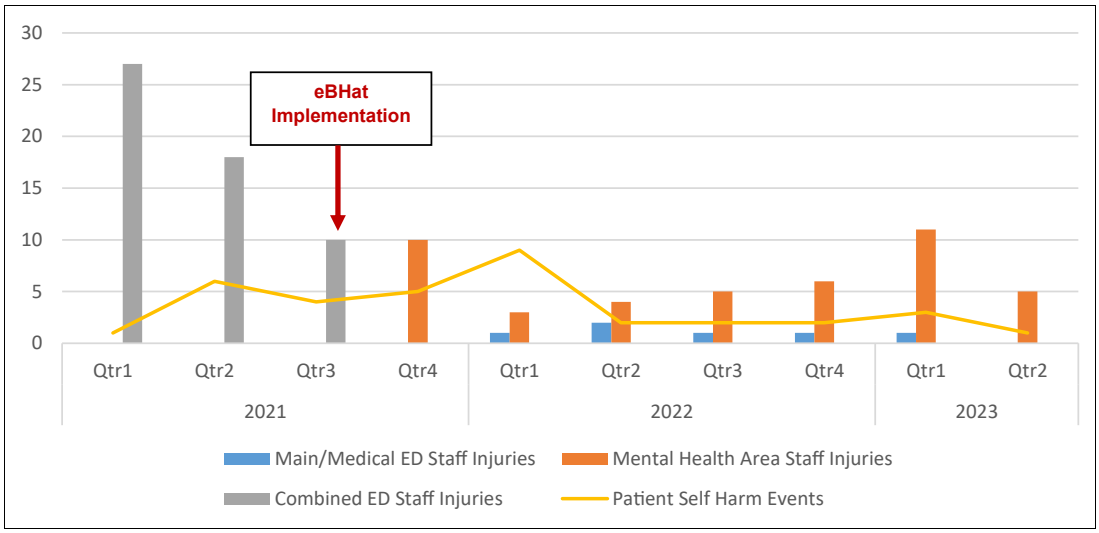


FIGURE 6

Staff injuries and patient self-harm Events in the pediatric emergency department and the mental health area of the emergency department.
Qtr = *quarter;* ED = *Emergency Department*
Note: Prior to quarter 4 of 2021, staff injuries were not tracked by specific areas of the ED (mental health vs. main ED). Fiscal calendar runs from October 1 to September 31. Each quarter is 3 months. Quarter 1 is October to December of the prior year (i., Q1 2021 is 10/1/2020 – 12/31/2020; Q2 2021 is 1/1/2021 – 3/31/2021).

distribution of resources, including the use of patient sitters and nursing assignments. This informed staffing needs and clinical skill mix. The eBHat data supported hiring additional MBH-dedicated RNs, an MBH nurse manager, and ancillary staff. Information from the eBHat dashboard supported treatment decisions and provided justifications for queries from the Connecticut Department of Public Health and The Joint Commission.

Since eBHat implementation, restraint use, seclusion occurrences, and patient self-injury events decreased. Staff injuries have trended downward. The dashboard provides emergency nurses, nursing leadership, and staff with up-to-date information on the current MBH population. Real-time access to acuity levels in the emergency department may help to predict MBH patient behaviors and the required level of support. Since the onset of the pandemic, the acuity level of pediatric MBH ED visits has significantly increased,[7-9] further supporting the need for clinical tools to support nursing care and medical decision-making that are tailored to individual patient needs.[18]

Various interventions have improved MBH care in pediatric emergency departments; however, the need for an interprofessional approach to pediatric MBH is critical. In 1 urban pediatric emergency department, an interprofessional approach, which included ED-embedded MBH specialists, revision of the care model, and increased MBH-dedicated staff, resulted in decreased LOS, improved patient satisfaction, and increased suicide screening.[29] During the pandemic, Esposito and colleagues' care model revision combined improved staffing, social work, and enhanced communication and documentation improved timely psychiatric assessment and reduced LOS.[30]

The eBHat, in combination with added MBH resources, helped ensure each patient had access to resources based on individual needs. Using an objective tool to assess behavioral acuity creates a systematic approach to assessment that is less subjective, thus increasing the likelihood of providing more equitable pediatric MBH care. Restraint use decreased as the distribution of resources focused on higher acuity patients in need of 1:1 care (continuous observation). Having a better understanding of acuity, coupled with increased staffing and education, has helped support fewer ED staff injuries. Quinn and Koopman[31] found that real-time patient violence risk assessments allowed emergency nurses to identify highest violent episode occurrences related to specific patient characteristics and times of day. While this tool improved reports of violence and RN injuries, the authors suggest that increased injury-related transparency, encouragement of staff reporting, and a deeper understanding of injury mitigation strategies are needed.[31]

Factors that heavily influence the outcome of LOS are beyond the scope of what the eBHat could affect. The availability of pediatric psychiatric care facilities and provider

preference concerning time kept under observation greatly influenced LOS in our study. Stronger community-based crisis response systems are needed to keep youth with MBH concerns out of emergency departments, as these environments are not conducive to therapeutic care.[32] Pediatric and adolescent clinician shortages are an ongoing concern to address in order to reduce MBH ED visits, shorten ED LOS, and meet demands for community-based supports and services.[33] A single-center study found that the integration of psychiatric interventions for lower acuity ED MBH patients did not change ED readmission rates or the need for inpatient psychiatric care.[34] Future work should consider predictive factors of prolonged MBH LOS. One unexpected finding was that Advanced Practice Providers were strong, early adopters of the eBHat while Psychiatry and Social Work were slower adopters. Understanding key stakeholders, early adopters, and change agents are critical elements for quality improvement teams to anticipate and consider.[35]

The eBHat identifies suicidal ideation but does not predict suicidality. As suicide is the second-leading cause of death of youth ages 10 to 24 years, youth suicide prevention must remain a high priority in pediatric emergency departments.[36] The entire MBH team, including nursing and ancillary support staff, understands the acuity level of the patient and the importance of identifying the level of risk. Future studies are planned to explore patient indicators, the predictive value of the eBHat, and the role that social determinants of health play on pediatric and adolescent MBH acuity.

As the pediatric mental health crisis grew amidst the COVID pandemic, attention was drawn to the role that social determinants of health, health equity, and diversity in research play in pediatric MBH health outcomes.[13,14] Children from disadvantaged backgrounds and those who identify as LGBTQIA+ face considerable obstacles related to mental well-being.[15,16] In this project, we attempted to use an objective measure of behavioral acuity to assess patients in the same manner, on the same factors. This approach may help to offset inequitable care and treatment differences based on sociobiological constructs rather than focusing on the needs of the individual child or adolescent. More research in MBH is needed, specifically considering health equity in children and adolescents from disadvantaged and diverse backgrounds.

Limitations

Some of the steps of the project, especially those in the first few months of the pandemic, were significantly slowed by the onset of COVID-19. This project was limited to 1 pediatric institution in the Northeast. At the time of development and implementation, there were no gold-standard nursing behavioral acuity assessment tools for pediatric emergency departments. As pediatric MBH grows, benchmarking the outcomes of the eBHat against industry standards will be easier. There is a need for further testing of the eBHat for instrumentation measures such as reliability, validity, and predictability of outcomes, and in other pediatric emergency departments. Another limitation of this study related to the availability of specific data. For example, information related to staff injuries was not separated by an area of the emergency department prior to study onset, thus, comparisons related to injuries in specific areas of the emergency department were not possible.

SUMMARY

Emergency departments across the US and the globe are responding to the pediatric MBH crisis. Historically, limited funding and support to improve pediatric psychiatric care resulted in a gap in research and development of care for this population. The declaration of the mental health crisis, coupled with a better understanding of MBH outcomes in children related to the COVID-19 pandemic gave much-needed attention to this special patient population. Despite increased attention to the problem, there remains a need for validated assessment tools and a better understanding of nursing interventions and outcomes. For pediatric ED RNs, improved attention to the MBH acuity level of patients with mental health complaints may inform staffing and nursing care decisions. The use of current triage and acuity tools (eg, ESI) is not an accurate way to understand the evolving needs of pediatric MBH patients.

Implications for Emergency Nurses

Caring for youth and adolescents with MBH concerns is a challenge for emergency nurses. Limited education and training, lack of experience, fear, violence, and strained MBH systems are significant barriers that ED RNs face with pediatric MBH patients. The eBHat provided a nursing-specific assessment tool to help quantify acuity and recommend potential interventions. The eBHat guided care-related conversations that enhanced nurse-provider communication. In this organization, data from the eBHat led to increased staffing and resources for pediatric MBH in the emergency department. Nurses play a critical role in identifying and advocating for what is best for the pediatric patient. Having emergency nurses who are specialty-trained

to care for MBH patients is another step that pediatric emergency departments can take to ensure the best care for this population.

Conclusions

For pediatric ED RNs, the ability to capture the acuity level of patients presenting with MBH concerns is critical. The development and implementation of eBHat gave nurses an increased understanding of how to measure and assess psychiatric acuity levels, provided real-time capture of acuity data, and quantified those patients with behavioral health needs who were in the emergency department at any given time. The eBHat provides a new and promising way to better assess patient mental health needs and gives nurses guidance related to care interventions. Further testing, refinement, and utility in other locations and ED types are needed. It is critical for nurse leaders and providers to have an accurate and reliable sense of MBH patient acuity levels and volume of MBH patients, as this data can be leveraged to support appropriate staffing for this patient population.

Author Disclosures

Conflicts of interest: none to report.

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Declaration of generative AI and AI-assisted technologies in the writing process: During the preparation of this work, the author(s) used Grammarly in order to review and correct grammatical errors. After using this tool/service, the author(s) reviewed and edited the content as needed and take(s) full responsibility for the content of the publication.

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Universal Suicidality Screening in a Pediatric Emergency Department to Improve Mental Health Safety Risk

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Contribution to Emergency Nursing Practice

- Suicide is the second leading cause of death for youth 12 to 18 years of age. Suicidal ideation can be predictive of suicide attempt, so universal screening for suicidal ideation by emergency nurses can help identify those at risk and facilitate timely intervention. Previous literature has highlighted the acceptability of universal screening for suicidality by nurses in the emergency department setting.
- This study shows that universal screening for suicide risk in pediatric emergency departments by nursing staff is critical for all patients older than 12 years, given that screening in this setting identified patients at risk of suicide who presented for non–mental health reasons.
- Universal screening for suicide risk in adolescents in the emergency department setting by nurses is feasible and identifies those at risk who may be missed without universal screening.

Abstract

Introduction: Suicide is the second leading cause of death for youth 12 to 18 years of age. Suicidal ideation can be predictive of suicide attempt, so screening for suicidal ideation by emergency nurses can help identify those at risk and facilitate timely intervention. This study evaluates the use of a universal suicide screening using the Patient Safety Screener 3 and the Columbia Suicide Severity Rating Scale to identify youth ages 12 to 18 years experiencing suicide risk and assess factors predictive of suicide risk level.

Methods: We conducted a retrospective cohort study using data from patients presenting to the emergency department at an acute care hospital that uses a universal screening program for suicide risk. We determined the frequency of positive screens and performed multivariate analyses to identify predictive factors of scoring high on the Columbia Suicide Severity Rating Scale.

Results: Notably, 9.1% of patients were experiencing some level of suicide risk; 10% of those with positive scores had no mental health history and were not presenting for a mental health reason. After controlling for other independent variables, insurance status, mental health presentation, and known mental health history were significantly associated with Columbia Suicide Severity Rating Scale score.

Discussion: Universal screening for suicide risk in pediatric emergency departments by nurses is critical for all patients older than 12 years, given that we identified patients at risk of suicide who presented for non–mental health reasons. These patients may not have been identified or referred to treatment if they were not screened for suicidality increasing risk of future suicide attempt.

Key words: Youth suicide; Universal screening; Suicidal ideation; Pediatrics; Suicide

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Introduction

PREVALENCE AND PREDICTORS OF YOUTH SUICIDALITY

Suicide is the second leading cause of death for youth 12 to 18 years of age.[1] The Youth Risk Behavior Surveillance System (YRBSS), a national survey of United States high school students, found that 22.2% of all respondents had seriously considered attempting suicide and 17.6% of respondents had made a plan for a suicide attempt in the previous year.[2]

SUICIDALITY SCREENING AS A UNIVERSAL PREVENTION STRATEGY

Universal screening aims to screen all individuals who present to the emergency department for a medical or mental health (MH) concern to identify individuals at risk and provide them with timely care. In 2016, The Joint Commission noted the concern of an increase in the prevalence of suicide and subsequently recommended health care settings improve detection and response in those reporting suicidality. In 2019, The Joint Commission added to this recommendation to screen patients for suicidality for those presenting with an MH condition as a chief complaint, although no delineation was made for pediatric settings.[3,4]

The body of evidence suggesting that universal screening for suicidality in high-risk environments could help reduce harm is growing.[5,6] Gairin et al[7] reviewed probable suicide cases for those 16 years of age and older and found that a third of these children had presented to an emergency department in the year earlier. In another study, Boudreaux et al[8] found that by moving from targeted to universal screening in an emergency department, the proportion of individuals identified as experiencing suicidal ideation (SI) doubled. A study of the implementation of universal screening by nurses in an ED setting showed a 37% increase in the number of pediatric patients identified with a risk of suicide.[9]

IMPLEMENTATION OF UNIVERSAL SCREENING IN A PEDIATRIC EMERGENCY DEPARTMENT

Although The Joint Commission does not mandate universal screening for suicide risk in emergency departments, some hospitals are opting to implement this approach to improve detection rates.[10] In a retrospective study in 1 hospital looking at risk detection for suicidality, the Patient Safety Screener 3 (PSS-3) was given to patients 12 to 18 years of age presenting to the pediatric emergency department. Individuals who screened positive on the PSS-3 were then administered the Columbia Suicide Severity Rating Scale (C-SSRS), which has been validated for use with children and can determine a more precise level of suicide risk.[11] This second step was implemented to improve the specificity of the universal screening process and to determine a more specific level of risk that clinicians might use in treatment decision making. A question that remains is how effective universal screening practice is in identifying adolescents who are experiencing SI, especially in those who would not have been identified if suicidality screening was not implemented for all patients. Previous literature has highlighted the acceptability of universal screening for suicidality by nurses in the ED setting.[12]

This study aimed to evaluate a universal screening process in a pediatric emergency department on (1) identifying adolescents experiencing suicide risk, including those who presented to the emergency department for non-MH reasons and would not have been identified by targeted suicide risk screening, and (2) determining which demographic factors were associated with and could be predictive of suicide risk level.

Methods

PARTICIPANTS

This study was approved by the University of Texas at Austin Institutional Review Board. Patients aged 12 to 18 years were retrospectively identified who presented for any reason to the emergency department at an urban acute care hospital with a level 1 pediatric trauma center that universally screened patients for suicide risk between January 1, 2019, and July 31, 2019. Patients had completed a 2-step suicide risk screening process in place at our hospital using the PSS-3 and the C-SSRS.[13,14] All data were sourced from the electronic medical record (EMR) and extracted manually or was queried from existing hospital-based databases.

INSTRUMENTATION

PSS-3 is a brief 3-item screening tool to identify suicide risk and need for further screening in the ED setting.[13] Each of its 3 items evaluates a different aspect of suicide risk: depressed mood, active ideation, and lifetime attempt. The patient's responses to these items help identify whether risk is present and allow ED staff to quickly evaluate suicide risk uniformly using a more in-depth assessment tool. The PSS-3 has only been validated for use with adult populations.[14] This is 1 reason that the simpler-to-administer PSS-3 is often paired with the C-SSRS, given that the C-SSRS is a pediatric (for those greater than 12 years of age)

validated tool. If the PSS-3 is negative, then no further screening is completed in this patient population during the time frame of the study.

C-SSRS is a 6-item screening tool developed to measure SI and behavior validated for pediatric populations greater than 11 years of age. The C-SSRS produces a subscore for ideation and behavior, but the aggregate risk score measures overall suicide risk level.[11] It was created specifically for the ED setting with clinical response algorithms for providers based on the risk level.[5] The first 2 items of the C-SSRS function as a screening tool for any presence of suicidality. If the patient screens positive, additional questions are asked to further evaluate risk. Its branching logic is structured to shorten the screening process if the risk assessment is not deemed necessary, improving efficiency for providers during the ED intake process.[15] For the purposes of predictive factor analyses, C-SSRS risk was consolidated into 2 aggregate levels. Those who scored no risk or low risk were in the "low" category for analysis. Those who scored medium risk or high risk, indicating that they required immediate intervention, were in the "high" category for analysis. This binary C-SSRS score was the reported outcome for univariate and multivariate analysis of predictive variables.

The compliance rate, or the percentage of encounters that correctly followed the suicide screening procedures (appropriate nurse administration of PSS-3 followed by administration of the C-SSRS for those positive on PSS-3), was calculated to understand screening procedure adherence.

DATA COLLECTION

Patients meeting study inclusion who had at least 1 positive response on the PSS-3 were identified (N = 1199) by querying hospital EMR databases for a 6-month period in 2019. A manual EMR review was conducted to validate the positive PSS-3 and to confirm that the C-SSRS was administered. EMR review found 44 patients had incorrectly coded PSS-3s and were excluded from further analyses. Of the remaining 1155 patients, 178 had a positive PSS-3 but were not administered the C-SSRS. These patients were also excluded, leaving 977 patients for primary analysis of suicide risk.

The variables queried from hospital databases included the date of the ED visit; age; sex (male and female); race (American Indian/Alaska Native, Asian, Black or African American, native Hawaiian/Pacific Islander, white, other race); ethnicity (Hispanic or Latino, Non-Hispanic or Latino); residential zip code; insurance status (private, public, and uninsured); length of hospital stay; International Classification of Diseases, Tenth Revision, Clinical Modification diagnostic code; both the PSS-3 and C-SSRS results; and information about whether the patient's presentation was MH related and whether the patients had a previous MH diagnosis or treatment.

MH history was ascertained by reviewing all current and past EMR charts for whether they included any mention of previous psychiatric treatment, history of psychiatric hospitalizations, a confirmed MH diagnosis in the EMR, or a prescribed psychiatric medication. Attention-deficit/hyperactivity disorder and other learning disabilities were not considered part of an MH history for the purposes of this study given that children with attention-deficit/hyperactivity disorder were not typically considered in the high-risk group for suicidality in this emergency department. Median household income was derived by combining patient residential zip code data from the EMR with median income per household in each zip code. Median income per household in each zip code was obtained from the 2019 American Community Survey data, administered by the United States Census Bureau.[16]

DATA ANALYSIS

Frequencies and percentages were used to investigate the rate of positivity among the study cohort and to determine the rate of those who screened positive with no history of MH nor presented to the emergency department for an MH reason. Univariate and multivariate analyses were performed to investigate risk factors for screening high on the C-SSRS. For all tests, an alpha of 0.05 was used to confirm statistical significance. A chi-square test of independence was performed for each of the categorical variables of interest, and a P value was obtained to determine whether there was a statistically significant difference in the factor among low and high C-SSRS scorers. A standard 2-tailed t test was used to test the association of the patient's age at the time of the encounter with the outcome. One variable, race/ethnicity, had less than 5 observations in 1 predictor category and thus required the use of Fisher exact test. For multivariate analysis, a logistic regression model was built. The model included each factor that was significant from its individual analysis. The relationship between each factor and the outcome was determined using odds ratios with a 95% CI.

Results

DEMOGRAPHIC CHARACTERIZATION

Of the 1155 patients identified as positive on the PSS-3 (Table 1), the majority were female (69.1%) and had a mean age of 14.7 years. Most of the patients (44.3%)

TABLE 1
Demographics of all patients with a positive Patient Safety Screener 3 (PSS-3) primary screening tool and those who were administered the Columbia Suicide Severity Rating Scale (C-SSRS) secondary screening tool

Characteristics	Total positive PSS-3 (n)	Total administered the C-SSRS
Number of patients	1155	977
Mean age (y)	14.7 (1.65)	14.7 (1.64)
Sex (%)		
Male	357 (30.9)	303 (31.0)
Female	798 (69.1)	674 (69.0)
Race/ethnicity (%)		
White	490 (44.3)	415 (44.5)
Black	125 (11.3)	109 (11.7)
Hispanic	471 (42.5)	392 (42.0)
Other*	21 (1.9)	17 (1.8)
Primary language spoken (%)		
English	1065 (92.2)	900 (92.1)
Spanish	88 (7.6)	77 (7.9)
Other	2 (0.2)	0 (0.0)
Insurance status (%)		
Private	503 (43.6)	446 (45.7)
Public†	548 (47.5)	448 (45.9)
Uninsured	102 (8.9)	82 (8.4)
Median income quartile (%)‡		
≤ 25%	293 (25.7)	244 (25.3)
>25%-50%	298 (26.1)	238 (24.7)
>50%-75%	279 (24.5)	247 (25.6)
>75%	270 (23.7)	235 (24.4)
Patient type (%)		
Inpatient	117 (10.1)	103 (10.5)
Outpatient	1004 (86.9)	850 (87.0)
Observation§	34 (3.0)	24 (2.5)

CHIP, Children's Health Insurance Program; EMR, electronic medical record; TCHD MAP, Texas Health Department Central Health's Medical Access Program.

* Those who reported being Asian, American Indian, native Hawaiian, or "other" as race were considered "other."

† Individuals who were wards of the state and received treatment were included in this category as well as other state-sponsored programs such as CHIP and TCHD MAP.

‡ Median income per household was determined by finding the median household income in each subject's residential zip code, provided by the American Community Survey through the United States Census Bureau. The available data were then divided into quartiles.

§ Patient type was determined by pulling data from the EMR and was marked by the physician or nurse. Observation was marked when the intake staff believed the patient would only remain for 24 hours or less.

were of white Non-Hispanic (white) race/ethnicity, whereas 42% of the population were Hispanic. Almost the entire population (92.2%) indicated their primary language was English. When the study population was characterized based on insurance status, 43.6% were privately insured, 45.7% were publicly insured, and 8.9% were uninsured. When median household income was assessed, 4 income ranges were defined: Q1 or ≤ 25% = $20,326 to $55,074, Q2 or >25%-50% = $55,075 to $73,496, Q3 or >50%-75% = $73,497 to $88,204, and Q4 or >75% = $88,205 to $184,500. Patients fell into the following quartiles: 25.7%, Q1; 26.1%, Q2; 24.5%, Q3; and 23.7%, Q4.

The demographic information for the 977 patients who had a positive PSS-3 response and were administered the C-SSRS during their ED visit is presented in Table 1. Characteristics of the study population were nearly identical to those of all the patients who screened positive on the PSS-

3, although there were no speakers of languages other than English or Spanish in the population.

SUMMARY OF UNIVERSAL SCREENING OUTCOMES

Of the 7069 patient visits to the emergency department during the first 6 months of 2019, 1155 patients (16.3%) screened positive for suicidality using the PSS-3 initial screening tool (Figure). Of the 977 patients who were administered the secondary C-SSRS test, 644 (65.9%) were found to have low, medium, or high suicide risk (Figure), whereas 333 were determined to have no risk. Thus, of the patients who visited the emergency department, 9.1% were found to be at some level of risk of suicide after completing the C-SSRS. Of the 644 patients found to have some level of positivity, 60 patients (almost 10%) did not have any previous MH history and were not presenting for an MH-related reason.

SUMMARY OF UNIVERSAL SCREENING RESULTS

C-SSRS risk level stratified by MH presentation and previous MH history is presented in Table 2; 60 individuals who scored low, medium, or high risk did not have an MH presentation or MH history. These represent the individuals identified by universal screening that would have been missed if only targeted screening was used. As expected though, most of each risk score (52% of low risk, 69.1% of medium risk, and 79.9% of high risk) had both MH presentation and MH history. For those with no MH

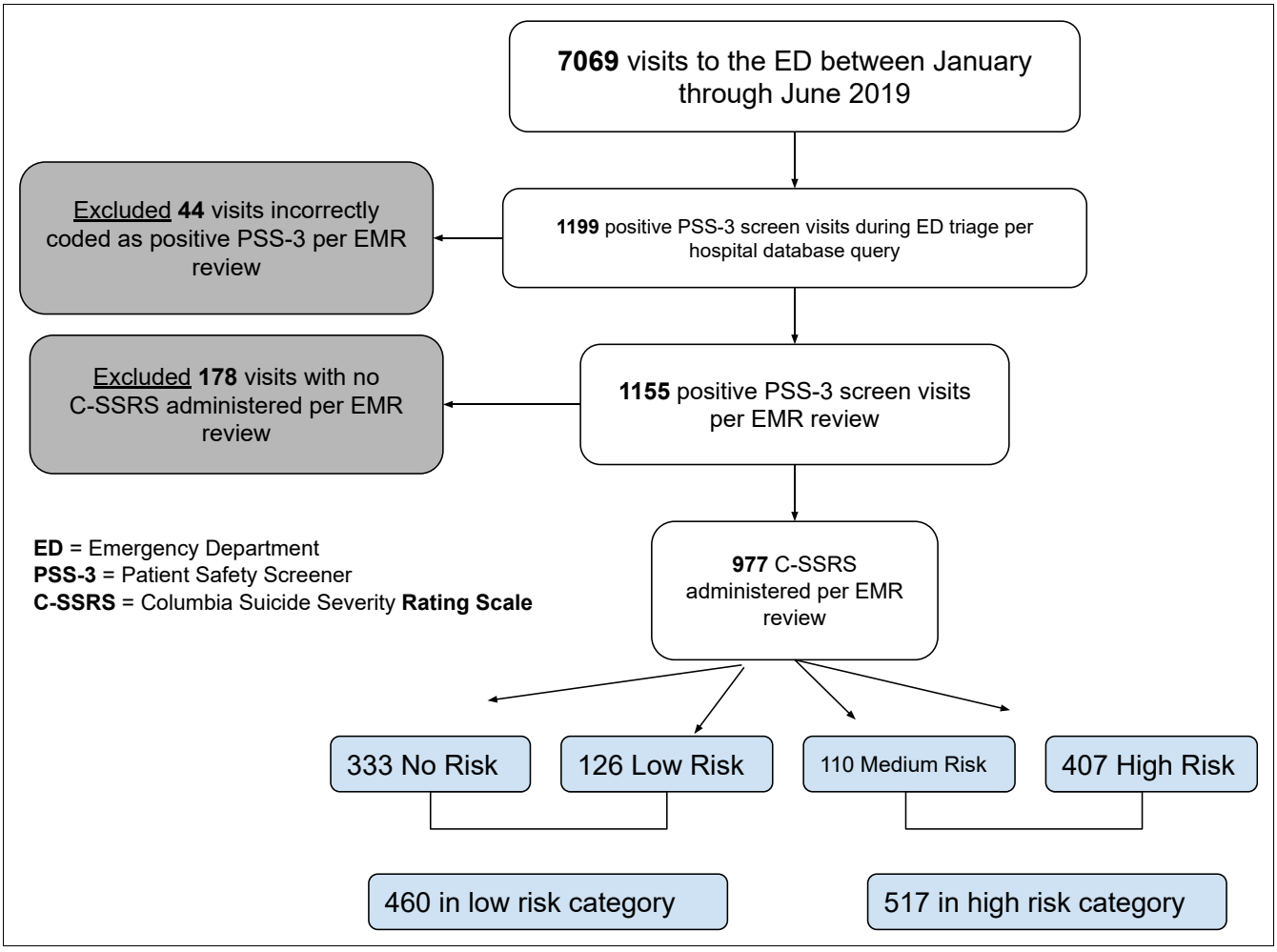

FIGURE
Flow chart of study inclusion and coding.

TABLE 2
Relationship between Columbia Suicide Severity Rating Scale (C-SSRS) risk level and mental health presentation and history of the study population

Mental health parameter	No risk (%)	Low risk (%)	Medium risk (%)	High risk (%)	Sum
MH presentation only (%)	31 (9.3)	21 (16.5)	12 (10.9)	47 (11.5)	111*
MH history only (%)	89 (26.7)	9 (7.1)	9 (8.2)	19 (4.7)	126*
Both history and presentation (%)	86 (25.8)	66 (52.0)	76 (69.1)	325 (79.9)	553*
Neither history nor presentation (%)	127 (38.2)	31 (24.4)	13 (11.8)	16 (3.9)	187*
Sum	333*	127*	110*	407*	977*

MH, mental health.
* Sum of column or row.

presentation or history (n = 60), we broke down screening question results for both the PSS3 and C-SSRS (Table 3). For the PSS-3, 81% (n = 49) answered "yes" to having felt down, depressed, or hopeless in the last 2 weeks; 31% answered "yes" to having thoughts of killing themselves; and 46% said "yes" to having attempted suicide in their lifetime. The C-SSRS results included 88% answering "yes" to wishing to be dead and 60% answering "yes" to having suicidal thoughts.

UNIVARIATE ANALYSES OF POSSIBLE PREDICTIVE DEMOGRAPHIC VARIABLES

Looking closer at the 977 patients who were screened with the C-SSRS, the univariate analysis of demographic variables broken down by dichotomous low (no and low risk) or high (medium and high risk) C-SSRS categories is presented in Table 4. Using chi-square analysis, the associations among 6 variables were found to be statistically significantly related to C-SSRS risk categories ($P < .05$) as follows: age ($P = .005$), race/ethnicity ($P < .001$), primary language spoken ($P = .013$), insurance status ($P < .001$), median income quartile ($P < .001$), and patient type ($P = .008$). The only variable that was not statistically significant was patient sex ($P = .21$). A documented MH presentation ($P < .001$) or MH history ($P < .001$) in the patient's chart was also significantly associated with high versus low C-SSRS risk categories.

LOGISTIC REGRESSION ANALYSIS OF POSSIBLE PREDICTIVE DEMOGRAPHIC VARIABLES

Multivariate analysis using logistic regression of dichotomous *low* or *high* C-SSRS risk categories to account for confounding within the predictors is presented in Table 5. For predictors with more than 1 level, the association was presented in comparison with a referent level. After controlling for each of the other independent variables in the model, there were 3 variables with statistical significance: insurance status, MH presentation, and known MH history. Patients who had a high C-SSRS risk level were 7.62 times more likely to have had an MH presentation and 1.98 times more likely to have had an MH history while controlling for other demographic variables in the model. In addition, privately insured subjects were almost twice as likely than publicly insured subjects to have high C-SSRS risk levels of suicidality. There were 4 variables that were not statistically significant in multivariate modeling: sex, race/ethnicity, language spoken, and median income quartile.

Discussion

Results from this study support the rationale for universal suicide risk screening for adolescents at the time of ED presentation to improve identification of adolescents who are at risk of suicide. Of patients completing the C-SSRS (n = 977), 187 patients presented without MH history nor MH-related chief complaint (n = 187). Of those 187, 32.1% had low, medium, or high risk of suicidality on the C-SSRS (n = 60). More than 15% of the 187 screened for either medium or high risk of suicidality (Table 2). These findings substantiate outcomes from several other studies[17-21] where youth had positive suicide risk screens who presented to an emergency department with non–MH-related chief complaints. Positive screen rates in these studies ranged from 3.1% to 46.3%. These patients' risk of suicidality potentially would not have been recognized nor resources provided in the absence of universal screening.

TABLE 3
Detail of PSS-3 and C-SSRS results from 60 patients screening positive with no known history of mental health issues and not presenting for a mental health–related reason

Questions	
Number of patients	60
PSS-3 results	
Q1: Have you felt down, depressed or hopeless in the last 2 weeks?	49 (81.7)
Q2: Have you had thoughts of killing yourself, in the last 2 weeks?	19 (31.7)
Q3: Have you ever attempted to kill yourself, in your lifetime?	28 (46.7)
C-SSRS results	
In the past month have you…	
Q1: wished to be dead?	53 (88.3)
Q2: had suicidal thoughts?	36 (60.0)
Q3: had suicidal thoughts with a method (without a specific plan or intent to act)?*	13 of 35
Q4: had suicidal intent (without specific plan)?*	12 of 35
Q5: had suicidal intent (with specific plan)?*	6 of 35
Suicide behavior questions	
Q6: Suicide behavior in lifetime†	24 (41.4) - only 58
Q7: Suicide behavior in past 3 months‡	10 (17.9) – only 56

C-SSRS, Columbia Suicide Severity Rating Scale; PSS-3, Patient Safety Screener 3.
* Questions 3, 4, and 5 are asked only of children who are positive for questions 1 and 2 (n = 35).
† Only 58 patients answered question 6.
‡ Only 56 patients answered question 7.

This study found female non-Hispanic white youth were associated with having a higher risk level on the C-SSRS in univariate analysis. Similar to this finding, Barczyk et al[22] examined youth presenting to 2 level 1 trauma centers in Central Texas due to suicide attempt and found the highest frequencies present among female and non-Hispanic white populations. Furthermore, a study comparing depression and suicide screening in a primary care setting before and during the coronavirus disease 2019 pandemic found increases in risk, especially among females. Non-Hispanic white and non-Hispanic Black adolescents were found to have increases as well.[23]

When examining insurance status as a socioeconomic indicator, percentages of patients receiving private versus public insurance were nearly identical. However, multivariate analysis showed that privately insured patients were almost twice as likely than publicly insured patients to have high C-SSRS risk levels of suicidality. These results differ from findings from a Johns Hopkins Hospital study finding that Medicaid was predictive of SI (odds ratio = 2.18, $P < .001$), although may match more recent findings that higher income status is related to completion of suicide (reference: Weldeslase).[19,24] These divergent findings may point to a difference in willingness to divulge information in those being screened for SI, indication of changing demographics of suicidality, or could be a matter of generalizability. Further study is warranted.

Adolescent suicide risk is a serious public health problem. A universal suicide risk screening process identified at-risk individuals including those who did not have an MH-related presentation or previous history and, thus, likely would not have otherwise been detected or referred to treatment. This study builds on evidence that the implementation of universal screening for SI may support the reduction of the suicide rate among the adolescent population given that they can be identified early and provided support services for prevention. In addition, our data may point to the increase in risk for adolescents in higher socioeconomic demographic categories who were previously thought to be at less risk than their counterparts in lower socioeconomic situations. Further research is needed to establish sustainable screening programs for adolescents presenting for care within pediatric emergency departments that reduce the burden of hospitals and increase the likelihood of patients being referred to the appropriate level of care.

TABLE 4
Univariate analysis of demographic variables by Columbia Suicide Severity Rating Scale (C-SSRS) risk category

Characteristics	No risk*	Low risk	Medium risk	High risk	*P* value†
Number of patients	333	127	110	407	
Mean age (y)	14.9 ± 1.8	14.2 ± 1.8	14.6 ± 1.5	14.7 ± 1.5	.0045‡
Sex (%)					
Male	111 (33.3)	46 (36.2)	29 (26.4)	117 (28.8)	.209
Female	222 (66.7)	81 (63.8)	81 (73.6)	290 (71.3)	
Race/ethnicity (%)					
Black	39 (12.1)	18 (15.0)	13 (12.3)	39 (10.1)	< .001‡
White	112 (34.8)	51 (42.5)	50 (47.2)	202 (52.5)	
Hispanic	167 (51.9)	51 (42.5)	41 (38.7)	133 (34.6)	
Other§	(0.9)¶	0 (0.0)	2 (1.9)	11 (2.9)	
Primary language spoken (%)					
English	298 (89.5)	113 (89.0)	101 (91.8)	388 (95.3)	.013‡
Spanish	35 (10.5)	14 (11.0)	9 (8.2)	19 (4.7)	
Insurance status‖ (%)					
Private	99 (29.8)	56 (44.1)	58 (52.7)	233 (57.3)	< .001‡
Public#	204 (61.5)	56 (44.1)	44 (40.0)	144 (35.4)	
Uninsured	29 (8.7)	15 (11.8)	8 (7.3)	30 (7.4)	
Median income quartile‖ (%)**					
≤25%	102 (30.9)	34 (27.4)	23 (21.1)	85 (21.2)	< .001‡
>25%-50%	100 (30.3)	25 (20.2)	26 (23.9)	87 (21.7)	
>50%-75%	69 (20.9)	28 (22.6)	40 (36.7)	110 (27.4)	
>75%	59 (17.9)	37(29.8)	20 (18.4)	119 (29.7)	
Patient type (%)					
Inpatient	27 (8.1)	16 (12.6)	8 (7.3)	52 (12.8)	.008‡
Outpatient	290 (87.1)	110 (86.6)	101 (91.8)	349 (85.8)	
Observation¶	(4.8)**	1 (0.8)	1 (0.9)	6 (1.5)	
Mental health presentation (%)					
Yes	216 (64.9)	40 (31.5)	22 (20.0)	35 (8.6)	< .001‡
No	117 (35.1)	87 (68.5)	88 (80.0)	372(91.4)	
Previous mental health history (%)††					
Yes	175 (52.6)	75 (59.1)	85 (77.3)	344 (84.5)	< .001‡
No	158 (47.5) (45.6)	52 (40.9)	25 (22.7)	63 (15.5)	

* Includes subjects who scored a no or low risk on the C-SSRS vs high, which includes subjects who scored a medium or high risk on the C-SSRS.
† Group means and frequencies were compared by 2-sided Student *t* tests, Fisher exact tests, and chi-squared tests, respectively. Statistical significance was set at $\alpha < 0.05$.
‡ Statistically significant.
§ Those who reported being Asian, American Indian, native Hawaiian, or "other" as race were considered "other."
¶ Patient type was determined by pulling data from the electronic medical records and was marked by the physician or nurse. Observation was marked when the intake staff believed the patient would only remain for 24 hours or less.
‖ Data were missing for this variable. Not all 977 patients in the study population are represented.
Individuals who were wards of the state and received treatment were included in this category as well as other state-sponsored programs such as CHIP and TCHD MAP.
** Median income per household was determined by finding the median household income in each subject's residential zip code, provided by the American Community Survey through the United States Census Bureau. The available data were then divided into quartiles.
†† Previous mental health history was defined as any previous recorded encounter with the medical system regarding mental health including a diagnosis, psychiatrist or therapist visit, or prescription.

TABLE 5
Multivariate analysis of demographic variables using logistic regression by dichotomous low or high Columbia Suicide Severity Rating Scale (C-SSRS) risk category

Variable	Odds ratio	95% CI	*P* value
Sex: female (ref = male)	1.30	0.93-1.80	.122
Race/ethnicity (ref = white)			
Black	1.04	0.61-1.76	.885
Hispanic	0.87	0.59-1.28	.479
Other	1.76	0.52-5.98	.366
Primary language spoken: Spanish (ref = English)	0.76	0.40-1.42	.384
Insurance status† (ref = private)			
Public	0.54	0.38-0.78	.001*
Uninsured	0.73	0.40-1.32	.297
Median income quartile† (ref = ≤ 25%)			
>25%-50%	1.12	0.72-1.74	.613
>50%-75%	1.02	0.65-1.62	.921
>75%	0.66	0.40-1.08	.098
MH presentation (ref = not an MH presentation)	7.62	5.23-11.11	< .001*
MH history (ref = no MH history)	1.98	1.37-2.85	< .001*

MH, mental health; ref, reference value to which other categories are compared.
* Statistically significant.
† Data were missing for this variable. Not all 977 patients in the study population are represented.

Limitations

This study has several limitations that may affect generalizability. First, only patients from the first 6 months of 2019 were included. Thus, seasonality trends could only be observed for the first 2 seasons of the year. Expanding the data set to an entire calendar year may provide additional evidence for a seasonality trend. Second, given that all variables were collected at the same time point for each observation, no temporal relationship can be definitively observed from this study. Third, the C-SSRS was only available in English and Spanish. Participants who spoke other languages did not have C-SSRS results and were excluded from the study. Finally, this study was conducted at a single site; thus, data are not available on patients in other geographic locations.

Implications for Emergency Nurses

Previous research supports the use of universal screening for suicidality in adolescents presenting to emergency departments. This work has been shown to be both acceptable to emergency nurses and effective at identifying patients at risk. Emergency nurses are in an ideal position to interact with adolescents, make connects, and deliver universal suicide screening.

Conclusion

This study strengthens the rationale for using a universal screening process over a targeted screening process to identify and stratify individuals experiencing suicide risk in a pediatric emergency department. It demonstrates that a universal screening method is feasible and effective at identifying patients at risk when properly implemented with a clearly defined plan of action for patient treatment based on risk level.

Author Disclosures

Conflicts of interest: none to report.

This research project was completed under the approval of the University of Texas institutional review board and considered an exempt protocol with no need for consent or patient contact.

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Management of Pediatric Convulsive Status Epilepticus From the Perspective of Emergency Nurses: A Cross-sectional, Multicenter Study

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Contribution to Emergency Nursing Practice

- When intravenous access is not available, non-intravenous benzodiazepines (intramuscular/buccal/nasal midazolam or rectal diazePAM) are effective in first-line treatment for pediatric convulsive status epilepticus.
- If the patient does not have intravenous access, non-intravenous benzodiazepines should become widespread in first-line treatment for pediatric convulsive status epilepticus.
- Emergency nurses have a key role, as responsible for establishing vascular access, and should be the decision makers in determining the first-line treatment option in pediatric convulsive status epilepticus. Given that trying to establish intravenous access during contractions will lead to a loss of time, emergency nurses should be aware of use of non-intravenous benzodiazepines in the first-line treatment of pediatric convulsive status epilepticus. Then intravenous access as soon as possible is crucial.

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Abstract

Introduction: Pediatric convulsive status epilepticus is one of the most common neurologic emergencies and should be managed by health care professionals as soon as possible based on current guidelines. This study aimed to determine the nursing approaches and management of pediatric convulsive status epilepticus from the perspective of emergency nurses in Turkey.

