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President's Message

Terry M. Foster, MSN, RN, CCRN, TCRN, CPEN, CEN, FAEN

As I write this President's Message, I find it hard to believe that my year as your Emergency Nurses Association (ENA) president is coming to an end. Serving in this role has been everything I've ever expected, a few unexpected things, and one heck of a ride the entire way!

We have had our disagreements and our "spirited debates," as well as instant connections to other members when we first met. Emergency nurses are well known for voicing their opinions and I appreciate that. I have learned so much from our members as to what makes them tick and what makes them ticked off!

Over the past year, daily, the ENA Public Relations staff has monitored any newsworthy items that directly affect our emergency departments. It has been rewarding, and at the same time heartbreaking, to reach out to our fellow members who have encountered struggles with acts of violence and mass shootings, as well as natural and man-made disasters. It's been an immense and personal satisfaction to be able to say to them, "We, your ENA family, are here for you," and to know they know exactly what I mean. It might be through an email, a text, or a personal phone call (my favorite). Many of these contacts have been made during evening or weekend hours, often when the major events have eased up a bit, offering some time to reflect.

Identifying with our members has been something I have always treasured. I never want to completely leave the bedside, and I continue to face many of the challenges you all face too. When I see another ENA member post a somewhat generic social media message that says, "Hug your kids or grandkids a little tighter tonight," I know immediately what happened that day in the emergency department (and you do too!). It means so much to be able to acknowledge that struggle and to share their compassion and understanding. I continue to be amazed by the resiliency of our members, despite some very stressful working conditions.

On a positive note, making the phone calls this summer to a record-setting 53 emergency departments notifying them they were Lantern Award recipients was one of the highlights of my year! These were often large group Zoom calls, and the cheers were often deafening—and deservedly so! Assisting with personally notifying other award and scholarship recipients has also been so gratifying. I have also attended every quarterly staff meeting in person at the ENA office in Schaumburg. There is a palpable energy when nearly every ENA employee is present! Along with Nancy McRae, our executive director, I can convey to them, on behalf of the members, how much their work is appreciated. Many of them are behind-the-scenes workers so it's great to interact with them directly.

Saying thank you doesn't seem to be enough, so I'll just say that my gratitude toward my fellow ENA members will be forever. I truly mean that from my heart. I hope I have inspired you in your emergency nursing practice. I don't plan on leaving emergency nursing nor the ENA. Onward, upward!

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The Game Is On and We're in the Ninth! Evolution of the Trauma Nursing Core Course, Ninth Edition

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Abstract

Trauma is a global phenomenon resulting in the death of millions of people every year and affecting countless others. Foundational to excellence in trauma nursing, which contributes to optimal patient outcomes, is evidence-based education driven by best practices accompanied by a systematic approach to the assessment and care of the injured patient. The Trauma Nursing Core Course has provided nurses with the knowledge necessary for the assessment and management of injured patients since the first course was held in 1986. The 9th Edition, launched in July of 2023, continues to provide nurses worldwide with knowledge necessary based on current evidence-based literature and resources. A revision is an arduous process necessitating a concerted team approach involving Emergency Nurses Association member volunteers, internal and external experts, and a lot of dedication!

Trauma is a global phenomenon resulting in the death of approximately 4.41 million people annually and affecting the health and socioeconomic well-being of countless others.[1] It is widely accepted that excellence in trauma nursing contributes to optimal patient outcomes and the prevention of complications, long-term consequences, and death for patients. Since its inception in 1986, the Emergency Nurses Association's (ENA) Trauma Nursing Core Course (TNCC) has provided registered nurses across the globe with the evidence-based knowledge necessary for the assessment and management of injured patients, and the TNCC 9th Edition[2] is no exception. TNCC has been taught in many countries worldwide, including Aruba, Australia, Bermuda, Bonaire, Botswana, Canada, Curacao, Hong Kong, Mexico, The Netherlands, Saudi Arabia, South Africa, South Korea, Sweden, Trinidad and Tobago, United Arab Emirates, and the United Kingdom.

The TNCC 9th Edition launched in July of 2023. The course consists of a provider manual, precourse learning modules, and instructor-led classroom time. Learners who successfully complete a skills case scenario and score at least 80% on a 50-item online cognitive examination are awarded a 4-year TNCC provider verification. The course is on a 4-year revision schedule. Each revision updates the clinical content to ensure it is current and evidence based. The teaching and evaluation methodologies are also evaluated and adapted to incorporate effective adult learning practices. This work starts almost as soon as the latest edition launches with ongoing analysis of a variety of data. Sources include objective data from scores on the skills and cognitive examinations, along with qualitative and quantitative data from course evaluations. Other important data sources include ENA member feedback, Connect communities, ENA committee members, current peer review literature, and other experts. A call for volunteers is used to form the TNCC Review Committee, charged with ongoing oversight of the course, and the TNCC Revision Work Team, charged with revising the course. Applicants are selected based on subject matter

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expertise, educational experience, and practice environment, with the goal of a wide representation of the resource variations available in the practice environment for learners taking the provider course.

Integral to the course is the Trauma Nursing Process (TNP), a systematic approach to the assessment and management of a trauma patient. This process provides a framework for nursing care, with instruction of key concepts using a scoring rubric that enables formative and summative evaluation of learner outcomes. The TNP uses the alphabet as a mnemonic and is associated with specific assessment and intervention criteria that evolved over the years. To reinforce construct and content validity, the TNCC Revision Work Team and the TNCC Review Committee critically appraised the TNP for adherence to evidence-based practices.[3] The language used to describe each criterion was simplified for clarity and to reduce the cognitive load on instructors and students navigating through each teaching and testing scenario. After the initial revision, the updated TNP was posted for all instructors to provide feedback. Live webinars were hosted to explain the changes and obtain additional subject matter expert input. Work Team and Review Committee members participated in pilot courses with ENA staff and other instructors not involved with the revisions to ensure consistency of use with learners.