Methods: A cross-sectional, multicenter study was conducted with 162 emergency nurses working in emergency departments in 35 different provinces in Turkey. The data were collected via an online form. Descriptive statistical methods were used in data analysis.

Results: Most emergency nurses (72.2%) attempted an intravenous access immediately to administer antiseizure medications during the stabilization phase. Approximately half the emergency nurses stated that rectal diazePAM was frequently administered in the initial therapy phase and intravenous diazePAM was administered in the second therapy phase. The emergency nurses had most difficulties attempting intravenous access, determining status epilepticus types, and calming the parents.

Discussion: As health care professionals and important members of the health team, emergency nurses have the responsibility to manage pediatric convulsive status epilepticus in the fastest and the most appropriate way based on current practice guidelines in emergency departments. When intravenous access is not available, nonintravenous benzodiazepines should be considered in the first-line treatment of pediatric convulsive status epilepticus, followed by immediate intravenous access.

Key words: Emergency department; Emergency nurses; Children; Nursing management; Pediatric convulsive status epilepticus

Introduction

The incidence of convulsive status epilepticus (CSE) is approximately 15 to 25 per 100,000 children a year, and it is 1 of the most common neurologic emergencies in

children.[1-3] CSE is defined as ≥30 minutes of a single seizure activity or ≥2 consecutive seizures within this period without the patient regaining consciousness. Seizures lasting ≥5 minutes are managed as status epilepticus (SE) to reduce adverse outcomes associated with prolonged seizures (such as neuronal damage).[1,4,5] Briefly, SE presents in several forms: (1) CSE consisting of repeated generalized tonic–clonic seizures with persistent postictal depression of neurologic function between seizures, (2) non-CSE where seizures produce a continuous or fluctuating "epileptic twilight" state, and (3) repeated partial seizures manifested as focal motor signs, focal sensory symptoms, or focal impairment of function (eg, aphasia) not associated with altered awareness (epilepsia partialis contina). The longer the duration of CSE, the more difficult it is to terminate, and the risk of morbidity increases.[2] Therefore, early control of CSE is among the principles of emergency treatment. It should be recognized as a time-sensitive emergency and quickly defined by health care professionals, and appropriate interventions should be made in terms of time management.[6,7] In the management of CSE, timely and effective interventions with the right team are lifesaving, as is choosing the appropriate treatment.

Pediatric CSE is managed using national or local algorithms based on evidence-based guidelines.[2,8,9] Using these algorithms as part of fast and effective teamwork in CSE management has critical value. Emergency nurses are among the most important members of the team given that they are often the first health care professionals to manage children who have had seizures.[10] For this reason, emergency nurses have the responsibility to follow and apply current guidelines on CSE management. However, emergency nurses have some difficulties in correctly defining seizures and approaching a child with seizures.[11] In CSE management, emergency nurses have the responsibility to follow the stabilization of vital functions, evaluate the general condition, and administer antiseizure medications according to the seizure phase.[10] These are collaborative practices to manage children with seizures, but there are not specific nursing protocols for this population. Standardization is important in the approach to children with seizures in emergency departments. Therefore, nursing protocols are needed to ensure standardization for this group.

BACKGROUND

Multiple studies on pediatric CSE management predominantly discuss the best medical approaches.[2,12] In addition to medical treatment, it is emphasized that health care professionals should focus on airway management, monitoring vital signs, and management of parent anxiety.[13] An example management pathway for pediatric SE has been presented[12] and a "status epilepticus code" for emergency departments has been proposed.[14] Unfortunately, the relevant studies do not address the perspective of nursing interventions or nurses' roles in the management of children with CSE. Therefore, nurses may have difficulty integrating the evidence into care approaches.

Uncertainties in acute seizure care and limitations on obtaining and maintaining appropriate treatment are among the barriers to the management of CSE.[15] It is important to determine the approaches nurses should take to manage seizures to prevent mortality and morbidity resulting from CSE in emergency departments. Most of the guidelines for CSE management focus on the medical treatment of seizures. Besides, studies investigating nurses' knowledge of and attitudes toward epilepsy have determined that they have low or moderate knowledge of this condition.[16-18] Research of nursing care and nurses' approach to the management of seizures are quite limited.[18] Current nursing studies aim to determine nurses' and student nurses' theoretical knowledge of and attitudes to epilepsy.[17,19,20] No study seeking to determine the approaches of nurses to pediatric CSE management in emergency departments has been found in the literature. This is the first multicenter study to determine emergency nurses' approaches and the medical therapy they administer in pediatric CSE management in emergency departments. Hence, there is a paucity of research on the current approach of emergency nurses to children with CSE and on their responsibilities in emergency departments for pediatric CSE management. This study aimed to determine the nursing approaches and management of pediatric CSE from the perspective of emergency nurses in Turkey. Therefore, the following research questions guided this study.

In pediatric CSE management in emergency departments in Turkey:

1. What nursing approaches do emergency nurses take?
2. What difficulties do emergency nurses experience?
3. What medical therapies are administered?

Methods

STUDY DESIGN

A cross-sectional, multicenter online survey study design was used. The study was reported according to the Strengthening the Reporting of Observational Studies in Epidemiology guidelines.[21]

SETTING AND PARTICIPANTS

This study was performed in cooperation with the Emergency Nurses Association of Turkey. It was conducted in emergency departments that admit pediatric patients in Turkey. Turkey has 81 provinces across 7 regions, and data were collected from 35 different provinces from these regions. It is not known exactly how many emergency nurses work in emergency departments in Turkey. In addition, the number of emergency services and emergency nurses could not be obtained. The study was not designed to test a hypothesis, and therefore, a sample size calculation was not performed.[22] However, to obtain a representative sample of nurses working in emergency departments, the nurses were asked to share the questionnaire form through mass media in cooperation with the Emergency Nurses Association. The study sample consisted of 162 nurses working in emergency departments. The inclusion criteria for participation were being a registered nurse and working in an emergency department. Nurses who had not provided care for pediatric CSE were excluded from the study. The power of the research was 96%.

DATA COLLECTION

Data were collected online between August 2 and December 1, 2022. The online questionnaire used was created using the free open-access Google Forms (https://www.google.com/forms/about/) application. The link was sent to the emergency nurses via the WhatsApp group of the Emergency Nurses Association in Turkey. The introduction to the data collection form informed participants that their answers were confidential and anonymous. The survey included a request for voluntary consent, and the nurses could proceed to answering the questions after ticking the button indicating that they gave this consent. The required button was activated for each question in the online questionnaire. If even one question was not answered, the questionnaire could not be sent to the researchers. Therefore, there are no missing values in the surveys.

DATA COLLECTION FORM

The data collection form was developed by the researchers in line with the literature to evaluate the interventions of emergency nurses working in different emergency departments in Turkey for children with CSE.[1,3,8,9,23] They were asked to evaluate in infants and children (1 month-18 years) in the form according to CSE management guideline.[2] This form consisted of 3 sections and had a total of 15 items. *The first section* of the form comprised 11 items aimed at determining the characteristics of the emergency nurses (8 items) and emergency departments (3 items). *The second section* of the form comprised 2 items: interventions for stabilization and difficulties experienced by emergency nurses in CSE management in emergency departments. *The third section* of the form comprised 2 items: medical treatments in the initial and second therapy phases for pediatric CSE management were given as options. The second and third sections of the form were created as multiple choice and participants were asked to mark them. To reveal the different practices they use in the clinics in which they work, an "other" option was added for the participant to answer with an open-ended response for each question.

DATA ANALYSIS

In total, 162 data were analyzed. The SPSS (Statistical Package for Social Sciences) version 23.0 (IBM Corp, Armonk, NY) was used for statistical analyses. Numbers, percentages, means, and standard deviations were used for data analysis.

ETHICAL CONSIDERATIONS

Ethical approval was obtained for the study from the Akdeniz University Clinical Research Ethics Committee (no. 470, date July 20, 2022). The research was conducted in accordance with the Declaration of Helsinki World Medical Association.[24] An informed consent was obtained by clicking on the phrase "I agree to complete the questionnaire" in the online form sent to the emergency nurses before completing the questionnaire.

Results

CHARACTERISTICS OF THE ENS AND EMERGENCY DEPARTMENTS

A total of 162 emergency nurses participated from emergency departments that admitted pediatric patients in 35 different provinces of 7 regions of Turkey. Information about the characteristics of the emergency nurses and emergency departments is presented in Table 1. The mean age of the emergency nurses was 31.8 (7.7) years (minimum-maximum = 20-52 years). Most nurses were female (84.6%), had a bachelor-degree educational level (61.1%), and had 5 years or less clinical nursing experience (40.7%). The mean duration of nursing experience in emergency departments was 5.2 (5.0) years (minimum-maximum = 1-27 years). Most of the participants did not have pediatric emergency nurse or emergency nurse certificates (76.5%). Only 5 nurses (3.1%) had

TABLE 1
The characteristics of the emergency nurses and emergency departments (N = 162)

Variables	N	%
Age (y) 31.8 ± 7.7* (20 [minimum] to 52 [maximum])		
Gender		
Female	137	84.6
Male	25	15.4
Education		
Vocational college	16	9.9
Associate degree	29	17.9
Bachelor degree	99	61.1
Master degree/PhD	18	11.1
Nursing experience (y)		
≤5	66	40.7
6-10	33	20.4
11-15	28	17.3
≥16	35	21.6
Nursing experience in the EDs (y) 5.2 ± 5.0* (1 [minimum] to 27 [maximum])		
Certification		
Certified pediatric EN	14	8.7
Certified EN	19	11.7
Neither	124	76.5
Both	5	3.1
Knows the types of seizures		
Yes	37	22.8
No	38	23.5
Some seizure types	87	53.7
Clinical algorithm for treatment of CSE for children in EDs		
Yes	83	51.2
No	79	48.8
Pediatric CSE frequency in EDs		
1-2 per d	39	24.1
1-2 per wk	79	48.8
1-2 per mo	44	27.1
Discharge training for CSE		
Yes	99	61.1
No	63	38.9

CSE, convulsive status epilepticus; ED, emergency department; EN, emergency nurse.
* Mean ± SD.

both certificates. In addition, only 22.8% of the nurses stated that they knew the types of SE.

Furthermore, 51.2% of the emergency nurses stated that they had a clinical algorithm for the treatment of pediatric CSE. In terms of frequency, 48.8% of the emergency nurses saw 1 to 2 cases of pediatric CSE per week. In addition, it was determined that discharge training for CSE was provided in 61.1% of the emergency departments (Table 1).

STABILIZATION PHASE INTERVENTIONS IN CASES OF PEDIATRIC CSE IN EMERGENCY DEPARTMENTS

The stabilization phase interventions for pediatric CSE in emergency departments are presented in Table 2. Insofar as possible, interventions are listed based on the guidelines.[1,3,8,9,23] The nurses listed the following interventions: recording the time elapsed since the onset of the seizure (72.8%); keeping the child safe and protecting them from injury (79.0%); turning the head sideways to keep the airway clear (83.4%); inserting an oropharyngeal airway (51.8%); oral suctioning to clear secretions from the mouth (80.2%); assessing oxygenation, giving oxygen via a nasal cannula/mask, and considering intubation if respiratory assistance was needed (51.3%); monitoring vital signs (83.4%); measuring temperatures (68.5%); collecting finger stick blood glucose (48.8%); and if glucose <60 mg/dL then administering intravenous (IV) dextrose (24.1%). Furthermore, 35.8% of nurses stated that they immediately administered rectal diazePAM, and 72.2% of nurses stated that they immediately attempted IV catheterization access and administered an anticonvulsant drug.

INITIAL AND SECOND-PHASE MEDICAL THERAPY OF PEDIATRIC CSE IN EMERGENCY DEPARTMENTS

The nurses described the medical therapy they applied in emergency departments according to the phases of CSE. According to the responses, in the initial therapy (5-20 - minutes), rectal diazePAM was applied (43.8%) followed by intramuscular (IM) midazolam (32.1%), IV diazePAM (29.6%), and IV midazolam (19.7%). In the second therapy (20-40 minutes), IV diazePAM was applied (40.1%) followed by IM midazolam (33.9%), IV PHENobarbital (14.8%), and IV midazolam (13.6%) (Table 3).

DIFFICULTIES EXPERIENCED BY NURSES IN CSE MANAGEMENT IN EMERGENCY DEPARTMENTS

Difficulties experienced by nurses while caring for a child with CSE included being unable to calm the parent (43.8%), having problems in attempting IV access (35.2%), and being unable to determine the type of seizure (77.2%). In addition, it was determined that nurses had difficulties in calculating the drug dose (9.9%), staying calm

TABLE 2
Interventions in emergency departments in the stabilization phase of pediatric CSE

Interventions*	n	%
Time seizure from onset.	118	72.8
Keep children safe and protect them from injury.	128	79.0
Insert oropharyngeal airway.	84	51.8
Turn head sideways to keep the airway clear.	136	83.4
Oral suctioning from the mouth.	130	80.2
Assess oxygenations, give oxygen via nasal cannula/mask, and consider intubation if respiratory assistance is needed.	83	51.3
Assess consciousness during seizures.	81	50.0
Monitor vital signs.	136	83.4
Measure temperature.	111	68.5
Collect finger stick blood glucose.	79	48.8
If glucose < 60 mg/dL, then IV dextrose.	39	24.1
Collect blood.	109	67.2
Immediately attempt IV access. Give anticonvulsant.	117	72.2
Immediately administer rectal diazePAM.	58	35.8
After the contractions stop, attempt IV access.	26	16.0
Take anamnesis from the parent.	108	66.7
Give the family information. Help calm parents.	97	59.9
Do not allow the family to be with the child during the seizure and interventions.	61	37.6
Evaluate seizure semiology.	70	43.2

CSE, convulsive status epilepticus; ED, emergency department; IV, intravenous.
* Multiple answers were given.

(8.0%), and collaborating with the emergency team (6.8%) (Figure).

Discussion

Emergency nurses are a key health care professional for management of pediatric CSE. To the best of our knowledge, this is the first study that reveals how pediatric epilepsy is managed by emergency nurses and the difficulties nurses face. The study reveals the pediatric CSE management profile of the country, given that the study data were obtained from 162 nurses working in emergency departments in 35 different provinces in 7 regions of Turkey. Although more than half of the nurses participating in the study had a bachelor's degree, most of them did not have an emergency nurse certificate. However, it is noteworthy that although pediatric CSE management guidelines exist, almost half the emergency departments where the study was conducted do not have a pediatric CSE management protocol (Table 1). It is extremely important that CSE management is performed within the framework of protocols established in line with evidence-based guidelines by competent health professionals.

TABLE 3
Medical therapy for CSE management in emergency departments

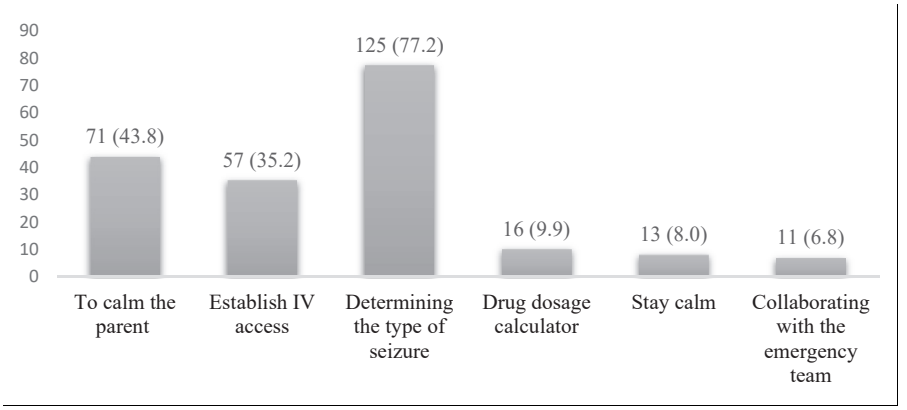
Phase	n	%
Initial therapy* (5-20 min)		
Rectal diazePAM	71	43.8
IM midazolam	52	32.1
IV diazePAM	48	29.6
IV midazolam	32	19.7
Second therapy* (20-40 min)		
IV diazePAM	65	40.1
IM midazolam	55	33.9
IV PHENobarbital	24	14.8
IV midazolam	22	13.6

CSE, convulsive status epilepticus; IM, intramuscular; IV, intravenous.
* Multiple answers were given.

THE INTERVENTIONS IN THE STABILIZATION PHASE OF PEDIATRIC CSE IN EMERGENCY DEPARTMENTS

The first 5 minutes of CSE is the *stabilization phase* and includes standard initial practices. In Turkey, the duties, authorities, and responsibilities of the emergency nurses are defined in the Nursing Regulation,[9] which states that emergency nurses provide monitoring of patients (electrocardiogram, respiration, SpO_2, body temperature, arterial blood pressure). According to the regulation, interventions in the stabilization phase should be performed by emergency nurses. The regulations support all of the nursing activities, but nurses reported that many were not performed 100% of the time (Table 2).

Assessment and supplementation of the patient's blood glucose are recommended in the stabilization phase in



FIGURE

Difficulties experienced by nurses in CSE management in EDs. CSE, convulsive status epilepticus; ED, emergency department; IV, intravenous.

pediatric CSE.[3] Almost half the nurses participating in the study thought about the need to control blood glucose (Table 2). Although there is evidence to support early control of blood glucose,[25] there is also evidence against the routine blood glucose testing of all children with a chief complaint of seizure in emergency departments.[26] In practice, blood glucose checks are not always indicated, especially if the patient has a known seizure disorder or other known rationale for SE. Given that we asked the nurses on a known seizure type (pediatric CSE) in this study, these results are consistent.

Most emergency nurses stated that they immediately attempted IV catheterization to administer anticonvulsant medication, and approximately one-fifth stated that they attempted this procedure after the contractions stopped (Table 2). Dispensing antiepileptic drugs intravenously is the fastest route of administration; however, introduction of a venous line may be difficult in children with seizures,[27,28] which would delay the initiation of treatment.[29] In the active phase of CSE or during tonic or tonic–clonic seizures, contractions adversely affect the success of an IV catheterization intervention. This is compounded by resource constraints and a lack of trained personnel.[27] Therefore, it would not be humane to try to perform another traumatic invasive procedure or to try it more than once on the child during contractions. It is emergency nurses' responsibility to make this assessment. In such a case, the most appropriate non-IV medications should be chosen in line with the current evidence. Deciding on medical treatment is the responsibility of the physician in Turkey. According to the regulation, nurses do not have the authority to decide on medical treatment.[9] However, in such situations emergency nurses should collaborate with the physician in determining the most appropriate medical treatment.

INITIAL AND SECOND-PHASE MEDICAL THERAPY OF PEDIATRIC CSE IN EMERGENCY DEPARTMENTS

Initial Therapy

Current evidence recommends the use of benzodiazepines in the initial therapy of CSE.[2,3,8,13] In the study, it is seen that the treatments applied in the initial therapy are benzodiazepines (Table 3). If IV access is not available, buccal midazolam, intranasal (IN) midazolam, or rectal diazePAM is recommended as the initial therapy in CSE.[2,3,8] Approximately half the emergency nurses reported that rectal diazePAM was used in the initial therapy of pediatric CSE in their emergency departments (Table 3). Countries in transition, and developing countries, even in developed countries may experience problems accessing available products for use in addition to existing production and distribution problems. Given that buccal and IN midazolam are not available in Turkey, rectal diazePAM is the most appropriate option for initial therapy in CSE. However, there are privacy concerns and application difficulties in rectal diazePAM administration. Therefore, current evidence indicates that IN or buccal midazolam is a more effective, atraumatic, and patient- and carer-friendly medical approach for initial therapy in CSE.[2,3,8,30,31] If IV access is available, IV LORazepam is recommended as initial therapy in CSE.[1-3,8] However, as IV LORazepam is not available in nationwide, emergency nurses made no mention of it in their responses in this study.

In first-line treatment, if the child does not have vascular access, non-IV midazolam administration is recommended in the guidelines.[2,3,31] Approximately one-third of the emergency nurses administered IM midazolam in emergency departments. In addition, approximately one-third of the emergency nurses administered IV diazePAM and one-fifth of them stated that IV midazolam was administered in emergency departments (Table 3). Intravenous benzodiazepines can result in serious side effects such as hypotension, decreased loss of consciousness, and respiratory depression.[32] In this case, nurses have a responsibility to monitor the child closely for side effects. Each country has algorithms for pediatric CSE management based on the latest evidence regarding its own circumstances. Within the framework of these algorithms, the nurse should know the side effects of the treatment, take responsibility, and be alert to preventing malpractice.

Second Therapy

As regards the second medical therapy phase, the emergency nurses stated that they administered benzodiazepines (diazePAM and midazolam) and PHENobarbital medications (Table 3). However, guidelines do not recommend administration of benzodiazepines at this phase. Guidelines recommend levetiracetam, phenytoin (or fosphenytoin), and sodium valproate for secondary therapy of CSE.[1,8] Current evidence[2,3,8,31] indicates that there is no difference in efficacy between these options. If none of these 3 recommended treatments is available, IV PHENobarbital may be considered as a second therapy alternative.[1] In this study, it was determined that IV PHENobarbital treatment was the only correct therapy (14.8%). This finding shows that the medical management of pediatric CSE in Turkey should be updated in line with current guidelines.

DIFFICULTIES EXPERIENCED BY NURSES IN CSE MANAGEMENT IN EMERGENCY DEPARTMENTS

The difficulties experienced by emergency nurses in CSE management in emergency departments are shown in the Figure. The nurses who participated in this study had most difficulties determining type of seizure, calming the parents, and attempting IV access. İşler et al[11] found that pediatric nurses faced similar difficulties and issues when caring for a child who had a seizure. A recent study from South Korea emphasized that nurses first recognize seizures in epilepsy patients in the ward and play a crucial role in epilepsy management. In addition, an algorithm-based education program regarding nursing care for children with epilepsy has been developed and can increase self-efficacy in providing such care and related nursing competence.[18] Determining the approaches of nurses to pediatric CSE management in emergency departments has critical value in terms of detecting the current situation in emergency departments, which is, in turn, an important step toward successful CSE management.

Limitations

The major strength of this study is that it is a multicenter study revealing the pediatric CSE management profile in Turkey. Nonetheless, this study has some limitations. First, all the findings obtained are based on the participants' own statements made online. Second, the researchers created data-collection tools. Another limitation is that it is not known how many emergency nurses there are in the country. Finally, causality cannot be established between the variables, given that the study is a descriptive cross-sectional study.

Implications for Emergency Nurses

This study draws attention to the role of emergency nurses in the management of pediatric CSE. Emergency nurses are responsible for establishing IV access in emergency departments. Because of that, trying to establish IV access during contractions in the first-line treatment of pediatric CSE would cause a loss of time. Use of non-IV benzodiazepines should become widespread in clinical practice. In this case, emergency nurses should be in a decision-making position, especially in directing first-line medical treatment in pediatric CSE. A rapid and effective health care team intervention plays an important role in the treatment of CSE and can prevent the acute and chronic damage that may be associated with CSE. Therefore, emergency nurses have a responsibility to follow current CSE treatment protocols.

Conclusions

Most emergency nurses attempted to establish vascular access so that IV benzodiazepines could be administered as first-line treatment in the management of pediatric CSE, and we found that IV/IM benzodiazepines, which are not included in the guidelines, were used in second therapy. In this study, we emphasized that non-IV benzodiazepines are effective in first-line treatment if the patient does not

have vascular access to the management of pediatric CSE and that this practice should become widespread in emergency departments. There are treatment protocols that include collaborative practices for managing children with seizures, but there is no specific nursing protocol for this population. It is very important to reveal how nurses currently approach CSE in emergency services and what interventions they apply so that appropriate future studies can be planned. To standardize the approach to pediatric CSE, nurses in emergency departments need to know and apply the CSE treatment algorithm based on evidence-based practice and internationally accepted guidelines for CSE. In this regard, it is clear that there is a need for training in this subject among emergency nurses.

Ethical Considerations

Ethical approval was obtained for the study from the Akdeniz University Clinical Research Ethics Committee (no. KAEK-470, date July 20, 2022). The research was conducted in accordance with the Declaration of Helsinki World Medical Association (Declaration of Helsinki, 2013). Informed consent was obtained by clicking on the phrase "I agree to complete the questionnaire" in the online form sent to the nurses before completing the questionnaire.

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Author Disclosures

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Ultrasound-Guided Radial Artery Puncture by Nurses in Emergency Department: A Randomized Controlled Study

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Contribution to Emergency Nursing Practice

- Nurses are invaluable in ensuring successful patient care and good medical outcomes in emergency departments and intensive care units. One of the procedures commonly performed in these units is radial artery puncture. The effectiveness of ultrasound-guided radial artery puncture by nurses has not yet been documented.
- In this study, we aimed to evaluate whether emergency nurses can use bedside ultrasound to successfully perform ultrasound-guided radial artery puncture.
- Emergency nurses successfully performed radial artery puncture under ultrasound guidance. Training emergency nurses on the use of ultrasound will contribute to their professional development.

Abstract

Introduction: Radial artery puncture has been performed by palpation as a standard method in many emergency departments and intensive care units. Nurses play an important role in the care of patients in various settings. Ultrasonography can be performed and interpreted not only by physicians but also by nurses. This study aimed to evaluate whether emergency nurses would be more successful in radial artery puncture procedure by using ultrasonography instead of palpation.

Methods: This single-center, prospective, randomized controlled study was conducted in the emergency department. The patients included in the study were randomized into 2 groups as ultrasonography and palpation groups. Data were recorded on the number of interventions, the duration of the procedure in seconds, total time in seconds, whether the puncture was successfully placed, whether there were complications, the types of complications (hematoma, bleeding, and infection), or whether it was necessary to switch to an alternative technique.

Results: A total of 72 patients, 36 patients in the ultrasonography group and 36 patients in the palpation group, participated in the study. The success rate at the first attempt was statistically significantly higher in the ultrasonography group. Although hematoma formation among the complications occurred in the entire palpation group, it was observed in 72.2% of the ultrasonography group. Puncture time and total time were statistically significantly lower in the ultrasonography group.

Discussion: Our study shows that emergency nurses can use bedside ultrasonography for radial artery puncture successfully.

Key words: Arterial blood gas; Emergency; Emergency nurse; Intervention; Point-of-care ultrasound; Radial artery puncture

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Introduction

Arterial blood gas (ABG) is a minimally invasive procedure commonly used in the emergency department or intensive care unit (ICU) for the evaluation of metabolic and respiratory status.[1] The radial artery is frequently preferred for ABG sampling because of its superficial location and low complication rate and the hand is fed by double arterial circulation.[2] Radial artery puncture (RAP) is performed by palpation and has been a standard method for a long time. This process is difficult and not completely safe.[3] Additionally, this method is difficult in hypotensive, tachycardic, edematous, and obese patients and may lead to multiple interventions.[2,4,5] In these cases, hematoma, bleeding, thrombosis, arterial vasospasm, and pain as the most common complications may occur after unsuccessful attempts and more likely occur as the number of unsuccessful attempts increases.[1,5,6] The use of ultrasonography (US) can potentially minimize these disadvantages.

Nurses play an important role in the care of patients in various settings. US can be performed and interpreted not only by physicians but also by other health personnel, including nurses. US-guided peripheral intravenous vascular access interventions, nasogastric tube verification, confirmation of endotracheal tube position in a cadaver model, focused US application to trauma patients, measurement of left ventricular ejection fraction by echosonography, measurement of inferior vena cava for volume assessment in hemodialysis patients, and lung US in rapid triage of dyspneic patients performed by nurses have been discussed in previous studies.[7-13] To the best of our knowledge, there is no randomized controlled study discussing US-guided RAP performed by nurses. This study aimed to compare the palpation method and the US-guided method for RAP in terms of first attempt success, number of attempts before success, and time to success for radial ABG analysis in emergency nurses who received US-guided RAP training.

Methods

This single-center, prospective, nonblinded randomized controlled and cross-sectional study was conducted between August 5 and 7, 2023, in the emergency medicine clinic of a tertiary education and research hospital. Ethical approval of our study was obtained from Istanbul Medipol University (Number: E-10840098-772.02-2877). An informed consent form was obtained from eligible patients or their relatives for the study. Patients who required RAP by their primary physician were included. Inclusion criteria were patients who were scheduled for RAP in the emergency department and were aged 18 years and older. The exclusion criteria were patients younger than 18 years; cardiac arrest patients; those with positive Allen test; pregnant and lactating patients; those with wrist bone injuries; those with vascular circulation disorders in the hand region; those with wounds, burns, and cellulitis in the area; those with a history of peripheral artery disease; and patients without consent. The use of US for RAP is an interventional procedure currently applied in our clinic, and this procedure is performed by clinicians with bedside US certification.

This study was planned in 2 stages. In the first stage, a training program was created to train all nurses working in the emergency department in line with their demands. All the nurses working in our emergency department were informed about the study. The nurses participating in the study did not have any formal training about US or US-guided vascular intervention before this study. Within the scope of this training program, 6 nurses with at least 5 years of professional experience received basic information about the US-guided vascular interventions for 1 hour, and educative videos about US-guided RAP were for 30 minutes. This was followed by a hands-on session to familiarize the nurses with using US equipment and the sonographic anatomy of the wrist. After completing the US training program, the nurses were asked to successfully perform 10 RAP procedures with both palpation and US guidance, and they successfully performed both methods. This entire process was performed under the supervision of a US-certified emergency medicine specialist physician. Stage 2 was performing the prospective, nonblinded randomized controlled study. Nurses participating in the study were divided into 2 groups: a US-guided RAP group and a palpation RAP group by a biostatistics specialist using block randomization from the SAS program[14]; 3 nurses were randomized to the US-guided method the other 3 to the palpation method.

For both groups, the Allen test was applied to the patients before the procedure and before sterilization; the forearm was extended in the supine position, parallel to the ground, with a small roller placed under the wrist. Asepsis of the intervention area was provided with povidone iodine. Arterial puncture was performed after the hand was fixed to the table with adhesive tape. All of the puncture procedures were performed using a blood gas injector with a 23-G 40 mm needle (Ayset Company, Adana, Turkey). Interventions were made using sterile technique, including sterile gloves, sterile drapes, rolls, and disposable US probe covers. The nurse was positioned to face the tip of the patient's arm with the US probe in their left hand and inserted the blood gas syringe with the right thumb and index finger as if holding a pencil. Local anesthesia with **2% lidocaine** was applied to the application area. Sonosite M-turbo (Fujifilm

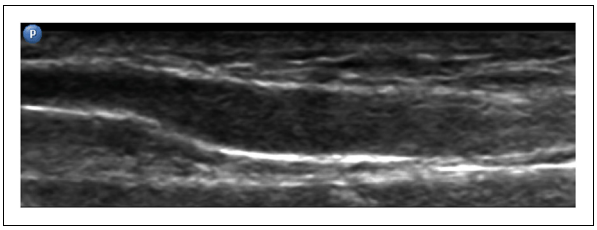

FIGURE
Ultrasound view of the radial artery.

Sonosite, Bothell, WA) equipped with a 13-6 megahertz high-frequency linear probe was used as the US device. After examining the radial artery in cross-section, the US probe was rotated 90° to obtain an image of the artery in long axis (long axis in-plane method) (Figure). The imaging mode of the US was switched to color Doppler mode to acquire the arterial blood flow signal.

In the palpation method, the nurse palpated the radial artery pulse with the left index finger and middle finger. The strongest pulse point was determined as the intervention site. When the needle of the blood gas injector was advanced toward the radial artery at an angle of approximately 15° to 45° and blood was seen in the chamber, it was drawn into the blood gas injector. Arterial puncture was considered successful only when the results of blood gas analysis showed that the puncture was indeed arterial.

Demographic data (age, gender, body mass index), systolic blood pressure, pulse rate, mean arterial pressure, vasopressor use, and intubation information of patients eligible for the study were recorded. The patients included in the study were primarily recruited according to the availability of the personnel who would perform the procedure and were randomized using a simple method and divided into 2 groups. In addition, not all nurses who performed the RAP procedure were blinded to the procedure. Data of the number of interventions, the duration of the procedure in seconds, total time in seconds, whether the puncture was successfully placed, the complications, the types of complications (hematoma, bleeding, and infection), or whether it was necessary to switch to an alternative technique were recorded in both groups. The procedure time and total time were measured by an appropriate nurse or emergency medical technician. Procedure time measurement started when the needle pierced the skin for both groups. After the skin was pierced, the nurse was able to redirect the needle, but each time the needle came out and re-entered the skin was considered additional intervention. For an attempt to be considered successful, 1 cc blood should be withdrawn and the timer stopped (Supplementary Video 1). Total time was also measured for the patients with more than 1 attempt. To minimize the possibility of multiple failed attempts at RAP, the number of attempts in each group was limited to 3 per patient. In the study protocol, the processing time was a maximum of 5 minutes. A procedure was considered as failed when it took more than 5 minutes or 3 unsuccessful attempts.[15] An alternative method was used to insert the RAP in case of failure. Patient follow-up occurred 2 days after the procedure to observe whether the puncture site was infected or whether there was a hematoma. Infection was defined as inflammation at the puncture site up to 48 hours after RAP.

The primary outcome was the number of attempts required for successful RAP placement. Secondary outcome was the time required for RAP and the type and number of complications.

STATISTICS

SPPS 25 (IBM Corp. Released 2017. IBM SPSS Statistics for Windows, Version 25.0. Armonk, NY) statistical package program was used to evaluate the data of the study. Descriptive statistics (mean, standard deviation, median value, minimum, maximum, number, and percentile) were given for categorical and continuous variables. In addition, the homogeneity of the variances, which is 1 of the prerequisites of the parametric tests, was checked with the Levene test. Normality assumption was checked with the Shapiro-Wilk test. To evaluate the differences between the 2 groups, if the parametric test prerequisites are met, Student t test was used, but, if not met, the Mann-Whitney U test was used. Relationship between categorical variables was analyzed with Fisher exact test and chi-square test. In cases where the expected frequencies are less than 20%, an evaluation was made with the Monte Carlo simulation method to include these frequencies in the analysis. $P < .05$ level was considered as statistically significant. As a result of the simulation study, it was stated that 80.69% power was reached with 72 patients and sufficient effect width was reached for calculations.[16]

Results

A total of 72 patients, 36 patients in the US group and 36 patients in the palpation group, participated in the study. Both groups were similar in terms of gender, age, pulse rate, mean arterial pressure, height, weight, body mass index, intubation status, and vasopressor use. Puncture application time and total time were shorter in the US

TABLE 1
Comparison of group variables and categorical variables

Demographics	US group n = 36	Palpation group n = 36	Test statistics	*P* value
Gender				
Male	20 (54.1%)	17 (45.9%)	0.500	.479
Female	16 (45.7%)	19 (54.3%)		
Age (y)	67.08 ± 14.55	71.58 ± 12.19	−1.422	.160*
Pulse rate (bpm)	97.38 ± 27.29	91.22 ± 21.89	−0.980	.327†
MAP (mm Hg)	91.02 ± 23.97	85.50 ± 15.97	−0.592	.554†
Height (centimeter)	165.05 ± 8.01	163.19 ± 9.16	0.917	.362*
Weight (kilogram)	82.88 ± 12.49	79.66 ± 15.17	0.984	.329*
BMI	30.48 ± 4.59	29.79 ± 4.35	−0.800	.424†
Vasopressor treatment				
Absent	33	34		
Present	3	2	−0.460	.645†
Intubation				
Absent	34	34		
Present	2	2	0.000	1.000†
Puncture time (s)	48.05 ± 21.47	71.19 ± 43.36	−2.630	.009†,‡
Total time (s)	57.80 ± 31.11	129.19 ± 102.29	−4.196	.001†,‡

BMI, body mass index; MAP, mean arterial pressure; US, ultrasonography.
* Two independent group *t* tests (Student *t* test).
† Mann-Whitney U test.
‡ $P < .05$.

group than the palpation group ($P = .009$ and $P = .001$, respectively) (Table 1). In the US group, the most common diagnosis was pneumonia, whereas chronic obstructive pulmonary disease was the most common diagnosis in the palpation group (Table 2). The success rate at the first attempt was statistically significantly higher in the US group than in the palpation group (86.1% vs 58.3%; $P = .00$). The number of patients who underwent multiple attempts was higher in the palpation group than the US group, and this procedure failed in 3 patients in the palpation group ($P = .000$). In the US group, the number of puncture manipulations (without steering and once) was quite successful compared with the palpation group (69.5% vs 0%, $P = .000$). Although hematoma formation among the complications occurred in the entire palpation group, it was observed in 72.2% of the US group ($P = .000$). The puncture time and total time were 48.05 (SD = 21.47) and 57.80 (SD = 31.11) seconds in the US group and 71.19 (SD = 43.36) and 129.19 (SD = 102.29) seconds in the palpation group, respectively. It was statistically significantly lower for both times in the US group ($P = .009$ and $P < .001$) (Table 3).

Discussion

We found that US-guided RAP procedure increased the first entry success rate and decreased the number of attempts, the number of manipulations, and the procedure time when

TABLE 2
Diagnoses of radial artery puncture patients

Diagnoses of patients	n (US group)	n (Palpation group)
Pneumonia	9	8
Acute heart failure	6	7
Asthma	3	2
Chronic obstructive pulmonary disease	5	11
Cardiogenic shock	4	3
Acute renal failure	4	2
Diabetic keto-acidosis	4	3
Sepsis	1	0

US, ultrasonography.

TABLE 3
Comparison of the relationships between group variable and categorical variables

Variables	US group (n = 36) n (%)	Palpation group (n = 36) n (%)	*P* value
Success on the first attempt	31 (86.1)	21 (58.3)	
>1 attempt	5 (13.9)	15 (41.7)	.007
Number of insertions			
◦1	31 (86.1)	21 (58.3)	.002
◦2	5 (13.9)	8 (22.2)	
◦3	0	4 (11.1)	
Unsuccessful	0	3 (8.4)	
Total success rate			.472
Puncture manipulation rate			
◦No manipulation	11 (30.6)	0 (0)	.002
◦1 manipulation	14 (38.9)	0 (0)	
◦2 manipulations	6 (16.7)	3 (8.3)	
◦≥3 manipulations	5 (13.8)	33 (91.7)	
Hematoma			
◦Present	26 (72.2)	36 (100.0)	.241
◦Absent	10 (27.8)	-	
Time (s)			
Puncture time, mean ± SD	48.05 ± 21.47	71.19 ± 43.36	.009*
Total time, mean ± SD	57.80 ± 31.11	129.19 ± 102.29	< .001*

US, ultrasonography.
* $P < .05$.

performed by emergency nurses in this study. In addition, we found that nurses without US experience before this study had a better overall success rate in the US-guided RAP procedure than the palpation method. This study was performed by 6 emergency nurses who were inexperienced in US. Thus, we showed that the US-guided RAP procedure can be applied to nonphysician assistant health personnel in this study. Our results show that US-guided method is more successful and safe than the palpation method for RAP and that nurses working in an academic emergency medicine department can successfully perform US-guided RAP after training. The most preferred artery for arterial puncture and cannulation in the emergency department and ICU is the radial artery because of its superficial location, easy accessibility, and low complication rates.[2] Currently, there is no defined method for RAP procedure. Classically, the digital palpation method is used for RAP. Recently, many clinical studies have shown the superiority of US-guided radial artery catheterization over the palpation method. Several meta-analyses have shown that US-guided methods are superior to palpation methods in adults, children, and even neonates.[17-20]

Berk et al[21] found that the long axis/in-plane approach increased the first attempt success rate compared with the short axis/out-of-plane approach. In addition, Arora et al[22] reported that the first-pass success rate of the in-plane method was superior in patients undergoing cardiac surgery in adults. However, according to the meta-analysis by Cao et al,[23] there was no significant difference in terms of both first attempt success rate and cannulation time between these 2 approaches. In our study, the in-plane method was used.

In our study, the overall success rate was 100% in the US group, whereas it was 91.7% in the palpation group. However, no statistically significant difference was found between the success rates of both methods. According to many studies, the overall success rate of US-guided radial artery cannulation varies between 68.3% and 100%.[20]

According to the meta-analysis by Bhattacharjee et al,[20] the first attempt success rate of the palpation

technique versus the US-guided technique in arterial catheterization is 53% and 95%, respectively. In our study, the first attempt success rate was found to be higher in the US group (86.1%) than in the palpation group (58.3%), which was consistent with the literature. According to meta-analyses published in recent years, first attempt success rate has increased in arterial cannulation with the help of US. This increase in the first attempt success rate resulted in a general decrease in the number of attempts and a decrease in vascular complications.[19,20] In our study, the first attempt success rate of RAP with the aid of US was high, and therefore, the number of attempts was low, consistent with the literature.

In this study, a significant difference was found between the US technique and the palpation technique in terms of the time to RAP and the total time ($P = .009$ and $P < .001$). Shiver et al[5] reported that the time required for radial arterial catheters was shorter in patients in the US group. Again, in the study by Levin et al,[24] they stated that there was a trend toward shortening of the total time required for catheter placement in the US group. However, according to the last meta-analysis, they found that US had no benefit in terms of the time until cannulation, and they said that the reason for this was that the people who applied radial artery catheter were experienced and experts.[20] Our study was conducted on nurses who were inexperienced in US and they performed 10 successful procedures for RAP under US guidance. Troianos et al[4] agreed that US-guided cannulation rates were higher when trainees improved their general experience and dexterity. In our study, there were overweight and obese patients according to body mass index in both groups. It has been reported that the palpation technique may be more difficult and US is more successful in these patients.