Also essential to the course is the editorial process, which includes editorial responsibility for the provider manual, online modules, instructor supplement, and classroom materials. The senior developmental editor is the liaison with the publisher for the provider manual printing, eBook creation, and routing of files for translations. In addition, editorial support is provided to authors as chapters are being written or updated regarding the use of the chapter template, basic editorial questions, and the fundamentals of evidence-based writing, including use of citations and reference formatting. Each chapter undergoes a rigorous review process often necessitating multiple drafts before being submitted to the publisher to begin production of the provider manual. This process includes an equally rigorous process of copyedit, composition of page proofs, and proofreading by the publisher. After each step, the content is returned to the senior developmental editor and work team for review. The publisher also handles the art program, creating original illustrations and diagrams for the provider manual. Careful attention is given to managing rights and permissions to establish that ENA has obtained permission to use copyrighted materials such as figures and tables. It is only after all these steps are completed that the material is deemed ready to send to the printer, and approximately 45 days later we have a bound book.

The postcourse learning outcome measures consist of a performance-based summative assessment using the TNP and an online cognitive examination. The creation of the examination for the TNCC 9th Edition began during the initial steps of the course revision by developing an outline of the content to be included in the course. From there a test blueprint was developed based on a survey of content experts, evaluation of the 8th Edition blueprint, and review of the 9th Edition content. Item writers who participated in the exam development process were primarily selected from the TNCC Work Group and the TNCC Revision Committee. They were charged with creating items that assessed higher-level cognitive learning, beyond mere fact memorization or the "knowledge" level. An additional goal, which was successfully attained, was to develop an item bank of at least 100 items, thereby decreasing the likelihood that a learner would receive the same questions if they were unsuccessful on the first test attempt and took the test a second time.

The revision work for the TNCC 9th Edition was a monumental task spanning 4 years of planning and development. It was paramount to have a well-developed project management plan to keep the project organized and on target. Substantial time was dedicated to developing a communication plan to keep stakeholders updated on the progress of the revision. Also integral to the successful launch of this revision were the in-house graphic design, learning design, and course management teams. It was only through the diligent work of ENA member volunteers and the relentless commitment to excellence of everyone involved in this endeavor that we were able to successfully launch the 9th Edition of TNCC. However, the process does not end with the launch of the 9th Edition. The TNCC Review Committee volunteers, along with ENA staff, will continue to participate in the course's oversight. The ENA Course Management team will continue their tireless work to ensure that the course runs as smoothly as possible for the learners, instructors, and course directors.

Author Disclosures

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REFERENCES

1. World Health Organization. Injuries and violence. Published March 19, 2021. Accessed August 15, 2023. https://www.who.int/news-room/fact-sheets/detail/injuries-and-violence
2. Emergency Nurses Association. *Trauma Nursing Core Course*. 9th ed; 2024.
3. American Psychological Association. APA PsycTests® methodology field values. Published 2020. Accessed August 22, 2023. https://www.apa.org/pubs/databases/training/psyctests-method-values.pdf

Letter to the Editor

Letters to the Editor are encouraged and may be submitted at jenonline.org where submission instructions can be found in the Author Instructions.

Comment on "Neurogenic Shock: A Case Report" J EmergNurs 2023;49:495-8

Dear Editor:

I read with anticipation the recent article "Neurogenic Shock: A Case Report" J EmergNurs 2023;49:495-8. I have a clinical passion and expertise for neurologic emergencies and have written and presented locally, regionally, and nationally on the subject for over 3 decades. After reading this case report, I feel compelled to voice my concern that the reader would be confused about the appropriate treatment for neurogenic shock.

In this case, the care was provided out of the hospital by an air medical service to a trauma patient who had no blood pressure. The patient was actively dying and the crew used what was in their protocol to maintain perfusion while transporting him to the emergency department. During rapid sequence intubation, intravenous (IV) epinephrine was given push as a bolus to minimize the risk of full arrest. The bolus of epinephrine (no dose reported) was followed by a continuous infusion of epinephrine (no dose provided).

My concern is that nurses working in emergency departments may read the report and the discussion that followed and think IV epinephrine given as a bolus is an appropriate first-line treatment protocol for a patient in neurogenic shock rather than its intent in this case—to treat a patient who was near arrest in the out-of-hospital setting. Even if the clinicians at the scene suspected neurogenic shock from the patient's presentation, administering IV epinephrine as a bolus is not part of the customary care for a multisystem trauma patient who may have neurogenic shock.

The case report is really not about neurogenic shock per se but about a horrifically injured patient who was dying when emergency medical services arrived and the decision making in the field. The discussion section is disconnected from the case report as it focuses on neurogenic shock, which was not the main acute prehospital clinical issue for this patient as the case report describes. The main prehospital clinical issue for this patient was undifferentiated shock quickly transitioning to traumatic arrest.

Overall, this case study could have been presented more effectively to teach emergency nurses about neurogenic shock—a complex subject that is not well explained in nursing school. The authors only touched on superficial aspects of the actual pathophysiology that needs a more detailed explanation, and they may have confused the reader by not "marrying" the actual case study to the discussion points.