In this study, a significant difference was found between the US-guide RAP and the palpation RAP in terms of the number of needle manipulations ($P = .002$). In the study of Kim et al[25] conducted on elderly patients, the number of cannula manipulations in the US group was lower in arterial catheterization, similar to the number of needle manipulations in our findings.

According to the meta-analysis by Bhattacharjee et al,[20] incidence of hematoma formation was similar between US-guided technique and digital palpation technique. Similarly, there was no significant difference between the incidence of hematoma with either technique ($P = .241$). In our study, complications such as infection, ischemia, and thrombosis were not detected in either group. Hematoma was observed in all patients in the palpation group. It can be said that the reason for this is the manipulations of needles. At the same time, no hematoma was observed in 10 patients in the US group. Again, we think that the reason for this is the placement of the needles without manipulation.

Limitations

The first limitation of this study was that it was a single-center study. Although the results of the study showed the superiority of the US method, the nurses were more familiar with the palpation technique. In addition, we did not take into account whether the nurse verbally requested help from the supervisor physician on issues such as needle or probe manipulation and US device adjustment. In addition, our emergency department cannot represent the general population. In addition, patient-related indicators such as pain or comfort were not measured in nonintubated patients; additionally, most of the patients in our study were hemodynamically stable. Finally, we used the same needle and US device throughout our study, but the arterial needle, US equipment, and US approach can potentially affect outcomes at other departments or institutions. In light of these findings, it is recommended that more studies be conducted on nurses' use of US in hemodynamically unstable patients.

Implications for Emergency Nurses

Emergency departments are under increasing pressure to manage more and increasingly complex patients each year. Nurses play a more important role in the care of patients in emergency departments. There are US applications for many indications that have been successfully implemented by nurses. One of these applications is RAP, as we showed in our study. US-guided RAP procedure may increase the first entry success rate and may decrease the number of attempts, the number of manipulations, and the procedure time when applied by emergency nurses. Standardization of training and professional development of emergency nurses in the use of focused US is needed.

Conclusion

Our study showed that emergency nurses who are inexperienced in US performed the RAP procedure faster and more successfully after a short US training. Especially in ICU and emergency departments where critical patient care is provided, the use of US can increase the success of the interventional procedure and decrease the complication rates. It can be made a part of nursing education about interventional

procedures accompanied by US. Our study showed that US provides faster and more successful RAP placement by emergency nurses.

Author Disclosures

Conflicts of interest: none to report.

Supplementary Data

Supplementary data related to this article can be found at https://doi.org/10.1016/j.jen.2024.01.001.

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Individual Attributes and Environmental Conditions of Registered Nurses Working in Freestanding Emergency Departments in the United States: A Descriptive Exploratory Study

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Contribution to Emergency Nursing Practice

- Very little is known about the elements of the work environment of freestanding emergency departments in terms of individual nursing characteristics and resource allotment.
- This article is the first to describe the individual and practice environment characteristics of freestanding emergency departments in the United States.
- Significant human and other resource challenges were reported in this practice environment, which may affect nursing and patient outcomes.

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Abstract

Introduction: Freestanding emergency departments (FSEDs) are emergency facilities not connected to inpatient services. The percentage of FSEDs of all EDs grew from 1% in 2001 to 12% in 2017, making FSEDs a substantial subset of US emergency care. The purpose of this study was to describe the individual attributes and environmental conditions of registered nurses working in FSEDs in the US.

Methods: A quantitative descriptive exploratory design with cross-sectional survey methodology.

Results: A total of 364 emergency nurses responded to the survey. Most reported their FSED was open 24 hours/day (99.5%), with board-certified emergency physicians onsite (91.5%) and a mean of 3.6 RNs working per shift. Resources immediately available in more than 50% of FSEDs included laboratory and imaging services, and in fewer than 30% of FSEDs included behavioral health care, MRI, obstetric care, orthopedic care, neurologic care, and surgical consult care. Respiratory therapy was reported by 39.6% of respondents as being immediately available. A significant minority of respondents expressed concerns about adequacy of resources and training and the effect on patient care in both survey (30% of respondents) and open-ended questions (42.5% of respondents).

Discussion: The practice environment of emergency nurses in FSEDs was reported as having positive elements; however, a substantial subpopulation reported serious concerns. FSEDs adhere to some of the standards put forward by the American College of Emergency Physicians, with notable exceptions in the areas of staffing RNs, staffing ancillary staff, and availability of some resources.

Key words: Freestanding emergency department; Nursing practice; Nursing environment; Staffing

Introduction

The nursing practice environment has been defined as comprising factors that facilitate or challenge a nurse's ability to practice nursing skillfully and deliver high-quality care.[1] Although literature on the practice environment of emergency nurses is increasingly robust[2,3] and describes a high-stress, under-resourced practice environment, there is little information on the practice environment of freestanding emergency departments (FSEDs), defined as emergency facilities not connected to inpatient services.[4] These facilities can be satellite FSEDs (affiliated with a hospital) or autonomous (not affiliated with a hospital).[4] FSEDs comprise 12% of all emergency departments and 6% of annual ED visits, making this form of care delivery a substantial subset of United States emergency care.[4]

The structure and regulation of FSEDs vary considerably. Texas has the most FSEDs, with 373, followed by Ohio and Colorado, respectively.[4] Notably, there are differences in the types of FSEDs. In Texas, 66% of FSEDs are autonomous, whereas in Ohio and Colorado 98% and 77% of FSEDs are hospital satellites, respectively.[4] Other state differences exist that may affect the type, number, and location of FSEDs. For example, in Texas, Colorado, and Arizona, FSEDs are allowed to open without a certificate of need[5] and often open in areas with other emergency departments rather than in areas lacking access.[6] FSEDs are reported to have shorter lengths of stay than hospital-based emergency departments, use fewer electrocardiograms and x-rays, and have lower hospital admission rates.[5] They also are reported to care for greater proportions of Emergency Severity Index (ESI) 3- and 4-level patients than hospital-affiliated emergency departments and fewer ESI 1-, 2-, and 5-level patients. The most common complaints at these facilities were injuries and respiratory symptoms.[6]

Reviewers of current regulations regarding FSEDs[5-8] determined that 29 states have no regulations about FSEDs (to either encourage or limit them) and there are currently only 4 states where autonomous FSEDs are legal (Delaware, Rhode Island, Texas, and Colorado). The diversity of state FSED policies reflects the diversity of FSED definitions, making research and record keeping challenging. This data challenge becomes important when attempting to look at the current state of FSEDs in the United States and the nursing practice environment.

There is considerable evidence that the practice environment of nurses affects a variety of health and safety outcomes. Lake et al[9] concluded from their meta-analysis of inpatient nursing workplace environments and outcomes that nurses in better work environments had lower dissatisfaction, burnout, or intention to leave and had lower odds of rating nursing unit quality and safety as fair or poor. The impact of the ED work environment on nurses is reported in the Australian literature as including greater perceived workload,[10,11] time pressure, and challenging management relationships that affect satisfaction and retention.[10] The current literature on FSEDs focuses on operational issues, with few specifically looking at nursing concerns in FSED environments (eg, staffing, education, training, or the effect of the practice environment on patient or nursing outcomes). The FSED occupies a space between a resource-heavy, hospital-situated emergency department and an urgent care center, so it is important to understand the practice conditions of emergency nurses as a necessary first step for professional nursing organizations and other policy makers who want to inform regulatory policies and create educational and leadership programs that provide a safer practice environment for both FSED nurses and patients.

The purpose of this study was to describe the individual attributes and practice environment of registered nurses (RNs) working in FSEDs in the United States.

Methods

The study purpose was addressed through a quantitative descriptive exploratory design with cross-sectional survey methodology. The Checklist for Reporting Results of Internet E-Surveys tool[12] was used to facilitate the comprehensive reporting of this study.

SAMPLE

A sample was recruited from the membership of the Emergency Nurses Association via email and non–Emergency Nurses Association members via social media. Inclusion criteria were (1) older than 18 years, (2) English speaking, and (3) working full time, part time, or per diem as an RN in an FSED in the United States. There were no exclusion criteria.

TABLE 1
Nursing demographics

Gender	n	%
Man	*70*	*19.3*
Woman	*287*	*79.3*
Non-binary	*2*	*0.6*
Other	*3*	*0.8*
Age	***Mean, years***	***SD***
	44.8	*11.6*
Race or ethnic group*	**n**	**%**
African/African American/ Black/Afro-Caribbean	*11*	*3.0*
Latinx/Chicanx/Hispanic	*24*	*6.6*
Multiracial/Biracial	*7*	*1.9*
American Indian/Alaskan Native/First Nations/ Native American	*10*	*2.7*
East Asian/East Asian American	*3*	*0.8*
South Asian/South Asian American	*4*	*1.1*
Middle Eastern/Arab/North African	*2*	*0.5*
Native Hawaiian/Pacific Islander	*2*	*0.5*
White	*295*	*81.0*
Highest educational degree completed	**n**	**%**
Nursing diploma	*8*	*1.6*
Associate	*70*	*19.2*
Bachelor's	*200*	*54.9*
Master's	*83*	*22.8*
Doctorate	*5*	*1.4*
Primary role is FSED	**n**	**%**
Staff nurse	*220*	*60.4*
Charge nurse	*66*	*18.1*
Case manager	*1*	*0.3*
Clinical coordinator	*6*	*1.6*
Clinical/nurse educator	*16*	*4.4*

continued

TABLE 1
Continued

Primary role is FSED	n	%
Director	*12*	*3.3*
Manager	*29*	*8.0*
Nurse practitioner	*2*	*0.5*
Consultant, not based in a specific hospital	*1*	*0.3*
Other	*11*	*3.0*
Years of Experience	**Mean, years**	**SD**
As a nurse, in emergency nursing only	*13.3*	*10.02*
As a nurse, in current FSED	*4.1*	*5.0*
Certifications/Verifications currently held*	**n**	**%**
Advanced Cardiovascular Life Support	*349*	*95.9*
Advanced Life Support	*124*	*34.1*
Basic Life Support	*351*	*96.4*
Certified Emergency Nurse	*161*	*44.2*
Certified Flight Registered Nurse	*5*	*1.4*
Certified Pediatric Emergency Nurse	*35*	*9.6*
Certified Transport Registered Nurse	*4*	*1.1*
Emergency Nursing Pediatric Course	*165*	*45.3*
Pediatric Advanced Life Support	*327*	*89.8*
Sexual Assault Nurse Examiner	*16*	*4.4*
Trauma Certified Registered Nurse	*40*	*11.0*
Trauma Nursing Core Course	*267*	*73.4*
Asked to stay longer than assigned time in last week	**n**	**%**
Every shift	*7*	*1.9*
Several shifts	*36*	*9.9*
A couple shifts	*84*	*23.1*

continued

TABLE 1
Continued

Asked to stay longer than assigned time in last week	**n**	**%**
Never	*237*	*65.1*
Average shift length (in hours)	**Mean, hours**	**SD**
	11.5	*1.7*
Asked to pick up another shift in the last month	**n**	**%**
More than once a week	*69*	*19.0*
Once a week	*88*	*24.2*
Once a month	*114*	*31.3*
Never	*93*	*25.5*
Average number of shifts per week	**Mean**	**SD**
	3.1	*1.9*

Note:
* Percentages do not equal 100 as multiple responses were allowed

DATA COLLECTION

Institutional review board approval was obtained before the recruitment of participants (Advarra Institutional Review Board, Columbia, MD). Participants completed an online survey (Qualtrics, Provo, UT) that included demographic data about the nurses, the FSEDs in which they work, and perceptions of the practice environment as measured with the Practice Environment Scale of the Nursing Work Index (PES-NWI). A study description was provided before participants being given access to the survey. Completion and return of the survey constituted consent. The survey period comprised the time between June 1, 2023, and September 25, 2023. Reminder emails were sent out every 2 weeks from June 15, 2023, to September 15, 2023. No compensation or other incentive was provided to participants.

SURVEY INSTRUMENT

PES-NWI is a reliable and valid instrument endorsed by the National Quality Forum.[13] It describes the elements of the practice environment that have been validated as important in facilitating or challenging a nurse's ability to practice nursing skillfully and deliver high-quality care.[1] The 31-item scale describes a set of organizational characteristics that support professional nursing practice. It has been found to be reliable (Cronbach's alpha = .82). On a Likert scale ranging from 0 ("strongly disagree") to 4 ("strongly agree"), nurses indicate the degree to which each item is present in their job. Five subscales comprise the PES-NWI (Cronbach's alpha follows each respective subscale in parentheses): (1) collegial nurse-physician relations (0.71), (2) nurse manager ability, leadership, and support of nurses (0.81), (3) nursing foundations for quality of care (0.80), (4) nurse participation in hospital affairs (0.83), and (5) staffing and resource adequacy (0.82). To minimize respondent fatigue, only 10 items were displayed per screen.

Given the exploratory nature of this study, 1 open-ended question was offered to respondents at the end of the survey as an opportunity to add further data that could be used to additionally guide future work. The question was "Is there anything else you would like to share about the nursing care environment in the FSED where you work?"

DATA ANALYSIS

Survey data were imported into SPSS (IBM Corporation, version 27, 2020) and summarized using appropriate descriptive statistics. Responses to the 1 open-ended question were analyzed by the research team using constant comparison[14] to identify categorical elements. Disagreements related to categorical elements were resolved within the research team by consensus.

Results

A total of 364 emergency nurses completed the full survey (see Tables 1, 2, and 3 for the demographics of this sample). Respondents reported whether the FSED they worked in was an autonomous FSED (72.8%), was open 24 hours/day (99.5%), and had board-certified emergency physicians onsite (91.5%), the mean daily volume of patients (57), and the mean number of RNs working per shift (3.6).

ESI was the triage scale used in 98.6% of FSEDs of respondents, and 95.3% reported that an RN performed initial triage. Resources immediately available on site included laboratory services (62.1%), computed tomography (68.1%), and x-ray (63.0%). Resources reported as not immediately available onsite included magnetic resonance imaging, obstetric care, behavioral health care, orthopedic care,

TABLE 2
Facility demographics

ED patient population	**n**	**%**
General ED	356	97.8
Adult only	3	0.8
Pediatric only	5	1.4
Facility type	**n**	**%**
Nongovernment, not-for-profit	252	69.2
Investor-owned, for-profit	105	28.8
State or local government	7	1.9
Geographic location	**n**	**%**
Large urban	98	26.9
Small urban	84	23.1
Suburban	134	36.8
Rural	48	13.2
Type of FSED	**n**	**%**
An independent FSED	99	72.8
A hospital outpatient department (satellite ED)	265	27.2
Number of ED beds	**Mean**	**SD**
	14.0	6.4
Daily patient volume	**Mean**	**SD**
	57.3	34.0
US state representation, HHS regions	**n**	**%**
Region 1 (Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, and Vermont)	7	2
Region 2 (New Jersey, New York, Puerto Rico, and the Virgin Islands)	24	7
Region 3 (Delaware, District of Columbia, Maryland, Pennsylvania, Virginia, and West Virginia)	20	5
Region 4 (Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, and Tennessee)	101	28
Region 5 (Illinois, Indiana, Michigan, Minnesota, Ohio, and Wisconsin)	71	20
Region 6 (Arkansas, Louisiana, New Mexico, Oklahoma, and Texas)	62	17
Region 7 (Iowa, Kansas, Missouri, and Nebraska)	8	2
Region 8 (Colorado, Montana, North Dakota, South Dakota, Utah, and Wyoming)	47	13
Region 9 (Arizona, California, Hawaii, Nevada, American Samoa, Commonwealth of the Northern Mariana Islands, Federated States of Micronesia, Guam, Marshall Islands, and Republic of Palau)	18	5
Region 10 (Alaska, Idaho, Oregon, and Washington)	6	2

ED, emergency department; FSED, freestanding emergency department; HHS, Health and Human Services; US, United States.

neurologic care, and surgical consult care (Table 3). Respiratory therapy was reported by 27.7% of respondents as being immediately available on site.

FSEDs generally accepted ambulances (91.5%) and had a transfer protocol for patients requiring additional care (96.4%). Participants reported that the transfer process was easy (48.6%) or very easy (13.5%) although 56.3% reported not having a dedicated transport team available (Table 3).

Respondents to the PES-NWI provided information on the domains of nurse participation in hospital affairs; nursing foundations for quality of care; nurse manager ability, leadership, and support of nurses; and staffing and resource adequacy. The distribution (percentage) of responses for each of the PES-NWI items is presented in Table 4.

PARTICIPANT COMMENTS ON FSEDS

Responses to a single open-ended question were received from 155 respondents (42.5% of the sample). Responses were grouped together in categories comprising resources, transport, staffing, practice environment and training, and administration. These open-ended responses detailed deficits in resources and staffing, especially in the overnight hours, and concerns about working conditions that featured multitasking. Notably, participants who responded "disagree" or "strongly disagree" to PES-NWI statements about resource adequacy were more likely to provide an answer or comments to the open-ended question (see Supplementary Table).

TABLE 3
FSED data

Certificates/verifications required by FSED*	n	%
Advanced cardiovascular life support	255	70.1
Advanced life support	76	20.9
Basic life support	263	72.3
Certified emergency nurse	5	1.4
Certified flight registered nurse	0	0.0
Certified pediatric emergency nurse	1	0.3
Certified transport registered nurse	0	0.0
Emergency nursing pediatric course	74	20.3
Pediatric advanced life support	229	62.9
Sexual assault nurse examiner	2	0.5
Trauma certified registered nurse	1	0.3
Trauma Nursing Core Course	117	32.1
Boards patients†	n	%
Yes	191	52.5
No	173	47.5
Patients seen regardless of insurance status	n	%
Yes	357	98.1
No	6	1.6
Don't know	1	0.3
FSED open 24 h a day	n	%
Yes	362	99.5
No	2	0.5
Typical provider staffing per shift*	n	%
Board-certified emergency physician	333	91.5
Emergency physician (not board certified)	90	24.7
Physician assistant	192	52.7
Nurse practitioners	175	48.1
Average number of nurse staff available in your FSED on a given shift	Mean	SD
RN	3.6	2.5
Nurse practitioners	0.4	0.8
Licensed practical nurses/licensed vocational nurses	0.1	0.6
Technician/medical assistants/nurse aide	1.2	1.7
Triage system used	n	%
Emergency Severity Index	359	98.6
Another scale/method	5	1.4
Who performs initial triage	n	%
RN	347	95.3
Other staff	17	4.7
Who manages patient registration	n	%
Registrar	293	80.5
RN	39	10.7
Other staff	32	8.8
FSED accepts ambulances	n	%
Yes	333	91.5
No	31	8.5
FSED has a standard transfer protocol	n	%
Yes	351	96.4
No	13	3.6
FSED has a transport team available for patient transfers	n	%
Yes	159	43.7
No	205	56.3
Ease of transfer of patients to hospital	n	%
Very easy	49	13.5
Easy	177	48.6
Difficult	116	31.9
Very difficult	22	6.0

Resources available	Available		Staff on site		Staff on call	
	n	%	n	%	n	%
Laboratory	313	86.0	226	62.1	9	2.5
CT scan	317	87.1	249	68.4	9	2.5
X-ray	317	87.1	248	68.1	9	2.5
MRI	94	25.8	51	14.0	60	16.5
Ultrasound	228	62.6	119	32.7	207	56.9
Obstetric care	38	10.4	6	1.6	53	14.6
Behavioral health	94	25.8	12	3.3	53	14.6
Orthopedics	55	15.1	4	1.1	79	21.7
Respiratory therapy	114	39.6	101	27.7	17	4.7
Neurology	69	19.0	1	0.3	63	17.3
Surgical consult	55	15.1	4	1.1	96	26.4

CT, computed tomography; FSED, freestanding emergency department; MRI, magnetic resonance imaging; RN, registered nurse.

* Percentages do not equal 100 given that multiple responses were allowed.

† Boards patients: defined as the process of keeping patients with an admission decision in the emergency department when no inpatient bed is available.

RESOURCES

Participants reported specifically that limited human and material resources can create an unsafe environment, with FSEDs perceived as not as fully resourced as the nurses need them to be. (Text in blocks below are direct quotes from survey respondents.)

TABLE 4
Practice environment scale of the nursing work index

Elements of the practice environment Nurse participation in hospital affairs	Distribution of respondents (%) Strongly agree	Agree	Disagree	Strongly disagree
A chief nursing officer equal in power and authority to other top-level hospital executives	20.1	46.6	25.5	7.8
A chief nursing officer who is highly visible and accessible to staff	15.4	22.5	37.9	24.1
Administration that listens and responds to employee concerns	22.3	41.8	23.1	12.9
Career development/clinical ladder opportunity	32.5	38.6	23.4	5.5
Nursing administrators consult with staff on daily problems and procedures	20.6	37.4	28.6	13.5
Opportunities for advancement	22.0	42.9	28.7	6.4
Opportunity for staff nurses to participate in policy decisions	22.3	38.1	30.2	9.4
Staff nurses are involved in the internal governance of the hospital	24.5	36.8	28.6	10.2
Staff nurses have the opportunity to serve on hospital and nursing committees	33.8	42.0	16.2	8.0
Nursing foundations for quality of care	**Strongly agree**	**Agree**	**Disagree**	**Strongly disagree**
A clear philosophy of nursing that pervades the patient care environment	27.6	50.9	17.7	3.8
A preceptor program for newly hired RNs	35.7	41.2	14.6	8.5
Active staff development or continuing education programs for nurses	40.9	38.6	16.5	3.9
An active quality assurance program	23.6	55.5	17.6	3.3
High standards of nursing care are expected by the administration	52.0	38.2	7.7	2.1
Nursing care is based on a nursing, rather than a medical, model	27.7	46.4	20.9	4.9
Patient care assignments that foster continuity of care	19.5	39.0	29.4	12.1
Use of nursing diagnoses	11.3	29.7	35.4	23.6
Working with nurses who are clinically competent	36.7	52.3	8.0	2.9
Written, up-to-date nursing care plans for all patients	17.3	32.7	33.8	16.2
Nurse manager ability, leadership, and support of nurses	**Strongly agree**	**Agree**	**Disagree**	**Strongly disagree**
A nurse manager who backs up the nursing staff in decision making, even if the conflict is with a physician	44.8	36.5	12.3	6.4

continued

TABLE 4
Continued

Nurse manager ability, leadership, and support of nurses	Strongly agree	Agree	Disagree	Strongly disagree
A nurse manager who is a good manager and leader	46.4	33.4	11.7	8.5
A supervisory staff that is supportive of the nurses	45.1	39.9	10.5	4.5
Praise and recognition for a job well done	30.0	43.2	18.3	8.5
Supervisors use mistakes as learning opportunities, not criticism	35.2	45.9	13.4	5.5
Staffing and resource adequacy	**Strongly agree**	**Agree**	**Disagree**	**Strongly disagree**
Adequate support services allow me to spend time with my patients	25.2	47.5	23.1	4.2
Enough registered nurses to provide quality patient care	29.2	41.4	22.5	6.9
Enough staff to get the work done	23.6	45.1	25.7	5.6
Enough time and opportunity to discuss patient care problems with other nurses	34.2	49.6	15.1	1.1
Collegial nurse-physician relations	**Strongly agree**	**Agree**	**Disagree**	**Strongly disagree**
A lot of team work between nurses and physicians	59.8	34.9	4.6	0.8
Collaboration (joint practice) between nurses and physicians	43.7	45.6	8.8	1.9
Physicians and nurses have good working relationships	68.5	28.3	2.4	0.8

Since we have limited resources (no RT, no L&D, no rapid response team, no onsite lab personnel, no onsite pharmacist, no onsite social work personnel, no onsite central supply personnel, no onsite building/facilities personnel, etc) I believe that minimal staffing level for clinical staff should be 3 RNs and 1 ED Tech (EMT or Paramedic) 24-hours per day. With only 2 RNs and 1 ED Tech, it only takes 1 emergent or critical patient to consume all 3 clinical staff members for an extended amount of time which leaves any and all other patients already in the FSED or any new patient(s) that check in to be seen at risk because all clinical personnel are busy. Although uncommon, it does not feel safe when these situations do occur.

TRANSFER

Comments about transfer processes offer a mixed view of the FSED. There were many comments about difficulties in transfers due to a lack of emergency medical services (EMS) staff and concerns that FSEDs are not a priority for transfers and that EMS just does not come due to staffing shortages, with up to 24-hour waits. Other respondents stated that transfers to the larger hospitals were unproblematic.

> Our Satellite ED is 9 minutes from the Main Hospital, so all services are available, we just transfer the patient to the Main ED. Our hospital has a contract with a local EMS/Fire Department who will transfer the patient (no expense to patient, hospital covers the transport cost).

> Rural critical access. We just lost our EMS service so must call multiple companies to attempt to find transport out of ER. At times have to board patients for 24-48 hours before a squad is available for transport. Due to staffing shortages, very difficult to get patients transferred to higher level of care.

STAFFING

For those who reported concerns about staffing, attention was focused on the bare-bones nature of staffing in their FSED, with several comments about only 1 RN on a shift and few ancillary staff available.

"We can be staffed with 1 RN and 1 paramedic. Not always 2 RNs, but there has to be 1 RN on shift."

"Only 4 people in the building during a shift; registrar, Radiology tech, RN and MD."

PRACTICE ENVIRONMENT AND TRAINING

Comments about practice environment centered around understaffing such that RNs were responsible for laboratory work, registration, housekeeping and restocking, and other tasks normally delegated to ancillary staff. Participants who provided comments about practice environment felt that administrators did not address issues. One participant wrote,

> Administration needs to come in and personally evaluate. Understaffed, dangerous and no one cares. Any emergency department minimally needs a triage RN, 2 RNs, charge nurse, and ancillary departments need to be responsible for their unit. If unit generates revenue for them, they need to provide the service for it. RNs do cardiology, lab services, purchasing and restocking, housekeeping, respiratory and pharmacy resulting in just sh*tty care and is unfair to the patient.

This carried back to comments about training, specifically due to the unpredictability of resources in an FSED. Concerns about new graduate nurses and nurses new to the emergency department focused on the FSED as "not a place to learn," given the staffing patterns and resource concerns expressed by the participants.

> New graduates and inexperienced ED nurses should NOT be hired, with the expectation by management or the nurse, to be trained by the experienced staff on shift. Neither should start their ED career in the FSED setting. It is not safe for patient care. It is not an appropriate setting in which to learn. I have been in FSED full time for 3 years with experience floating to FSED over the course of my career. The setting for a new grad or inexperienced ED nurse to learn is in a hospital ED with more resources and patient volume. Anything else is unfair to that nurse as well as the nurses she will work with 1 day at the FSED. Worse, it sets that nurse up for failure and the potential unsafe patient experience.

ADMINISTRATION

Finally, participants wrote about management and administrators as challenging to communicate with. The participants who responded to this question focused on a lack of response from administration to requests for increased human and other resources. A participant noted,

"[Our]nurse manager is the only leadership on site, struggles to get administration and other leaders from ancillary departments from our parent facility to take ownership of their teams and the department and to get recognition from the parent facility."

Discussion

The purpose of this study was to describe the individual attributes and practice environment of RNs working in FSEDs in the United States.

Recent literature suggests that the practice environment of emergency nurses is related to their perception of patient care quality, personal burnout, and intention to leave their current job.[15] In addition, the staffing recommendations from the American College of Emergency Physicians for FSEDs[16] include qualified emergency physicians, adequate nurse staffing to perform written protocols and anticipated needs of the facility, and an RN onsite who is certified in advanced life support for both adults and pediatrics. Our findings suggest a practice environment that adheres to some of these recommendations, while being deficient in others. Although most participants reported that their FSEDs (91.5%) have emergency physicians as the primary providers, there is also reliance on nonboard-certified emergency physicians (24.7%), physician assistants (52.7%), and nurse practitioners (48.1%) (Table 3). Most of FSED nurses (89.8%) reported being trained in pediatric advanced life support; 95.9% reported being trained in advanced cardiac

life support, and 73.4% reported holding a Trauma Nursing Core Course verification certificate (Table 1).

Although 70% of participants reported "enough RNs to provide adequate care" (Table 4), a substantial subset of respondents disagreed or strongly disagreed with that statement. In particular, 43.2% reported being asked to pick up an extra shift at least once per week; 33% reported being asked to stay later in their shift at least "a couple of shifts" in the last week, suggesting that staffing was in part dependent of nurses working overtime and/or extra shifts (Table 1). A similar percentage disagreed or strongly disagreed with the statement that there was "enough staff to get the work done" (Table 4).

Kunaviktikul et al[17] reported extended work hours are related to outcomes such as patient identification errors, pressure ulcers, communication errors, and patient complaints and with nurse outcomes of emotional exhaustion and depersonalization. They also reported a negative correlation between extended work hours and job satisfaction as a whole, intent to stay, and organizational productivity. If "extended work hours" are understood as a proxy for "not enough staff available," this becomes relevant. Although patient outcomes or intent to leave were not measured in this study, the responses from nurses to the open-ended question (eg, "Administration needs to come in and personally evaluate. Understaffed, dangerous and no one cares. Any emergency department minimally needs a triage RN, 2 RNs, charge nurse and ancillary departments need to be responsible for their unit") suggest that the perceived relationship between inadequate staffing and patient care may exist in this setting as well.

In terms of other staffing, almost 43% of participants in this study described concerns related to staffing and access that may create a suboptimal practice environment. In addition, although Alexander and Dark[6] reported that the most common complaints were injuries and respiratory symptoms, fewer than 30% of our respondents reported that orthopedic care was immediately available, and only 39.6% of our respondents reported that respiratory therapy was immediately available.

Limitations

Limitations of this study include a self-selecting sample of emergency nurses who self-reported data related to their facility. Although 38 states are represented in these data, it may be difficult to generalize to the complete set of FSEDs. In addition, qualitative analysis was based on the subset of participants who voluntarily provided additional information about their perceptions of the practice environment. This may not be representative of the experiences of the entire cohort of nurses who responded to the survey. The strength of this study is a national sample used to describe these practice environments; as an initial description, these results provide a starting point for further investigation.

Implications for Emergency Nurses

This is the first study to describe individual and practice environment elements of FSEDs. Concerns raised related to adequacy of human and other resources and nurse training and their effect on patient care are significant; the FSED seems to exist in an intermediate space with regard to staffing, oversight, and responsibilities of RNs. As such, emergency nurses working in FSEDs should consider a critical appraisal of their workplace environments with investigative and advocacy efforts centered on nursing impact on patient access to specific forms of care, and patient outcomes.

Conclusions

The practice environment of emergency nurses in most FSEDs is perceived by nurses as containing positive elements. However, a substantial subpopulation expressed concerns about the practice environment. Participants reported that FSEDs adhere to some of the standards recommended by the American College of Emergency Physicians, with some critical exceptions in the areas of staffing of RNs, staffing of ancillary staff, and availability of some diagnostic and therapeutic resources. These exceptions are associated with concerns about patient safety. Future research should explore the relationships between FSED practice environments and nursing effects on patient outcomes, with specific consideration of the relationship between staffing levels and these outcomes.

Data, Code, and Research Materials Availability

Ethical approval from Advarra, Inc, Institutional Review Board (Columbia, MD) # Pro00072491.

Author Disclosures

Conflicts of interest: none to report.

Supplementary Data

Supplementary data related to this article can be found at https://doi.org/10.1016/j.jen.2024.02.007.

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Appendix

Percent change from unanswered to answered Q29 (negative values mean less people selected that option when they answered Q29, positive means more people selected option)

	Strongly agree	Agree	Disagree	Strongly disagree
Adequate support services allow me to spend time with my patients.	-21.935484	-10.9556	56.12903	34.83871
Physicians and nurses have good working relationships.	6.70689255	-14.3881	68.54839	-100
A supervisory staff that is supportive of the nurse.	-13.222613	-6.89708	93.83065	51.69355
Active staff development or continuing education programs for nurses	-14.992987	13.54839	13.77016	-10.1075
Career development/clinical ladder opportunity	-13.186036	5.450786	6.149623	22.58065
Opportunity for staff nurses to participate in policy decisions	-22.208437	-19.4067	32.3417	68.54839
Supervisors use mistakes as learning opportunities, not criticism.	-1.1182796	-15.0516	24.4665	119.1129
Enough time and opportunity to discuss patient care problems with other nurses	-3.9505082	-16.9297	81.73913	304.5161
Enough registered nurses to provide quality patient care	-11.512097	-13.5273	19.15979	115.7419
A nurse manager who is a good manager and leader	-8.3096774	-9.49183	34.83871	52.8172
A chief nursing officer who is highly visible and accessible to staff	-12.751423	-19.6154	1.993383	28.84588
Enough staff to get the work done	-25.357143	-12.8315	31.9698	169.6774
Praise and recognition for a job well done	-37.075269	20.03934	16.11111	34.83871
High standards of nursing care are expected by the administration	-1.0358094	-16.9017	55.58313	843.871
A chief nursing officer equal in power and authority to other top-level hospital executives	-26.962366	18.53952	-14.1935	25.84946
A lot of team work between nurses and physicians	6.10259122	-9.51613	34.83871	-100
Opportunities for advancement	-32.580645	28.09677	-3.36559	-19.0968
A clear philosophy of nursing that pervades the patient care environment	-0.6451613	-1.36798	-7.74194	79.78495
Working with nurses who are clinically competent	5.68439407	-9.71669	44.47005	12.36559
A nurse manager who backs up the nursing staff in decision making, even if the conflict is with a physician	0.04162331	-11.7722	34.83871	14.09429
Administration that listens and responds to employee concerns	13.3870968	-19.9395	-3.68664	75.29032
An active quality assurance program	-7.4636306	-5.95283	52.8172	-55.0538

continued

Continued

Percent change from unanswered to answered Q29 (negative values mean less people selected that option when they answered Q29, positive means more people selected option)

	Strongly agree	Agree	Disagree	Strongly disagree
Staff nurses are involved in the internal governance of the hospital (e.g., practice and policy committees).	5.17419355	-27.1561	29.75046	27.74194
Collaboration (joint practice) between nurses and physicians	3.37634409	-17.5258	124.7312	1.129032
A preceptor program for newly hired RNs	2.04010462	5.9447	-36.3262	43.82796
Nursing care is based on a nursing, rather than a medical, model.	-7.8602151	-9.2175	15.10622	111.8894
Staff nurses have the opportunity to serve on hospital and nursing committees.	2.0921659	-15.3672	21.7898	44.47005
Nursing administrators consult with staff on daily problems and procedures.	-40.359801	-2.71131	24.85066	40.45699
Written, up-to-date nursing care plans for all patients	-5.2484743	-8.84144	5.525947	13.77016
Patient care assignments that foster continuity of care, i.e., the same nurse cares for the patient from one day to the next	-12.19805	-14.7571	-2.13319	114.1556
Use of nursing diagnoses	-13.703226	-14.1935	28.70968	-11.8362

Nurse Participation in Hospital Affairs
Nursing Foundations for Quality of Care
Nurse Manager Ability, Leadership, and Support of Nurses
Staffing and Resource Adequacy
Collegial Nurse-Physician Relations

A New Perspective on Missed Nursing Care in the Emergency Department: A Descriptive Cross-Sectional Study

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Contribution to Emergency Nursing Practice

- Missed nursing care is identified as a threat to patient safety but studies are scarce in the emergency department setting.
- Nursing staff assessed that nursing care is frequently missed in the emergency department, indicating that emergency nursing staff must prioritize among nursing tasks. Registered nurses reported higher level of missed nursing care compared to nursing assistants.
- Increased awareness concerning missed nursing care highlights the importance of correct priorities to ensure quality of care and patient safety in the emergency department.

Abstract

Introduction: This descriptive cross-sectional study describes missed nursing care, quality of care, and patient safety rated by nursing staff in emergency departments. Required patient care that is omitted or delayed (missed nursing care) is associated with poorer quality of care and increased risk for adverse events, but studies are scarce in the emergency setting.

Methods: Emergency registered nurses and nursing assistants (N=126) at 2 Swedish emergency departments participated in the study. The *MISSCARE survey–Swedish version* was used for data collection.

Results: Emergency nursing staff assessed that nursing care is frequently missed in the emergency department. More than half of the 24 nursing care items were reported as missed by over 50% of the participants, and registered nurses rated most items significantly higher compared to nursing assistants. Half of the nursing staff perceived quality of care to be good, but nearly the same proportion perceived patient safety as poor. Registered nurses viewed both quality and safety worse than nursing assistants.

Discussion: The present study found very high levels of missed nursing care in most nursing items. Results indicate that nursing staff in emergency departments need to prioritize between the tasks and that some tasks may not be relevant in the context. The emergency setting focuses primarily on identifying signs of urgency, assessing patients, performing interventions, and diagnostics. However, even items that seemed to be prioritized, such as reassessment of vital signs, had a

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surprisingly high level of missed nursing care in comparison to in-hospital wards.

Key words: Emergency department; Missed nursing care; Patient safety; Quality of care

Introduction

The ED context is characterized by unpredictability as patient attendance, presentation of patient symptoms, and the priority levels of patient conditions vary considerably.[1] The variation in severity of symptoms among patients, the fast-paced setting,[2,3] and a complex communication area[3] with high rates of interruptions and distractions[4] create challenges for maintaining patient safety. At arrival, patients usually undergo triage in order to determine the safe order for assessment and treatment by a physician.[5] During the stay in the emergency department, most patients do not have a clear medical diagnosis or any baseline data to enable identification of the critically ill. Hence, nurses need to be skilled at timely identification of so-called red flags (indicators of potential or actual serious illness or injury, suggested by the emergency nursing assessment framework) and respond to them.[6]

The nursing assessment process in the emergency department has been described as HIRAID: History (presenting problem and individual health history), Identifying Red flags (physiological and historical indicators of urgency), Assessment (clinical examination, including vital signs), Interventions (deliver patient care and treatment based on assessment findings, either nurse initiated or at the request of a physician) and Diagnostics (ordering, performing, and reviewing diagnostic tests in a timely manner).[6] To ensure patient safety, patients must be reassessed and evaluated concerning effects of treatment, overall condition, and vital signs at appropriate intervals during the entire ED visit.[6]

ED crowding, defined as the 'identified need for emergency services exceeds available resources for patient care,'[7] is a well-known patient safety risk. Multiple studies have reported crowding to be associated with negative effects for patients, such as delays of required care, increased risk of being exposed to errors, and increased mortality.[8-11] The reason behind these negative effects is unknown, but 1 hypothesis is that necessary nursing care that is missed increases during crowding. From the health care staff perspective, the negative effects of ED crowding are, for example, increased stress and poorer adherence to approved guidelines.[8]

Missed nursing care (MNC), defined as any aspect of required patient care that is omitted (in part or whole) or delayed,[12] has been identified as a threat to patient safety.[13,14] Many studies have been conducted on the subject,[15] and MNC is associated with poorer quality of care, increased risk of adverse events (eg, falls and medication errors), poorer patient satisfaction, and increased length of stay. Although MNC, both as a phenomenon and for its association with patients-per-RN ratios, has been frequently studied at in-hospital wards,[15,16] studies from the ED setting are scarce.

MNC has been associated with staffing levels, skill mix, patient acuity, material resources, and miscommunication.[15] When registered nurses (RNs) at in-hospital wards tend to a high number of patients, ie, more than 6 patients per RN, the level of MNC increases,[13] and evidence supporting the notion that it would be reduced by adding support workers is scarce. Some studies even report increasing levels of MNC if the skill mix is diluted.[17] A recent study by Smith et al[18] demonstrates that RN staffing levels influence the rates of failure to respond to patients' abnormal vital signs, which might explain the link between low RN staffing and higher odds of inpatient mortality.[19]

Hence, there are reasons to believe that MNC also occurs in the emergency department, especially during periods of ED crowding, but evidence for this assumption is lacking. To increase the knowledge concerning patient safety and the quality of care in the emergency department, there is a need for a deeper understanding of MNC and its reasons within the ED context.

AIM

To describe MNC, quality of care and patient safety assessed by nursing staff in the emergency department.

Method

DESIGN

A descriptive cross-sectional study using the *MISSCARE survey–Swedish version*.[20]

SETTING

The study was conducted at 2 emergency departments at a Swedish University hospital located at 2 sites in a densely populated, multicultural urban area. Both sites

host their own emergency department for adults, with approximately 60,000 (site 1) and 15,000 (site 2) ED visits per year. Site 1 is a regular all-access emergency department and sees patients with internal medicine, surgical, orthopedic, neurological, and infectious conditions. The hospital at site 2 focuses primarily on highly specialized conditions and treatments and is also a level-1 trauma center. Thus, this emergency department is only available to adult patients with referrals, with ongoing treatment at that hospital (foremost patients with oncologic conditions), and patients arriving with emergency medical services with life-threatening conditions (eg, cardiac arrest) or trauma patients.

Bedside staff at Swedish emergency departments consist primarily of physicians and nursing staff. Nursing staff consists of approximately 60% RNs and 40% nursing assistants (NAs).[21] The RNs hold at least a bachelor's degree in nursing (included in nursing education since 1993) and autonomously have the overall responsibility for nursing and nursing interventions. Additionally, RNs carry out prescriptions from other professions, eg, medical-technical tasks and medication administration based on physicians' prescriptions.[22] Swedish specialist RNs with a 1-year master's degree upon their bachelor's degree have been grouped together with RNs in this study because they usually have similar clinical duties. Most NAs are educated in nursing at a high-school level and perform basic nursing tasks independently, as well as being assistants to RNs and physicians.

PARTICIPANTS

All RNs (approx. 120) and NAs (approx. 75) performing active ED duty during the data collection period were eligible for participation.