Important discussion/teaching points about the pathophysiology of neurogenic shock include the following description. A traumatic injury to the spinal cord area at or above the level of the sixth thoracic vertebrae disrupts innervation to the peripheral sympathetic nervous system. This sympathetic trunk is formed of sympathetic ganglia and the communication between them. It is anatomically located posteriorly in the thorax close to the heads of the ribs at the sides of the vertebral bodies and extends up to the neck and down to the abdomen and pelvis. With no innervation from the brain and spinal cord to these nerve cell bundles, this disruption stops any signals to tissues to release the physiologically active molecules of epinephrine and norepinephrine (catecholamines, neurotransmitters), quickly decreasing their levels at receptor sites in key tissues such as the heart, blood vessels, and the lungs. With no stimulation from the sympathetic catecholamines to these tissues, the parasympathetic nervous system is unopposed and becomes the sole system (vagal response) to innervate automatic systems such as heart rate, blood pressure, and respiratory rate. The heart sustains a basal rate between 40 and 60 beats per minute and the blood vessels dilate throughout the body, which eliminates any robustness to the cardiovascular system, especially because of the basal heart rate not being able to generate any push or pressure through dilated blood vessels. Neurogenic shock (distributive shock, loss of vasomotor tone) is manifested by the triad of hypotension, bradycardia (relative), and core temperature instability. The patient's skin will be pale/ashen/yellow (compared with baseline skin tone), cool, and diaphoretic about the level of the spinal cord injury, and their skin will be baseline skin tone, warm, and dry below the level of the spinal cord injury due to this autonomic nervous system disruption. As expected with a spinal cord injury, the patient also will lack sensation and motor ability below the level of injury. Neurogenic shock needs to be differentiated from spinal and

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hypovolemic shock. Hypovolemic shock tends to be associated with tachycardia but can be masked by the patient's inability to mount a sympathetic response (tachycardia and vasoconstriction) to loss of blood volume. Duration of neurogenic shock is often less than 72 hours as adrenal gland secretion of catecholamines ramps up.[1]

Immediate treatment is paramount once neurogenic shock is recognized. Fluid resuscitation is always the priority in a patient with neurogenic shock, and vasopressors are the second-line treatment when hypotension is not corrected with fluids. Under the Discussion section, paragraph 5, the treatment and management of neurogenic shock are outlined and the authors clearly state that the priority intervention is fluid volume resuscitation. Every textbook and publication about neurogenic shock (including Emergency Nurses Association's Trauma Nursing Core Course) emphasizes that the "tank" (intravascular compartment) needs to be "filled" first before one would even consider starting a sympathomimetic (vasopressor) medication.[1,2] One does not squeeze the vessels until the vessels are full of crystalloid or colloid fluid. If hemorrhagic hypovolemic shock is also highly suspected (as in this patient with a liver laceration and femur and rib fractures), blood products should be used to regain adequate volume status before any vasopressor medication is administered. In addition, the preferred sympathomimetic (vasopressor) medication administered for neurogenic shock is dopamine or phenylephrine. Epinephrine or norepinephrine is rarely administered. Although they are all vasopressor medications, there are nuances to how each medication influences the cardiovascular system. The selection is based on the patient's heart rate and always with the goal of not causing tachycardia from the administration of a vasopressor.

It might have been a better match with the case study to discuss the contrast treatment between a medical cardiac arrest and traumatic arrest (purposefully choosing to not perform chest compressions on a trauma patient; when to administer and not to administer epinephrine to a patient in hemorrhagic, hypovolemic shock; and resuscitative thoracotomy to name a few) and/or discuss the radiological imaging sequence needed to definitively diagnose a transected spinal cord, statistical insight into that commonly morbid state, and the end-of-life decisions that the clinical team needs to help the family through.

In addition, I want to make a comment about 1 other concerning statement by the authors—third paragraph of the Case Report section—the authors state that despite altered mental status, a traumatic brain injury (TBI) could be ruled out because the patient had pupils equal reactive to light (PERL). That is certainly not correct—even with PERL, altered mental status is a sign that a TBI is still possible. Although I agree that PERL is a reassuring sign, it does not rule out TBI—pupil changes are a late sign for increased intracranial pressure, not an early sign.

I also want to emphasize the emergency nurse's role in safe medication administration in the emergency department. Every medication order that an emergency nurse receives, often as a verbal order in a critical situation, should include a specific dose. Acting upon an order to just "push to effect" a highly concentrated vasopressor medication such as epinephrine or Phenylephrine HCL/Neo-Synephrine/Phenyl-stick/Neo-stick, as an IV push dose more times than not, can lead to medication errors and untoward patient outcomes. In a critical situation, when being asked to administer these potent medications as a "push dose," an emergency nurse needs to be aware of the medication's concentration and needs to make sure the syringe is clearly labeled with the concentration, and through call-back communication, the emergency nurse needs to request a specific dose. That specific dose needs to be documented and the patient continuously monitored for untoward cardiovascular effects.—*Ann White, MSN, APRN, CCNS, CEN, CPEN, Emergency Department, Duke University Hospital, Level I Trauma Center and Associate Consulting Professor, Duke University School of Nursing, Durham, NC; E-mail: awhitenc@nc.rr.com*.

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REFERENCES

1. Dave S, Dahlstrom JJ. Neurogenic Shock. In: StatPearls *[Internet]*. StatPearls Publishing; 2023. Accessed September 28, 2023. https://www.ncbi.nlm.nih.gov/books/NBK459361/
2. Emergency Nurses Association. *TNCC Provider Manual*. 8th Edition. Jones and Bartlett; 2020.

Nurse in the Emergency Department

Authors: Haofuzi Zhang, MD, PhD and Lu Hao, BN, Xi'an, China

Amid the chaos of a world in pain,
Amid the cries and anguished strain,
A beacon of calm in the emergency room,
The nurse, a hero, dispelling the gloom.

With tender touch and steady hand,
They bring solace to those in demand,
A guardian angel in scrubs and white,
Guiding patients through the darkest night.

They bear witness to human tragedy,
And still maintain their steadfast majesty,
A pillar of strength when all seems lost,
In their care, a measure of hope is embossed.

The nurse stands tall in the face of fear,
Fighting for their patients, year after year,
A true embodiment of compassion and care,
A shining star in the health care sphere.

So let us honor this unsung hero,
Whose tireless efforts never go to zero,
With gratitude and respect that never fades,
For the nurse in the emergency department, who forever aids.

Author Disclosures

Conflicts of interest: none to report.