DATA COLLECTION

The *MISSCARE survey–Swedish version*[20] was sent by e-mail to all nursing staff at both emergency departments. Data were collected on 3 separate occasions over t2 years: autumn 2019, autumn 2020, and spring 2021. Non-responders received a reminder e-mail after 1 week and then another after 2 weeks.

INSTRUMENT

The *MISSCARE survey–Swedish version*[20] comprises 3 parts. The instrument has been translated and psychometric evaluated in the Swedish context, where the overall test–retest ICC for section A was 0.907 and for section B 0.514, with a CI 95%. Cronbach's alpha for the total scale in part B was 0.769. The first section contains background information about the participants, such as age, experience in role, and educational level. It also includes a number of patients taken care of during the last shift as well as staffing levels and teamwork at the unit. The next part (part A) comprises 24 questions on elements of MNC activities, using a 5-point Likert scale ranging from "always missed" to "never missed" reflecting on the previous 30-day period. The last part (part B) measures the reasons for MNC, using a 4-point Likert scale ranging from "significant reason" to "not a reason for missed care" and contains 17 questions. Two additional questions were included: "How do you perceive the quality of care on the ward?" and "How do you perceive patient safety on the ward?" using a 5-point Likert scale, ranging from "very good" to "very poor."

STATISTICAL ANALYSIS

All data were treated as 1 without separating the hospital sites. All data are presented as 1 group as well as by professional role (RN and NA). Categorical variables are presented as frequencies and percentages. Age and number of patients taken care of during the last shift are presented with median and interquartile ranges (IQ1 and IQ3) to illustrate the variation. To compare age and number of patients taken care of between the groups, an independent median test was used. Nursing staff were instructed to register 0 in the column "numbers of patients responsible for during latest shift" if they had roles that did not involve constant patient responsibility, and the result has been presented the same way.

To analyze frequencies of, and reasons for, MNC (sections A and B), data were classified in the same manner as the instrument originator[23] and several other studies on MNC.[24,25] The variables were treated dichotomously, and the answers "always missed," "frequently missed," and "occasionally missed" in section A were classified as MNC. In section B, the answers "significant reason" and "moderate reason" were classified as reasons for MNC.[24] The results were ranked from the most frequently reported item to the least frequently reported item.

The study-specific questions on perception of patient safety and quality of care were grouped into 3 categories: good (including "very good" and "good"), neutral, and poor (including "poor" and "very poor"). Satisfaction with level of teamwork was also grouped into 3 categories: satisfied (including "very satisfied" and "satisfied"), neutral, and not satisfied (including "dissatisfied" and "very dissatisfied").

Chi-square analysis was used to examine differences in the results between RNs and NAs. No imputation of missing

TABLE 1
Characteristics of participants

Characteristic	RN* and NA† (*n* = 126)	RN* (*n* = 75)	NA† (*n* = 51)	*P* value‡
Age (yrs)				.02
Median (IQR)	39.5 (31-53)	36.0 (31-46)	47.5 (33-56)	
Missing	6	5	1	
	n (%)	n (%)	n (%)	
Sex				.53
Male	26 (20.8)	17 (22.7)	9 (18.0)	
Female	99 (79.2)	58 (77.3)	41 (82.0)	
Missing	1 (0)	0 (0)	1 (0)	
Professional role				
Specialist nurse	32 (25.4)			
Registered nurse	43 (34.1)			
Nursing assistant	51 (40.7)			
Missing	0 (0)			
Experience in role				.01
≤6 mos	1 (0.8)	0 (0)	1 (2.0)	
>6-24 mos	7 (5.6)	7 (9.5)	0 (0)	
>2-5 yrs	20 (16.0)	13 (17.6)	7 (13.7)	
>5-10 yrs	28 (22.4)	21 (28.4)	7 (13.7)	
>10 yrs	69 (55.2)	33 (44.6)	36 (70.6)	
Missing	1 (0)	1 (0)	0 (0)	
Experience at current unit				.57
≤6 mos	4 (3.2)	1 (1.3)	3 (6.0)	
>6-24 mos	25 (20.0)	16 (21.3)	9 (18.0)	
>2-5 yrs	35 (28.0)	21 (28.0)	14 (28.0)	
>5-10 yrs	37 (29.6)	24 (32.0)	13 (26.0)	
>10 yrs	24 (19.2)	13 (17.3)	11 (22.0)	
Missing	1 (0)	0 (0)	1 (0)	
Hours of overtime the past 3 months				.43
None	36 (28.8)	23 (30.7)	13 (26.0)	
1-12 hrs	45 (36.0)	29 (38.7)	16 (32.0)	
More than 12 hours	44 (35.2)	23 (30.7)	21 (42.0)	
Missing	1 (0)	0 (0)	1 (0)	
Number of absent days or shifts due to illness, injury, etc. past 3 months				.98
None	65 (51.6)	38 (50.7)	27 (52.9)	
1 day or shift	16 (12.7)	10 (13.3)	6 (11.8)	
2-3 days or shifts	24 (19.0)	14 (18.7)	10 (19.6)	
4-6 days or shifts	12 (9.5)	8 (10.7)	4 (7.8)	
Over 6 days or shifts	9 (7.1)	5 (6.7)	4 (7.8)	
Missing	0 (0)	0 (0)	0 (0)	

* Registered nurse.
† Nursing assistant.
‡ *P* value (Chi-square analysis was used) ≤ 0.05 is considered statistically significant.

TABLE 2
Patients per nursing staff and perception of patient safety, quality of care and teamwork

	RN* and NA† (*n* = 126)	RN* (*n* = 75)	NA† (*n* = 51)	*P* value‡
Number of patients responsible for during latest shift				.86
Median (IQR) [n]	13 (9-17) [71]	14 (9-16) [43]	11 (8.5-20) [28]	
Role without constant patient responsibility	38	20	18	
Missing	17	12	5	
	n (%)	n (%)	n (%)	
Perception of adequate staffing on the unit				.08
100% of the time	6 (4.8)	1 (1.3)	5 (9.8)	
75% of the time	47 (37.3)	24 (32.0)	23 (45.1)	
50 % of the time	46 (36.5)	31 (41.3)	15 (29.4)	
25% of the time	17 (13.5)	12 (16.0)	5 (9.8)	
0% of the time	10 (7.9)	7 (9.3)	3 (5.9)	
Perception of quality of care on the unit				.01
Good	63 (50.0)	29 (38.7)	34 (66.7)	
Neutral	29 (23.0)	21 (28.0)	8 (15.7)	
Poor	34 (27.0)	25 (33.3)	9 (17.6)	
Perception of patient safety on the unit				.01
Good	39 (31.0)	16 (21.3)	23 (45.1)	
Neutral	29 (23.0)	18 (24.0)	11 (21.6)	
Poor	58 (46.0)	41 (54.7)	17 (33.3)	
Satisfaction with the level of teamwork on the unit				.02
Satisfied	70 (56.0)	34 (45.9)	36 (70.6)	
Neutral	35 (28.0)	24 (32.4)	11 (21.6)	
Not satisfied	20 (16.0)	16 (21.6)	4 (7.8)	
Missing	1 (0)	1 (0)		

* Registered nurse.
† Nursing assistant.
‡ *P* value (Chi-square analysis was used) ≤ .05 is considered statistically significant.

data were conducted. The 2-tailed significance level (*P*-value) was set at 0.05. The statistical software used for the analysis was IBM SPSS Statistics version 25 (IBM, US, 2017).

ETHICAL CONSIDERATIONS

Ethical approval was obtained from the Regional Ethical Review Board in Stockholm (2019-04080). The participants were invited to the study by their work e-mail, and information about the study was given in the introduction of the survey. The voluntary nature of the study was emphasised in the text, and the participants gave their consent to participate by answering the survey. Researchers had access to unidentified data only, and research data were always kept in password-locked computers.

Results

A total of 126 members of the emergency nursing staff responded to the questions in the study, with a distribution across the 2 groups of approximately 60% RNs and 40% NAs (Table 1). The 126 respondents constitute an

TABLE 3
Nursing care reported always, frequently or occasionally missed

Items of missed nursing care		RN* and NA† (*n* = 126)	RN* (*n* = 75)		NA† (*n* = 51)		*P* value‡
Rank§		n (%) [missing]	Rank§	n (%) [missing]	Rank§	n (%) [missing]	
Turning patient every 2 hours	1	107 (87.0) [3]	3/4	68 (91.9) [1]	2	39 (79.6) [2]	.047
Ambulation 3 times per day or as ordered	2	105 (85.4) [3]	3/4	68 (91.9) [1]	3	37 (75.5) [2]	.01
Attend interdisciplinary care conference whenever held	3	99 (85.3) [10]	5	64 (87.7) [2]	1	35 (81.4) [8]	.36
Monitoring intake/output	4	99 (83.9) [8]	2	68 (93.2) [2]	6	31 (68.9) [6]	< .001
Mouth care	5	102 (83.6) [4]	1	69 (95.8) [3]	7	33 (66.0) [1]	< .001
Feeding patient when the food is still warm	6	99 (80.5) [3]	6	63 (85.1) [1]	4	36 (73.5) [2]	.11
Response to call light is initiated within 5 minutes	7	88 (71.0) [2]	7	63 (84.0) [0]	10	25 (51.0) [2]	< .001
PRN medication requests acted on within 15 minutes	8	80 (70.8) [13]	10	53 (70.7) [0]	5	27 (71.1) [13]	.97
Patient teaching	9	82 (68.3) [6]	11	52 (70.3) [1]	8	30 (65.2) [5]	.56
Assist with toileting needs within 5 minutes of request	10	80 (64.0) [1]	8	57 (76.0) [0]	11	23 (46.0) [1]	.001
Patient bathing/skin care	11	76 (61.3) [2]	9	56 (75.7) [1]	13	20 (40.0) [1]	< .001
Medications administered within 30 minutes before or after scheduled time	12	62 (55.4) [14]	15	43 (57.3) [0]	9	19 (51.4) [14]	.55
Assess effectiveness of medications	13	64 (54.7) [9]	13	46 (61.3) [0]	12	18 (42.9) [9]	.054
Emotional support to patient and/or family	14	65 (52.0) [1]	12	50 (66.7) [0]	17	15 (30.0) [1]	< .001
Patient teaching about procedures, tests, and other diagnostic studies	15	58 (46.4) [1]	14	45 (60.0) [0]	19	13 (26.0) [1]	< .001
Wound care	16	53 (42.7) [2]	16	41 (55.4) [1]	20	12 (24.0) [1]	.001
Focused reassessments according to patient condition	17	50 (41.0) [4]	18	37 (50.0) [1]	18	13 (27.1) [3]	.01
Vital signs assessed as ordered	18	49 (39.8) [3]	17	41 (54.7) [0]	21	8 (16.7) [3]	< .001
IV/central line site care and assessments according to hospital policy	19	45 (38.5) [9]	19	32 (42.7) [0]	15	13 (31.0) [9]	.21
Patient assessments performed each shift	20	42 (34.4) [4]	20	27 (36.5) [1]	14	15 (31.3) [3]	.55
Setting up meals for patients who feed themselves	21	38 (30.9) [3]	22/23	23 (31.1) [1]	16	15 (30.6) [2]	.96
Bedside glucose monitoring as ordered	22	34 (27.6) [3]	21	26 (35.1) [1]	22	8 (16.3) [2]	.02
Full documentation of all necessary data	23	29 (23.6) [3]	22/23	23 (31.1) [1]	23	6 (12.2) [2]	.02
Nursing staff's hand washing	24	16 (13.1) [4]	24	11 (14.9) [1]	24	5 (10.4) [3]	.48

* Registered nurse.
† Nursing assistant.
‡ *P* value (Chi-square analysis was used) ≤ .05 is considered statistically significant.
§ Ranking of most frequently reported missed item[1] to least reported missed item.[24]

approximate response rate of 22%. There were significant differences in age and experience in work roles between the groups, where NAs were older and more experienced in their work roles than were the RNs. No significant differences could be seen between the groups regarding experience at the current unit, gender, hours of overtime, or absence due to illness.

TABLE 4
Significant or moderate reasons reported for missed nursing care

Reasons for missed nursing care	All participants ($n = 126$)		RN* ($n = 75$)		NA† ($n = 51$)		*P* value‡
	Rank§	n (%) [missing]	Rank§	n (%) [missing]	Rank§	n (%) [missing]	
Inadequate number of staff	1	124 (98.4) [0]	1	73 (97.3) [0]	1	51 (100) [0]	.51
Unexpected rise in patient volume and/or acuity on the unit	2	119 (95.2) [1]	2	71 (94.7) [0]	2	48 (96.0) [1]	> .99
Urgent patient situations (eg, a patient's condition worsening)	3	107 (85.6) [1]	3	68 (90.7) [0]	3	39 (78.0) [1]	.048
Unbalanced patient assignments	4	90 (72.6) [2]	4	53 (70.7) [0]	4	37 (75.5) [2]	.55
Medications were not available when needed	5	74 (62.7) [8]	5	50 (66.7) [0]	7	24 (55.8) [8]	.24
Inadequate number of assistive personnel (eg, nursing assistants, techs, etc.)	6	68 (55.7) [4]	8	42 (57.5) [2]	9	26 (53.1) [2]	.63
Heavy admission and discharge activity	7	67 (55.4) [5]	6	46 (62.2) [1]	12	21 (44.7) [4]	.06
Nursing staff did not communicate that care was not done	8	67 (54.9) [4]	9	41 (54.7) [0]	8	26 (55.3) [4]	.94
Tension or communication breakdowns with other support departments	9	67 (54.5) [3]	7	44 (58.7) [0]	10	23 (47.9) [3]	.24
Lack of back-up support from team members	10	66 (52.4) [0]	10	36 (48.0) [0]	6	30 (58.8) [0]	.23
Tension or communication breakdowns within the nursing team	11	54 (44.3) [4]	11	32 (43.2) [1]	11	22 (45.8) [3]	.78
Tension or communication breakdowns with the medical staff	12	50 (41.3) [5]	12	32 (42.7) [0]	13	18 (39.1) [5]	.70
Inadequate handover from previous shift or sending unit	13	51 (41.1) [2]	15	22 (29.3) [0]	5	29 (59.2) [2]	.001
Caregiver off unit or unavailable	14	45 (36.9) [4]	13	27 (36.0) [0]	14/15	18 (38.3) [4]	.80
Supplies/equipment not available when needed	15	44 (36.1) [4]	14	26 (34.7) [0]	14/15	18 (38.3) [4]	.68
Supplies/equipment not functioning properly	16	38 (31.4) [5]	16	21 (28.4) [1]	16	17 (36.2) [4]	.37
Other departments did not provide the care needed	17	23 (19.3) [7]	17	12 (16.2) [1]	17	11 (24.4) [6]	.27

* Registered nurse.
† Nursing assistant.
‡ *P* value (Chi-square analysis was used) ≤ .05 is considered statistically significant.
§ Ranking of most frequently reported reason[1] to least reported reason.[17]

As depicted in Table 2, nursing staff were responsible for a median of 13 patients, but there was a large range among the numbers reported by both RNs (from a minimum of 5 to a maximum of 25 patients) and NAs (from a minimum of 4 to a maximum of 100 patients). The perception of quality of care and patient safety in the emergency department differed significantly between the 2 nursing staff groups. Only half of the respondents considered the quality of care on the unit to be good, and almost the same proportion of staff perceived patient safety as poor. Both items had significant differences between the groups and were reported as worse by the RNs than by the NAs. Satisfaction with the level of teamwork was also classified as significantly lower by the RNs.

The results concerning MNC are presented by rank from the most to the least frequently missed item for all

nursing staff, as well as divided by professional group (Table 3). Most nursing staff (98%) reported at least 1 item as MNC, with a mean of 13 items (SD = 6.35) reported as MNC by each person. The level varied between the items, but generally, it was high. Out of 24 reported items, 6 were reported as MNC by more than 80% of the respondents, while 14 were reported as MNC by more than 50%.

When divided by a professional group, there were significant differences in 14 of the 24 items. In all these items, the RNs reported MNC to a greater extent than the NAs.

The reasons for MNC are presented in Table 4 and have been ranked from most to least frequently reported reason. More than 95% of the participants stated "Inadequate number of staff" and "Unexpected rise in patient volume and/or acuity level" as reasons for MNC in the emergency department.

Overall, the 2 nursing groups reported similar reasons for MNC. However, there were significant differences between RNs and NAs in 2 reported MNC reasons: "Urgent patient situations" was considered as a greater reason among the RNs, and "Inadequate handover from previous shift or sending unit" among NAs.

Discussion

More than half of the 24 MNC items were reported as missed by more than 50% of the respondents, and 6 items by more than 80%. Compared to results from cardiac wards in the same hospital,[25] the level of MNC in the emergency department is very high. Furthermore, in comparison to a large multi-hospital study in in-hospital wards,[24] the level seems high. The relatively low ranking of the items 'Assess vital signs as ordered' and 'Reassessment according to patients' condition' suggests it is prioritized in the ED context. But even so, approximately 40% of nursing staff reported these items as MNC, which, in comparison to studies from in-hospital wards, is much higher.[24,25] A cornerstone of emergency care is assessing and managing the risk of clinical deterioration, initially at triage and then continually during the entire ED stay.[26] The repeated need for reassessments might be a reason behind the high proportion of MNC for these 2 items in the emergency department. However, to sustain patient safety in the ED setting, identifying red flags (such as deviating vital signs) in a timely manner is essential.[6]

There are significant differences between RNs and NAs in the reported levels of MNC in 14 of 24 items. All those items were reported as MNC to a greater extent by the RNs, a result that has similarities to previous studies.[27,28] The reason behind the difference is unclear, but it has been argued it can be attributed to the differences in education, role, and responsibilities between the 2 groups, where RNs might have a more holistic and thorough evaluation of a patient's needs.[27] It might also be related to a lack of communication, or even a lack of trust, between the groups.[28] The primary distinguishing feature of the ED, ie, to identify and provide safe care for critically ill patients,[29] might influence the results of the study. As described earlier, HIRAID is a model for the nursing assessment process in the emergency department.[6] HIRAID differs from the nursing assessment process for in-hospital wards. When applying the HIRAID structure to the *MISSCARE survey*, we noticed that "IR" (identify red flags) and "A" (assess patients to identify health deterioration and ensure patient safety), both of which are key aspects of HIRAID, is partly captured by the items "Assess vital signs as ordered," and "Reassessment according to patients' condition." However, "H" (presenting problem and health history) and "I" (interventions) were not captured satisfactorily in our opinion. Moreover, diagnostics (ordering, performing, and reviewing diagnostic tests in a timely manner) are also not fully covered. The survey includes "Bedside glucose monitoring as ordered," but not other common ED tasks, such as performing blood samples, ECGs, etc. in a timely manner.

A qualitative study[30] concerning the process behind MNC (in the emergency department and in-hospital wards) identifies the main reason for MNC as overload (in the form of numbers, acuity, and/or complexity of patients, and lack of experience among staff) and time constraints. Similar main reasons for MNC were identified in this study. Decisions by RNs to omit or delay a nursing task have been found to occur after considering whether it would harm the patient. Less urgent tasks, where a delay would not threaten the patient's condition, were sometimes consciously delayed or omitted.[30] Further studies concerning what is considered necessary nursing tasks in the ED setting, as well as priorities between those tasks, would be of interest.

Patient safety in the emergency department was perceived as poor by nearly half of the nursing staff and even more among RNs. Only half of the nursing staff working in the emergency department considered quality of care as good, and that proportion was even lower among RNs. This is concerning, as nursing staff's perceptions of such measures have been shown to correlate well with patient outcomes.[31,32] Exploration of RNs' perception of safe staffing in the emergency department reveals that patient acuity, rather than patient-per-nurse ratio or patient volume, has the largest impact on patient safety.[2] This is in line with the present study, where 1 of the main reasons for MNC was "Unexpected rise in patient volume and/or acuity on the unit." Even though experienced nurses with high skill levels have a greater ability to recognize safety risks, they may also

have difficulties managing simultaneous care of several critically ill patients.[2]

Since emergency departments are open to everyone in need of emergency care and have very limited ability to control the inflow of patients, there ought to be a higher readiness for unexpected rises in patient volume and/or acuity level than in other units. Although it is known that emergency departments cannot control the inflow, the results of the study indicate that the ED nursing staff perceive insufficient margins to manage such events.

We suggest that a version of the *MISSCARE survey* be developed to capture the items that are relevant to the ED setting. We believe that the results from this study indicate that this might not be the case with the current *MISSCARE survey*. On a group level, 13 out of the 24 items were reported as MNC by each respondent, which might indicate that nursing staff must prioritize between various nursing items or that not all items listed were intended to be performed during patients' ED stay. Since there is no "Not applicable" option available in the current version, we were not able to investigate this in the study. From our clinical experience, we believe that some items may not be as relevant or applicable in the ED setting as in the in-hospital wards. For example, the items "Ambulation 3 times per day," "Mouthcare," and "Feeding patients with food that is still warm," might have been answered with a high level of MNC simply because there may not be an intent to perform them during a short ED stay. However, when length of stay is increased in the emergency department, the way of viewing what is needed is challenged, and patient boarding (waiting in the emergency department due to a lack of available beds at the in-hospital wards or Intensive Care Units) has expanded the ED mandate,[33] and the care needs vary between different patients.[34] While patients remain in the emergency department, there are basic needs that must be attended to.[35] Caring for boarding patients has been shown to make up more than a third of the ED workload.[33,36] RNs often find it impossible to perform safe practices of nursing and caring for boarding patients because the emergency department is not designed, structured, or equipped for that purpose.[37]

Limitations

The major limitation of the study is that the *MISSCARE survey* was developed to measure MNC in the in-hospital setting. Even if the results indicate that an adaptation of the survey for the emergency department would be beneficial, it highlights that there might be a difference in which nursing tasks are performed and prioritized in the different settings. Important aspects in the ED nursing assessment process (using the HIRAID structure) were identified as not being captured to its full extent. The "number of patients responsible for during the last shift" lacks validity in this study since patient flows in the ED setting vary over a shift.[21] The question may also be open to interpretation in this setting, which the wide variations in results indicate. The extreme answers might come from respondents working in triage or as a resource working over the entire emergency department.

Data concerning MNC and reasons for MNC were included from all staff, including responses from nurses with roles without constant patient responsibility on the day of data collection. Nurses in participating emergency departments alternate between working roles, and it is most likely that all nurses have had primary patient responsibility during the previous 30-day period to which the survey relates.

The self-reporting format of the instrument, the fact that respondents are referring to the previous 30-day period regarding MNC, as well as the relatively low response rate (22%) may affect the validity of the study.

The response rate might be influenced by the fact that the web survey was sent to all staff reported by Human Resources to be working at the emergency department, not excluding those who were long-term absent. All nursing staff working in the emergency department at time of data collection were eligible to respond to the survey. Hence, there may be participants that participated in all 3 data collections.

Data were collected before and during the COVID-19 pandemic, but all data collection took place during the times of normal operation in the hospital and not during ongoing COVID-19 waves.

Implications for Emergency Nurses

In this study, MNC was found to be high among most of the nursing items, even in items that should be prioritized in the ED setting, and the RNs reported MNC to a greater extent than NAs. Moreover, patient safety was perceived as poor by nearly half of the nursing staff, and quality of care as poor by nearly one-third of the nursing staff. To care for patients in the emergency department is a complex task. The nurses continuously assess and manage the risk of clinical deterioration, initially at triage and then continually during the entire ED stay, and multiple reassessments are often

required. Moreover, ED patient care has changed over time due to the increasing length of stay and patients' boarding time, for which neither the emergency department nor the nursing staff training are suited. ED patient care may be fragmented due to this. Thus, increased awareness about missed nursing care highlights the importance of correct priorities to ensure quality of care and patient safety at the emergency department.

Conclusions

The present study, 1 of only a few in the ED setting, found exceedingly high levels of MNC in most nursing items, reported by both nursing staff groups. On a group level, more than half of the items were reported as missed by each person, which indicates that nursing staff need to prioritize between nursing tasks and be aware that some tasks may potentially not be relevant to the context. The ED setting is unique and focuses mainly on identifying signs of urgency, assessing patients, and performing interventions and diagnostics. However, even items that seemed to be prioritized in the emergency department, such as assessment and reassessment of vital signs, had a surprisingly high level of MNC in comparison to in-hospital wards.

Author Disclosures

Conflicts of interest: none to report.

All authors approved the final version of the manuscript and are accountable for all aspects of the work.

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Evaluating the Oncology-Related Education Needs of Emergency Nurses

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Contribution to Emergency Nursing Practice

- Despite frequent ED utilization by patients with cancer, there is no specific oncologic training for emergency nurses.
- This paper highlights key areas for oncologic emergency curriculum development for emergency nurses.
- Our findings suggest that emergency nurses need a stronger foundation of the knowledge and skills required to care for patients with cancer.

Abstract

Introduction: Treatment for patients with cancer in the emergency department ranges from treating life-threatening emergencies to symptom management or issues unrelated to their cancer, but for which cancer and its treatment may be complicating factors. Nurses are expected to manage the care of this population and be aware of risk factors for complications that may be unique to cancer patients. To date, education for emergency nurses regarding oncologic emergencies and the care for patients with cancer has been limited.

Methods: We conducted a cross-sectional needs assessment to establish emergency nurses' educational needs (knowledge, skills, and attitudes) related to the care of patients with cancer and to evaluate if there are different educational needs for emergency nurses associated with the care of the cancer patient by practice setting type.

Results: Of 237 nurses surveyed, only 28% of nurse respondents indicated receiving any cancer-specific education or training. Overall, scores on a knowledge assessment were relatively low (mean 53%; range 9.5-85.7%; SD 13%). Nurses reported variable confidence and skills, with the weakest areas being in the triage of complications and oncologic emergencies, assessment of complications related to cancer treatment, and end-of-life conversations. Nearly all of the respondents (97%) indicated a need for oncologic education for emergency nurses with moderate-high priority in relation to other educational needs.

Discussion: Our findings suggest that emergency nurses need a stronger foundation of the knowledge and skills required to care for patients with cancer. Results from this study can inform future curriculum development efforts.

Key words: Emergency department; Nurses: Education; Cancer; Oncology

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Introduction

Emergency departments provide a wide range of crucial health care functions to a diverse and varied patient population. Education and training for emergency clinicians is complex and requires understanding a range of subspecialty populations, such as the treatment of patients with chronic conditions, trauma, and burn, and treatment of pediatric, geriatric, and psychiatric patients. One subspecialty that presents unique challenges is the treatment of patients with cancer and oncologic emergencies. These patients require swift assessment, proficient symptom management, and empathetic patient care. This study aims to gather the current state of emergency nurses' education related to oncologic emergencies, identify knowledge gaps, and determine the need for enhanced education opportunities.

As of January 2022, there were nearly 18 million people with a diagnosis of cancer in the United States, and almost 2 million more will be diagnosed with cancer each year.[1-3] Although cancer is still the second national leading cause of death, between 1960 and 2023, the 5-year survival rate substantially increased from 39% to 70%, with variation by cancer type and other sociodemographic factors.[4] The Food and Drug Administration approved more than 45 new drugs for oncology from 2020 to 2023, with more investigational treatments moving to clinical trials every day.[5-7] The result is a large oncology patient population with rapidly changing and complex treatment regimens.

Between 44% and 69% of cancer patients visit the emergency department within 1 year of diagnosis.[8] This rate varies substantially by cancer type, and these patients generally require a high level of care.[9-12] Many patients with cancer have multiple ED visits.[8,13] Approximately 4% of all adult ED visits in the US are for cancer-related complaints.[11,14] This is likely an underestimation due to limitations in data collection methods.[15] Furthermore, this represents a significant number of visits considering the various conditions treated in emergency departments, and this rate is comparable to the proportion of visits related to congestive heart failure (4%), chronic kidney disease (3.5%), cerebrovascular disease, including strokes (3.7%), and highly prevalent chronic conditions such as diabetes (6%).[11,15]

Current estimates project dramatic increases in new cancer diagnoses and overall cancer survivorship, which will have implications for managing acute and unscheduled care needs, which often occur in emergency departments.[16-18] Furthermore, when patients with cancer require unscheduled care in an emergency department, they tend to present to the health system, where they receive treatment for only 1 in 3 visits.[19] This means that patients may frequent smaller community emergency departments, with staff who may lack the specialty knowledge around cancer care that may be present at larger hospitals. Emergency nurses should be prepared to provide quality care for this population as it grows. Nurses are expected to manage the care of this population and be aware of risk factors for complications that may be unique to cancer patients. To date, education for emergency nurses regarding oncologic emergencies and the care for patients with cancer has been limited.

Despite the growing numbers and complexity of patients with cancer presenting to emergency departments, education and training about the care of these patients have not been standardized. A recent study demonstrated that despite the recognized importance of oncologic training, there was no standard education of emergency physician resident programs across the nation, and efforts are currently underway to establish a high-quality curriculum.[20,21] To date, residency programs for ED physicians have been limited to the recognition and management of conditions such as tumor lysis syndrome, cord compression, leukemias, and neutropenic fever, and there is a gap in understanding of the advances in oncologic therapies.[20,21]

An even more significant variation in training exists for Registered Nurses (RN). RNs receive basic education on caring for patients with cancer in their pre-licensure coursework; however, specialty training generally occurs in the units where nurses obtain employment and is highly variable by institution. This variation is particularly true for emergency nurses, where training and annual competencies depend on the type of emergency department and patient populations treated (eg, myocardial infarction, stroke, pediatrics, etc). Additionally, available literature is more often published for an advanced practice nursing role or a physician audience.[22]

Educational resources available for emergency nursing outline a limited number of hematologic disorders (eg, sickle cell and leukemia) and oncologic emergencies (eg, tumor lysis syndrome and spinal cord compression); however, these resources lack details regarding managing cancer treatment side effects or other nursing-specific considerations.[23] For emergency nurses, there is some additional assessment of cancer-related knowledge if the emergency nurse obtains the Certified Emergency Nurse specialty certification, but those topics are generally limited to basic understandings of hematologic disorders and risks of immunocompromise in patients receiving chemotherapy.[24] Some examples of complicating factors that may be unique to the cancer patient include Tissue Plasminogen Activator eligibility in the presence of ischemic stroke, cytokine release syndrome following immunotherapy, sepsis recognition with atypical presentations, blood transfusions, and stem cell transplants, continuous bladder irrigation for hemorrhagic cystitis, and others.[25] Like physicians' training, there is also a notable gap in understanding the advances in oncologic therapies and managing complications for nurses.

While managing patients with cancer in the emergency department is an important, complex, and evolving topic, emergency nurses are expected to manage a wide variety of patient conditions, including but not limited to trauma, pediatrics, and complications from other chronic illnesses (eg, diabetes, COPD, etc). Furthermore, the extent to which emergency nurses must demonstrate high levels of expertise in cancer-related care depends on their institution and other structural and health system

factors, such as whether the emergency department is affiliated with a comprehensive cancer center.

According to the Association for Nursing Professional Development, a gap analysis is the process of identifying the difference between desired best practices and the current knowledge, skills, and practices among nurses.[26,27] However, best practices for emergency nurses related to cancer care management have not been clearly defined. Therefore, the purpose of this study is to clearly define and analyze the gap in existing oncology-related education and training for emergency nurses and conduct a targeted needs assessment for this population.

Given the lack of consistent training opportunities, there is a need to understand the specific educational needs more clearly, including knowledge, skills, and attitudes regarding the care of patients with cancer and oncologic emergencies. These educational needs include an analysis of the prioritization of cancer-related education in relation to the variety of other mandatory and optional professional development requirements for emergency nurses. Therefore, the specific aims of this study are to:

1. Describe the emergency nurses' educational needs (knowledge, skills, and attitudes) related to the care of the patient with cancer and oncologic emergencies.
2. Evaluate if there are differences in educational needs for emergency nurses related to the care of cancer patients by practice setting type.

Methods

THEORETICAL FRAMEWORK

The 6 curriculum development steps outlined by Thomas et al[28] provide the foundation for this work. This model outlines the following steps for curriculum development: problem identification, targeted needs assessment, goals and objectives, educational strategies, implementation with evaluation, and feedback.[28] The current pilot study addresses the first 2 steps: problem identification and targeted needs assessment.

NEEDS ASSESSMENT

To complete the first 2 steps in curriculum development, we conducted a cross-sectional needs assessment using expert input and targeted surveys. Specifically, we evaluated relevant content, current knowledge, skill confidence, and attitudes toward oncology-related education for emergency nurses. We used the Oncologic Emergencies Curriculum,[21] designed for ED physician residents as a guide to areas relevant to emergency practice, and modified content specifically for emergency nursing. The first phase of the needs assessment was content expert input and feedback. The second phase was a targeted knowledge, skills, and attitudes assessment of current emergency nurses via electronic survey.

Sample and Recruitment

Content experts in oncology, emergency medicine, emergency nursing, or nursing professional development were identified using convenience sampling from organizations across the US in emergency and oncology settings. Experts known to the researchers were asked to participate and provided names of additional relevant content experts. The experts' specialties included oncology, oncologic emergency, pediatric oncology, emergency department, professional development, quality improvement, and internal medicine. For the second phase, nurses were contacted via email using a national database of emergency nurses.[29] Emails were sent to 2980 nurses in all 50 US states, with the study information sheet explaining the purpose and voluntary nature of the study and links to the online survey. Inclusion criteria were being a registered nurse with any nursing role relevant to emergency nursing (bedside nurse, charge nurse, educator, manager, etc). We performed a power analysis using G-Power.[30] Our power analysis indicated a minimum sample size of 200 participants to detect moderate effect sizes (0.25) between groups (to analyze differences by practice site) with a power of 80% and alpha of .05. Participants were given a gift card ($10) as compensation for their time. This research was deemed not human subject research as defined by the Indiana University Institutional Review Board. As data was treated as confidential, contact the corresponding author for questions related to data availability.

Phase 1

Of the 18 content experts contacted, 4 nurses, 3 advanced practice nurses, and 1 physician ($n = 8$) provided feedback via survey, where they ranked key topics identified from the Oncologic Emergencies Curriculum and important knowledge and skills for emergency nurses.[21] Next, 4 content experts were interviewed and provided additional information regarding knowledge areas for treating patients with cancer in the emergency setting.

Phase 2

Phase 2 was the targeted needs assessment, which is defined as assessing the needs of one's targeted group of learners and their medical institution/learning environment.[28] Using the information from stakeholder feedback, we surveyed emergency nurses to assess the current state of knowledge, skills, and attitudes toward the key identified content areas among emergency nurses using the Knowledge, Attitude, and Practice model.[31] The survey had 3 components. In addition to demographic and workplace information, nurses were queried regarding their previous education and attitudes toward cancer-related education. Next, they were asked about current practices, the frequency of caring for patients with cancer, and their levels of skills and confidence in key areas identified by content experts using Likert-type scales. Lastly, a 21-question knowledge assessment test was developed to ascertain baseline knowledge of hematologic and oncologic emergencies, cancer treatment, side effects, and symptom management. The items were developed by an experienced exam item writer with expertise in emergency nursing, oncology, and oncologic emergencies.

DATA COLLECTION AND ANALYSIS

The team collected data via an online survey database. Descriptive statistics were used to describe the sample. Descriptive data and questions related to current practice, skills, and attitudes were analyzed and reported if the individual questions were complete. The knowledge assessment of participants was scored only if the entire assessment was completed. Chi-square, *t*-tests, and analysis of variance tests were used to examine differences between groups in categorical and continuous variables as appropriate. The use of Cronbach's alpha was not indicated for the knowledge questionnaire due to the relatively small number of questions and the large number of concepts being assessed.

Results

Among survey respondents, 237 completed the general questionnaire, and 200 completed the knowledge assessment. Most survey respondents were staff nurses (66%), had more than 10 years of experience (48%), held a bachelor's degree (54%), worked in community hospitals (61%) and treated general ED populations (67%) (Table 1). Table 2 outlines the cancer-related knowledge and skills content experts indicated were important for emergency nurses.

TABLE 1
Survey responses*

Years of nursing experience (mean [SD])	16.75 (11.94)
Years of nursing experience category (%)	
0-2 yrs	8.4
3-5 yrs	10.5
5-10 yrs	19.4
>10 yrs	61.6
Years of emergency nursing experience (mean [SD])	13.05 (10.27)
Years of emergency nursing experience category (%)	
0-2 yrs	13.1
3-5 yrs	16.5
5-10 yrs	22.4
>10 yrs	48.1
Highest education (%)	
Associates Degree/Diploma	12.7
Bachelors	54
Masters	30.4
Doctorate	3
Current certifications (%)†	
None	42
Certified Emergency Nurse	39.2
Certified Pediatric Emergency Nurse	11.4
Trauma Certified Registered Nurse	17.7
Certified Critical-care Nurse	4.2
Oncology Certified Nurse	1.2
Other	10.1
Current role (%)	
Staff nurse	66.2
Clinical Nurse Specialist	3.4
Nurse Educator/Professional Development Specialist	11.8
Nurse Manager	12.2
Nurse Practitioner	2.5
Other (please specify)	
Primary practice setting (%)‡	
Academic medical center	30
Community hospital	60.5
Free standing ED	6.4
Other	1.7
Urgent care	1.3

continued

TABLE 1
Continued

Primary patient population (%)[‡]	
Adult ED	16.3
General ED	67
Pediatric ED	8.6
Specialty ED-cancer-specific	3.9
Specialty ED-other	4.3
Population density (%)[‡]	
Rural	15.5
Suburban	36.9
Urban	47.6
Approximate number of annual ED visits (%)[‡]	
20k-39,999	21.9
40k-59,999	24.9
60k-79,999	16.7
Less than 20,000 per year	12
More than 80k	24.5
Is ED affiliated with cancer center? (%)[‡]	
No	47.2
Yes	27.9
Unknown	24.9
How frequently do you provide care for patients with cancer? (%)[§]	
All the time	8.8
Frequently	39.4
Occasionally	41.2
Rarely	10.2
Never	0.4
How frequently do you provide care for patients with oncology emergency? (%)[§]	
All the time	4.4
Frequently	11.9
Occasionally	48.7
Rarely	32.3
Never	2.7
Which of the following oncologic emergencies have you encountered in the past 12 months? (%)[§]	
Neutropenic fever	66.6
Spinal cord compression	10.9
Vena cava syndrome	5.1
Tumor lysis syndrome	11.4
Sepsis	87.3
Symptom management (nausea, vomiting, pain, etc)	83.4
Other (please specify)	2.9
Have you had any cancer specific training? (%)[§]	
Yes	28.3
No	71.7
Do you feel there is a need for additional cancer-related education for emergency nurses?(%)[§]	
Yes	96.9
No	3.1
How high would you rank the need for cancer-related education? (%)[§]	
High	17.7
Moderate	67.7
Low	6.7
Not a priority	0.05

continued

TABLE 1
Continued

* $n = 237$ unless specified to account for missing data.
† More than 100% reported due to multiple certifications.
‡ $n = 233$.
§ $n = 226$.

AIM 1: CURRENT KNOWLEDGE, SKILLS, AND ATTITUDES RELATED TO THE CARE OF THE PATIENT WITH CANCER

Knowledge

Content experts agreed the major topic areas relevant to emergency nursing were similar to those in the Oncologic Emergencies Curriculum,[21] with nursing-specific modifications. Table 1 shows the overall ranking of the importance of topic areas for curriculum development. The top 5 knowledge areas were oncologic emergencies, neutropenic fever and sepsis recognition, treatment complications from chemotherapy, general cancer knowledge, and pain management/palliative.

Only 28% of nurse respondents ($n = 64$) indicated receiving cancer-specific education or training. Overall, scores in the knowledge section were relatively low. The average score was 11.66 (range 2-18; SD = 2.66). This score reflects an average of approximately 53% (range 9.5-85.7%; SD 13%). See Figure 1 for the distribution of total scores. Of the 21 questions asked, 1 survey item had 92% of respondents answer correctly, 1 item had 84%, 4 items had between 70% and 79%, 1 item had 60%, 6 items had 50% to 58% answer correctly, 2 survey items had between 43% and 45%, 3 items had between 34% and 36%, and

TABLE 2
Content expert feedback

Important knowledge topics*

1. Oncologic emergencies
2. Neutropenic fever and sepsis recognition in cancer patients
3. Treatment complications from chemotherapy
4. General cancer knowledge
5. Pain management and palliative care in cancer patients
6. Treatment complications from radiation
7. Immunotherapy and immune-related adverse events
8. Management of thromboembolic events in cancer patients
9. Treatment complications of stem cell transplants and cellular therapy
10. Management of bleeding events in cancer patients
11. Co-morbidities exacerbated by cancer disease and therapy
12. Common surgical procedures and complications in cancer patients

Important skills†

1. PICC line insertion (assist)
2. Manage peritoneal drains
3. Manage pleural drains
4. Blood, platelet and fresh frozen plasma transfusions
5. Access port-a-cath
6. Bladder irrigation

* Ranked by level of importance.
† At least 50% respondents listed as important.

another 3 survey items had 22% to 35% respondents answer correctly. Nurses tended to answer questions related to general oncologic emergencies and sepsis correctly (79% to 92%) but missed questions related to electrolyte imbalances, immunotherapy-related adverse events, and the management of thrombotic events in cancer patients (22% to 53% correct). Questions related to complications from radiation, chemotherapy, and surgical procedures had correct responses ranging from 58% to 70%.

Current Skills and Practice

Content experts indicated important skills competencies include peripherally inserted central catheter (PICC) line insertion, management of peritoneal drains, management of pleural drains, blood, platelet and fresh frozen plasma transfusions, ability to access an implanted port device (aka port-a-caths), and bladder irrigation (Table 1). Nurses self-reported relatively high levels of skill confidence with blood product transfusions, wound care, chest tube placement, communication, and accessing port-a-caths (Figure 2). Nurses were less confident in the triage of complications and oncologic emergencies, assessment of complications related to cancer treatment, end-of-life conversations, assisting with pleural and peritoneal drains, assisting with PICC line insertion, thoracentesis, paracentesis, and blood patches (Figure 2). Nurses were least confident in emergency chemotherapy administration and assisting with punch biopsy or blood patch procedures (Figure 2).

While approximately 4% of the sample worked in oncology-specific settings, 48% of nurses reported caring for cancer patients frequently or "all of the time," and 16% reported managing oncologic emergencies frequently or "all of the time" (Table 1). Of the common cancer patient presentations, sepsis (87%) and symptom management (84%) were encountered by the majority of nurses, while other commonly considered oncologic emergencies were encountered by 5% to 11% of nurses in the past year (Table 1).

Attitude

While only 28% of nurse respondents indicated they received cancer-specific education, 97% indicated there is a need for cancer-related education for emergency nurses. Concerning other emergency education needs, 14% of respondents found this area a low priority, 68% a moderate priority, and 18% believe cancer education is a high priority for emergency nurses (Table 1).

AIM 2: DIFFERENCES IN EDUCATIONAL NEEDS BY PRACTICE SETTING TYPE

On the knowledge section of the survey, nurses scored relatively low across all practice types, locations, and population settings. There was no significant difference in scores based on the nursing practice setting, population density, or annual number of ED visits ($P > .05$) (Table 3). Educational needs were differentiated by the primary population served, in which nurses in cancer-specific emergency departments scored significantly higher than those who did not work in a cancer-specific ED ($P < .001$). Additionally, those nurses who did not know their cancer center affiliation status had lower scores than those who worked in emergency departments not affiliated with a cancer center ($P = .037$). However, content experts indicated that nurses in cancer-specific emergency departments should be familiar

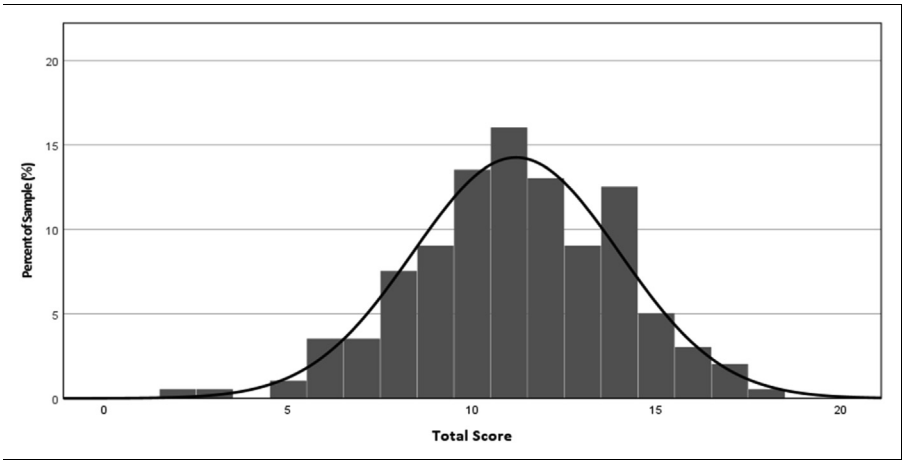

FIGURE 1
Distribution of score ($n = 200$)

with assisting with blood patches, punch biopsy, and emergency chemotherapy administration (not shown in tables).

Discussion

This study underscores the critical need for comprehensive and specialized education in oncologic emergencies for emergency nurses. Additionally, the results highlight gaps in knowledge and skills, emphasizing the importance of tailored training programs to ensure that emergency nurses are well-prepared to deliver optimal care to cancer patients in critical situations. Addressing these educational needs is crucial to enhancing the quality of care and outcomes for this patient population in emergency settings.

Overall, nurses achieved low scores on the knowledge assessment, indicating a need for more target education related to the care of patients with cancer. As expected, nurses in cancer-specific emergency departments scored higher than nurses working in other areas. Nurses overwhelmingly indicated a desire for education related to this population, translating to a moderate-high priority for this type of education. This is an important finding, as developing additional education for a group with high levels of required training and education could prove challenging without nurses and other clinical leaders recognizing the importance of preparing to care for this growing population.

Interestingly, the only significant difference in educational requirements for practice settings was the potential need for an advanced curriculum for oncology-specific emergency departments and urgent care sites. While some content experts indicated that the required education level could be driven by the volume of cancer patients in a given facility, responses from nurses indicate that even emergency departments not associated with cancer centers need training in this population. This is highlighted by the frequency with which nurses report caring for patients with cancer with and without oncologic emergencies. The need for additional training is underscored by the fact that patients may frequent emergency departments that are not necessarily where they receive their cancer treatment, requiring all emergency nurses to be prepared to address the concerns of patients with cancer.

Results from experts and the survey indicate that an ED nursing oncology curriculum should reflect content similar to the physician's Oncologic Emergencies Curriculum.[21] Specific nursing considerations to explore include but are not limited to identifying risk factors present in cancer patients, identification of life-threatening conditions in cancer patients, management and nursing interventions for common cancer chief complaints, symptom management, and assessment findings and precautions with cancer patients.[25] Emergency nursing skills identified to reinforce in future training include blood product transfusions, wound care, chest tube placement, communication and accessing port-a-caths. An emphasis should be placed on skills such as triage of complications and oncologic emergencies, assessment of complications related to cancer treatment and end-of-life conversations, assisting with pleural and peritoneal drains, assisting with PICC line insertion, thoracentesis, and paracentesis. The advanced curriculum could include emergency chemotherapy administration and assisting with punch biopsy or blood patch procedures for nurses in oncology-specific settings.

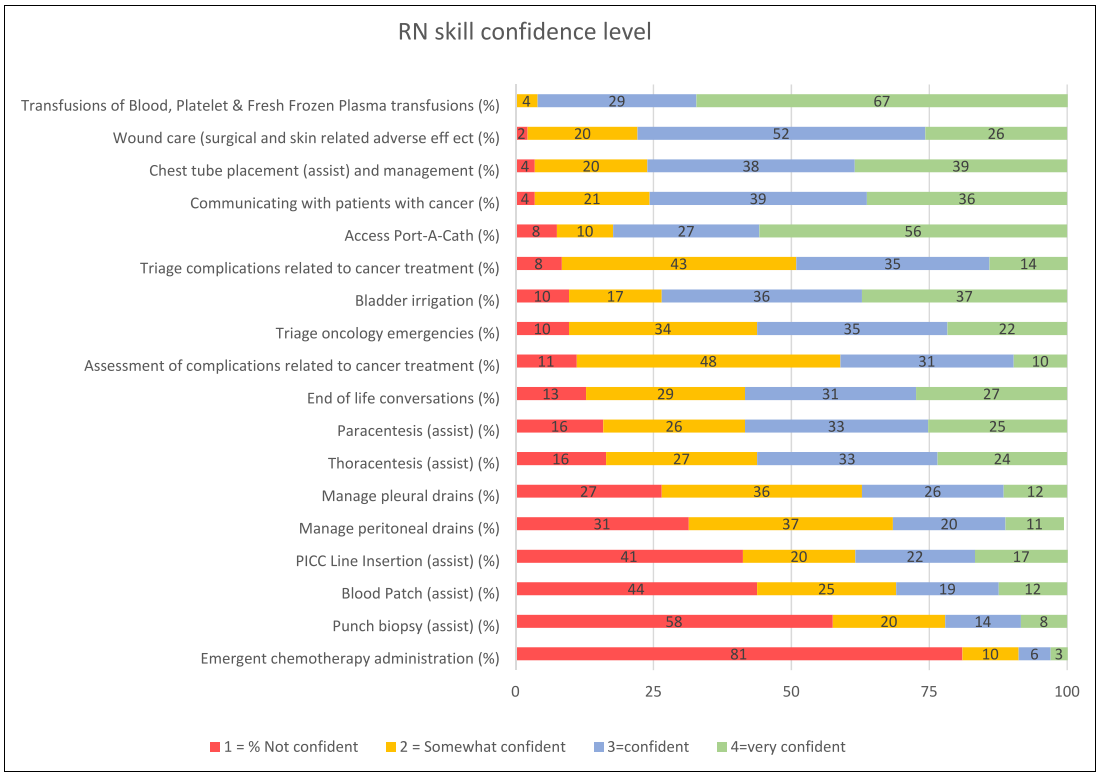

FIGURE 2

Registered nurse skill confidence level ($n = 226$). PICC, peripherally inserted central catheter.

Now that specific education needs have been identified, the next steps in the curriculum development process are establishing the goals and objectives of the curriculum, educational strategies to be used, implementation, and ongoing evaluation of the curriculum. By developing this curriculum, we can assure effective, efficient, and quality emergency nursing care to the growing population of patients with cancer and determine the appropriate education for high-quality and cost-effective educational programs for emergency nurses related to the care of patients with cancer. Furthermore, this work can be used to evaluate if there is a need for a cancer emergency nursing education and research subspecialty.

Limitations

This study is subject to the limitations common to self-report survey data. While we reached our target sample size, due to self-selection and the low response rate (approximately 10%), survey respondents may be those nurses with a particular interest in the care of patients with cancer, which may limit the generalizability of the results. While this may result in a slight overestimation in the prioritization of future education, this only magnifies the identified gaps in knowledge among this group, which further supports the need for high-quality cancer-related education for emergency nurses. Additionally, the knowledge questionnaire was relatively short compared to the variety of topics addressed. Future research should pay specific attention to developing and testing high-quality knowledge and skills assessment methods.

Implications for Emergency Nurses

Our findings suggest that emergency nurses need a stronger foundation of the knowledge and skills required to care for patients with cancer.

Conclusion

With the dramatic rise in cancer diagnosis and survivorship, the need for oncologic emergency education for emergency nurses will only continue to increase. Addressing the knowledge and skills gaps should be a priority for emergency

TABLE 3
Responses by practice setting ($n = 200$)

Practice setting type	Raw score mean (SD)	Percent mean (SD)	*P* value*
All respondents	11.19 (2.8)	53.29 (13.32)	
Primary practice setting			
Academic medical center ($n = 61$)	11.66 (2.66)	55.5 (12.66)	0.46
Community hospital ($n = 121$)	10.98 (2.9)	52.26 (13.79)	
Free standing ED ($n = 15$)	10.93 (2.28)	52.06 (10.87)	
Other ($n = 3$)	11.67 (4.04)	55.56 (19.25)	
ED population			
General ($n = 138$)[a]	11.41 (2.68)	54.35 (12.75)	.001
Adult ($n = 31$)[b]	10.29 (2.44)	49.00 (11.61)	
Pediatric ($n = 16$)[c]	9.75 (3.44)	46.43 (16.36)	
Cancer-specific ($n = 9$)[d]	14.00 (2.18)	66.67 (10.38)	
Other specialty ($n = 6$)[e]	10.33 (2.88)	49.21 (13.69)	
Population density			
Urban ($n = 94$)	10.86 (2.76)	51.72 (13.15)	0.29
Suburban ($n = 75$)	11.52 (2.97)	54.86 (14.14)	
Rural ($n = 31$)	11.39 (2.42)	54.22 (11.51)	
Cancer center affiliation			
Yes ($n = 55$)[f]	11.44 (2.78)	54.46 (13.24)	.037
No ($n = 97$)[g]	11.49 (2.71)	54.74 (12.9)	
Unknown ($n = 48$)[h]	10.29 (2.86)	49.01 (13.61)	

Post Hoc d>a, b, c, e, f; g>h.
* ANOVA

nursing professionals. More research is needed to develop the specifics of the education, but it could mirror topics outlined in the physician Oncologic Emergencies Curriculum.[21] This framework can act as a scaffolding to build out nursing-specific considerations and ultimately lead to higher quality care for all patients with cancer presenting to emergency departments.

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Polish Perspective: The Influence of National Emergency Severity Index Training on Triage Practitioners' Knowledge

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Contribution to Emergency Nursing Practice

- The Emergency Severity Index (ESI) triage system is scientifically validated, widely used in the United States, and has gained international recognition.
- This publication highlights the national-level implementation of ESI education, which mandates the utilization of ESI in all emergency departments throughout Poland.
- This study revealed that ESI level 4 proved to be the most significant challenge for Polish practitioners. Experienced and novice triage personnel may benefit from distinct educational approaches, and novice staff can effectively receive training to accurately identify patients with ESI 1 and ESI 2 priority.

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Abstract

Introduction: The aim of this study was to assess the impact of the national government initiative Emergency Severity Index version 4.0 validated triage training on triage practitioners' knowledge and accuracy.

Methods: This pre/post intervention study evaluated the knowledge of triage practitioners, who constituted 30% of employees trained by the national program, in 74 emergency departments across Poland in 2020. Statistical analysis was used to evaluate the impact of the triage training.

Results: No significant differences in triage knowledge were found based on experience, length of ED service, or previous training. Training resulted in increased accuracy (61.3% vs 81.1%) and decreased overtriage and undertriage. Participants significantly reduced errors and improved Emergency Severity Index guideline–based case evaluations, especially for Emergency Severity Index 1-3 cases, with the most notable improvements observed among those without prior triage experience. The training significantly improved interrater reliability.

Discussion: The Emergency Severity Index pilot training demonstrated a significant improvement in the accuracy of triage practitioners. Emergency Severity Index level 4 has been identified as a challenging area to learn, as well as yielding promising results in the acquisition of knowledge across levels 1 and 2, among less experienced practitioners.

Key Words: Triage; Education; Emergency Severity Index; Public health

Introduction

Triage systems worldwide aim to ensure fair treatment and assist with departmental organization, monitoring, and evaluation.[1] The Emergency Severity Index (ESI) triage system has been demonstrated to be a valid and reliable tool.[2] The Polish Ministry of Health recognized its potential, funded training, and implemented the ESI triage nationwide in

August 2020.[3] This study resulted from pilot training conducted by qualified trainers endorsed by the Emergency Nurses Association (ENA), the legal authority for the ESI triage system version 4. Before this study, triage in Poland was merely recommended, not mandatory, with some emergency departments lacking any triage system.

According to Watson, teaching nurses involves equipping people with critical thinking, evaluation, and decision-making skills through education.[4] Studies indicate that even a single triage refresher training can greatly improve the ability to perform triage accurately.[5] A study by Ebrahimi et al[6] demonstrated that triage training enhances the nursing staff's efficiency and improves the accuracy of their decisions. Additionally, training has a positive impact on knowledge, practice, and attitude among triage personnel.[7]

Nursing expertise is a complex matter that involves various types of knowledge, including procedural knowledge, factual knowledge, potential factual knowledge, and beliefs/opinions.[8] Although factual knowledge is important in triage decisions, it is closely intertwined with experience-based knowledge. Evaluating triage-focused educational programs requires a closer examination of the relationship between clinical decisions, knowledge, and experience.[9] According to Boshoff, there is no correlation between the accuracy of triage decisions and higher professional qualifications or longer work experience among postgraduate emergency nurses.[8] Similarly, the agreement level in triage decisions using written scenarios does not significantly correlate with experience.[9] Clinicians often rely on knowledge gained through networks with coworkers, without necessarily questioning whether colleagues' opinions are supported by scientifically proven data.[10]

This study aimed to evaluate the implementation of triage education at the national level among Polish ED staff and assess its impact on their triage knowledge and accuracy. The objective was to determine whether the training resulted in improved validity and interrater reliability compared with the pretraining results. Furthermore, the study examined whether the level of experience in triage, prior training in triage, and years of ED service had any impact on the current triage staff's knowledge.

Methods

STUDY DESIGN

A nonrandomized, pre-post intervention study was used to evaluate the results of a pilot education program on ESI triage in Poland. The decision to conduct the pilot training was made centrally on a national level within a concise 3-month time frame. A comprehensive evaluation of the initiative's impact was considered crucial to offer a rationale for stakeholders and highlight the outcomes. To attain this objective, a set of 5 prevalidated clinical cases suitable for the Polish context was used for both pre- and post-tests. Patient cases of varying ages were employed, including a pediatric patient in the case of ESI 1. Strategies, such as not providing test answers, avoiding test discussions, and refraining from giving direct answers during the course, were implemented. Both tests featured reordered questions, and participants were unaware of the post-test, reducing the likelihood of memorization, aiming to mitigate potential biases arising from the use of a limited number of questions.

STUDY SETTING

This study was conducted in 74 rural and urban emergency departments from June to August 2020 across 6 districts in Poland. Triage personnel in each hospital received a standardized 4-hour "ESI Provider" course delivered by trainers trained and validated by ENA. The course was designed by ENA in line with the ESI guidelines.[2]

PARTICIPANTS

Participants, including nurses, paramedics, and physicians functioning as triage personnel, met the qualification criteria outlined by current laws in Poland. These laws specify that triage in the emergency department can be performed by a "system nurse," paramedic, or "system physician." A "system nurse" refers to an individual with specialized training or currently undergoing specialization in emergency nursing. Similarly, a "system physician" is a specialist in emergency medicine or has completed at least 2 years of specialization in the field. Starting in 2013, paramedics in Poland are required to hold a 3-year paramedic bachelor's degree, whereas before 2013, a 2-year postsecondary school program sufficed for obtaining this qualification.[11]

A sample size of 400 was calculated using conservative assumptions (effect size of 0.2, type I error rate of 0.007, power of 0.9). The study group represented 410 participants (more than the calculated minimum) and represented 30% of all employees trained under the national project.

STUDY PROCEDURE

At least 2 weeks before each course, 5-7 participants were recruited through convenience sampling and given the Implementation Handbook.[2] On the course site, each

participant was provided with a metrics sheet and 5 clinical cases (A-E) to triage before and after the course based on the ESI guidelines. Instructions were displayed on a projector screen. Answers were collected on paper, compared with a template, and entered into a spreadsheet for analysis. Clinical cases were assessed individually, with the presence of a trainer, to minimize confounding factors from group work. Participants evaluated the same cases both before and after the course.

MEASURES

Six indexes were constructed to assess participants' knowledge:

- Case-specific timed mistake size indexes ($MSIpreESI_{1\text{-}5}$, $MSIpostESI_{1\text{-}5}$) assessed the size of mistakes in assigning triage acuity categories for each case and time point: pre- and post-training.
- Case-specific answer shift indexes ($ASI\text{-}ESI_{1\text{-}5}$) assessed the change in answer correctness over the training period.
- Timed mistake size index (MSI-pre, MSI-post) reflected the aggregate participants' results pre- and post-training.
- Overall MSI (OMSI) was the final variable of interest assessing the difference in overall mistake size between before and after training. A higher OMSI value indicates a greater number of incorrect answers and of greater magnitude before training compared with the post-training assessment.

A sensitivity analysis focusing on the answer's correctness without considering the magnitude of mistakes included:

- Timed correctness indexes (TCI-pre, TCI-post) calculated as binary variables, scored as 0 for a correct answer and 1 for an incorrect answer (corresponding to MSI-pre and MSI-post).
- Overall correctness index (OCI) (corresponding to OMSI).

For the expansions and detailed definitions of all indexes, refer to Table 1.

The aim was to test the significance of nonzero mean values for the OMSI and OCI and determine if there is a significant difference between pre- and post-test evaluations using a paired *t* test. A positive mean indicates significantly worse results before training compared with the post-training outcome.

STATISTICAL ANALYSIS

SPSS version 27 and R software version 4.0.4 were used for the analyses.

The distributions of pre- and post-training indexes, which were close to normal, were characterized using medians, quartiles, and nonparametric tests (analysis of variance or Mann-Whitney *U*). In contrast, OMSI and OCI, which had a normal distribution, were described using means and standard deviations, and were assessed using parametric tests. The study investigated variations in answer correctness at baseline based on participant characteristics, including length of ED service, triage experience, and previous triage training. Pre- and post-training outcomes and indexes were compared using χ^2 tests and paired *t* tests. Additionally, to confirm robustness, McNemar, and Cochran Q tests were used to assess changes in the correctness of answers. Interrater reliability was assessed using Kendall's W. Multiple linear regression analyses were performed to examine the associations between variables and the magnitude of index changes over time. Model 1 included variables for length of ED service and triage experience. Model 2 incorporated occupation as an additional variable. Model 3 adjusted for the variables in Model 2 and included sex (determined by the individual) and prior triage training.

ETHICAL CONSIDERATIONS

This study obtained approval from the Jagiellonian University Medical College Institutional Review Board, acquired the consent of research participants, and is in compliance with the General Data Protection Regulation.

Results

There were 466 employees who initially signed up to participate in the study. Part of the training was skipped by 25 participants, 15 participants did not meet the legal criteria to perform triage, and the postcourse clinical case evaluation was not completed by 7 participants. Indicators and pre-/postcourse response sheets were collected from 419 participants, but 9 were incomplete and subsequently rejected, resulting in data from 410 participants being included in the final analysis (Figure 1).

Participants were mostly females and paramedics (both $> 50\%$). The average age and experience were higher among

TABLE 1
Abbreviations, expansions, and definitions of indexes used in analysis Abbreviation Expansion

Abbreviation	Expansion	Definition	Calculation
ESI_{1-5}	Case-specific	One among the cases: Case A: ESI 3 Case B: ESI 1 Case C: ESI 2 Case D: ESI 5 Case E: ESI 4	-
Pre/post	Timed	Determined for each time point: pre- and post-training	-
Indicators that take into account the size of the student mistake			
$MSIpreESI_{1-5}$ $MSIpostESI_{1-5}$	Case-specific timed mistake size index	The absolute deviation from the correct answer for each case and for each time point	For example, MSI-$preESI_1$ = |ESI_1 participants answer - ESI_1 correct answer|
ASI-ESI_{1-5}	Case-specific response shift index	Deviation from the correct answer during the training period for each case	For example, ASI-ESI_1 = |MSI-$preESI_1$ – MSI-$postESI_1$|
MSI-pre MSI-post	Timed mistake size index	Sum of 5 case-specific timed mistake size indexes	MSI-pre = MSI-$preESI_1$ + …. MSI-$preESI_5$ MSI-post = MSI-$postESI_1$ + …. MSI-$postESI_5$
OMSI	Overall mistake size index	The difference between timed mistake size indexes for each time point	OMSI = MSI-pre - MSI-post
Indicators taken into account only if student answers were correct/false			
TCI-pre TCI-post	Timed correctness index	Sum of 5 case-specific timed correctness index For each case, a binary variable were scored as 0 if the answer was correct and as 1 if incorrect	TCI-pre = TCI-$preESI_1$ + …. TCI-$preESI_5$ For example, TCI-$preESI_1$ = 1 if incorrect 0 if correct TCI-post = TCI-$postESI_1$ + …. TCI-$postESI_5$
OCI	Overall correctness index	Indication of the change in the participants' test score before and after the training	OCI = TCI-pre - TCI-post

ESI, emergency severity index.

the female group. Most participants reported familiarity with the Manchester Triage System (MTS) and had at least 2 years of triage experience. Less than half of all participants had received previous triage training despite working in this role. Table 2 provides further details on the respondents' characteristics.

The length of triage experience, length of ED service, and previous triage training were found to have no impact on the overall triage outcome pre- and postcourse. This was reflected by similar medians and quartiles for MSI-pre, MSI-post, TCI-pre, and TCI-post. Neither the Mann-Whitney *U* test nor the Kruskal-Wallis test detected any differences among the preselected study groups (Table 3).

Following course completion, accuracy improved significantly, increasing from 61.3% to 81.1%. Furthermore, the percentage of overtriage and undertriage decreased from 14.4% to 10.9% for overtriage and from 24.5% to 8% for undertriage ($P < .001$, Table 4). Notably, the proportions of overtriage and undertriage reversed.

Analysis of all 6 indexes revealed a significant improvement in scenario evaluation after receiving the training. If

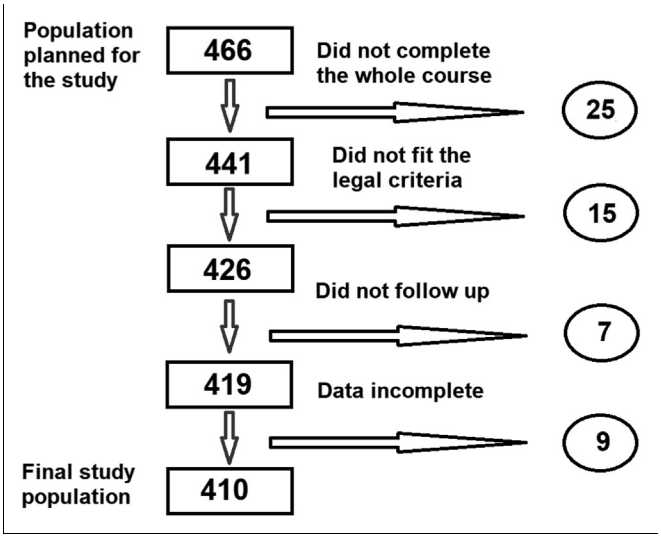

FIGURE 1
Study participants flow diagram.

participants' answers differed from the correct one, it was mostly by 1 point. Participants demonstrated a lower average error of 1.22 points in the post-training assessment compared with the pre-evaluation (mean difference [95% CI]: 1.22 [1.04; 1.40], $P < .001$, OMSI, Table 4). The OCI, which did not take into account the size of an error but only the number of correct answers, yielded very similar results (mean difference [95% CI]: 0.99 [0.85; 1.13], $P < .001$). Significant reductions were observed in all 5 MSI-post$ESI_{1\text{-}5}$ scores compared with MSI-pre$ESI_{1\text{-}5}$ scores, indicating post-training improvement for evaluating each ESI case. The ASI-ESI scores ranged from 0.10 for ESI 4 and 0.2 for ESI 5 to 0.31 and 0.34 for ESI 1 and ESI 2 cases, respectively, suggesting that the training resulted in smaller improvements in assessing less urgent cases (Table 4).

McNemar and Cochran Q tests identified significant differences in triage performance across all 5 ESI categories. Respondents demonstrated improved triage accuracy between pre- and post-assessment, confirming the robustness of the findings ($P < .05$). Higher differences were observed for ESI categories 1, 2, and 3, whereas differences were still significant but less pronounced for ESI cases 4 and 5 (Figure 2).

In the pre-training assessment, approximate numbers of correct answers for ESI 1-3 cases were identified. The accuracy for these cases significantly improved, reaching comparable levels in the post-training measurement for ESI 1-3 cases. Figure 2 clearly demonstrates that the greatest improvement from the training was observed for ESI 1-3 cases. The ESI 4 case showed the lowest number of correct responses in the post-training assessment despite having a comparable number of correct answers before training compared with cases ESI 1-3. Hence, the observed improvement was the lowest among all cases. Finally, the ESI 5 case was assessed most accurately during the pre-training evaluation but obtained a lower number of correct answers in the post-training assessment compared with ESI 1-3 cases.

The multiple linear regression analysis confirmed the positive impact of the training on the participants' assessment across 2 general indexes (OMSI, OCI) and all 5 case-specific response shift indexes (Table 5).

The intercept significance for general indexes (OMSI and OCI) was observed in all models except for 1 case (OCI, model 3), where it approached statistical significance. Conversely, only a few ASI showed significant intercepts. Among individual cases, after adjusting for covariates in all 3 models, ASI-ESI_1 demonstrated significant or near-significant improvement, indicating an increase in knowledge in assessing the most urgent cases. The ASI-ESI_4 intercept did not show a significant difference from 0 in all models.

For OMSI, OCI, ASI-ESI_5, and ASI-ESI_3, length of ED service was associated with a statistically significant lower accuracy, which means the longer the ED service, the less improvement was observed after training. Additionally, the analysis of OCI and OMSI suggested a trend of greater training benefits in the group with no triage experience compared with those with 2-5 years of triage experience, but this result was not statistically significant. Conversely, ASI-ESI_1 and ASI-ESI_2 demonstrated a significant trend of stronger benefits in the group with no triage experience compared with the group with 2-5 years of experience.

Kendall's W indicated significant differences in interrater reliability before and after completing the course. Interrater reliability improved post-course, with measured agreement increasing from 0.79 to 0.92 ($df = 4$, $N = 410$, $P < .05$).

Discussion

The triage training provided led to a significant 20.8% improvement in response accuracy, reducing overtriage and undertriage and effectively enhancing factual knowledge for better case evaluation using ESI guidelines. Participants without prior triage experience showed the greatest improvement, especially in assessing ESI 1 and ESI 2 scenarios. The most substantial knowledge increase occurred for ESI 1-3 cases, whereas in the case of ESI 4, the smallest knowledge gain was observed. Interrater

TABLE 2
Demographic, profession, and triage experience characteristics of the study group ($N = 410$)

Variable	Complete data, *n* (%)*	Q2 (Q1-Q3)
Age, y	379 (92.4%)	Female: 40, male: 31, total: 37 (29-48)
Length of practice, y	405 (98.8%)	13 (5-27)
Length of ED service, y	405 (98.8%)	Female: 9, male: 4, total: 6 (2-14)

Variable	Category	*n* (%)
Sex	Male	174 (42.4%)
	Female	236 (57.6%)
Occupation	Paramedic	211 (51.46%)
	Nurse	170 (41.46%)
	Physician	16 (3.9%)
	Nurse and paramedic	11 (2.68%)
	Nondefined	2 (0.49%)
Familiarity with triage systems†	ATS	2 (0.4%)
	CTAS	4 (0.8%)
	MTS	193 (36.2%)
	ESI	12 (2.3%)
	Other 3-level	87 (16.3%)
	Other 4-level	33 (6.2%)
	Other 5-level	202 (37.9%)
Current triage system‡	CTAS	410 (100%)
	MTS	154 (37.6%)
	ESI	3 (0.7%)
	Other 3-level	36 (8.8%)
	Other 4-level	28 (6.8%)
	Other 5-level	189 (46.1%)
Triage experience	Non	30 (7.3%)
	Sporadic	99 (24.1%)
	Regular <2 y	87 (21.2%)
	Regular 2-5 y	119 (29.0%)
	Regular§ > 5 y	75 (18.3%)
Previously trained to triage	Yes	190 (46.3%)
	No	205 (50.0%)
	Do not know	19 (3.7%)

ATS, Australian Triage Scale; CTAS, Canadian Triage and Acuity Scale; ED, emergency department; MTS - Manchester Triage System.
* All statistics except age and length of ED service are expressed as *n* (%).
† Multiple-choice questions, sum of counts, and percentages are not equal sample size (100%).
‡ Declared current triage system in use in respondent institution.
§ Regular triage experience: a person with continuity in performing triage having the necessary qualifications: being a system nurse, system physician, paramedic.

reliability significantly increased after the training. Notably, participants' pre-existing factual triage knowledge was observed to be unaffected by experience level, prior training, or years of ED service.

The average age of Polish nurses is relatively high at 54 years, whereas for United States nurses, it is 52 years.[12,13] In comparison, the average age of nurses in countries belonging to the Organization for Economic Cooperation and

TABLE 3
Association between triage experience, years of ED service, previous triage training and 4 indexes: MSI-pre, TCI-pre, MSI-post, and TCI-post

Variable	MSI-pre	MSI-post	TCI-pre	TCI-post
Triage experience				
Non, $n = 30$	2.0 (1.3-3.8)	0.0 (0.0-1.8)	2.0 (1.3-3.0)	0.0 (0.0-1.8)
Sporadic, $n = 99$	2.0 (1.0-3.5)	1.0 (0.0-2.0)	2.0 (1.0-3.0)	1.0 (0.0-2.0)
Regular < 2 y, $n = 87$	2.0 (1.0-3.0)	0.0 (0.0-2.0)	2.0 (1.0-3.0)	0.0 (0.0-2.0)
Regular 2-5 y, $n = 119$	2.0 (1.0-3.0)	0.0 (0.0-2.0)	2.0 (1.0-3.0)	0.0 (0.0-2.0)
Regular > 5 y, $n = 75$	2.0 (1.0-4.0)	1.0 (0.0-2.0)	2.0 (1.0-3.0)	1.0 (0.0-2.0)
P	0.431	.683	.346	.762
Years of ED service				
Below median (<6 y)	2.0 (1.0-4.0)	1.0 (0.0-2.0)	2.0 (1.0-3.0)	1.0 (0.0-2.0)
Below median (≥6 y)	2.0 (1.0-3.0)	0.0 (0.0-2.0)	2.0 (1.0-3.0)	0.0 (0.0-2.0)
P	.29	.84	.44	.79
Previously trained to triage				
No/Do not know	2.0 (1.0-3.0)	1.0 (0.0-2.0)	2.0 (1.0-3.0)	1.0 (0.0-2.0)
Yes	2.0 (1.0-3.0)	0.0 (0.0-2.0)	2.0 (1.0-3.0)	0.0 (0.0-2.0)
P	.86	.58	.91	.42

Values presented in table are given as medians and interquartile ranges Q2 (Q1-Q3).
P values based on nonparametric tests Mann-Whitney *U* test and analysis of variance rank Kruskal-Wallis test.
ED, emergency department; MSI, mistake size index; TCI, timed correctness index.

TABLE 4
Basic statistics and statistics of calculated indices; $N = 410$ (participants), $N = 2050$ (answers)

Pre-training assessment			Post-training assessment					
Answers	**No.**	**%**	**Answers**	**No.**	**%**	***df***	χ^2	***P****
Correct	1257	61.3	**Correct**	1662	81.1	2	236.9622	<.001
Undertriage	503	24.5	**Undertriage**	162	8			
Overtriage	290	14.4	**Overtriage**	224	10.9			

Pre-training assessment			Post-training assessment			Pre-post difference		
Index	**Mean (SD)**	**Min-max**	**index**	**Mean (SD)**	**Min-max**	**index**	**Mean (95% CI)**	***P**†*
MSI-pre	2.23 (1.81)	0-12	**MSI**-post	1.01 (1.24)	0-6	**OMSI**	1.22 (1.04; 1.40)	<.001
TCI-pre	1.93 (1.34)	0-5	**TCI**-post	0.95 (1.13)	0-5	**OCI**	0.99 (0.85; 1.13)	<.001
MSI-preESI$_1$	0.47 (0.64)	0-4	**MSI**-postESI$_1$	0.17 (0.39)	0-2	**ASI-ESI$_1$**	0.31 (0.24; 0.37)	<.001
MSI-preESI$_2$	0.49 (0.65)	0-3	**MSI**-postESI$_2$	0.15 (0.39)	0-2	**ASI-ESI$_2$**	0.34 (0.27; 0.40)	<.001
MSI-preESI$_3$	0.43 (0.6)	0-2	**MSI**-postESI$_3$	0.16 (0.39)	0-2	**ASI-ESI$_3$**	0.27 (0.21; 0.34)	<.001
MSI-preESI$_4$	0.43 (0.55)	0-2	**MSI**-postESI$_4$	0.33 (0.52)	0-2	**ASI-ESI$_4$**	0.10 (0.03; 0.16)	<.005
MSI-preESI$_5$	0.4 (0.69)	0-4	**MSI**-postESI$_5$	0.2 (0.45)	0-2	**ASI-ESI$_5$**	0.20 (0.13; 0.27)	<.001

ASI, answer shift index; ESI, emergency severity index; MSI, mistake size index; OCI, overall correctness index; OMSI, overall MSI; TCI, timed correctness index.
* Based on χ^2 test.
† Based on paired *t* test.

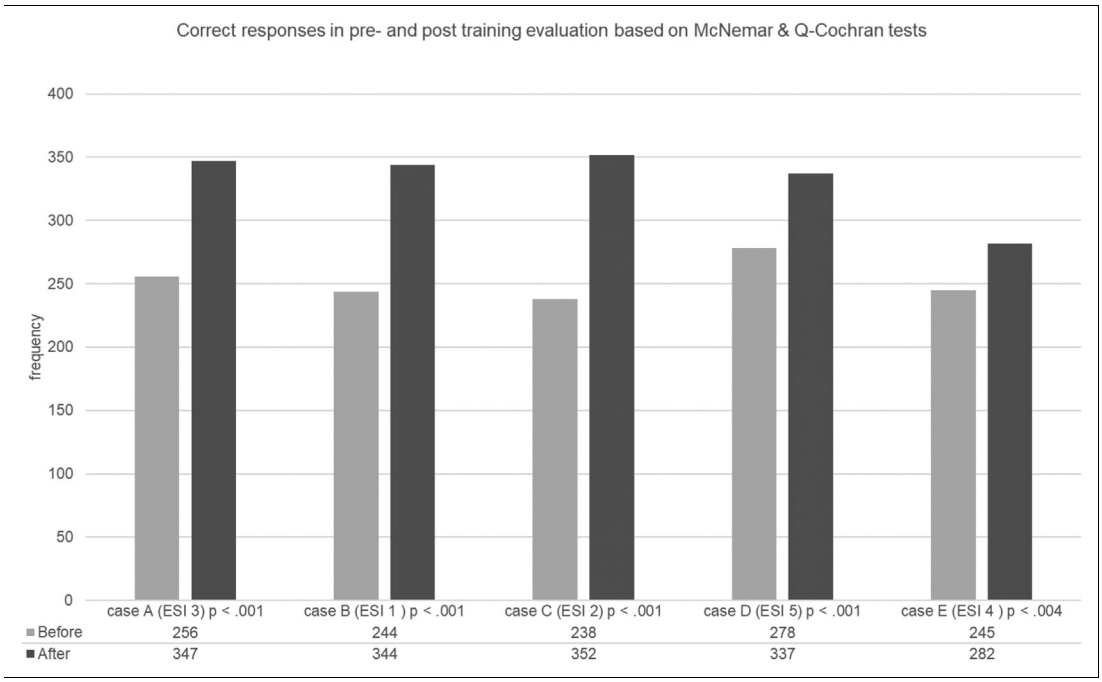

FIGURE 2

Correct answers summary before and after the training. *P* values are based on McNemar and Q-Cochran tests. ESI, emergency severity index.

Development is almost 10 years lower at 42.7 years.[14] However, in our study, the average age of emergency department's triage staff participants is lower, at 41 years. Similar data are observed in the United States, where the mean age of employed emergency nurses is 43 years.[15] Notably, this study revealed a mixed employment structure for triage in Poland, with the majority of participants being paramedics. Assuming that work experience increases with age, it is worth noticing that studies found no significant correlation between triage accuracy and emergency nursing or triage experience.[16,17] The findings of this study confirm that experience alone and years of ED service do not result in improved triage decisions.

Mistry et al[18] reported an overall ESI triage accuracy of 59.2%, whereas other authors reported a range of 56.2% to 82.9%.[19] This study demonstrated a substantial enhancement in response accuracy, increasing from 61.3% precourse to 81.1% postcourse, along with a significant decrease in over- and undertriage. These results align with reports by Brosiński et al[5] where the undertriage percentage declined from 26.3% to 9.3% following ESI training. Undertriage, which can result in an increased prevalence of admission and critical patient outcomes, as well as overtriage, leading to the erroneous allocation of scarce resources and amplified costs, are pivotal concerns in emergency departments.[20,21] The American College of Surgeons Committee on Trauma has established undertriage rates below 5% and overtriage rates between 25% and 30% as acceptable.[22] What is more, this study and the findings by Smith et al[23] reveal that triage practitioners frequently make errors of 1 point on the ESI urgency scale, occurring in both overtriage and undertriage.