Submissions to this column are encouraged and may be submitted at jenonline.org where submission instructions can be found in the Author Instructions.

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Escape the Monotony: Gamification Enhances Nursing Education

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Abstract

Introduction: Creating meaningful and engaging learning opportunities can be challenged by budgets, time, and learning management systems with limited methods of interaction. An innovative method was necessary to meet competency evaluation and continuing education needs for emergency department staff.

Design: Gamification and simulation techniques were combined to offer an interactive learning opportunity through an escape room format to improve engagement and knowledge retention. This educational offering was designed to enhance staff learning of trauma care and processes at emergency departments that are not designated trauma centers.

Outcomes: Emergency department team members completed the trauma escape room challenge, and postsurvey results demonstrated favorable ratings of new knowledge acquisition, skill competency, teamwork, and confidence when providing care for a trauma patient.

Discussion: Nurse educators can "escape" the monotony of passive learning by using active learning strategies including the fun of gamification to improve clinical skills and confidence.

Key words: Gamification; Simulation; Trauma; Nursing education; Innovation

Introduction

Creating meaningful and engaging learning opportunities can be challenged by budget and time constraints. Today's student has better knowledge acquisition and retention when active learning techniques are applied that enhance the education experience.[1] Interprofessional training opportunities have been linked with improved staff performance, communication, and patient safety.[2,3] Combine a creative learning environment with an active learning pedagogy structure and the result can be a successful educational event that will resonate with the nursing workforce.

Gamification is a teaching method to consider for increasing learner interaction and participation. This method can have many applications to improve learning outcomes in the classroom and clinical settings. Gamification is not new, but is often underutilized in health care.[4] Literature shows variation in terminology; however, the most consistent definition comes from Rutledge et al[4] who state, "Gamification involves the application of game design elements (conceptual building blocks integral to building successful games) to traditionally nongame contexts."

To meet competency evaluation and continuing education needs of emergency department staff at a large tertiary health care system, an innovative educational approach was used through game-centered simulation. A clinical nurse educator partnered with a simulation and education specialist to design an interactive learning experience through an escape room format. A typical escape room game design features a team of participants locked in a room in which they must solve puzzles or discover clues to accomplish a goal and escape the room in a specific amount of time. This process has similarities to caring for a patient during an emergency situation. Competency evaluation is directed at high-risk, low-frequency skills or processes to improve utilization, learning, and safety. Team members/participants apply assessment techniques, practice skills, and interpret laboratory values to solve patient needs and influence outcomes.

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Design

An innovative educational intervention was developed by combining simulation-based training with an escape room format. The intention of combining the 2 methodologies was to engage emergency clinicians in caring for a trauma patient using the Emergency Nurses Association Trauma Nursing Core Course, Trauma Nursing Process (TNP).[5] Clinicians must systematically implement each step of the process to reveal clues, keys, puzzle pieces, or information necessary to continue assessing and caring for the patient. The simulation ends once all puzzle pieces are discovered and the care team correctly solves the puzzle to escape the room.

A trauma scenario outline was drafted to depict each phase of the TNP. Each step listed the simulated patient's status, intended actions of the care team, and the patient's response to appropriate interventions. Once the initial scenario outline was created, it was reviewed by an interdisciplinary team to ensure the trauma patient's presentation and intended actions were appropriate for the scenario. Recommendations made by the review team were discussed and any modifications made to the scenario were reviewed until no further recommendations were identified and the trauma scenario was finalized.

Once the trauma scenario was confirmed, any locks, puzzle pieces, codes, or keys associated with the steps to the TNP were added to the scenario to ensure the TNP would be completed in sequential order. The final version of the scenario was drafted and included a prebrief to introduce the scenario and instructions for the escape room to ensure continuity in scenario implementation among participants.

The intervention was implemented in 4 emergency departments of a large tertiary health care system located in the Midwestern United States. Two freestanding emergency departments and 2 emergency departments located in community hospitals were selected as the sites of the intervention given that they share similarities in learning needs and limited resources. None of the selected sites have trauma level designation. On average the freestanding and community hospital emergency departments provide care to 7400 patients every month. Approximately 100 registered nurses, 25 ED technicians, and 28 respiratory therapists are employed throughout the freestanding and community hospital emergency departments. Each of these roles is represented in the ED teams participating in the trauma escape room. Attendance is mandatory for all ED staff, and advanced scheduling is available through an electronic software tool. Teams are limited to a maximum of 6 participants per team, and each team is required to include at least 1 emergency nurse. The ideal setting for the trauma escape room is an ED patient care room or hospital inpatient room. Consider using an available ED room or other inpatient area. The room must be big enough to fit a stretcher, 6 emergency clinicians, and the equipment needed to treat the simulated patient. The location requires an adjacent space available to stage equipment and any technology necessary to facilitate the training. This may include a tablet, monitor, and other wireless technology needed to receive a signal and control the human patient simulator used to play the trauma patient. The room is staged to reflect a typical patient care room in the emergency department with minimal equipment necessary to complete the trauma escape room scenario. References such as a TNP poster and a Glasgow coma scale table will be available in the escape room, and the participants have paper and pencil for recording information. "Do Not Touch" signs are placed on equipment and items to minimize misuse or breakage of technology and gear that is not part of the scenario.

EDUCATIONAL INTERVENTION

The collaborative learning experience (CLE) is an educational event conducted in our health care system's 2 freestanding and 2 community hospital emergency departments. The event addresses required or requested competency evaluation and continuing education needs for ED staff that focuses on high-risk, low-frequency equipment, skills, or processes. The CLE events are developed by a planning committee with representation of ED staff, ED educators, and emergency nurse managers. ED staff are expected to demonstrate professional accountability by completing 4 hours of continuing education per calendar year in addition to regularly scheduled work time. ED staff are paid for their time to participate and costs are built into an annual department budget.