Faiheim et al[7] demonstrated that triage education improves knowledge, practice, and attitudes, enhancing triage performance. Habitual behaviors tend to persist in familiar settings, whereas intentional behavior predominates in unfamiliar or changing environments, with habits prevailing in cases of conflict.[24] Dreyfus et al[25] reported that inexperienced practitioners strictly adhere to protocols, have difficulty recognizing nuances, and lack flexibility, whereas experienced practitioners rely less on explicit rules and guidelines, using implicit understanding, and employing analytical methods sparingly. Results of this study showed that the shorter an individual serves in the emergency department, the more training gain tends to occur. This effect was most pronounced for ESI 1 and ESI 2 scenarios, suggesting room for improvement in identifying these cases during new employee training. This finding is particularly valuable, given that a multicenter study reported a sensitivity of only 66% in identifying critically ill patients.[26]

TABLE 5
Multiple linear regression analysis of chosen indexes as dependent variables (N= 410)

Index	Category/Unit	Model 1	*P*	Model 2*	*P*	Model 3	*P*
OMSI							
Intercept		1.15 (0.81; 1.48)	<.001	1.33 (0.23; 2.44)	.019	1.20 (0.07; 2.33)	.037
ED service LEN	Per 1 y	−0.03 (-0.05; 0.00)	.044	−0.03 (−0.06; 0.00)	.027	−0.03 (−0.06; 0.00)	.031
Triage EXP†	2-5 y	0 (ref.)		0 (ref.)		0 (ref.)	
	Non	0.52 (−0.23; 1.26)	.173	0.60 (−0.18; 1.38)	.133	0.62 (−0.17; 1.41)	.123
	Sporadic	−0.01 (−0.50; 0.49)	.976	0.00 (−0.50; 0.50)	.986	0.00 (−0.50; 0.51)	.986
	< 2 y	−0.07 (−0.59; 0.45)	.797	−0.07 (−0.59; 0.44)	.779	−0.08 (−0.60; 0.43)	.750
	> 5 y	0.25 (−0.30; 0.81)	.376	0.22 (−0.33; 0.78)	.429	0.19 (−0.37; 0.75)	.509
OCI							
Intercept		0.92 (0.65; 1.18)	<.001	1.01 (0.13; 1.89)	.025	0.87 (−0.02; 1.77)	.056
ED service LEN	Per 1 y	−0.02 (−0.04; 0.00)	.050	−0.03 (−0.05; 0.00)	.017	−0.03 (−0.05; −0.01)	.017
Triage EXP	2-5 y	0 (ref.)		0 (ref.)		0 (ref.)	
	Non	0.42 (−0.17; 1.00)	.167	0.48 (−0.14; 1.09)	.133	0.52 (−0.10; 1.15)	.103
	Sporadic	−0.05 (−0.44; 0.34)	.803	−0.06 (−0.45; 0.34)	.784	−0.03 (−0.43; 0.37)	.892
	< 2 y	−0.02 (−0.43; 0.39)	.927	−0.02 (−0.43; 0.39)	.920	−0.03 (−0.44; 0.38)	.896
	> 5 y	0.32 (−0.12; 0.76)	.153	0.30 (−0.15; 0.74)	.189	0.26 (−0.19; 0.70)	.255
ASI-*ESI$_1$*							
Intercept		0.33 (0.20; 0.45)	<.001	0.39 (0.00; 0.79)	.053	0.38 (−0.02; 0.79)	.066
ED service LEN	Per 1 y	0.00 (−0.01; 0.01)	.834	0.00 (−0.01; 0.01)	.506	0.00 (−0.01; 0.01)	.438
Triage EXP	2-5 y	0 (ref.)		0 (ref.)		0 (ref.)	
	Non	0.24 (−0.03; 0.51)	.080	0.28 (0.00; 0.56)	.051	0.30 (0.02; 0.59)	.040
	Sporadic	−0.05 (−0.23; 0.13)	.560	−0.06 (−0.24; 0.12)	.547	−0.04 (−0.22; 0.14)	.663
	< 2 y	−0.10 (−0.29; 0.09)	.299	−0.10 (−0.29; 0.09)	.287	−0.10 (−0.29; 0.09)	.300
	> 5 y	−0.02 (−0.22; 0.18)	.850	−0.04 (−0.24; 0.17)	.730	−0.04 (−0.24; 0.16)	.707
ASI-*ESI$_2$*							
Intercept		0.30 (0.18; 0.43)	<.001	0.30 (−0.11; 0.70)	.153	0.26 (−0.16; 0.67)	.224
ED service LEN	Per 1 y	−0.01 (−0.01; 0.00)	.249	0.00 (−0.01; 0.01)	.445	0.00 (−0.01; 0.01)	.466
Triage EXP	2-5 y	0 (ref.)		0 (ref.)		0 (ref.)	
	Non	0.20 (−0.08; 0.47)	.158	0.34 (0.06; 0.63)	.019	0.35 (0.06; 0.64)	.019
	Sporadic	0.01 (−0.17; 0.20)	.881	0.04 (−0.14; 0.23)	.653	0.04 (−0.14; 0.23)	.641
	< 2 y	0.04 (−0.16; 0.23)	.709	0.03 (−0.16; 0.22)	.780	0.02 (−0.17; 0.21)	.806
	> 5 y	0.06 (−0.14; 0.27)	.561	0.05 (−0.15; 0.26)	.606	0.04 (−0.16; 0.25)	.682
ASI-*ESI$_3$*							
Intercept		0.26 (0.14; 0.38)	<.001	0.31 (-0.09; 0.71)	.128	0.20 (-0.20; 0.61)	.327
ED service LEN	Per 1 y	−0.01 (−0.02; 0.00)	.007	−0.01 (−0.02; 0.00)	.027	−0.01 (−0.02; 0.00)	.026
Triage EXP	2-5 y	0 (ref.)		0 (ref.)		0 (ref.)	
	Non	0.04 (−0.23; 0.31)	.767	0.05 (−0.23; 0.33)	.745	0.08 (−0.21; 0.36)	.591
	Sporadic	0.03 (−0.15; 0.21)	.751	0.03 (−0.15; 0.21)	.723	0.05 (−0.13; 0.23)	.591
	< 2 y	−0.07 (−0.26; 0.12)	.461	−0.07 (−0.26; 0.11)	.450	−0.08 (−0.26; 0.11)	.410
	> 5 y	0.11 (−0.09; 0.31)	.289	0.11 (−0.09; 0.31)	.290	0.08 (−0.12; 0.28)	.444

continued

TABLE 5
Continued

Index	Category/Unit	Model 1	*P*	Model 2*	*P*	Model 3	*P*
ASI-*ESI*$_4$							
Intercept		0.10 (−0.02; 0.22)	.111	−0.02 (−0.43; 0.39)	.921	−0.06 (−0.48; 0.35)	.765
ED service LEN	Per 1 y	0.00 (−0.01; 0.01)	.743	0.00 (−0.01; 0.01)	.802	0.00 (−0.01; 0.01)	.919
Triage EXP	2-5 y	0 (ref.)		0 (ref.)		0 (ref.)	
	Non	0.10 (−0.17; 0.37)	.477	0.06 (−0.23; 0.35)	.675	0.05 (−0.24; 0.34)	.724
	Sporadic	−0.06 (−0.24; 0.12)	.522	−0.07 (−0.25; 0.12)	.469	−0.08 (−0.27; 0.11)	.407
	< 2 y	0.06 (−0.13; 0.25)	.540	0.07 (−0.13; 0.26)	.505	0.06 (−0.13; 0.25)	.549
	> 5 y	−0.04 (−0.24; 0.17)	.704	−0.03 (−0.24; 0.17)	.745	−0.05 (−0.25; 0.16)	.667
ASI-*ESI*$_5$							
Intercept		0.16 (0.03; 0.30)	.018	0.35 (−0.09; 0.80)	.118	0.42 (−0.03; 0.87)	.066
ED service LEN	Per 1 y	−0.01 (−0.02; 0.00)	.148	−0.01 (−0.02; 0.00)	.044	−0.01 (−0.02; 0.00)	.049
Triage EXP	2-5 y	0 (ref.)		0 (ref.)		0 (ref.)	
	Non	−0.06 (−0.36; 0.23)	.678	−0.13 (−0.45; 0.18)	.403	−0.16 (−0.47; 0.16)	.330
	Sporadic	0.06 (−0.14; 0.26)	.534	0.04 (−0.16; 0.24)	.662	0.03 (−0.17; 0.23)	.768
	< 2 y	0.01 (−0.20; 0.21)	.959	0.01 (−0.20; 0.21)	.946	0.01 (−0.20; 0.22)	.922
	> 5 y	0.14 (−0.08; 0.36)	.213	0.13 (−0.09; 0.35)	.245	0.15 (−0.07; 0.38)	.184

ASI, answer shift index; ED, emergency department; ESI, emergency severity index; EXP, experience; LEN, length; MSI, mistake size index; OCI, overall correctness index; OMSI, overall MSI; TCI, timed correctness index.

* Model 1: included only length of ED service and triage experience; model 2: adjusted to variables in model 1 and additionally to occupation (physician, nurse, and paramedic); model 3: adjusted to variables in model 2 and additionally to previously trained to triage and sex.

† Regular triage experience: a person with continuity in performing triage having the necessary qualifications: being a system nurse, system physician, and paramedic.

A significant improvement in assessing scenarios was observed across all ESI levels after completing the course, but the most substantial enhancement was observed in the classification of ESI levels 1 and 2, whereas the smallest improvement was noticed in levels 4 and 5. Learning the identification of ESI levels 1 and 2 is crucial for differentiating patients who meet high acuity level criteria and predicting the likelihood of intensive care unit admission and mortality.[27] The identification of ESI categories 4 and 5 is also important because it ensures patient's safe wait or redirection to primary care during ED overcrowding.[28] In this study, accurate assessment of ESI level 4 was found to be particularly challenging.

Interrater reliability is an indicator of whether the emergency department's staff have a shared understanding of the assessment scale. A comparable initiative to the one implemented in Poland, mandating the first national standardization of triage, was conducted in Jamaica, where a research analysis showed low interrater reliability among raters.[29] In this study, the interrater reliability among triage staff had good initial scores that further improved after completing the course. This study evaluated participants immediately after the training using scenarios. Using standard written case scenarios, as used by Jordi, is 1 approach among many for evaluating the effectiveness of triage system application, but the study by Travers et al found that the interrater reliability is higher for scenarios than for actual patients.[30,31] Additionally, previous studies have not identified significant correlations between the length of emergency nursing, triage experience, or triage qualifications and the degree of concurrence among nursing personnel.[16] Estabrooks et al[32] has shown that nursing staff predominantly learn through informal means of mutual interaction, "learning the same language," but it does not necessarily imply that the assessment scale is being used accurately.

Limitations

This theoretical study focused on assessing factual knowledge only and did not evaluate the practical application of this knowledge. Kolb defined learning as the process of human adaptation, involving the conversion of experience into knowledge.[33] However, recent research suggests that the

conversion of explicit knowledge acquired from books and other sources into implicit or tacit knowledge may begin during the educational phase.[34] Additionally, empirical evidence indicates that factual knowledge continues to play a significant role in triage decision making, regardless of the evaluation methods used for such decision-making processes.[9]

In this study, the use of the same scenarios for pre- and post-tests may have influenced outcome increases. We opted for the same set of questions for a direct performance comparison before and after the course. Ensuring validity in measurement for a different set of questions would require validating additional questions tailored to the Polish background and having a sufficient number of questions to prevent bias arising from the different difficulty levels. Considering that this study was an additional activity to the course and had no funding, it was not feasible to incorporate numerous questions, conduct prolonged validation, and assess knowledge persistence over time. Further research is needed to investigate the real-time application of knowledge acquired through training, especially concerning its practical implementation in clinical settings with actual patients.

Although many respondents reported the use of MTS in their hospitals, objective data revealed that only 2 hospitals had implemented a verified MTS methodology. This study was conducted in Poland and results may not be generalizable to other countries.

Implications for Emergency Nurses

Findings from this study highlight the challenges that may arise, particularly in educating individuals with different levels of clinical experience (ED tenure) and the difficulties in identifying cases with ESI 4 priority. Furthermore, this study demonstrates that inexperienced personnel can efficiently be educated to acquire factual knowledge to identify patients with ESI 1 and ESI 2 priority. Emergency nurse educators may want to provide more focus on the identification of patients with level 4 priority to reduce under- and overtriage rates.

Conclusion

This training implementation improved factual knowledge, resulting in a significant increase in accuracy and interrater reliability, and a reduction in rates of over- and undertriage in pre- and post-test scenarios. The greatest improvements were observed for staff with no prior triage experience, particularly in ESI 1 and ESI 2 scenarios. However, individuals with longer employment in the emergency department demonstrated a diminished response to the training. The study showed that achieving an undertriage rating below 5% is a challenging task. Further research is necessary to identify the reasons for the challenges encountered while evaluating and training recognition of ESI 4 cases in Poland. Regulatory policies mandating ongoing training, coupled with time for practice, are important to ensure the effective transfer of factual knowledge into practical application.

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"I Just Know if I Keep Going, I'll End Up Hating Nursing." Lived Experiences of Emergency Nurses Three Years Into the Global COVID-19 Pandemic

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Contribution to Emergency Nursing Practice

- The current literature on emergency nursing during the coronavirus disease 2019 pandemic indicates that nurses are leaving the profession at rapidly increasing rates, with impacts on health and well-being, ultimately leading to increased levels of anxiety, depression, and post-traumatic stress.
- This article contributes knowledge to the Australian emergency nursing experience 3 years into the coronavirus disease 2019 pandemic and after the major 2021/2022 summer virus outbreak. A key strength was the longitudinal contact with the same sample of emergency nurses, resulting in greater depth of findings.
- Key implications for emergency nursing practice include implementation of professional boundaries such as policies on work communications outside of working hours and allowance for staff to take accrued leave entitlements and to provide input into professional practice and culture guidelines within the department, which may enhance role satisfaction and increase intentions to remain in the emergency nursing workforce.

Abstract

Introduction: As the coronavirus disease 2019 pandemic continues globally, the personal and professional pressure on health care workers continues to accumulate. Literature suggests that as the pandemic evolves, nurses are experiencing increased levels of anxiety, depression, and post-traumatic stress, ultimately leading them to voice intentions to leave the profession, if they have not done so already.

Methods: Informed by an interpretive hermeneutic phenomenological approach, this longitudinal study was designed to capture how the lived experiences of 9 emergency nurses evolved over the coronavirus disease 2019 pandemic, highlighting their feelings, attitudes, and perceptions toward working in the emergency department at this time in history. Interviews were undertaken in June 2022 and were analyzed using a thematic analysis approach.

Results: Data analysis resulted in a total of 2 major themes and 8 minor themes. The 2 major themes included "exposed wounds" and "Band-Aid solutions." Levels of burnout increased during the pandemic, with most of the emergency nurse participants dropping their hours, moving roles within the profession, or leaving the profession entirely. Findings elucidate where and

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how concerns may arise in clinical practice and holistic well-being among emergency nurses, particularly surrounding professional boundaries and protecting work-life balance and professional identity.

Discussion: As the world moves to managing coronavirus disease 2019 as a recognized common respiratory illness, providing time and space for emergency nurses to voice their concerns, design their well-being interventions, set professional boundaries, and reconnect with their professional passion may see lower attrition rates and higher levels of professional satisfaction in emergency nurses globally.

Key words: Emergency department; Coronavirus disease 2019; Pandemic; Vaccine; Lived experience; Qualitative; Nursing; Australia

Introduction

As the coronavirus disease 2019 (COVID-19) pandemic continues globally, the personal and professional pressure on health care workers continues to accumulate. As the pandemic evolves, nurses are experiencing increased levels of anxiety, depression, and post-traumatic stress.[1,2] In Turkey, predictors of these experiences included a lack of organizational support, an increase in working hours, and more colleagues being diagnosed as having COVID-19.[1] In 1 study, Putekova et al[3] explored the impact of COVID-19 on 1170 nurses in Slovakia and found that 70% of respondents thought of leaving their jobs due to increased work stress and inadequate salary.

In the United States and Canada, data suggest that trauma experienced by emergency nurses during the pandemic was likened to that of trauma experienced in war or assault.[4,5] These trauma and stress experiences may cause moral injury to emergency nurses, an increasingly recognized phenomena resulting from the pandemic whereby feelings of grief, meaninglessness, and remorse arise from a transgression that violates assumptions and beliefs of what is right and what is wrong.[6] This increase in moral injury may lead to impacts on the emergency nurse's professional identity, subsequently negatively influencing confidence in one's own skills and self.[4] Conversely, when confidence is present within the workplace, empowerment, resilience, and strength in teams and decision making may be present within staff, which subsequently results in patients' perceptions of hospital experience being higher.[7] Furthermore, literature suggests that acknowledging the emergency nurse voice and empowering staff to be involved in decision making about clinical practice and personal healing after COVID-19 induced traumas may assist in maintaining a healthy and resilient workforce.[5,8]

Within Australia and globally, studies exploring the longitudinal lived experiences of emergency nurses throughout the COVID-19 pandemic are limited. To date, there are no comprehensive studies that explore emergency nurse COVID-19 experiences over time. This study forms part of a longitudinal investigation that may bring clarity to identifying the specific feelings, attitudes, and perceptions of emergency nurses during this time, providing a snapshot of what nurses experienced when they were exposed to working in the COVID-19 pandemic. This may elucidate where and how concerns may arise in clinical practice and holistic well-being among the emergency nurse population, allowing implementation of stronger, time-bound, well-being practices and professional boundaries and mitigation of adverse effects in future pandemic or epidemic events. Findings from stage 1 of this study in 2020 demonstrated the uncertainty and fear of contracting COVID-19 among the emergency nurses and fears of taking the virus home to their families.[9] In 2021, the second year of the pandemic within Australia, the emergency nurses voiced that they were feeling the early effects of burnout and frustration with the mounting pressure on them professionally.[10] This present paper will showcase the findings of the third and final stage of data collection in 2022, which aimed to demonstrate the lived experiences of the emergency nurses now 3 years into the COVID-19 pandemic within Australia and how this experience affected their thoughts, feelings, and attitudes personally and professionally.

Methods

AIM

This research aimed to explore the lived experiences of Australian emergency nurses working on the frontline 3 years into the COVID-19 pandemic.

Research questions that were addressed included:

1. What were the lived experiences (eg, feelings, attitudes, and perceptions) of 9 Victorian nurses working in the emergency department in Australia during the third year of the COVID-19 pandemic?

TABLE

Participant characteristics	n or mean
Sex	
Male	2
Female	7
Age (y)	40.3 (mean)
Country of birth	
Australia	7
Kenya	1
New Zealand	1
Education level	
Undergraduate degree	3
Postgraduate qualification	2
Master's degree	2
Doctoral degree	2
Working history (y)	18.8 (mean)
Employment region (Victoria)	
Metropolitan	6
Regional	3
Employment status	
Casual or temporary	1
Part time	6
Full time	2
Marital status	
Single	3
Married	6
Children or caring responsibilities	
Yes	6
No	3

2. What perceived impact did working in the emergency department during a global pandemic have on nurses?

DESIGN

The study used a qualitative research design, informed by an interpretive hermeneutic phenomenological approach.[11] By incorporating an emergent, reflexive design in this study, it allowed for study evolution as the pandemic continued.[12] This paper will explore the third and final stage of a 3-stage data collection, which was undertaken in 2020, 2021, and 2022. Findings from 2020 and 2021 have previously been reported.[9,10]

POPULATION

The study population comprised 9 Australian emergency nurses residing in the state of Victoria, Australia, 3 from regional hospitals and 6 from metropolitan hospitals (see Table for participant characteristics). All participants were the same sample of registered nurses interviewed in stage 2 of this research project in 2021, as outlined by Simic et al, 2023.[10] Participants ranged from 23 to 58 years of age and varied from newly graduated nurse to nurse unit manager, having 2 to 38 years of clinical experience. Participants completed a consent form and were provided with a plain language information statement before their scheduled interview, where verbal consent was also attained. The relevant University Human Research Ethics Committee granted ethical approval for this project.

DATA COLLECTION PROCEDURE

The sample of 9 emergency nurses were contacted by email to enquire whether they would like to participate in a further interview regarding their COVID-19 experiences. Data collection was undertaken using a semistructured interview approach, allowing robust discussion of thoughts, feelings, and attitudes from participants.[13] Participants were asked 2 open-ended questions, with the objective to let participants share their lived experiences without restriction. Data were collected in line with COVID-19 restrictions, with all interviews conducted virtually via Microsoft Teams (Microsoft Corp, Redmond, WA) and Zoom Video Communications, Inc (San Jose, CA). Data collection was undertaken in June 2022, with interviews ranging from 14 to 36 minutes in duration. During preceding interview sessions with participants, rapport had been gained by deep discussion surrounding COVID-19 lived experiences.[10] This previous rapport building meant that ice-breaking methods at the commencement of interviews were not required; therefore, interviews were shorter in duration for the third stage of data collection than for previous data collection points.

Questions asked of participants included:

- Tell me a bit about your experiences since we last spoke 6 months ago.
- Have there been any changes to your role? What sort of role are you in now?
- We spoke about your experiences with "X" in our last interview; can you tell me about your experiences with that now?

DATA ANALYSIS

Data were analyzed using a Braun and Clarke[14] 6-step thematic analysis approach. Steps 1 and 2 involved transcribing interviews verbatim, replacing participant names with code for the research team to begin drawing out codes independently. Step 3 involved combining research codes for refining and development of initial themes. Steps 4 and 5 involved mapping and refining of themes to develop clear names and outcomes for themes. Finally, step 6 involved appropriate documentation of participant quote excerpts to capture the theme essence.

Within the research team, authors 1 and 2 were involved in steps 1 to 3 of the analysis process, with authors 3 and 4 assisting from step 4 to 6. This combined analysis approach ensured unbiased decision making to occur in the development and reporting of themes.

RIGOR

In qualitative research, demonstrating trustworthiness and rigor of data can be achieved through representing the credibility, dependability, confirmability, transferability, and authenticity of the project and the chosen methods.[15-17] In this study, credibility was achieved by way of the longitudinal study design, with prolonged engagement with the same sample of emergency nurses, allowing for a richer and more nuanced exploration of their experiences. Dependability and confirmability were achieved in the rigorous interview notes, reflections, and COVID-19 process logs kept by the research team, which were shared in peer debriefing sessions to confirm findings and avoid biases. Although specific findings may not be generalizable to other populations within qualitative research, transferability of this study was achieved in the documentation and reporting of all data through process logs, academic publication, and global conference dissemination. Finally, authenticity of the project was achieved by appropriately reporting participant experiences who varied in ethnicity, age, gender, and experiences through quote excerpts.

Results

Data analysis resulted in a total of 2 major themes and 8 minor themes generated from the data. The 2 major themes included "exposed wounds" and "Band-Aid solutions"

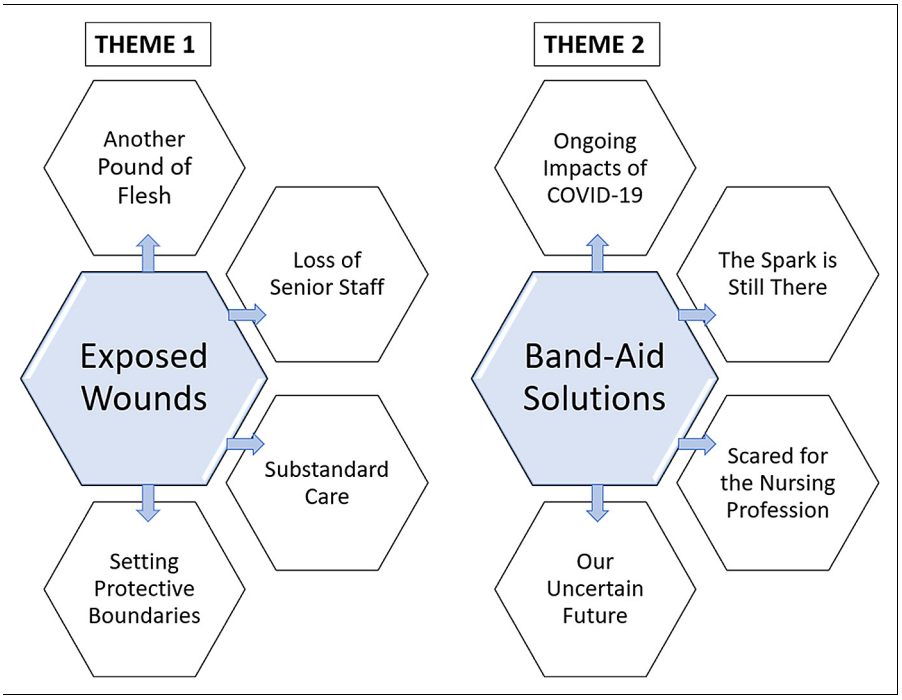

FIGURE
Major theme model.

(Figure). Levels of burnout increased during the pandemic, with most of the emergency nurse participants dropping their hours, moving roles within the profession, or leaving the profession entirely.

EXPOSED WOUNDS

The first major theme, "exposed wounds," explores how the emergency nurses managed the relentless pressures of their roles, while also attempting to manage their own well-being. The emergency nurses described being asked to work well beyond their allocated hours and noted an increase in senior staff leaving the profession, which was beginning to affect the quality and safety of care provided in the department. Dropping hours and making a conscious effort to take time to care for oneself were now occurring as the pandemic continued within Australia.

Another Pound of Flesh

Now 3 years into the COVID-19 pandemic, the emergency nurses described the increasing negative impacts of their role on their mental health and well-being and of being asked to give more of themselves to their employer than what they thought was possible:

> "Sometimes you'll get a message that will say 'there's 2 tubed patients in ED, can anyone come help?' And that just makes you feel really bad because I could go in and help with those patients, but I have a family and I think that's just the guilt." (P6)

The nurses highlighted that "I do feel like there's an element of post-traumatic stress" (P9), and when they entered the emergency department, they could "feel a lot of stress and anxiety coming back" (P9). To manage a workload that required many of the emergency nurses to forgo annual holiday leave and work longer hours, the emergency nurses described how they "pushed down and repressed a lot of my mental health issues" (P4), which ultimately returned with heightened intensity. "It all kind of bubbled up and became quite overwhelming" (P4). The emergency nurses said:

> "I feel absolutely wrecked after these last, I would say, 3 years... I feel absolutely wrecked. There's no holiday on the horizon." (P7)

When discussing the unrelenting pressures of their employment, the emergency nurses talked about "the constant text messages that come, there's like 4 or 5 a day" (P6). To protect their own time and well-being, the nurses would sometimes have to "ignore" (P6) the messages. For some, they had to step away from the profession completely:

> "I just know if I keep going, I'd end up hating nursing or something like that or my mental health would deteriorate worse or my physical health would deteriorate worse. I really struggled to get that fine balance over the last few years with nursing." (P4)

When discussing how they felt now 3 years into the pandemic, the emergency nurses described "I'm passed being burnt out, I'm into another realm. There's like a numbness now, I don't know any more what I feel" (P7). For some, they knew "I want to stay working in the ED and supporting it" (P7), but the pressure from management to work longer hours without reprieve was challenging:

> "I don't think asking people to do doubles and doing overtime is great for people's well-being. Whether or not this has all just come to light because of COVID or this has probably been a long-stemming issue and COVID just highlighted the fact." (P3)

Loss of Senior Staff

The emergency nurses not only had to manage their declining personal physical and mental well-being, but they were also managing senior staff leaving the profession and "loss of leadership" (P3) in the department. The nurses described how "there's been a huge amount of movement, in and out, more than any other time" (P2):

> "From what I can see just so many people have left that there's just not enough senior staff left to actually run the department in a safe manner at all, it's quite scary." (P9)

With the loss of senior staff, there was a loss of "reassurance that people need" (P3) from those in leadership positions in the department; "you'll see things that would have been picked up by a senior nurse much sooner" (P6). With senior staff leaving, the staff with fewer years' experience were concerned about what they were being asked to now do, in particular take on senior leadership positions:

> "I don't feel comfortable, and you can't pressure me into doing something like that. And there was probably a lot of pressure to try and move up the tree a little bit to fill in those gaps… I'm not ready for that sort of thing." (P3)

This increased pressure to step up into more senior roles "puts a greater toll on those that stay because the workforce just becomes so much more junior" (P5). From the senior staff perspective, "I see the senior staff quite desperate…it makes me really anxious… I don't want to leave them like that" (P7). Not only was COVD-19 loss of senior staff affecting colleagues, but it was beginning to affect the level of care that could be provided to patients:

> "A lot of what's happening with patients, it's really quite dangerous when they are looking at a cubicle to be a resuscitation room and you've only got junior staff out on the floor. That's just bloody dangerous." (P7)

Substandard Care

With the loss of senior staff came increasing impact on the care that could be provided to patients. The emergency nurses discussed the "substandard care" (P8) that was being provided and how this went against their nursing values:

> "You can't provide the care the patient deserves because you are short staffed. You want to provide the best care for patients, but unfortunately due to staff shortages, the care for the patients just isn't there." (P3)

The staff shortages were beginning to lead to "very poor outcomes for patients" (P7). The emergency nurses described "3 or 4 incidences in that last 2 or 3 weeks where it's been life threatening, and its due to being short staffed, not having the resources to be across a lot of this" (P7). In addition to staff shortages affecting care provided for patients, the emergency nurses highlighted that "they're [hospital management] still not allowing visitors to come in with patients unless someone is imminently dying or they've had a miscarriage or they need a carer" (P8). With a lack of focus on "person-centered care" (P8) the emergency nurses described:

> "…There is a lack of empathy for patients and compassion and reluctance to have patient advocates come with them. And that's a mixed emotion, and it goes against my ethos of nursing." (P8)

Setting Protective Boundaries

In the midst of the ongoing "frustration" (P8) of the current state of the emergency department, the emergency nurses focused more on setting "boundaries" (P6) between their work and personal life. The current working environment was no longer sustainable:

> "I definitely felt it [was] more of an unsafe environment and I just didn't want to be part of it for my own safety, but also my patients. And I know that's kind of hypocritical as well because I've left [the hospital] which leaves them [the former workplace] even more short staffed, but I guess ultimately, you've got to put yourself first sometimes." (P4)

The nurses found that either dropping hours or sharing their time between other roles was protective for their well-being. It gave the nurses "more time to do activities and keep up just around the home" (P6), which ultimately "makes you feel more in control of your life" (P6):

> "I'm finding that having a mix of roles and being able to sort of have a day or 2, or 2 days a fortnight away from physical patients is a little bit more…it's better for my own work-life balance." (P5)

The emergency nurses voiced that they were doing "the limit of what I can do" (P6). Some acknowledged that they were "taking that break from clinical nursing" (P4) and that "you do need to have a break now and then and listen to how you feel and how you're responding at work" (P4). The emergency nurses discussed how their "coping mechanisms" (P8) included "yoga" (P8), being able to "socialize" (P5), "walking the dog" (P5), and "friendship…within the workplace and outside of the workplace" (P8). Within the workplace, communication was key to feeling heard and valued as an emergency nurse in the department:

> "The staff have more voice now. Whenever staff raise issues, the issues are taken very seriously… So at least there's good communication, or lines of communication between the executives and all the staff, which was not happening before COVID." (P2)

In this first major theme, the emergency nurses highlighted that they could not give any more to their organization without it being at significant detriment to their health and well-being. Seeing colleagues leave the profession due to burnout and the subsequent impact this had on patient care increased moral distress. To protect their own well-being, the emergency nurses implemented boundaries between themselves and their workplace. However, despite implementing these boundaries, there remained a degree of uncertainty regarding their future within the department and the profession.

BAND-AID SOLUTIONS

In the second major theme, "Band-Aid solutions," the emergency nurses highlighted that although they were 3 years into the COVID-19 pandemic, they were still adapting to the many changes to clinical practice and environment. The nurses discussed that despite time passing and lessons learned, issues within the department remained unresolved and only temporary solutions were implemented. Although they continued to have a great passion for emergency nursing, the likelihood of resigning or reducing their fraction of employment was imminent for many. The emergency nurses were concerned that the profession would never recover from the impact of COVID-19.

Ongoing Impacts of COVID-19

The emergency nurses were beginning to adapt to COVID-19 changes to practice and figuring out how to manage the constantly updating virus landscape. "Now that COVID's around for almost 3 years, I think everybody has learnt how to play the game" (P2). When reflecting on how things had changed over this time, the emergency nurses reflected on how they had adapted to the pandemic with "less worry about the unknown" (P10) in the clinical environment:

> "I remember at 1 point we had a COVID positive patient in the department in an open cubicle and he'd taken his mask off for maybe 10 minutes while he was assessed… We had staff furloughed, they shut down the entire department for the day. I sort of look back and laugh at that now!" (P10)

When discussing the impact of the pandemic, the emergency nurses described that "people have developed resilience" (P2), yet COVID-19 was "just ongoing and relentless" (P8). The "strain" and "stress load" (P5) of managing COVID-19 on top of increasing acute care presentations were bringing the ED environment to boiling point:

> "We're bed blocked, we haven't got adequate beds, there's not enough staff, there's staff off sick constantly, we're still required to wear PPE [Personal Protective Equipment]. It's [COVID-19] still affecting so much. It's affecting education free time, it's affecting staff supporting each other, it's affecting staff attrition, it's affecting support for each other." (P8)

The emergency nurses discussed the political impacts of COVID-19 in Australia. Some acknowledged that "COVID has been a blessing in disguise somehow because it brought up a lot of issues that people are just quiet about in the health sector" (P2). For others, not enough had been done to highlight the increasing pressures on staff in the emergency department:

> "We just had a whole election and health care wasn't mentioned at all. And now all of a sudden, this week everyone's saying, 'Ooh, someone waited 12 hours in the emergency department.' And I'm like, yeah so what? People are actually starting to die now because we don't have the ability to do our job and I think no one's talking about that." (P9)

The emergency nurses were doing what they could to maintain their high standard of work, understanding the demands of the environment. "We expect that [ED] to always be short staffed. The workloads, it's onerous, it's busy, it's demanding" (P7). As the pandemic continued, so did the "demand for emergency services" (P2), with emergency nurses describing that "everyone's getting on with their lives but…it's not for nursing and it's not for the health environment. It's still relentless and it's still ongoing" (P8).

The Spark Is Still There

Despite the numerous challenges of the pandemic, many emergency nurses still wanted "longevity" (P5) in their careers. They were "still definitely very passionate about nursing" (P4), describing how nursing was "really a special profession" (P4):

> "I still really enjoy my job. I have bad days, but I still enjoy coming to work in the emergency department. I think that is also about the people that I work with. Hopefully even with the change of staffing, it's still the culture within the workplace that's still 1 that you want to be there for." (P5)

For some staff, they had considered "maybe it's time to step away from [clinical work] for a little while" (P10), whereas others "would prefer to look for another position in the hospital" (P7). The emergency nurses stated "burnout" (P3) and "needing a bit of change" (P3) as some of the biggest reasons to either dropping hours or resigning from their role, in addition to the moral distress of nursing in the current COVID-19 environment:

> "I have thought about seriously just resigning from the role… I haven't but I guess that's why I'm probably picking up less shifts. But I've seriously contemplated that… I love patient care and love working in

that team environment and when you can't provide the care that you want to provide, or even nearly the care, then it goes against all my values of nursing." (P8)

Scared for the Nursing Profession

When asked about what the future may hold for them and their professional practice, the emergency nurses were "scared for the nursing profession future" (P8). They stated that "no one applied for the mid-year post-graduate [certificate/diploma]" (P3). For some, this lack of confidence in the emergency nursing profession was more systemic:

"I think the health system is broken, fully broken. The staff are not necessarily the people to fix it and I don't know who will fix it. They're [the organization] relying on the kindness of the staff and the ideas of loyalty and solidarity to keep these places going." (P9)

When looking to the future, the emergency nurses were uncertain whether they could maintain their current momentum, stating that "it's really hard to get people to perform at their peak when they're already struggling with showing up to work and worried about what might happen to them" (P10). When attempting to solve COVID-19 issues in their departments, the staff were required to "think way outside the box" (P9), with their organizations having "looked at other opportunities" (P7) to keep staff "rejuvenated" (P7), such as sharing hours across other hospital departments. Others were unsure how COVID-19 issues in the department were going to be resolved:

"I really don't know what the answer is, if there is an answer to it? Everyone's going to say they want more money to stay, but is that really the answer? Or maybe being recognized? I don't know." (P3)

Despite implementing a range of "ideas" (P9) from reduced hours, shared roles between clinical environments, or stepping away for a break, the emergency nurses were "worried that it [nursing] will never go back to how it should be" (P8):

"We've still seen a lot of staff leave, a lot of staff reduce their hours as well. And I guess there's no end in sight, there's not going to be, there's no easy fix, and we're all well aware of that. So, I guess long term wise, everyone's like, 'How much longer can we do this for?'" (P5)

Our Uncertain Future

When asked about whether they would stay within the emergency nursing profession, some stated their limit would be "5 years" (P2, P10). From a leadership perspective, some outlined that they were unlikely to remain in senior leadership roles due to it being "a draining role, and it's been extra draining through COVID" (P10). For those who were working toward senior leadership, there was increased motivation to stay:

"For now, I hope to stay in the emergency department. I am working towards my CNS [Clinical Nurse Specialist], but as to the long long term, I guess, who knows really. I think time will tell as to how long things stay the way they are as to what happens. But for the immediate, short future, I see myself in the ED still." (P5)

There was a strong desire to want to continue practicing nursing in the emergency department and working with colleagues and friends who had been a source of personal and professional support throughout the pandemic. Some gave "credit to the team" for their ability to "function so well" (P10) despite the challenges of COVID-19. Others made the decision to stay in the emergency department for the immediate future because they did not feel comfortable leaving their workmates short another staff member:

"I just can't bring myself to leave it [the ED]. I can't do it. I know too many people down there. I know what position they're in and I think morally I just can't do it." (P7)

In the second major theme, the emergency nurses reflected on how the pandemic had developed over the last 3 years and that, despite the challenges they had faced, they still had a deep passion for nursing and the emergency department. A level of hopelessness was identified in what the future may hold for the nursing profession, with many leaving and a lack of new interest in the department from students and newly graduated nurses. The future of the profession on an individual level and as a whole remained uncertain as the emergency nurses managed emotions that were at conflict with their own personal and professional identity.

Discussion

This research paper aimed to explore the lived experiences of emergency nursing during the third year of the COVID-19 pandemic within Australia. It was anticipated that by

exploring and reporting on the longitudinal COVID-19 experiences of the 9 emergency nurses, greater understanding of their thoughts, attitudes, and perceptions may be achieved. By understanding this experience over time, greater insight into supportive ED practice and policy recommendations may be developed for future pandemic and epidemic events. To date, the authors are not aware of any other study that has explored emergency nurses' experiences of the COVID-19 pandemic over an extended period.

Emergency nurses in this study highlighted that as the pandemic continued within Australia and the pressure of their role increased, so did the prevalence of mental ill health including anxiety, burnout, and post-traumatic stress. These findings aligned with Zehra and Tugba,[1] where 50% of a nursing population who were caring for COVID-19 positive patients had experienced an increase in anxiety, depression, and post-traumatic stress. Zehra and Tugba[1] demonstrated that the likely reasons for this increase in mental ill health were inadequate organizational support and an increase in working hours.[1] Emergency nurses in this study highlighted similar reasons as to why they believed their levels of burnout had increased, including a lack of professional boundaries and inadequate staffing. The feeling of being "devalued" was supported by Holtz et al,[4] where nurses felt "betrayed" by their organization, feeling as though the organization put their own priorities before the well-being of staff. The emergency nurses in this present study voiced that their organizations would call or text them outside of their rostered hours, sometimes multiple times per day. This left them feeling guilty about not attending work and concerned about the well-being of their colleagues. This fracture to moral values affected professional identity and potentially the ability to remain in a profession that could no longer protect them personally and professionally.[4,6]

Now 3 years into the COVID-19 pandemic in Australia, the emergency nurses in this study voiced that they were more readily saying no, ignoring requests to work additional hours, and spending more time looking after themselves physically and mentally. When exploring the most effective support strategies endorsed by nurses, Quon et al[8] demonstrated that nurses were most interested in self-directed healing strategies. These strategies included focusing more on social and emotional well-being: spending time with family and friends, engaging in healthy eating and exercise, and seeking counseling offered or sponsored by the workplace.[8] Emergency nurse experiences in this study of boundary setting and protective strategies included not answering their phones outside of working hours to avoid contact with their employer, dropping their employment fraction to spend more time with family or work in settings other than the emergency department, and spending time on well-being activities such as exercise and personal development. Global literature congruence with this study indicates that a greater focus on providing nurse autonomy over their personal and professional healing may encourage a more resilient and empowered emergency nursing workforce.[8]

Most emergency nurses in this study voiced that, within the 3 years of COVID-19 in Australia, they had moved roles within the nursing profession, dropped their hours, or had left the nursing profession entirely. This trend of "self-preservation" was supported in global literature by Holtz et al,[4] where perceived "hopelessness" eroded nurses' sense of identity and Putekova et al,[3] where 70% of their nursing sample voiced intending to leave the profession because of unsustainable workloads and poor salary. Emergency nurses in this study expressed that although they ultimately moved roles, dropped hours, or left the profession, they still had a strong desire to return to the nursing workforce in the future. This key finding demonstrates that although the COVID-19 pandemic has had a profound negative impact on the professional and personal well-being of emergency nurses, they still desire to reenter the workforce after a professional break or change of environment. Limited global literature exists on those emergency nurses who desire to stay in the department and build a positive ED culture after the COVID-19 pandemic. Further research is required into fostering emergency nursing culture to support departments in future pandemic and epidemic events and in retention and recruitment of new staff.

Limitations

A key strength to this study was the contextual understanding the lead author had when interviewing participants and interpreting data. Having worked in the emergency department as a registered nurse, the lead author understood the context being described, having dialogue as a nurse colleague, with the ability to be removed from the clinical environment as a researcher. Another key strength to this study was its longitudinal nature. Documenting the evolution of lived experiences of the emergency nurse participants allowed for robust insight into key moments in the trajectory of COVID-19 and may better inform opportunities for intervention to protect practice and well-being of the nursing workforce.

Although this study had many strengths, such as the rich deep and longitudinal nature of the responses gained

from each participant, it was not without limitations. It was recognized that the ongoing impacts of COVID-19, particularly after the Code Brown emergency response in Victoria implemented to ensure departments did not exceed safe functional capacity, may have affected the nurses' ability to give additional time to research external to their professional roles. Despite the increased load on the emergency nurses, all 9 participants who remained from stage 2 of the study returned for a third interview. In addition, although including an appropriate cross-section of emergency nurses was achieved in this project, findings may not be generalizable to other Australian states or internationally.

Implications for Emergency Nurses

As the COVID-19 pandemic continues to affect the health of populations globally, findings from this study demonstrate that emergency nurses do not wish to accept current practice and protocol as "the new normal." Instead, emergency nurses are making the difficult decision to step away from their profession to protect their mental and physical well-being.

This presents an opportunity for organizations to explore options for the emergency nursing workforce to regain their professional autonomy and design their own professional healing. Nurse well-being in the workplace has been comprehensively documented by National Academies of Sciences,[18] with holistic nurse well-being described and broad clinician well-being frameworks outlined. These frameworks provide a foundation for further development of emergency nursing–specific guidelines for practice and well-being. With reduced staff availability and increasing patient presentation back to emergency departments in the peri-COVID-19 era, this puts added strain on organizations to manage workforce and admission capacity. However, it is also acknowledged that by maintaining the current practice of asking health care workers to go above and beyond their professional and personal capacity, workforce numbers will continue to decline.