The trauma escape room CLE was designed to review concepts and interventions of trauma care and improve confidence of ED staff to tend to the needs of an adult trauma victim. In this trauma escape room, a care team receives a patient scenario and becomes "locked" in the patient room. Each team has a maximum of 45 minutes to find keys, unlock codes, and solve puzzles necessary to provide care. The team will be successful in the escape room only if they apply effective teamwork, conduct a focused patient assessment, and use critical thinking to guide decision making. In addition to demonstrating various clinical and assessment skills, the team will need to employ useful communication and collaboration techniques to achieve the best patient outcome and escape the room.

The trauma patient for this scenario was an adult male who was involved in a motorcycle crash. A high-fidelity mannikin was used to provide the simulation experience

for the trauma care of this patient. In this manner participants were able to evaluate responsiveness, pulses, breath sounds, and vital signs to gauge the effect of their intervention on the outcome of the patient. Specific objectives for this scenario included applying TNP to assess the patient for injuries and demonstrating appropriate intervention skills needed to treat the patient.[5] During the TNP assessment for this trauma patient, participants should recognize life-threatening signs and symptoms in the circulation step of the primary survey, such as weak central pulses. The escape room has a total of 8 locked boxes, and each one corresponds with 1 of the TNP steps; the keys or codes to the locked boxes are found in an earlier step. For example, 1 locked box correlates with "C" for circulation and contains equipment needed to provide a fluid bolus to a patient that has weak and rapid central pulses. The code to unlock the box with the fluids is hidden in step "A" and is found when the clinicians assess the patient's airway. If the airway assessment is completed correctly, the clinicians will find a piece of paper obstructing the patient's airway with the code to the lock printed on it. In this manner, the trauma escape room scenario ensures that the care team follows the TNP to systematically care for the trauma patient, identify life-threatening injuries, and apply interventions.

Further evaluation of the trauma patient would reveal bruising to the lower abdomen and scrotum, and an unstable pelvis. Participants need to apply assessment and critical thinking skills to ascertain that this patient is showing symptoms of hypovolemic shock and an unstable pelvic fracture requiring immediate intervention. Solving another lockbox code would offer access to a pelvic stabilization device, and correct interpretation of lab results would solve the code to provide uncrossmatched blood products. Participants are required to demonstrate competency in uncrossmatched blood administration and application of a pelvic stabilization device. Teams would not be successful in the escape room if these objectives were not identified and addressed. Costs for this game design were minimal due to using common items such as department store storage bins with combination or key locks and chains applied to create the 8 lock boxes. The lock boxes contained necessary supplies to care for the trauma patient, such as blood pressure cuff, equipment to obtain vascular access, and pelvic stabilization device (Figure 1). As the participants apply appropriate assessment and critical thinking strategies to unlock the boxes and care for the patient, puzzle pieces are revealed that yield the final clue needed to escape the room (Figure 2). After completion of the exercise, team members participated in a debriefing session.

Audio and video monitoring were used to allow the educators to communicate as needed without going into the training space (Figure 3). Three training facilitators were required to manage the escape room challenge. Facilitators consisted of clinical nurse educators, simulation specialists, and nursing members of the CLE planning committee who participated in designing the escape room. Facilitator #1 communicated with the escape room participants. This facilitator gave each team the patient scenario and a scripted introduction before they entered the escape room. Facilitator #1 also provided hints as needed, assisted in watching the clinicians complete the training, and led the debriefing session. Facilitator #2 observed the team as they completed the challenge to ensure the objectives were met, monitored the time, and led the debriefing session. Facilitator #3 operated the human patient simulator and managed the other technology used during the training.

A debriefing session begins immediately inside the escape room after a team successfully breaks out of the room or 45 minutes has passed. The session is led by facilitator #2, who monitored the team's journey through the escape room and who reviews the sequence of actions related to the objectives of TNP assessment, critical thinking, and competency. Facilitator #2 uses a structured debrief derived from Kolb's experiential learning theory.[6] The cycle of learning begins with a concrete experience—simulation—followed by observation and reflection on the experience, recounting the events that took place.[6] During the debriefing, team members were able to identify areas of strength as well as what they could have done better to improve the patient's outcome. Topics such as communication and collaboration were reviewed and discussed as contributing factors to the overall performance of the care team. The total amount of time it took for the team to escape the room was shared and compared with other teams from the same emergency department to enhance the challenge of the escape room game. Pictures of each team were captured and posted in the emergency department upon completion of the trauma escape room CLE event (Figure 4).

Outcomes

The escape room format offered a unique learning opportunity that challenged teamwork, communication, and decision making, and developed skills through an interactive environment. And, it was fun! After participation in the educational intervention, ED team members were asked to complete an evaluation consisting of 7 statements that were scored on a 5-point Likert-type scale (1 = strongly disagree, 5 = strongly agree). Descriptive statistics were used to summarize responses to the evaluation statements. In total, 99 participants

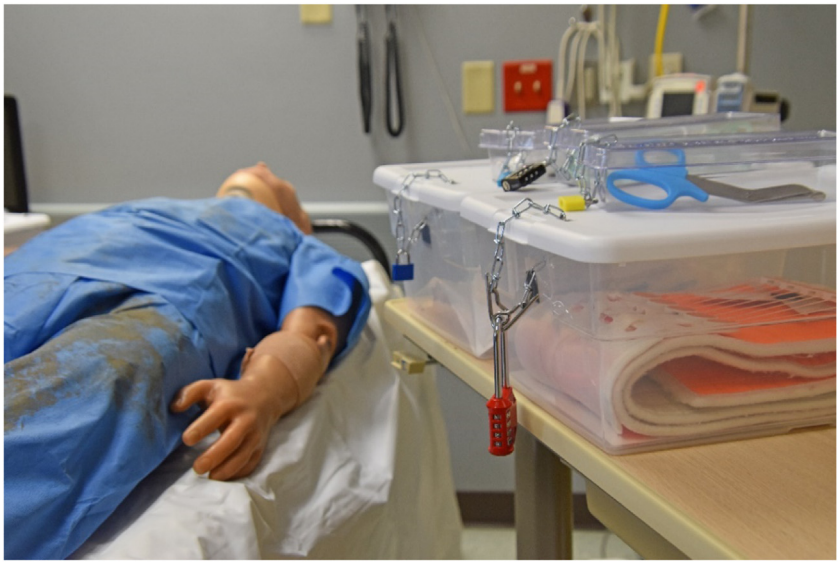

FIGURE 1
Examples of the lock boxes and high-fidelity mannikin used in the trauma escape room design.

completed the trauma escape room challenge and 83 participants completed an evaluation. Although most participants had never experienced an escape-room game, the responses were overwhelmingly positive as depicted in the Table.

Participants were asked to rate how much they agreed with the statement that they learned new information in the escape room CLE; 98% rated they strongly agree. When asked whether they felt more confident in using the TNP and caring for the trauma patient after completing the escape room CLE, 97% of participants rated they strongly agree. When asked whether they felt that they learned skills to improve communication during the escape room CLE,

FIGURE 2
Emergency nurses demonstrate appropriate assessment and teamwork to reveal clues that will unlock equipment needed to care for this simulated trauma victim.

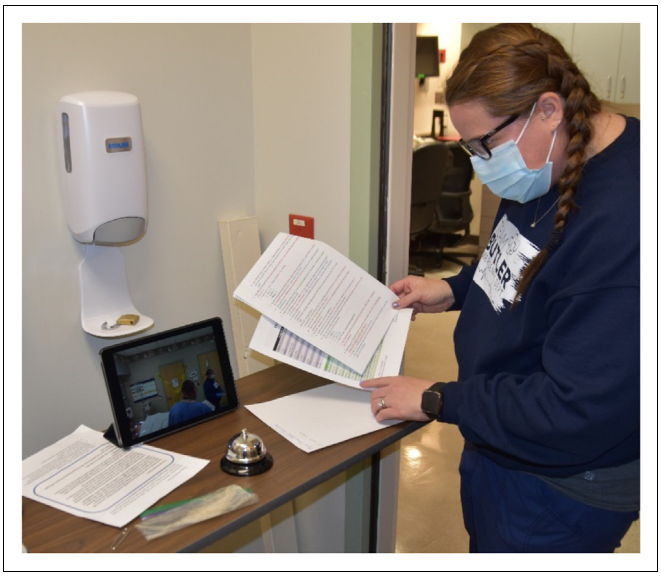

FIGURE 3

Facilitator #2 monitors escape room participants via live stream video software and ensures objectives are met.

94% of participants rated they strongly agree. When asked whether they felt that they learned skills that improved teamwork during the escape room CLE, 97% rated they strongly agree. Most participants (98%) found the escape room to be more engaging and enjoyed it more than previous CLE offerings. Written comments included "Best simulation experience I have been a part of!" "So much fun and a great way to learn," "So much fun! Hands on, different than the normal learning experiences. Made you think! Let's do it again!" A summative display of the results, pictures, and debriefing notes were shared with the ED staff and stakeholders to relay the success of the trauma escape room CLE.

Discussion

Simulation-based learning is a cost-effective way to provide a safe environment where caregivers can make mistakes and practice techniques to improve clinical skills and self-confidence.[2,7] The escape room format generated high results of engagement and knowledge acquisition; however, we believe the challenge would yield an even greater outcome if the timed element were removed from the scenario. Some teams concentrated on beating the clock and achieving the fastest time for escaping the room rather than focusing on the TNP steps to systematically care for the patient. Consequently, these teams deviated from the learner outcomes and neglected to provide appropriate care to the trauma patient or demonstrate competent skills because they were focused on speed. It is recommended, to sustain outcomes of knowledge retention and application, that educators focus on recognizing steps of competency, assessment findings, and interventions when using gamification techniques versus a timeframe.

FIGURE 4

ED team members enjoyed treating the trauma patient and discovering clues, and escaped the room in <45 minutes.

TABLE
Results from the trauma escape room after survey

Statement	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
I learned new information.	0	0	1 (1%)	1 (1%)	81 (98%)
I feel more competent in applying the Trauma Nursing Process.	0	0	1 (1%)	2 (2%)	80 (97%)
I found the escape room to be more engaging than previous trainings.	0	0	0	2 (2%)	81 (98%)
I have increased confidence in my ability to care for the trauma patients.	0	0	2 (2%)	1 (1%)	80 (97%)
I learned skills that improved by communication.	0	0	2 (2%)	3 (3%)	78 (94%)
I learned skills that improved teamwork.	0	0	3 (3%)	0	80 (97%)

ED team members were asked to respond to each statement using a 5-point Likert-type scale after participating in the escape room challenge.

Implications for Emergency Nurses

Studies show that interprofessional team training can be key to preventing poor performance, miscommunication, and safety errors.[2,3] One way to accomplish this can be to offer creative teaching methods such as gamification. A multimodal learning style meets the educational need of a diverse population of students. Combining gamification with simulation strategies provides a learning platform that stimulates interaction, critical thinking, skill development, problem solving, and knowledge retention. The escape room offers versatility to enhance continuing education in a wide variety of subject matter. Care providers need to routinely demonstrate competency and practice patient care delivery on low-volume, high-risk equipment, skills, and scenarios to ensure safe practices. This trauma escape room CLE was originally developed to provide continuing education to nontrauma-designated emergency departments. This educational offering was so successful that it has been replicated at our system's trauma center. Our trauma team found it to be an engaging method to review the TNP while having fun.