Empowering nurses to reduce their working fraction to maintain an appropriate work-life balance, share their employment fraction with other departments or outside of the organization, and engage in other professional development ensures that decision-making autonomy is returned to the individual. Furthermore, implementation of professional boundaries such as policies on contact outside of working hours, allowing staff to take accrued leave entitlements, and permitting staff to provide input into professional practice and culture guidelines within the department may further enhance role satisfaction and increase intentions to remain in the emergency nursing workforce.

Conclusion

The COVID-19 pandemic has had devastating consequences on the personal and professional well-being of emergency nurses. Findings from the third year of the pandemic within Australia demonstrate that the emergency nurses in this study are experiencing high levels of burnout and poor professional satisfaction, and are voicing intentions to leave the profession if they have not done so already. As the world moves to managing COVID-19 as a recognized common respiratory illness, providing time and space for emergency nurses to voice their concerns, design well-being interventions, set professional boundaries, and reconnect with their professional passion may see lower attrition rates and higher levels of professional satisfaction. These findings present an opportunity for hospital management to review current practices within their organization, recognize the impact of the pandemic on emergency nurses, and facilitate a voice for staff to reinvigorate the emergency nursing culture for the future.

Data, Code, and Research Materials Availability

Ethical approval for this project was granted by the Federation University Human Research Ethics Committee, approval number: A20-095.

Author Disclosures

Conflicts of interest: none to report.

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Individual Earthquake Resilience Scale: Psychometric Properties of the Turkish Version

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Contribution to Emergency Nursing Practice

- The Individual Earthquake Resilience Scale demonstrated strong validity and reliability, making it a robust instrument for evaluating individual earthquake resilience in Turkish contexts.
- This study contributes to the effectiveness of emergency nursing practice by providing a reliable and validated tool to assess individual earthquake resilience, enabling tailored interventions to enhance disaster preparedness and response.
- This study expands the cross-cultural applicability of the Individual Earthquake Resilience Scale, highlighting its potential for utilization in diverse cultural settings beyond its original language. This opens doors for further research and applications worldwide, enhancing emergency nursing practice in earthquake-prone regions.

Abstract

Introduction: The Individual Earthquake Resilience Scale was developed with the aim of measuring individual resilience in the context of earthquake disasters. The purpose of this study was to adapt the Individual Earthquake Resilience Scale into Turkish and examine its psychometric properties.

Methods: A total of 419 adult individuals (65.2% females, median age = 43.35) participated in the study. The psychometric properties of the scale were examined in terms of content validity, face validity, construct validity, criterion-related validity, and reliability. Translation and back-translation processes were conducted.

Results: Confirmatory factor analyses revealed that the scale has a 4-factor structure. In terms of criterion-related validity, a positive relationship was found between Individual Earthquake Resilience and the Short Psychological Resilience Scale. The reliability of the scale was assessed using Cronbach's alpha coefficient. The total scale had a Cronbach's alpha score of 0.892. The Individual Earthquake Resilience Questionnaire subscales had Cronbach's alpha scores of 0.620, 0.817, 0.776, and 0.692, respectively.

Discussion: The study confirmed that the 4-factor structure of the Individual Earthquake Resilience Scale met the required standards for validity and reliability at an acceptable level. This validates its use in assessing individual resilience within the context of earthquakes in a Turkish-speaking population.

Key words: Earthquake; Psychometric properties; Earthquake resilience

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Introduction

Natural disasters, being both unpredictable and uncontrollable, are common, occurring without warning regarding their specific time or location. Earthquakes are natural disasters with far-reaching and devastating consequences, causing both a significant loss of life and substantial economic damage. Their impact can extend far beyond the initial event, affecting communities and economies for an extended period. In 2021, a total of 2206 earthquakes with a magnitude of 5 or higher were documented worldwide.[1]

Turkey is 1 of the countries that have recorded the highest numbers of earthquakes. Turkey experiences

thousands of earthquakes of varying magnitudes each year because it is situated on fault lines. A total of 47,164 earthquakes occurred in 2023 until June.[2] On February 6, 2023, 2 powerful earthquakes, followed by 11,020 aftershocks, struck the southern and southeastern regions of Turkey, as well as the border region with Syria. Two major earthquakes, 1 with a magnitude of 7.7 centered in Pazarcık, Kahramanmaraş, and another with a magnitude of 7.6 centered in Elbistan, Kahramanmaraş, had a direct impact on 11 provinces and affected more than 14 million people in Turkey. These earthquakes resulted in the destruction of more than 18,000 buildings across 11 provinces and caused damage to at least 62,000 homes. As of March 1, 2023, the estimated number of earthquake-related fatalities in the affected region stood at approximately 55,000.[3]

Reducing disaster losses, minimizing vulnerability to climate-related extreme events, and mitigating disaster-related economic losses, human casualties, and the number of affected individuals are direct objectives of the United Nations Sustainable Development Goals.[4,5] Disaster risk reduction has evolved into a global strategy focused on enhancing the ability to effectively manage extreme events at the individual, family, community, and societal levels. This process of capacity development to anticipate hazards, adapt to them, and recover from their impact is commonly referred to as resilience.[6] According to Ungar,[7] resilience is the capacity of a system "to anticipate, adapt and reorganize itself under conditions of adversity in ways that promote and sustain its successful functioning." As for disasters, resilience equips the system to respond to, adapt to, and recover from extreme events. Individual earthquake resilience refers to an individual's capacity to respond and adapt to disasters, fostering the development of self-protection and survival skills in the face of such events. It involves assessing earthquake disaster resilience, identifying influencing factors, and then concentrating on residents' ability to adapt and respond effectively.[8] Individual resilience can play a pivotal role in mitigating the adverse consequences that may ensue after a natural disaster and in adapting to distressing situations.[9,10] Hence, assessing earthquake disaster resilience and identifying the factors that influence it is crucial. This information can help enhance people's capacity to adapt and respond effectively in such situations.

One of the most commonly used survey instruments in disaster research conducted in Turkey is the Connor-Davidson Resilience Scale (CD-RISC).[11-13] The CD-RISC was originally developed in English language[14] and adapted to Turkish by Karairmak.[15] The scale consists of 3 subscales: (1) tenacity and personal competence, (2) tolerance of negative affect, and (3) spiritual influences. Higher scores indicate more psychological resilience. The scale is also frequently used in disaster research conducted in Turkey.[16-18]

Despite frequent use of the CD-RISC in Turkish earthquake preparedness research, a more recently developed survey instrument that specifically addresses earthquake preparedness might be more useful. This study focused on the Individual Earthquake Resilience Questionnaire (IERQ) developed by Jiang et al.[8] Unlike other resilience scales, the IERQ concentrates on health status, mental resilience, social adaptation, and disaster response capacity.

There is no valid and reliable Turkish scale that can be used to assess earthquake-specific resilience. Therefore, this study was conducted to adapt the IERQ to Turkish.

Methods

This study used a methodological design with cross-sectional data collection to determine the psychometric properties of the IERQ Turkish version.

RESEARCH SETTING AND SAMPLE

The study included parents of students from secondary schools in Ankara, Turkey, as the study population. Following Tavşancıl's[19] recommendation, a standard practice in scale adaptation research suggests having a sample size 5 to 10 times the number of items in the scale. Given that the IERQ comprises 17 items, the initial target sample size was set at 170 participants.[20] However, the final sample was expanded to 419 participants to enhance the clarity of the psychometric structure, aligning with the approach advocated by Gregoire in 2018.[21]

Research data were collected by reaching out to parents through students in schools. Teachers were responsible for distributing the questionnaires and consent forms in sealed envelopes to the students, who were then instructed to pass them on to their respective parents. The questionnaire provided parents with detailed information about the study's purpose and procedures. Families participating in the study were asked to provide their consent by signing a form and filling out a questionnaire. Each participant filled out the questionnaire, sealed it in an envelope, and returned it to the teacher through the student.

TRANSLATION AND ADAPTATION PROCESS

When adapting a scale into Turkish, the primary objective is not merely to translate the scale from English into Turkish but rather to develop a comprehensible scale that aligns with

Turkish culture. Hence, the adaptation process considered both the Turkish language and culture. First, language validity analyses were conducted for the Turkish adaptation. The scale was initially translated from English into Turkish by an individual who is bilingual in both Turkish and English, with English as their native language but having lived in Turkey for an extended period. Subsequently, a native Turkish speaker, proficient in English, conducted the reverse translation from Turkish back into English. A professional translation from English to Chinese was conducted, followed by a back translation performed by another bilingual translator. A common Turkish questionnaire was developed by a person who has worked in the field of disasters. The translators carefully took into account cultural, psychological, and grammatical differences in both languages. The translation process prioritized achieving language equivalence.[21] Therefore, a thorough assessment of the translation and back-translation processes was conducted. The final Turkish version was obtained.

PARTICIPANTS AND PROCEDURE

A pilot study was conducted with 10 adults to evaluate the clarity of the scale.[22] These adults were selected through purposive sampling to assess the scale's clarity. The individuals chosen for the pilot study were easily accessible representatives of the intended population. Based on the pilot test results, no changes were considered necessary for the items. Each participant took between 7 and 10 minutes to complete the questionnaire. Participants from the pilot study were excluded from the main research sample. The inclusion criteria for the study were: at least 28 years old, able to complete questionnaires independently, able to provide an informed consent, and adults residing in the region at the time of the study, regardless of the duration of their residence.

The study was conducted in Ankara, the city that received the most earthquake-affected immigrants from the Kahramanmaraş earthquake.

DATA COLLECTION TOOLS

The information was gathered through a personal data form, the Brief Resilience Scale (BRS), and the IERQ. Demographic variables were collected with the personal information form.

IERQ

The IERQ was developed by Jiang et al[8] to assess earthquake-specific resilience. The scale consists of 17 items rated on a 5-point Likert-type scale. It has 4 subscales: (1) health status, (2) mental resilience, (3) social adaptation, and (4) disaster response capacity. The total score ranges from 17 to 85, with higher scores indicating higher earthquake-specific resilience. In this study, the scale had a Cronbach's alpha score of 0.875.

BRS

The BRS was developed by Smith et al[23] and adapted to Turkish by Doğan.[24] The instrument consists of 6 items rated on a 5-point Likert-type scale. The total score ranges from 6 to 30, with higher scores indicating high resilience. In this study, the scale had a Cronbach's alpha score of 0.83.

STATISTICAL ANALYSIS

To minimize the impact of missing data on our analysis, we implemented a 3-step process.

Defining a Threshold

We permitted a maximum of 5% missing data per survey to be included in the analysis. This threshold aimed to balance inclusivity of participants with maintaining a robust data set. The overall percentage of missing data in our data set was approximately 3%, falling within our acceptable threshold.

Understanding the Missingness

Our assessment indicated that the missing data were missing at random, meaning the likelihood of missingness was not related to the missing values themselves but rather to other observed variables in the data set.

Imputing Missing Values

We used mean imputation to replace missing data points. This method involved substituting missing values with the mean of the observed values for that variable. We selected this technique based on the characteristics of our data and the pattern of missingness. We commenced our analysis with item analysis, focusing on descriptive statistics and item-to-item correlations. Subsequently, confirmatory factor analysis (CFA) was conducted to ascertain construct validity and concurrent validity. In our data analysis section, we will explicitly outline the acceptable standards set for each of these analyses.

After the validation analyses, our focus shifted to measures of reliability, encompassing internal consistency assessed through Cronbach's alpha. Time invariance was examined through test-retest analysis and Pearson's correlation. Finally, all analyses were executed using the Analysis of

TABLE 1
Sample characteristics

Age (in y)	**Mean (SD)**	**43.35 (SD = 8.125)**
Sex	n	%
Women	273	65.2
Men	146	34.8
Marital status		
Married	349	83.3
Single	70	16.7
Education		
Illiterate	2	0.5
Primary school	23	5.5
Middle school	33	7.9
High school	149	35.6
Bachelor's degree	170	40.6
Graduate studies	42	10.0

Moment Structures (AMOS, IBM, version 23.0) statistical package, adhering to the systematic order as outlined earlier.

Results

We received a total of 419 returned surveys, which were deemed complete enough for inclusion in our analysis. The participants had a mean age of 43.35 years, with the majority being married (83.3%). In addition, less than half of the participants held bachelor's degrees (40.6%) (Table 1).

DESCRIPTIVE ANALYSIS

Participants had a mean IERQ score of 67.52 (minimum = 33 and maximum = 85). They had mean IERQ "health status," "mental resilience," "social adaptation," and "disaster response capacity" subscale scores of 12.94 (SD = 2.00), 19.45 (SD = 3.94), 20.89 (SD = 3.19), and 14.23 (SD = 3.64), respectively (Table 2).

VALIDITY

Content Validity

The content validity ratio was determined through the Davis technique, involving evaluation by 7 academics who used a 4-point rating scale (1 = the item is suitable, 2 = minor revision required, 3 = major revision required, 4 = the item is unsuitable).[24] Following feedback from the experts, the items were revised. Both the content validity ratios and the scale content validity index (S-CVI) were calculated as 1.0. Face validity was established through the evaluation of the scale by a panel of experts who assessed whether it accurately represented the intended construct for measurement. Minor modifications, primarily rewording for clarity in Turkish, were applied to some of the items as needed.

Construct Validity

CFA was performed to confirm the validity of the factor structure. Consistent with established criteria outlined by Büyüköztürk[25] and Ersin et al,[26] the results indicated a satisfactory model fit for the 4-factor model based on various goodness-of-fit indices. The results were as follows: Chi-square divided by degrees of freedom = 3.345, adjusted goodness of fit index = 0.872, goodness of fit index = 0.905, normed fit index = 0.891, comparative fit index = 0.920, incremental fit index = 0.921, Tucker-Lewis index = 0.904, and root mean square error of approximation = 0.075. Figure shows the CFA path diagram.

In examining the correlations between subscales and total scores, significant low to moderate correlations were observed between subscales. In particular, the correlations between health status and mental resilience were 0.603,

TABLE 2
Descriptive statistics of responses to the Individual Earthquake Resilience Scale

Dimensions of scale	**Minimum**	**Maximum**	**Mean**	**SD**
Health status	3.00	16.00	12.94	2.00
Mental resilience	7.00	25.00	19.45	3.94
Social adaptation	7.00	25.00	20.89	3.19
Disaster response capability	4.00	20.00	14.23	3.64
Total	33.00	85.00	67.52	10.32

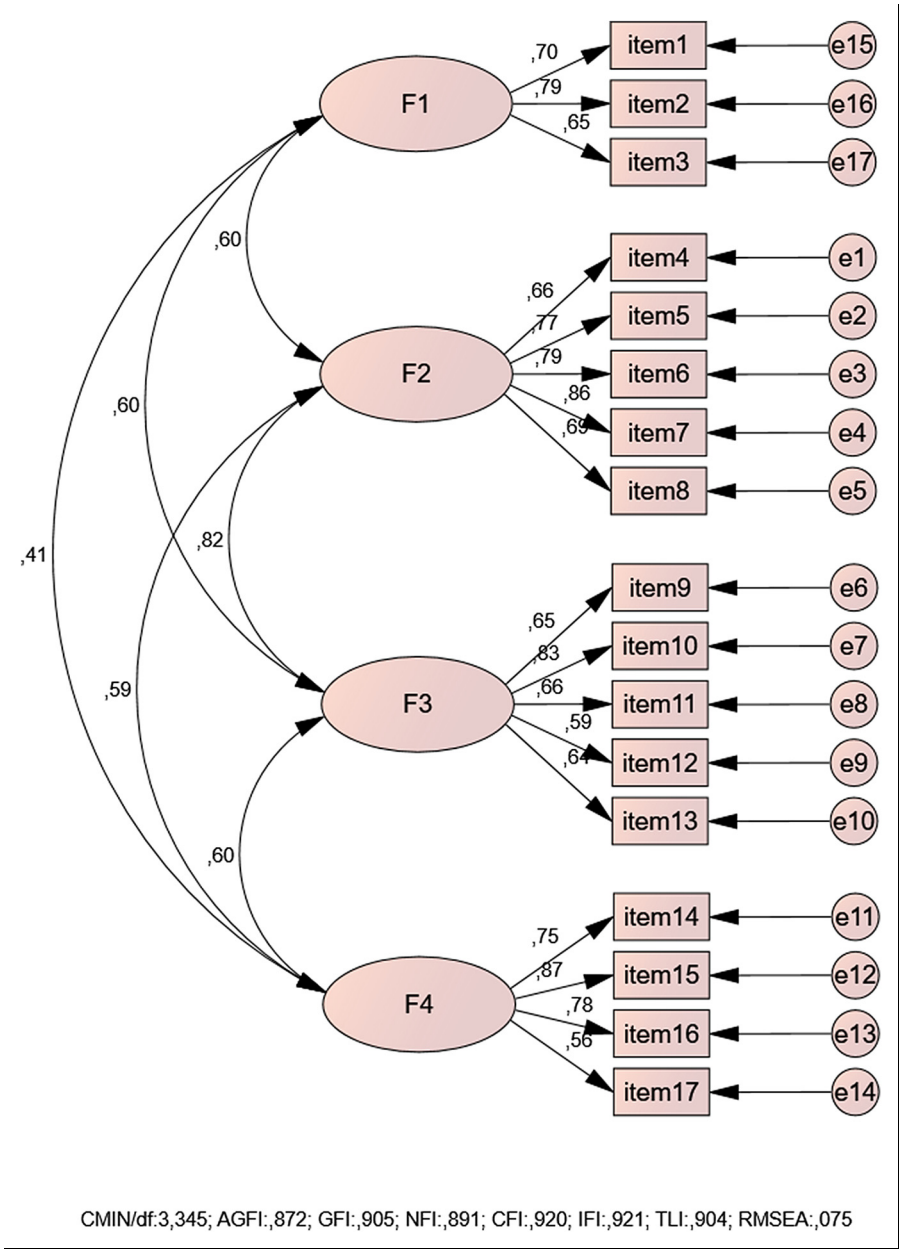

FIGURE
Path model.

between health status and social adaptation were 0.602, and between health status and disaster response capacity were 0.408. Furthermore, substantial correlations were identified between mental resilience and social adaptation at 0.817, mental resilience and disaster response capacity at 0.588, and social adaptation and disaster response capacity at 0.598.

Criterion-Related Validity

The BRS was used for criterion-related validity. The result showed a positive correlation between the scale scores (r = 0.52*, $P < .001$ [2 tailed]). This result indicated that the IERQ had criterion-related validity.

RELIABILITY

The reliability of the scale was assessed using Cronbach's alpha coefficient, and the internal validity of the items was examined through item-total correlation analyses.[27] The total scale had a Cronbach's alpha score of 0.892.[28] The IERQ "health status," "mental resilience," "social adaptation," and "disaster response capacity" subscales had Cronbach's alpha scores of 0.620, 0.817, 0.776, and 0.692, respectively. A correlation of 0.40 to 0.70 was considered satisfactory.[29]

A test-retest method was used to assess the scale's consistency over time. Pearson's correlation test was used to examine the strength and significance of the relationship between the 2 measurements. After reaching a total sample size of 419 participants, the scale was administered to 100 randomly selected participants for the second time with an interval of 4 weeks.[19,22] The scale had a post-retest reliability coefficient of 0.950.

Discussion

Our study successfully adapted the Individual Earthquake Resilience Scale (IERS) to the Turkish context. CFA confirmed the 4-factor structure of the original scale, with each item significantly predicting its relevant subscale. The scale demonstrated high internal consistency and satisfactory discriminative power, indicating reliable measurement of individual earthquake resilience. In addition, a positive correlation with the Short Psychological Resilience Scale supported the IERS's criterion-related validity.

The adapted IERQ exhibits a robust 4-factor structure, replicating the original scale's findings[8] while demonstrating acceptable[30] model fit within the Turkish context. However, the slightly lower explained variance suggests potential cultural or sample-specific influences, paving the way for further research exploring this discrepancy. The instrument showcases strong internal consistency[26] and satisfactory discriminative power, ensuring reliable measurement of earthquake resilience. Both versions demonstrate strong validity based on expert assessment,[31] although the discrepancy in the S-CVI/Ave score warrants further investigation.

Although the test-retest analysis confirms strong short-term reliability, evaluating its stability over longer periods and diverse contexts could enhance the instrument's applicability. Exploring alternative models, potential cultural influences, the S-CVI/Ave discrepancy, and the link between interventions and resilience changes using the IERQ present valuable avenues for future research. Overall, the adapted IERQ demonstrates its potential as a valid and reliable tool for assessing and improving earthquake resilience in Turkish populations, laying the groundwork for research, practice, and intervention efforts in vulnerable communities.

Although existing instruments may address earthquake resilience in general,[32,33] the adapted IERQ offers a more culturally specific and psychometrically robust alternative, potentially leading to more accurate and impactful assessment and intervention efforts.

Future research could explore its application in diverse Turkish subgroups, examine its effectiveness in intervention programs, and investigate its predictive capacity for long-term earthquake adaptation. Moreover, there is a need for exploring the impact of varying earthquake exposure levels in future research. Cross-cultural comparisons with other versions of the IERS could elucidate potential cultural influences on earthquake resilience.

Limitations

The robust aspect of our study is reflected in the substantial sample size of 419 participants, contributing to the comprehensive analysis and validation of the adapted IERQ to the Turkish context. This is the first study to adapt the IERQ to Turkish culture. In addition, future translations and/or cultural adaptations should undergo factor extraction to ensure the stability of the 4-factor structure.

A significant limitation of this study is the exclusive utilization of individuals of child-rearing age (with a mean age of 43.35 years) in Ankara as our sample. Consequently, the generalization of results beyond Ankara and to an older demographic poses a challenge. Another potential limitation is the presence of response bias, given that there were individuals who did not respond to our participation request, and their perspectives may differ from those who participated.

Implications for Emergency Nurses

The Turkish IERS provides emergency nurses with a powerful tool to directly enhance their support for individuals living in earthquake-prone areas. By pinpointing those most susceptible to distress and maladaptive coping, nurses can prioritize interventions and allocate resources efficiently. Understanding individual strengths and weaknesses in earthquake resilience allows them to tailor interventions, building on existing coping mechanisms and developing strategies for effective adaptation. Furthermore, the IERS enables nurses to monitor the effectiveness of their efforts by tracking changes in resilience over time and making

adjustments as needed. This real-time feedback loop ensures interventions remain relevant and impactful.

Beyond its immediate application, the Turkish IERS also unlocks valuable insights for future research. Emergency nurses can play a crucial role in refining and expanding the IERS. Validation studies in other languages and cultural contexts can broaden its reach and applicability, whereas exploring its potential for assessing resilience in different types of disasters can yield crucial knowledge for disaster preparedness and response. This active research engagement fuels continuous improvement of the IERS, ensuring it remains a relevant and reliable tool for future generations of emergency nurses. Ultimately, the IERS holds the potential to significantly enhance emergency nursing practices in earthquake-prone regions. By equipping nurses with the resources and expertise to evaluate and address individual resilience, we can empower communities to become more resilient and prepared, and to ultimately minimize the human impact of future earthquakes.

Conclusion

The outcomes demonstrate that the Turkish adaptation of the IERQ is a practical, valid, and consistent tool suitable for the Turkish cultural context. Scholars can use this instrument to explore the connection between earthquake-specific resilience and diverse variables. Furthermore, researchers are encouraged to assess the scale's psychometric properties among earthquake survivors and examine its validity and reliability across different age groups.

Data, Code, and Research Materials Availability

To adapt the IERQ into Turkish, permission was obtained by email from PLOS ONE, where the original scale was published. The study was approved by the ethics committee of the University. Permission was obtained from all schools and the Ministry of National Education.

Author Disclosures

Conflicts of interest: none to report.

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Emergency Department Discharge Teaching Interventions: A Scoping Review

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Contribution to Emergency Nursing Practice

- The current emergency department discharge process does not provide patients with sufficient self-management skills, leading to poor comprehension of discharge instructions, poor adherence to medications, follow-up, care plans, return visits, hospital admissions, and adverse effects after ED visits.
- This scoping review highlights multimodal discharge teaching interventions that incorporate patients' individualized learning styles (auditory, kinesthetic, reading/writing, and visual) to ensure adequate patient recall of discharge instructions and prevent adverse events.
- Emergency nursing practice opportunities include incorporating multimodal teaching approaches based on ED patients' individualized learning styles and prioritizing sufficient time to assess patients' ability to recall information through auditory teach-back or similar returned skill-based demonstration methods, thus encouraging health equity and mitigating disparities among patients with low health literacy.

Abstract

Introduction: Emergency department discharge education is intended to provide patients with information to self-manage their condition or injury, identify potential complications, and follow-up or referral. However, most patients cannot recall the discharge information provided, leading to adverse clinical outcomes, return visits, and higher costs. A scoping review was undertaken to explore discharge education interventions that have been studied in the emergency department setting and outcomes that have been used to evaluate the effectiveness of the interventions.

Methods: A literature review was conducted using the databases PubMed/Medline, Cumulative Index to Nursing and Allied Health Literature, and Education Resources Information Center, with search terms focused on emergency nursing and patient discharge education interventions.

Results: Of the publications identified, 18 studies met the inclusion criteria. There was variation among studies on the conditions/injuries and populations of focus for the intervention. The interventions were categorized by learning styles, including auditory (n=10), kinesthetic (n=1), visual (n=15), reading/writing (n=1), and multimodal (n=7). Outcomes evaluated included those that were patient-specific (education, self-management, clinical, and adherence) and metrics of the health system and public health.

Discussion: Multimodal discharge education that addresses various learning styles and levels of health literacy improved patient education, self-management, and clinical outcomes. Additional support and reminders improved patient adherence. Identified gaps included limited kinesthetic interventions and culturally tailored education. Translational science for

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advancing sustainable interventions in clinical practice is needed to enhance the emergency department discharge process and patient, system, and public health outcomes.

Key words: Emergency nursing; Discharge education intervention; Patient preferred learning styles; VARK learning style framework

Emergency Department Discharge Teaching Interventions: A Scoping Review

Emergency Department (ED) discharge education refers to providing knowledge for individuals to manage their condition or injury in the home environment and providing follow-up instructions.[1] The visual, auditory, read/write, and kinesthetic (VARK) learning styles provide a framework for considering ED patients' preferred learning styles based on how learners obtain information through the VARK senses.[2] These learning style preferences include visual (graphics, handouts, videos, or apps), auditory (lectures, repeating information out loud, or playing music), reading/writing (notes, workbooks, or reports), and kinesthetic (tactile learning, demonstrations, or games).[2] Using strategies specific to the patient's preferred learning styles during ED discharge education can help to convey relevant information and facilitate comprehension of self-management skills.[3] The emergency department provides routine written discharge instructions (reading/writing) that may include basic pictures related to their diagnosis (visual), with various levels of verbal education (auditory) by the emergency nurse. However, the emergency department's routine discharge may not meet every patient's learning needs and can result in inadequate communication between the emergency nurse and patient.[4] Patient knowledge deficits[3] can lead to poor care management and higher costs.[1]

Current research identifies ED discharge education as a gap in our current health care system, with 40-80% of the educational content forgotten immediately or incorrectly remembered by the patient.[5] Emergency nurses report a perceived lack of quality in discharge education practices due to barriers that include but are not limited to competing priorities, inadequate preparation time, communication challenges, and difficulty assessing patient learning styles.[6,7] In addition, practice setting barriers can include interruptions or distractions during the ED discharge education process.[7,8] Patient-related factors may also pose barriers to the effectiveness of ED discharge education. Barriers consist of the patient's physiologic status and cognition, differing priorities, mismatch between the education delivery and learning preferences, or level of health literacy.[4,8,9]

This ED discharge education gap may directly affect the patient's ability to attain the knowledge, skills, and confidence to self-manage their condition or injury, adhere to follow-up, and comply with prescribed medications.[1,3,8] This gap can increase the risk of adverse outcomes, unnecessary return ED visits, and poor patient satisfaction.[1,7,9] Although optimal ED discharge education does not guarantee patient adherence to the instructions and follow-up recommendations, at a minimum, it should provide the patient with the information needed to make informed choices or obtain further support. An exploration of ED discharge education interventions that have been studied may reveal insights into effective strategies to improve patient comprehension, discharge quality, and patient satisfaction. Thus, the purpose of this scoping review was to evaluate ED discharge education interventions that were categorized according to the 4 VARK learning styles. The main questions guiding this scoping review were: Using the VARK framework, what discharge education interventions have been studied in the ED setting, and for which patient conditions? What methodologies have been used to test the effectiveness of ED discharge education interventions? What outcomes have been assessed in studies evaluating ED discharge education interventions? What gaps have been identified in the literature related to ED discharge education?

Methods

This scoping review followed the Arksey and O'Malley (2005)[10] method, which includes 5 stages: (1) identifying the initial research question; (2) identifying relevant studies; (3) selecting studies; (4) extracting data; and (5) collating, summarizing, and reporting the results. The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) extension[11] for scoping reviews guided reporting.

LITERATURE SEARCH

A literature search, review of abstracts, and data abstraction were undertaken by the authors with assistance from a professional librarian. Publications from peer-reviewed journals were searched using the following databases: PubMed (n=95), CINAHL (n=56), Education Resources Information Center (ERIC) (n=28), and Journal of Emergency Nursing (JEN) (n=3). Keywords and MeSH terms included "Emergency Nursing" [MeSH], "Patient

Education as a topic" [MeSH], "Audiovisual Aids" [MeSH], "Video Recording" [MeSH], "Educational Technology" [MeSH], including "Teaching Materials" [MeSH] with filters placed for studies published from 2014 to May 2023. In addition, a search of the grey literature was conducted using Google with the terms "Emergency Department discharge teaching intervention" (n=104).

INCLUSION AND EXCLUSION CRITERIA

Inclusion criteria included: (1) primary studies evaluating an educational intervention in the emergency department for ED patients of any age and any diagnoses; (2) Randomized Control Trials (RCT), interventional quasi-experimental studies, and quality improvement publications; (3) published in English between January 1st, 2014, to May 1st, 2023.

Exclusion criteria included: (1) primary studies that evaluated an educational intervention in other departments; (2) did not include discharge educational interventions; (3) non-interventional study designs.

SCREENING AND EXTRACTION

Identified articles from the search were imported into an online systematic review management tool used to streamline the review process, and abstracts were screened by 2 independent reviewers (AC and AB) according to the inclusion and exclusion criteria. A third author resolved discrepancies between the reviewers. Eligible studies were retained for full-text screening, and identified articles were thoroughly reviewed for data extraction *(see Figure 1. PRISMA Diagram. Discharge Teaching Intervention Study Selection Process).* Data from each article (eg, author, study title, journal, study location, study aims, study design, education intervention, main findings) was extracted into an electronic table for analysis (see supplemental materials).

Results

Studies included in the scoping review (n=18) were published between 2018 and 2022. Study designs consisted of experimental (n=11) and quasi-experimental (n=7). Studies were conducted in France (n=1), Netherlands (n=2), Ireland (n=2), and the United States (U.S.) (n=13). ED locations included large inner-cities (n=3), urban (n=4), rural (n=2), community (n=4), academic (n=4), trauma centers (n=5), military (n=1), free-standing (n=1), single-center (n=13), and multi-center (n=5) health care systems. *(Table 1: Extracted Data from Included Studies on ED Discharge Education).*

Convenience or purposive sampling was used for recruitment in all studies. The sample size ranged from 52 to 9,093 participants per study, including pediatric and adult ED patients. Study participant inclusion criteria included: female and male ED patient participants of any age (n=3),[13,14,16] female and male pediatric-focused ED patient population (n=2),[18,20] female and male adolescent and adult population (n=1),[25] female and male adult population (n= 9),[12,17,19,21-23,27-29] and older adult-specific ED patient population (greater than 50 years old) (n=1).[24] Other studies focused on female-only adolescent and adult ED patients (n=2)[15,26] or military-only female and male adult ED patients (n=1).[28] Four studies combined the ED patient (pediatric) with their caregivers (n=1)[18] and ED patients (adult) with the ED physician providing direct care (n=3).[13,22,23]

All studies reported participant characteristics, including self-reported sex, age, ethnicity/race, education level, and income for control and intervention groups. One study included health literacy as a participant characteristic.[22] Most studies focused on English-only patients, while others focused on multilingual (Spanish, Dutch, or French) education (n=5).[14,16,17,21,25] The chief reason for an ED visit reported in the studies included body system disorders, injuries, assaults, uncomplicated infections, health promotion education, or prescription refills *(See Table 2: Patient Conditions Addressed in ED Discharge Education).*

EDUCATIONAL INTERVENTIONS

All studies compared standard discharge education content and a discharge intervention. The primary discharge education strategy of the intervention was categorized for the scoping review according to VARK learning styles,[2] including:

- Visual (n=15)[12-15,17-20,22-26,28,29]
- Auditory (n=10)[12,16,17,20-25,27]
- Reading/writing (n=1)[12]
- Kinesthetic (n=1)[12]

Several studies used a multimodal interventional approach (n = 7).[12,17,20,22-25] Visual-focused interventions consisted of videos (n = 7),[12,15,17,24,26,28,29] pictorial aids (n = 2),[14,18] guides (n = 1),[13] flyers (n = 1),[17] cards (n = 2),[19,26] brochures (n = 1),[20] leaflets (n = 1),[25] or 1-page sheets (n = 2).[22,28] Auditory-focused interventions included teach-back (n = 3),[16,21,27] patient presentations (n = 1),[12] counseling/educational sessions (n = 2),[12,20]

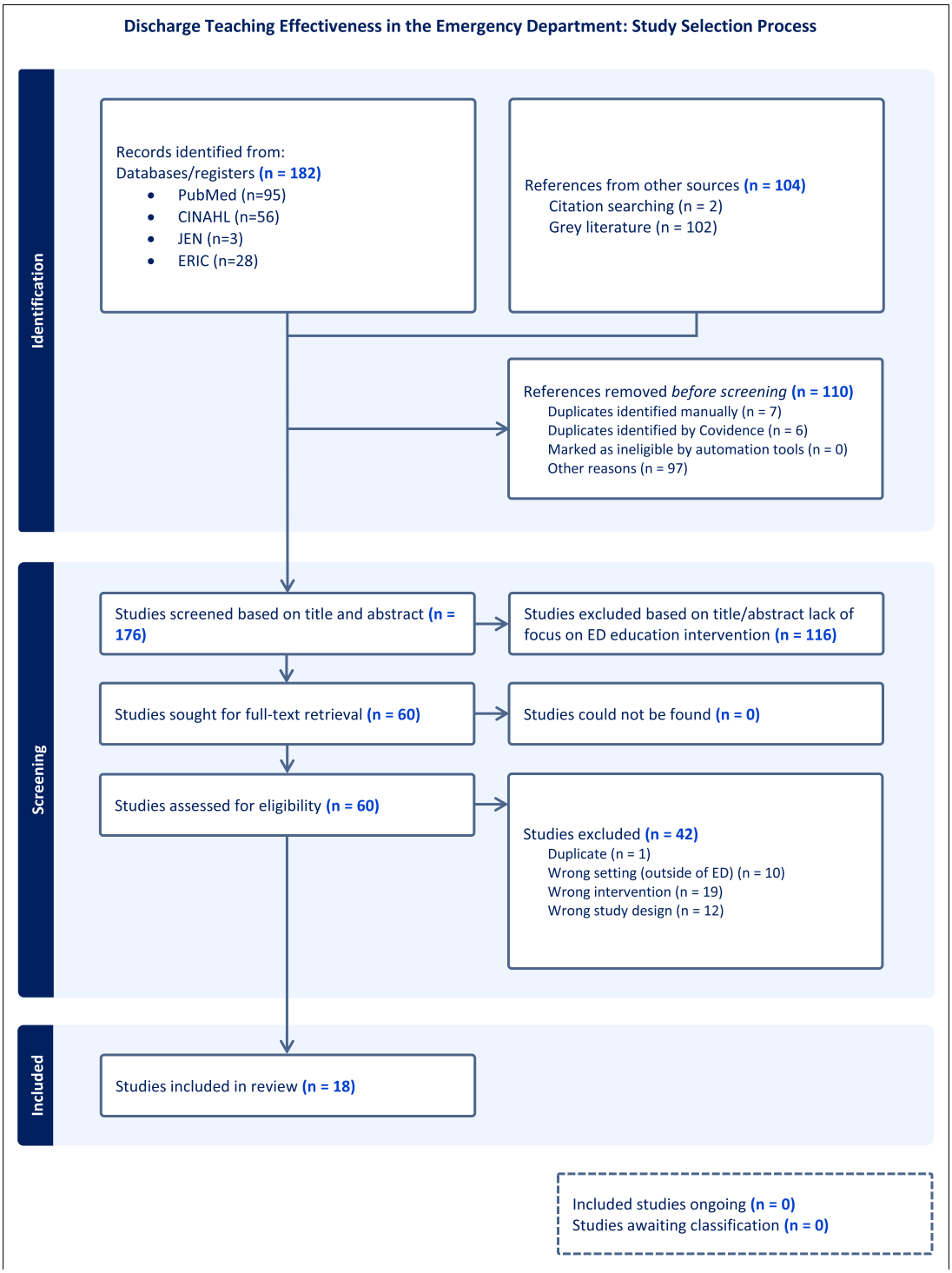

FIGURE 1

PRISMA diagram. discharge teaching intervention study selection process.