Conclusion

It is encouraged that nursing education "escapes" the monotony of passive learning and educators use the fun of gamification to improve clinical skills and confidence. Combine problem solving, competency-based evaluation, and skills assessment with an interactive challenge to make continuing education meaningful.

REFERENCES

1. Deslauriers L, McCarty LS, Miller K, Callaghan K, Kestin G. Measuring actual learning versus feeling of learning in response to being actively engaged in the classroom. *Proc Natl Acad Sci U S A*. 2019;116(39):19251-19257. https://doi.org/10.1073/pnas.1821936116
2. Moore SC, Finch M, MacArthur SK, Ward KS. Using simulation to cross-train staff and build effective teams. *Clin Simul Nurs*. 2018;20:1-6. https://doi.org/10.1016/j/ecns.2018.04.002
3. Reime MH, Johnsgaard T, Kvam FI, et al. Simulated settings; powerful arenas for learning patient safety practices and facilitating transference to clinical practice. A mixed method study. *Nurse Educ Pract*. 2016;21:75-82. https://doi.org/10.1016/j.nepr.2016.10.003
4. Rutledge C, Walsh CM, Swinger N, et al. Gamification in action: theoretical and practical considerations for medical educators. *Acad Med*. 2018;93(7):1014-1020. https://doi.org/10.1097/ACM.0000000000002183
5. Emergency Nurses Association. *TNCC Provider Manual: Trauma Nursing Core Course*. 8th ed. Jones and Bartlett; 2020.
6. Abulebda K, Auerbach M, Limaiem F. Debriefing techniques utilized in medical simulation. In: *StatPearls*. StatPearls Publishing; 2022.
7. Padilha JM, Machado PP, Ribeiro A, Ramos J, Costa P. Clinical virtual simulation in nursing education: randomized control trial. *J Med Internet Res*. 2019;21(3):e11529. https://doi.org/10.2196/11529

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Neonatal Triage Red Flags

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"Somebody help me! There is something wrong with my baby…." These are words that can unsettle even the most experienced of emergency triage nurses. Being able to recognize high-risk situations is critical to efficient and effective care of all patients, including neonates, that fragile group of humans defined as birth to 28 days of age.[1]

Most recent available statistics report more than 300,000 ED visits annually are neonatal patients.[2] Studies are showing that pediatric and neonatal presentations to the emergency department are rising,[3-5] so it is becoming increasingly important that emergency triage nurses know the red flags to look for to most accurately triage neonates.

The pediatric assessment triangle (PAT) or across-the-room critical look begins the triage interaction. If the neonate is sleeping, wake them up so the general appearance difference between sleeping and unconscious can be determined. When awake, the nurse can also assess the TICLS aspects of the child's appearance: **t**one, **i**nteractivity, **c**onsolability, **l**ook or gaze, and **s**peech or cry.[6] Other components of the triangle include work of breathing and a brief circulation assessment.[6,7] Regardless of triage acuity scale being used, if lifesaving interventions are needed, a level 1 acuity is indicated, and if the neonatal patient has worrying or high-risk findings in this quick look/PAT assessment, a level 2 acuity is appropriate.[7,8]

After the quick look/PAT assessment, for a child who is not experiencing life-threatening or high-risk situations, the triage nurse performs common triage elements including a brief physical assessment, pertinent medical history of the birthing parent, perinatal history, neonatal birth history, and any previous brief, resolved, unexplained events.[6] The remainder of the article will focus on selected "red flags" in neonatal triage that may or may not be discovered during the critical look/PAT assessment.

Lethargy/Excessive Sleeping

Neonates sleep 16 to 17 hours per day, waking to feed.[9] A tired baby is a hungry baby so a neonate who is unable to awaken enough to feed or to feed well is concerning. Increased sleepiness or lethargy is also a possible sign of an infectious process, high levels of serum bilirubin, or congenital heart defects (CHDs),[1,10,11] which are covered in later paragraphs.

Not Eating Well

Neonates feed every 2 to 4 hours, which equates to 8 to 12 feedings per day.[12] Poor feeding or reported poor suck coordination can be a general sign of hypoglycemia and can also cause hypoglycemia.[1] Infective processes that can lead to sepsis can also reduce feeding in a neonate. Poor feeding is a worrisome, high-risk symptom in a neonate. Strongly consider assigning a level 2 acuity and check a blood glucose as soon as possible using a nursing protocol or a provider order.

Bilious Vomiting

Report of green or bilious vomiting is a cardinal sign of malrotation of a midgut volvulus that can occur at any age but is most common in the neonate.[1] Approximately 97% of neonates diagnosed as having malrotation report bilious vomiting as their primary symptom.[13] In addition to the vomiting, this twisting of the bowels can reduce or eliminate circulation to the mesenteric artery, which is a life-threatening surgical emergency.[1] Other types of bowel obstruction, including necrotizing enterocolitis, can also cause bilious vomiting in a neonate. This high-risk symptom warrants a level 2 triage acuity rating with emergency care focused on airway protection, hydration, and gastric decompression before any indicated surgical intervention.[14]

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Hypothermia

Neonates, especially those who were born premature, get hypothermic easily. Hypothermia activates the hypothalamus to release norepinephrine,[1] which, in turn, causes an increase in oxygen consumption and respiratory rate and an increase in metabolic rate and glucose consumption. In addition, hypothermia is more common than hyperthermia as a sign of possible infection or sepsis in a neonate.[1] Hypoglycemia may also present as hypothermia.[1] Use warming methods to achieve normothermia and isolation procedures if concerned about an infectious process.