TABLE 1
Extracted data from included studies on ED discharge education

Author	Purpose	Study design/ population	Intervention description	Main findings	Outcomes and identified gaps
Boden-Albala et al. 2019[12]	Culturally tailored skills-based educational intervention	Experimental: RCT (with **1**-year follow-up)/multi-center (n=4) EDs in U.S. 552 adult ED or ED-to-hospitalized stroke and TIA patients	**Auditory:** educational session via PowerPoint presentation **Auditory:** Telephone call **Kinesthetic:** Skill-based returned demonstration **Reading/ Writing:** Workbook. **Visual:** Video	**Testing the intervention:** Biophysiological improvements automated blood pressure cuff **Main findings:** (-/+)	**Outcomes:** Long-term biophysiological improvements and compliance. Review of health literacy. **Gap:** Few behavioral intervention studies focused on skills-based approach. Need for culturally tailored, skills-based strategies
Chiu et al. 2021[13]	Effectiveness of automated discharge instruction system	Quasi-Experimental: Experimental (Non-randomized)/ Single-center urban academic ED in U.S. 2,824 pediatric and adult ED patients who smoke tobacco	**Visual:** Printed Self-Help guide	**Testing the intervention:** Percentage of E.H.R. automated printed counseling **Main findings:** (+)	**Outcomes:** Streamlining automated informatics. **Gap:** E.H.R. manual selection of additional self-help guides
Dermody et al. 2021[14]	Educate patients to self-care at home, address any remaining concerns or questions, and inform patients about available community support	Experimental: Systematic Review and Meta-Analysis of RCTs/ Multi-Center (n=4). 1,347 pediatric and adult ED patients with lacerations, wounds, or medication prescriptions	**Visual:** Pictorial Aid	**Testing the intervention:** Verbal recall questions by nurse and forced-choice questionnaire on patient satisfaction, adherence, and perceived comprehension. **Main findings:** (+/-)	**Outcomes:** Improving patient perceived comprehension, compliance, and satisfaction. Supported pictorial discharge advice. **Gap:** Pictograms needed for at-risk patient groups. Costs of cartoonists, educationalist for accurate age and literacy, paper and printing

continued

TABLE 1
Continued

Author	Purpose	Study design/ population	Intervention description	Main findings	Outcomes and identified gaps
Gilmore et al. 2019[15]	Efficacy of video interventions on PO misuse after sexual assault	Quasi-Experimental: Cross-sectional study (Intervention, non-randomized)/ Single-center ED in U.S. 154 Adolescent and adult female ED sexual assault patients	**Visual:** Video intervention	**Testing the intervention:** Telephone follow-up interview on satisfaction and adherence. **Main findings:** (+)	**Outcomes:** Mental health and substance abuse prevention. **Gap:** Male, LGBTQ+ patients with traumatic event exposure
Hodges et al. 2021[16]	Nurse-led teach-back intervention could improve patients' satisfaction with discharge information	Quasi-Experimental: Quality Improvement Project (Intervention, non-randomized)/ Single-center ED in U.S. 2,570 pediatric and adult ED patients; all diagnoses	**Auditory:** Teach-back method **Auditory:** Telephone call	**Testing the intervention:** Verbal recall questions by nurse and forced-choice questionnaire using Likert Scale format on satisfaction. **Main findings:** (+/-)	**Outcomes:** Health literacy, language barriers, and patients' satisfaction. Teach-back may improve patient satisfaction. **Gap:** Teach-back implementation challenging due to fast pace and frequent changes in patient acuity. Need frontline teach-back champions. Patient engagement factor
Hoek 2022[17]	Health care and productivity costs between mild traumatic brain injury (mTBI) patients received additional flyer (and video) discharge instructions	Experimental: Cohort study (with Randomization and Pre-Post Implementation)/ Multi-center (n=6) ED in Netherlands. 1,155 adult ED mTBI patients	**Auditory:** Telephone call **Visual:** Video **Visual:** Self-development flyer	**Testing the intervention:** Verbal recall discharge instructions. Department data health care use and productivity loss. **Main findings:** (+)	**Outcomes:** Video discharge instructions with standard verbal and written discharge methods, improved patient understanding and retention of discharge instructions. **Gap:** Health care related costs and long-term consequences and recall bias

continued

TABLE 1
Continued

Author	Purpose	Study design/ population	Intervention description	Main findings	Outcomes and identified gaps
Keenan et al. 2020[18]	Use of the Acute Concussion Evaluation-Emergency Department Discharge Instructions (ACE-ED DI) improves knowledge of injury management, returning to school and sports activities, and follow-up	Quasi-Experimental: Experimental (Non-randomized)/ Single-center Pediatric ED in U.S. 68 adult caregivers of pediatric ED patients plus ED patient with concussion or closed-head injuries	**Visual:** Pictorial Aid	**Testing the intervention:** Forced-choice questionnaire using Likert Scale format by nurse assessing patient satisfaction. **Main findings:** (+)	**Outcomes:** More effective at increasing caregivers' perceived knowledge of management, returning to activities specifics, and follow-up. **Gap:** Reinforcement needed for complex issues. Lack of diversity and follow-up
Leamy et al. 2019[19]	Effectiveness of simplified discharge information card to improve patients' awareness of discharge diagnosis and requirements for follow-up	Experimental: Prospective pre-post interventional study/ Single-center ED in U.S. 229 adult ED patients; all diagnoses	**Visual:** Simplified Discharge Information Card	**Testing the intervention:** Patient verbal recall and perceived comprehension of discharge diagnosis. **Main findings:** (+)	**Outcomes:** Improved awareness of discharge diagnoses and follow-up requirements empowered patients. **Gap:** Interventions to improve knowledge of diagnosis and follow-up indicated for all patients, providing simplified and succinct written instructions
Macy et al. 2019[20]	Feasibility, acceptability, and potential efficacy of ED-based counseling session and tailored brochures to promote appropriate Child Restraint System (CRS)	Experimental: Randomized pilot trial/ Multi-center EDs in U.S. 339 pediatric ED patients requiring CRS.	**Auditory:** Motivational counseling session **Auditory:** Telephone **Visual:** Tailored brochures	**Testing the intervention:** Forced-choice questionnaire of behaviors and satisfaction using Likert Scale format. **Main findings:** (+/-)	**Outcomes:** Suboptimal CRS use can be identified and intervened upon during a child's ED visit. **Gap:** Need motivational interviewing–based counseling session in the ED combined with mailed tailored brochures

continued

TABLE 1
Continued

Author	Purpose	Study design/ population	Intervention description	Main findings	Outcomes and identified gaps
Mahajan et al. 2020[21]	Determine the direct and short-term impact of teach-back as well as feasibility for routine use in the ED	Quasi-Experimental: Intervention cohort study (non-randomized)/ Single-center, Urban, non-academic ED in Netherlands 483 adult ED patients with fractures, contusions, wounds, simple infections, pain, neurological, thromboembolic, cardiovascular diseases, or multiple diagnoses	**Auditory:** Teach-back method	**Testing the intervention:** Verbal recall by nurse. **Main findings:** (+)	**Outcomes:** Efficient and non-time-consuming method to improve patients' immediate and short-term recall and comprehension of discharge information. **Gap:** Information often incomplete or insufficient, especially concerning return precautions
McCarthy et al. 2019[22]	Effect of Electronic Medication Complete Communication (EMC2) opioid strategy on patients' safe use of opioids and knowledge about opioids	Experimental: RCT/ Single-center urban academic ED in U.S. 652 adult ED patients/ physicians requiring opioids	**Auditory:** Telephone call **Visual:** Opioid education 1-page MedSheet	**Testing the intervention:** Verbal recall by nurse of correct way to take medications and behavior verification patient demonstrating accurate taking of medication. EMC2 scores. **Main findings:** (+/-)	**Outcomes:** EMC2 tools improved demonstrated safe dosing. **Gap:** Medication diaries subject to recall bias with low rate of return, particularly in patients who performed more poorly on the demonstrated dosing task and higher risk for label misunderstanding due to lower literacy

continued

TABLE 1
Continued

Author	Purpose	Study design/ population	Intervention description	Main findings	Outcomes and identified gaps
Patel et al. 2018[23]	Effects of mailed pamphlet and brief scripted educational phone call from emergency physician (EP) utilization by low-risk adults with a recent treat-and-release ED visit	Experimental: RCT/ Multi-center EDs in U.S. 9,093 adult ED patients with low-risk diagnoses	**Auditory:** Telephone call **Visual:** Mailed pamphlet	**Testing the intervention:** E.H.R. data and independent variables, phone or mail open-ended patient questions on satisfaction. **Main findings:** (+/-)	**Outcomes:** Low-acuity ED visit decreased by an EP explaining alternative venues of care for future medical needs. **Gap:** Targeting specific interventions based on age. Identifying the optimal ED patient population for interventions targeting ED utilization for low-risk situations
Platts-Mills et al. 2020[24]	Interactive educational video about pain medications and recovery-promoting behaviors, a telecare phone call, and an electronic communication containing clinical information to the patient's primary care provider	Experimental: RCT/ Single-center academic ED in U.S. 360 older adult ED patients with acute musculoskeletal pain	**Auditory:** Telephone call **Visual:** Video Intervention	**Testing the intervention:** Biophysiological improvements (Pain severity) and forced-choice questionnaires on adherence and satisfaction on analgesic use, recovery-promoting behaviors, and PCP care. **Main findings:** (trial)	**Outcomes:** Trial underway, if effective, future studies will examine the effectiveness of implementation strategies. **Gap:** Trial underway

continued

TABLE 1
Continued

Author	Purpose	Study design/ population	Intervention description	Main findings	Outcomes and identified gaps
Sustersic et al. 2019[25]	Impact of patient information leaflets on doctor-patient communication (DPC), patient satisfaction and adherence, and on patient and doctor behaviors	Quasi-Experimental: Clinical Trial (Prospective, controlled, comparative, interventional, non-randomized)/ Multi-center EDs in France. 324 adolescent and adult ED patients diagnosed with sprain or infection	**Auditory:** Telephone call **Visual:** Patient information leaflets	**Testing the intervention:** Phone questionnaire using forced-choice questionnaire Likert scale format on patient satisfaction. **Main findings:** (+/-)	**Outcomes:** PILs given by doctors improve DPC, increase patients' satisfaction with health care professionals, reduce the number of emergency consultations for the same pathology and modify the doctor's behavior. **Gap:** Lack of time in the ED and minimal ED interventional studies are relatively scarce, due to difficulties in implementing them. The level of severity of a disease impact on satisfaction; the more severe the pathology, the less importance the patient gives to the infrastructure and more satisfied

continued

TABLE 1
Continued

Author	Purpose	Study design/ population	Intervention description	Main findings	Outcomes and identified gaps
Vayngortin 2020[26]	Contraception use among adolescents in ED and evaluated impact of educational video on interest in and uptake of long-acting reversible contraceptives (LARC)s	Experimental: Clinical Trial (Randomized controlled)/ Freestanding Children's ED in U.S. 79 adolescent and adult female ED patients who are sexually active	**Visual:** Educational video **Visual:** Information card	**Testing the intervention:** Forced-choice questionnaire Likert scale format on interest in LARCs pre/post video on behavior and satisfaction. **Main findings:** (+/-)	**Outcomes:** Acceptable to adolescents and feasible to implement in a busy urban ED setting. They had significantly greater interest in using LARCs, but no demonstrated change in actual adoption of contraception. **Gap:** Assess feasibility and acceptance. Offering contraception counseling in the ED is provider-dependent, barriers including time, training, and motivation

continued

TABLE 1
Continued

Author	Purpose	Study design/ population	Intervention description	Main findings	Outcomes and identified gaps
Waszak et al. 2018[27]	Develop, implement, and evaluate educating patients discharged from ED with opioid analgesic prescriptions. Increase patient comprehension of safety information about opioid prescriptions before discharge from ED	Experimental: Quality Improvement Project (Intervention)/ Single-center Level-1 trauma regional ED in U.S. 52 adult ED patients requiring opioid pain medication	**Auditory:** Teach-back focusing on low health literacy patients	**Testing the intervention:** Forced-choice questionnaire Likert-Scale format on patient recall and satisfaction (printed/ digital) and verbal recall. **Main findings:** (+)	**Outcomes:** Improving opioid prescription education at ED discharge enhances patient knowledge and promotes safety, mitigate opioid crisis by reducing rate of opioid use disorder and accidental overdoses. **Gap:** No follow-up conducted to measure patient recall of pain medication education and overdose admissions. Nurses needed extra steps in standard discharge workflow. Need interprofessional process for automated opioid-specific patient education sheets

continued

TABLE 1
Continued

Author	Purpose	Study design/ population	Intervention description	Main findings	Outcomes and identified gaps
Wilkin 2020[28]	Evaluate the effects of video discharge instructions, as an adjunct to standard discharge procedures, on adult ED patient understanding of their discharge instructions	Experimental: RCT/ Single-center military ED in U.S. 60 adult military ED patients diagnosed with infection	**Visual:** Video discharge instructions **Visual:** Printed 1-page educational sheets	**Testing the intervention:** Forced-choice, 5-question, multiple-choice questionnaire on patient education recall. **Main findings:** (+)	**Outcomes:** Improved patient understanding and retention of discharge instructions. Video discharge instructions should be considered in all EDs. 44% of patients would prefer video discharge instructions alone and up to 38% of patients would still prefer both methods be provided. **Gap:** To implement videos in ED and urgent cares, a high number of diagnosis-specific videos are needed, including technology requirements, and cost. Needed follow-up to measure reductions in morbidity, mortality, 3–5 days later

continued

TABLE 1
Continued

Author	Purpose	Study design/ population	Intervention description	Main findings	Outcomes and identified gaps
Wray et al. 2021[29]	Determine patient understanding of ED discharge and aftercare instructions improved through instructional videos in addition to standard written discharge instructions	Quasi-Experimental: Prospective pre-post-intervention study/ Single-center, academic tertiary care ED. 240 adult ED patients with diagnosis of vaginal bleeding; concussion; splint care; laceration care; or upper respiratory tract infection	**Visual:** Video	**Testing the intervention:** Forced-choice questionnaire on patient recall and patient perceived comprehension. **Main findings:** (+/-)	**Outcomes:** Help improve patient comprehension and information retention. Better understanding of aftercare instructions and follow-up. **Gap:** E.H.R. systems need to allow physicians to "prescribe" educational videos to patients through the EHR, emailing the video to the patient. Encourage further development and utilization

(+) The intervention reported positive findings.
(-) The intervention reported negative findings.
(+/-) The intervention reported inconclusive findings or mixed findings.

TABLE 2
Patient conditions adressed in ED discharge education

ED patient chief complaints or conditions included:	Teaching intervention	n=	Source
Assaults or trauma (Sexual)	**Video** *(Visual)*	1	15
Neurological injuries and disorders (Concussions, headaches, closed-head injuries, moderate traumatic brain injuries, stroke or TIA)	**Educational session via pictorial aid** *(Visual)* **PowerPoint presentation** *(Auditory)* **Self-development flyer** *(Visual)* **Skill-based returned demonstration** *(Kinesthetic)* **Telephone call** *(Auditory)* **Teach-back method** *(Auditory)* **Video** *(Visual)* **Workbook** *(Reading/ Writing)*	5	12,17,18,21,29
Cardiovascular disorders (Thromboembolic or cardiovascular diseases)	**Patient information leaflets** *(Visual)* **Teach-back method** *(Auditory)* **Telephone call** *(Auditory)*	2	21,25
Head, eyes, ears, nose, or throat disorders (Sinusitis, conjunctivitis, pharyngitis)	**Mailed pamphlet** *(Visual)* **Printed educational sheets** *(Visual)* **Telephone call** *(Auditory)* **Video** *(Visual)*	2	23,28
Throat and respiratory disorders (Upper respiratory tract infections, or hyperventilation)	**Mailed pamphlet** *(Visual)* **Patient information leaflets** *(Visual)* **Printed educational sheets** *(Visual)* **Teach-back method** *(Auditory)* **Telephone call** *(Auditory)* **Video** *(Visual)*	5	21,23,25,28,29
Abdominal region disorders (Gastroenteritis, gallstones, colitis, stomach/rectal pain, or vomiting)	**Mailed pamphlet** *(Visual)* **Printed 1-page sheet** *(Visual)* **Patient information leaflets** *(Visual)* **Teach-back method** *(Auditory)* **Telephone call** *(Auditory)* **Video** *(Visual)*	4	21,23,25,28
Genital urinary system or OBGYN disorders (Pregnancy complications, vaginal bleeding, prostatitis, pyelonephritis, urinary tract infections, or urinary retention)	**Mailed pamphlet** *(Visual)* **Patient information leaflets** *(Visual)* **Teach-back method** *(Auditory)* **Telephone call** *(Auditory)* **Video** *(Visual)*	4	21,23,25,29
Musculoskeletal injuries (Contusions, hematomas, lacerations, wounds, fractures, sprains, or splints)	**Patient information leaflets** *(Visual)* **Pictorial aid** *(Visual)* **Teach-back method** *(Auditory)* **Telephone call** *(Auditory)* **Video** *(Visual)*	5	14,21,24,25,29
Any and/or multiple diagnoses	**Teach-back method** *(Auditory)* **Telephone call** *(Auditory)* **Simplified discharge information card** *(Visual)*	3	16,19,21

continued

TABLE 2
Continued

ED patient chief complaints or conditions included:	Teaching intervention	n=	Source
Risk reduction/Health promotion education (Smokers, sexually active contraception, or pediatrics requiring restraint systems)	**Motivational counseling session** *(Auditory)* **Printed self-help guide** *(Visual)* **Simplified discharge information card** *(Visual)* **Telephone call** *(Auditory)* **Tailored brochures** *(Visual)* **Video** *(Visual)*	3	[13,20,26]
Prescription refills (Opioid prescriptions)	**Teach-back** *(Auditory)* **Telephone call** *(Auditory)* **1-page MedSheet** (*Visual*)	2	[22,27]

and telephone calls (n = 8).[12,16,17,20,22-25] Reading/writing consisted of workbooks (n = 1).[12] Kinesthetic-focused interventions consisted of patient skill-based returned demonstration (n = 1).[12] Additional considerations from the articles consisted of culturally tailored resources (n = 1),[12] training emergency nurses on effective communication (n = 1),[16] electronic health record (EHR)-based implementations (n = 2),[13,22] or electronic communications containing clinical information to the patient's Primary Care Provider (PCP) (n = 1).[24]

METHODOLOGIES USED TO TEST THE EFFECTIVENESS OF ED EDUCATION INTERVENTIONS

Discharge education interventions consisted of mainly visual and auditory strategies, with positive results demonstrated in video interventions,[15,17,28] printed flyers,[17] pictorial aids,[18,19,21,27] and the teach-back method.[21,27] The effectiveness of the interventions was evaluated using patient biophysiological improvements (for example, decreased hypertension or pain severity) measured by an emergency nurse (n = 2),[12,24] chart review using EHR data extraction (n = 3),[13,22,23] or patient recall (n = 6).[14,16,19,21,22,27-29] Health literacy was screened using a single-item literacy screener (SILS) question in several studies.[17,18,28] Follow-up time frames ranged from 24 hours to 1 year.[12,16,17,20,22-26]

OUTCOMES

Outcomes that can be gained from ED discharge education interventions include:

- Patient education and adherence outcomes
- Health care system outcomes
- Public health equity outcomes

Patient education and adherence outcomes were present in all 18 articles. Patient-perceived comprehension and satisfaction (n = 11)[12,14-17,19,21,23,26,27,29] was a subjective outcome measured in 61% of the studies. Patient compliance and adherence to treatment (n = 6)[12,14,15,20,23-25] was measured in 30% of the studies, in addition to patient's perceived self-management (n = 6),[15,16,18-20,27] measured directly after the education provided up to 1-year in follow-up. All VARK learning styles were represented in the articles. However, only 7 provided a multimodal education intervention approach.[12,17,20,22-25] Nine of the 18 articles (50%) demonstrated mixed results at follow-up or conclusion of the study.

In addition to measuring patient-related outcomes, some studies evaluated the impact of the intervention on the health system and/or public health outcomes. Health care system outcomes (n = 14),[13,14,16-19,21,22,24-29] consisted of streamlining automated provider and nursing reminders to provide additional education tools and provider compliance (n = 3),[13,22,27] cost analysis (health care costs and productivity costs) (n = 4),[14,17,26,28] time effectiveness (n = 3),[21,25,26] and reduction in unnecessary ED return visits (n = 8).[16-19,21,22,28,29] Health care delivery or health care system outcomes were measured immediately after the intervention and up to 6 months post-intervention.

Some of the studies evaluated the impact of the intervention on public health equity outcomes (n = 8) [12,14-17,22,24,27] through maximizing quality of life for all ED patients (n = 3),[14,17,27] improving health literacy (n = 6),[12,14,16,18,22,27] and/or focusing on culturally tailored care (n = 1).[12] Long-term patient outcomes were reported in studies demonstrating secondary and tertiary prevention initiatives (n = 4).[12,15,24,27] These included preventing relapses in substance abuse (n = 2),[15,27] reduction in hypertensive blood pressure readings (n = 1),[12] or mindfulness-

based skills to reduce chronic pain (n = 3)[12,15,24] with follow-up between 6 months and 1 year.

Discussion

This scoping review explored ED discharge teaching interventions that offered various modalities to improve patient, health care, and public health equity outcomes. Discharge education interventions demonstrated positive effects on patient education or adherence outcomes and health system or public health outcomes. Culturally tailored and health literacy interventions maximized ED patients' quality of life and promoted health equity.[12,14-18,22,24,27] Many interventions improved discharge education efficiency and quality by sending automated reminders to provide patients with supplemental education based on their learning preferences.[13,22,27] Additional benefits included reduced health care costs and improved productivity,[14,17,26,28] improved time effectiveness,[21,25,26] and reduction in unnecessary ED return visits.[16-19,21,22,28,29]

GAPS IN LITERATURE

Several of the identified research articles discussed gaps in this body of research, which focused mainly on verification of outcomes in the clinical setting. Standard ED discharge education consists of an autogenerated and pre-formatted information sheet based on the primary medical diagnosis as developed by the Agency for Healthcare Research and Quality and National Institute of Health Guidelines to promote clear communication,[1,30] including diagnosis, disease-specific information, worsening and improving symptoms, medications prescribed, and follow-up information. The written information is intended to be delivered along with verbal education provided by the emergency nurse to reinforce the instructions, assess the patient's comprehension, and address any misunderstandings or clarification needs.[1] However, there is no standardized verification process or monitoring of ED patients' transition to PCP follow-up visits, ability to obtain prescribed medications from the pharmacy, or accurate and safe administration of prescribed treatments.

In addition to the gaps in verification, there were other gaps identified. Many of the methods used to assess effectiveness of the intervention did not include an assessment of patient behaviors but rather consisted of patient-reported questionnaires. Although the teach-back method is an evidence-based practice for confirming understanding of discharge instructions with patients in all clinical settings,[31] there were no studies that described this as a standard of practice, and only 3 studies included teach-back[16,21,27] as part of their discharge education intervention. Another gap was the impact of the intervention on transitions of care and long-term outcomes.[27]

In addition, few interventions focused on providing culturally tailored teaching interventions (n = 1),[12] or improving health literacy (n = 6),[12,14,16,18,22,27] and few articles mentioned additional interventions tailored for sex or gender-based preferences.[15] Kinesthetic (n = 1)[12] and reading/writing (n = 1)[18]-focused interventions including patient skill-based returned demonstration (n = 1)[12] or additional workbooks (n = 1)[12] were limited. However, there were positive findings on patient skill-based returned demonstration.[12]

Strengths

This research provides an opportunity to review our current discharge education teaching tools and consider their adaption based on patient learning preferences. Encouraging the availability and implementation of multimodal resources such as skill-based patient returned demonstrations or teach-back can further standardize patient recall post-instructional delivery. The findings from this scoping review support the need for provider training on strategies to deliver multimodal ED discharge education that can meet the needs of the patient in terms of their learning style and level of health literacy. A focus on patient demonstration of comprehension and skill performance could be used for validation and potentially improve outcomes, especially among patients with low health literacy. Patient learning preferences should be identified for education modification to meet the patient's needs. Future research on interventions for ED discharge education should integrate evidence-based strategies for validation of learning and should consider the use of novel techniques, such as use of technology to improve comprehension, recall, and implementation of learned skills.

IMPLICATIONS FOR EMERGENCY NURSES

Current ED discharge education interventions are primarily designed for visual and auditory learners, which may not address the various learning styles of all patients, especially when delivered within the ED setting. The findings from this scoping review highlight the effectiveness of multimodal ED discharge education interventions that incorporate patients' individualized learning styles (visual, auditory, reading/writing, and kinesthetic) to ensure adequate patient recall of discharge instructions and prevent adverse events.

Additional strategies identified include: (1) matching educational content with the patient's level of health literacy; (2) prioritizing sufficient time to assess patients' ability to recall information through auditory teach-back or similar returned skill-based demonstration methods; (3) incorporating educational tools and reminders in the EHR and facilitating communication with the patient's PCP. These advancements in ED discharge education will require nurse leaders who can work at a systems-level to integrate accessible tools and technology into the ED workflow.

LIMITATIONS

Limitations of the scoping review include the selection of quantitative research designs that were published in English, which may have introduced bias by only considering studies from Western countries and may limit generalizability. This review did not include books or descriptive, qualitative, or mixed-method studies, which may limit the breadth of the scoping review. Finally, the review limited publications between 2018 and 2022 to inform current clinical practice using the latest technology, but this search strategy may have excluded other important work in the field.

Conclusions

The findings from this scoping review provide a summary of ED discharge education interventions that could be used to improve patient education and adherence, systems of care, and public health equity outcomes. Using multimodal education strategies that are accessible beyond the point of discharge and bridge communication with the patient's PCP can facilitate continuity of care. The teach-back method is efficient and minimally time-consuming while improving patient satisfaction and should become a standard discharge practice to improve patient recall. As leaders and innovators, emergency nurses are ideally positioned to oversee and facilitate the implementation of these advancements in practice and improve the experience of ED discharge education and patient outcomes. Future work in this area is critical, including methods for assessing and matching educational content with the patient's learning style, level of health literacy, and primary language, incorporating technology in delivery to provide access and reminders beyond the point of discharge and to bridge communication with the patient's other health care providers. These strategies can be used across conditions and patient populations to facilitate continuity of care, enhance efficiency of care and patient safety, and improve health equity.

Author Disclosures

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Supplementary Data

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ENA Clinical Practice Guideline Synopsis: Family Presence During Resuscitation and Invasive Procedures

Clinical Question

Does family presence have a positive or negative influence on the patient, family, and staff during invasive procedures and resuscitation?

Problem

With the rise of family-centered care, family input into health care decisions and patient visitation has increased. The concept of family presence was first highlighted in the early 1980s when Foote Hospital in Michigan began a program to facilitate the practice of family member presence during resuscitation as a response to demands by families (Doyle et al, 1987). Since the seminal research by Hanson and Strawser (1992), research about family presence during resuscitation (FPDR) and invasive procedures has centered on several different aspects, such as health care professionals', family members', and patients' perceptions of the practice, benefits of FPDR, disadvantages of FPDR, cultural implications of FPDR, and policy development surrounding FPDR. Evidence indicates that, in the United States, both health care professionals and families support family presence. Current research continues to support the practice recommendations for allowing FPDR. FPDR and invasive procedures is supported by the American Association of Critical-Care Nurses (Guzzetta, 2016) and the Society of Critical Care Medicine who indicate that family presence is an expected practice and includes the need for family to be assigned a staff member to provide support (Davidson et al, 2017). These recommendations also note a need for established policies and procedures to implement and integrate family presence into practice (Davidson et al, 2017; Guzzetta, 2016). Family includes individuals that provide support for the patient and has a significant relationship with the patient and may or may not be related to the patient (Davidson et al, 2017). The definition of family for the purpose of this clinical practice guideline includes any persons whom the patient identifies as family.

Recommendations

Description of Decision Options/Interventions and the Level of Recommendation	
Family member presence during invasive procedures and/or resuscitation does not lead to increased anxiety, stress, depression, or PTSD symptoms (Alireza et al., 2019; Celik et al., 2019; Jabre et al., 2013; Jabre et al., 2014).	A
Concerns that family presence is detrimental to the patient, the family, or the healthcare team are not supported by the evidence (Bjorshol et al., 2011; Celik et al., 2013; Fernandes et al., 2014; Fernandez et al., 2009; Hassankhani et al., 2017a; Jabre et al., 2013; Jabre et al., 2014; McAlvin et al., 2014; Nigrovic et al., 2007; Porter et al., 2014; Sacchetti et al., 2005; Yavuz et al., 2014; Youngson et al., 2016).	A
Family member presence during invasive procedures or resuscitation should be offered as an option to family members and should be based on written institution policies (Fernandes et al., 2014; Ferrara et al., 2016; Howlett et al., 2010; Lederman & Wacht, 2014; Madden & Condon, 2007; Magowan & Melby, 2019; Pankop et al., 2013; Park & Ha, 2021; Porter et al., 2014; Powers & Reeve, 2018; Sak-Dankosky et al., 2014; Tíscar-González et al., 2021; Waldemar & Thylen, 2019; Zavotsky et al., 2014).	B
Family member presence during invasive procedures reduces patient anxiety (Cypress et al., 2017; Gheshlaghi et al., 2021; Tíscar-González et al., 2021).	B
Healthcare professionals and families support the presence of a designated trained staff member assigned to family members present to provide explanation and comfort (Dingeman et al., 2007; Fernandez et al., 2009; Fernandes et al., 2014; Garcia-Martinez et al., 2018; Hassankhani et al., 2017b; Kuzin et al., 2007; McClement et al., 2009; Meghani et al., 2019; Porter et al., 2014; Porter, 2019; Powers & Reeve, 2020; Stefano et al., 2016; Tíscar-González et al., 2021; Twibell et al., 2015; Waldemar & Thylen, 2019; Yavuz et al., 2014).	B
Educating staff in the development, implementation, and evaluation of policy regarding family member presence provides structure and support to healthcare professionals involved in this practice (Baretto et al., 2018; Chapman et al., 2011; Ferrara et al., 2016; Howlett et al., 2010; Madden & Condon, 2007; Zavotsky et al., 2014).	B
Family presence is supported during pediatric resuscitation and during invasive procedures (Dingeman et al., 2007; Mark et al., 2021; McAlvin et al., 2016; Stewart et al., 2019).	B
Family members want to be present for invasive procedures and/or resuscitation and feel they provide emotional support to patients during resuscitation, have a right to be present, and help by providing information to the healthcare team (Baretto et al., 2019; Cypress et al., 2017; Dwyer et al., 2015; Fernandez et al., 2020; Leung & Chow, 2012; Stefano et al,. 2016; Toronto et al., 2018; Tíscar-González et al., 2021; Zali et al., 2017).	C
Acceptance of family presence may have some cultural basis (Abuzeyad et al., 2020; Al bshabshe et al., 2020; Al-Mutair et al., 2012; Baretto et al., 2018; Batista et al., 2017; Bellali et al., 2020; Celik et al., 2013; Chen et al., 2017; Enriquez et al., 2017; Fernandes et al., 2014; Günes & Zaybak, 2009; Gutysz-Wojnicka et al., 2018; Hassankhani et al., 2017a, 2017b; Hayat et al., 2019; Iorga et al., 2018; Lai et al., 2017; Leung & Chow, 2012; Niemczyk et al., 2020; Soleimanpour et al., 2015; Tíscar-González et al., 2021; Wong et al., 2019; Yavuz et al., 2014; Young, 2014; Youngson et al., 2016; Zali et al., 2017).	C

Level A	Based on consistent and good quality of evidence; has relevance and applicability to emergency nursing practice.
Level B	There are some minor inconsistencies in the quality of evidence; has relevance and applicability to emergency nursing practice.
Level C	There is limited or low-quality patient-oriented evidence; has relevance and applicability to emergency nursing practice.
NR	Not recommended based upon current evidence.
INE	Insufficient or no evidence upon which to make a recommendation.

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Clinical Practice Guidelines can be found at https://www.ena.org/enau/practice-resource-library

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Substance Use Disorders and Addiction in the Emergency Care Setting

EMERGENCY NURSES ASSOCIATION

According to the American Society of Addiction Medicine, substance use disorder (SUD) is described as a "cluster of cognitive, behavioral, and physiological symptoms indicating that the individual continues to use alcohol, nicotine, and/or other drugs despite significant related problems" (the American Society of Addiction Medicine national practice guideline for the treatment of opioid use disorder: 2020 focused update, 2020, p. 7). Even with extensive evidence of the devastation that substance abuse has on lives and livelihood and the impact use, abuse, and addiction have on our emergency departments, substance use continues to proliferate around the world. (O'Donnell et al, 2021). From May 2020 to April 2021 in the United States, overdose deaths exceeded 100,000, with 64% coming from synthetic opioids such as illicitly manufactured fentaNYL (O'Donnell et al, 2021). There is a "substantial disconnect between real risks and public perception about the dangers of substance use and abuse." (United Nations Office on Drugs and Crime [UNODC], 2021, p. 22) The UNODC states that commercially produced cannabis is currently the most abused product around the world today. Adolescents perceive that the higher-potency commercial cannabis available today is less harmful than earlier cannabis produced noncommercially, despite evidence to the contrary (UNODC, 2021).

Pain, both acute and chronic, is the primary reason patients seek out care in emergency departments. (Zelaya et al, 2020). Medicare's Hospital Readmission Reduction Program focuses interventions to reduce readmissions for people treated with medical conditions such as heart failure, pneumonia, and strokes but does not focus on SUD or substance-related ED visits, which have higher readmission rates. (Gardner et al, 2022). Patients with co-occurring pain and SUD present special challenges and deserve dignified, holistic, and integrated multidisciplinary approaches to treatment that include pharmacologic and nonpharmacologic care. (Turner et al, 2022). There are still alcohol exclusion laws as part of insurance codes in the United States. (Azagba et al, 2021). These exclusion laws allow insurance companies to deny claims for injuries or illnesses related to alcohol or nonprescribed substances. Documentation of alcohol or substance use as contributing factors for ED visits in states with alcohol exclusion laws is problematic. Thus, ED visits related to substance use, abuse, and addiction are underestimated, creating barriers to understanding the full impact of SUD, abuse, and addiction on ED capacity. Despite such laws, there was an increase in ED costs for visits related to alcohol from $4.1 billion to $15.3 billion between 2006 and 2014. (White et al, 2018).

According to UNODC (2021) 114 million jobs were lost in 2020 owing to coronavirus disease 2019 (COVID-19). This created conditions that left people more susceptible to substance use and willing to engage in cultivation of illicit crops. During the severe acute respiratory syndrome coronavirus 2 pandemic, there was a major disruption in health care services. Social isolation, coupled with pre-existing mental health conditions, SUDs, and newfound financial hardships during stay-at-home orders, reduced access to treatment, except in emergency departments (Holland et al, 2021). Nurses were not immune to the consequences of social isolation and are suffering from burnout and job dissatisfaction, mainly owing to short staffing. (Lluch et al, 2022). The pandemic has further reduced the nursing workforce, increasing stress on those nurses who remain. Data from previous pandemics, particularly after quarantine, suggest that health care workers might develop symptoms of post-traumatic stress disorder, depression, and SUDs (Luurila et al, 2022).

According to Fauteux (2022), nurses are just as likely as the public to abuse substances as a coping mechanism. Past pandemics have shown that the need for additional substance use interventions increases (Kar et al, 2020). McKay and Asmundson (2020) claim COVID stress syndrome, through activation of the behavioral immune system and the unique sequence of stressors, places essential workers at a

high risk of alcohol and substance use. According to Mumba and Kraemer (2019), nurses' SUD occurs at the same level as the general population, which is estimated to range from 5% to 20%. Nurses have an ethical obligation to report impairment of a colleague at work and professional misconduct (International Council of Nurses [ICN], 2021). According to the International Council of Nurses, the fear of job loss and stigma of reporting have limited the ability to gain accurate data on SUD among nurses (2021). Although state boards of nursing have alternative-to-discipline (ATD) programs, hospitals and nursing schools may not. Education for nursing leaders about the benefits of rehabilitating nurse employees who find themselves dependent on substances could improve individual health, demonstrate support for the larger nursing community, and improve staffing (Trinkoff et al, 2022).

ENA Position

It is the position of the Emergency Nurses Association that:

1. Emergency care staff provide dignified, respectful, compassionate, and personalized care to patients presenting with pain, regardless of SUD.
2. Emergency care settings provide crisis intervention and stabilizing treatments for the physical and psychological consequences of SUD.
3. Emergency nurses participate in the development of ED management plans and prescriptive guidelines designed to address the immediate needs of patients with SUD, to provide them with appropriate treatment and rehabilitation service referrals.
4. Health care facilities provide education to all employees regarding alcohol and illicit drug use, with established policies, procedures, and practices to promote safe, supportive, drug-free workplaces.
5. Emergency nurses realize that drug diversion for personal use is primarily a symptom of a serious and treatable disease and not exclusively a crime.
6. Emergency nurses are aware of the risks associated with substance use, impaired practice, and drug diversion and have the responsibility and means to report suspected or actual concerns.
7. Health care employers and nursing schools adopt ATD approaches to treat nurses and nursing students with SUD with the stated goals of retention, rehabilitation, and entry or re-entry into safe professional practice.

Background

Many patients with SUD seek care in emergency departments for a variety of issues. ED visits can be a critical incident for patients and an opportunity to provide education on the connection between substance use and potential health consequences (Schreffler et al, 2021). Emergency health care providers are uniquely poised to influence these patients, assisting them in initiating interventions and referrals for continued treatment (Schreffler et al, 2021).

The post-COVID-19 economic crisis may increase the allure of illicit drug cultivation and production (UNODC, 2021). Mobility restriction measures disrupted not only health care services but also drug supply chains in 2020. UNODC (2021) states that by early 2021 the supply chain for drug trafficking appeared to rebound to pre-COVID-19 levels.

Alcohol is frequently found in combination with substance abuse deaths. Excessive alcohol use contributes to more than 140,000 deaths in the United States each year since 2015. According to the Centers for Disease Control and Prevention (2022), early deaths from alcohol and substance abuse come from motor vehicle crashes, homicides, suicides, and poisonings. The World Health Organization asserts that alcohol consumption is a causal factor in more than 200 diseases, injuries, and other health conditions (2022). Alcohol is associated with a risk of developing health problems such as mental and behavioral disorders, including alcohol dependence, major noncommunicable diseases such as liver cirrhosis, some cancers, and cardiovascular diseases (WHO, 2022).

According to Smiley and Reneau (2020), nurses who lose a nursing position or leave the profession because of mental health issues or substance use are at a higher risk of suicide. Earlier or more complete treatment for mental illness may help prevent suicide in this population (Smiley & Reneau, 2020). Jarrad et al (2018) found that compassion fatigue can occur in nurses who are repeatedly exposed to vulnerable traumatic experiences through providing multidimensional care that can then lead to maladaptive behaviors, such as substance use. Nurses are frequently involved with patients at critical moments in time from trauma to end-of-life care. Nursing leaders should be acutely aware of the potential for substance use among nurses and help build organizational solutions to overcome compassion fatigue (Jarrad et al, 2018). According to the National Institute on Drug Abuse (2014), SUDs are treatable

conditions. During education of health professionals, if addiction is given the same emphasis as heart or lung disease and our provision of care was directed in the same way, then stigma may be reduced and lives saved.

ATD programs for nurses with SUD need to be improved and standardized. Some state licensing boards have used the ATD program in cases of drug diversion, understanding that the behavior is often a symptom of an underlying SUD (Geuijen et al, 2021). Professional assistance programs exist in almost all states and may provide a pathway for licensed health care professionals who have diverted to return to practice during or after SUD treatment (Smiley & Reneau, 2020). According to Geuijen et al (2021), professional assistance programs have shown success rates, measured by abstinence and work retention through follow-up, varying from 60% to 90%.

Resources

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Emergency Nursing Review Questions: May 2024

Authors: Benjamin E. Marett, EdD, MSN, CEN, CCRN, COHN, NPD-C, NE-BC, TCRN, FAEN, FAHA, and Anne P. Manton, PhD, RN, FAEN, FAAN, Schaumburg, IL
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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 patient is brought to the emergency department due to the onset of agitated and aggressive behavior. The first step in caring for this patient is:
   - **A.** Prepare physical restraints
   - **B.** Elicit patient's psychiatric and physical history
   - **C.** Administer sedating medication
   - **D.** Place patient in isolation room to protect others
2. A patient comes to the emergency department complaining of abdominal pain. In response to questions by the nurse, he admits to depression. Continuing assessment reveals current thoughts of suicide. The nurse recognizes that the factor in the patient's history that is the strongest risk factor for suicide is:
   - **A.** Self-cutting/self-mutilation
   - **B.** Substance abuse
   - **C.** Prior suicide attempt
   - **D.** Treatment with antidepressants
3. Which of the following assessment findings would cause the greatest concern with a 32-week-pregnant patient after a motor vehicle crash?
   - **A.** Fetal heart rate of 84 beats per minute
   - **B.** Hematocrit of 42%
   - **C.** Fundal height of 30 centimeters
   - **D.** 0.1% value with the Kleihauer Betke assay
4. A 17-year-old male presents to the emergency department complaining of severe pain in the genital region. He denies trauma. Upon evaluation, the patient describes intense scrotal pain, denies penile discharge, and says the pain started after having sexual intercourse for the first time. The nurse would suspect?
   - **A.** Acute cystitis
   - **B.** Testicular torsion
   - **C.** Acute epididymitis
   - **D.** Paraphimosis
5. Which of the following statements would be considered in violation of the Emergency Medical Treatment and Active Labor Act related to turning a patient away from the emergency department without treatment?
   - **A.** The medical screening examination must be performed by a qualified medical professional.
   - **B.** Approved hospital medical staff bylaws determine who are qualified medical professionals.
   - **C.** Women in active labor are not considered to be stabilized until after delivery of the placenta.
   - **D.** Triage by a licensed registered nurse constitutes a medical screening examination.
6. A patient is evaluated in the emergency department complaining of chest pain. He states the pain started approximately an hour ago. The patient is diaphoretic and nauseated. Blood pressure is 90/60 mm Hg. The cardiac monitor shows a sinus rhythm. The initial 12-lead electrocardiogram is listed below:

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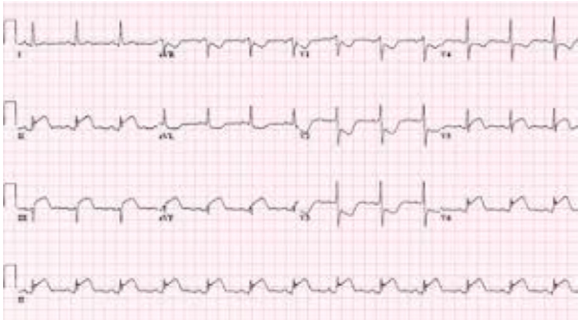

The nurse would suspect:

A. Anterior-septal myocardial infarction
B. Lateral myocardial infarction
C. Inferior-lateral myocardial infarction
D. Septal myocardial infarction

ANSWERS

1. Correct answer: B

Because the onset of agitation and aggressive behaviors can have many precipitants both physiological and psychological, it is most important to know the patient's history before beginning any other interventions.[1]

2. Correct answer: C

Research has shown that history of suicide attempts (especially in past 5 years) is the most reliable risk factor for suicide in current presentation. Although self-cutting/self-mutilation, substance abuse, and use of antidepressants are important considerations when assessing risk factors for suicide, past suicide attempt is the most important risk factor.[2,3]

3. Correct answer: A

At 32 weeks pregnant, the fetal heart rate should average between 110 and 160 beats per minute. A fetal heart rate less than 110 beats per minute would indicate severe compromise to the mother and or the fetus (A). A hematocrit level of 42% would be considered a normal value (B). Fundal height should be close to the number of weeks pregnant plus or minus 2 centimeters (C). A Kleihauer Betke assay is done to detect fetal cells in maternal circulation. This value is considered normal, or no fetal cells detected (D).[4]

4. Correct answer: B

Testicular torsion is most commonly seen in patients aged 12 to 18 years. It is caused by twisting of the testicle or spermatic cord within the tunica vaginalis within the scrotum, causing strangulation of the testicle. It is characterized by severe scrotal pain with swelling and edema. The condition may be caused by intense exercise, sexual intercourse, trauma, or cold weather. Approximately 50% of torsions occur during sleep and may be seen with congenital abnormalities (B). Acute cystitis may occur with a bladder or urethral infection causing painful urination (A). Acute epididymitis has a gradual onset of pain with possible urethral discharge. The epididymis can be palpated as enlarged and very painful to examination (C). Paraphimosis is the inability to fully retract the foreskin of an uncircumcised penis. The foreskin tightens around the head of the penis, causing swelling and pain (D).[5]

5. Correct answer: D

Unless approved by the hospital governing board and specified in the hospital bylaws, the triage registered nurse is not considered a form of the medical screening examination and triage nurses are not automatically considered qualified medical professionals (D). The other statements listed are in accordance with the Emergency Medical Treatment and Active Labor Act and are true statements (A, B, C).[6]

6. Correct answer: C

The patient's presenting complaint with hypotension and chest pain would be suggestive of a myocardial infarction. The electrocardiogram presented shows ST elevation in leads II, III, and AVF, along with V5 and V6, defined as inferior-lateral leads. This electrocardiogram would indicate an

inferior-lateral myocardial infarction (C). ST elevation in leads V1 to V4 would indicate an anterior-septal myocardial infarction (A). A lateral myocardial infarction would be indicated by ST elevation in leads I and aVL and /or V5 and V6 (B). A septal myocardial infarction would demonstrate ST elevation in V1 and V2.[7]

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