Fevers

Infants use nonshivering thermogenesis to maintain body temperature. In this process, norepinephrine is secreted to facilitate the breakdown of brown fat, which creates heat.[1] Given that nonshivering thermogenesis follows hypothermia, either can be an indicator for possible infection. Newborns should not be sick, and therefore, they should not get fevers. Persistent hyperthermia is concerning for sepsis. Using a validated sepsis screening tool developed for neonates may be helpful early in an ED visit.[15,16] At some sites, the sepsis risk calculation is done at birth or upon discharge so a review of records later in the ED visit may provide a comparison calculation.[15] There are 3 risk calculators for infants and pediatric patients with fever, but data suggest the Step-by-Step calculation (https://www.mdcalc.com/calc/1801/step-step-approach-febrile-infants) is the most sensitive[16] and, along with clinical judgment, is best suited for use in the emergency department.

Jaundice

Elevated levels of bilirubin cause jaundice, a yellowing of skin and eyes, first visible in the conjunctivae of the eyes and then spreading to the face proceeding head to toe as bilirubin levels increase.[17] An estimated 80% of neonates will have some level of jaundice.[10] In a previously healthy child, bilirubin levels of over 18 mg/dL,[16] or jaundice reaching almost to the feet, is cause for concern, however acceptable bilirubin levels are based on an age-related curve. Jaundice appearing within the first 24 hours of life is a red flag.[17] A child with risk factors, such as prematurity or concurrent illness, may have a lower threshold for concern at which any level of elevated bilirubin may require focused treatment. Initial appearance of jaundice after 2 weeks of age or worsening jaundice for any age neonate is a red flag finding. Room lighting, patient skin tone, and body region affected can cause variability in recognizing jaundice.[10,18] Gentle pressure to the skin, such as used to check capillary refill, may help assessment. Rapid treatment is needed to prevent neurotoxicity and may include phototherapy, intravenous medications, and/or blood transfusion exchange procedures.[10,18]

Congenital Heart Defects (CHD)

CHDs are those structural and functional cardiac abnormalities present at birth, which may or may not have signs or symptoms at the time of birth. Common signs of CHD are weight loss or poor weight gain, poor feeding, and signs of poor breathing (retractions and tachypnea).[13,19] Caregivers may bring their newborn to the emergency department due to trouble breathing or poor feeding, both of which can be indicative of cardiac issues. In the United States and United Kingdom, screening for critical CHDs is mandated to be done before initial hospital discharge[19,20] but would not capture all at-risk newborns given that some congenital cardiac abnormalities do not present in the first few days or weeks after birth. A 2018 article estimated that 1 in 6 newborns pass the CHD screening, but in fact have a serious CHD.[11] One easy and important test an emergency nurse can perform to help determine CHD is comparison pulse oximetry measurements in the right hand to either foot. The test is considered a fail if either reading is less than 95%.[19] Auscultation of heart tones is less accurate because the lack of a murmur does not rule out a CHD.[11]

Seizures

The brain, like much of neonatal physiology, is not fully developed. This means that the traditional generalized motor movements of seizures do not occur in neonates. The most common signs of a seizure are lip smacking, horizontal eye movements, sustained eye deviation, abnormal tongue movement, pedaling, and apnea.[6] Approximately 60% of neonatal seizures are caused by hypoxia, and therefore, prompt identification is key for the treatment of neonatal seizures.[21]

Summary

Undertriage of neonates can result from an incorrect perception of ill versus well neonatal presentations. Listen closely to caregivers, because they are already very aware of

"normal" for their child. In situations where the baby is not healthy and well, it is vital the triage nurse be able to recognize signs of high-risk presentations to expedite timely testing and treatment. A basic understanding of neonatal physiology is helpful in recognizing a neonate at high risk of a life-threatening event. Being aware of the red flags described in this article can assist the emergency nurse to assign the correct triage acuity rating to improve outcomes for an ill neonate.

Author Disclosures

Conflicts of interest: none to report.

REFERENCES

1. Karlsen K. *Pre-transport/Post-resuscitation Stabilization Care of Sick Infants' Guidelines for Neonatal Healthcare Providers – Learner Manual.* 6th Ed. Salt Lake City, UT: S.T.A.B.L.E., Inc; 2018.
2. Lee HC, Bardach NS, Maselli JH, Gonzales R. Emergency department visits in the neonatal period in the United States. *Pediatr Emerg Care*. 2014;30(5):315-318. https://doi.org/10.1097/PEC.0000000000000120
3. Batu ED, Yeni S, Teksam O. The factors affecting neonatal presentations to the pediatric emergency department. *J Emerg Med*. 2015;48(5):542-547. https://doi.org/10.1016/j.jemermed.2014.12.031
4. Blakey SJ, Lyttle MD, Magnus D. Retrospective observational study of neonatal attendances to a children's emergency department. *Acta Paediatr Int J Paediatr*. 2021;110(11):2968-2975. https://doi.org/10.1111/apa.16039
5. Millar KR, Gloor JE, Wellington N, Joubert GIE. Early neonatal presentations to the pediatric emergency department. *Pediatr Emerg Care*. 2000;16(3):145-150. https://doi.org/10.1097/00006565-200006000-00001
6. Emergency Nurses Association. Emergency Nursing Pediatric Course: Provider Manual. 5th ed. Schaumburg, IL; 2020.
7. Warren DW, Jarvis A, LeBlanc L, et al. Revisions to the Canadian triage and acuity scale paediatric guidelines (PaedCTAS). *CJEM*. 2008;10(3):224-232.
8. Wolf L, Ceci K, McCallum D, Brecher D. *Emergency Severity Index (ESI) handbook*. 5th edition. Emergency Nurses Association; 2023.
9. Newborn sleep patterns. CHOP.edu. Accessed July 23, 2023. https://www.chop.edu/conditions-diseases/newborn-sleep-patterns#
10. Kemper AR, Newman TB, Slaughter JL, et al. Clinical practice guideline revision: management of hyperbilirubinemia in the newborn infant 35 or more weeks of gestation. *Pediatrics*. 2022;150(3), e2022058859. https://doi.org/10.1542/peds.2022-058859
11. Allen KY, Pittsenbarger Z, Roben E. Neonatal cardiac emergencies. *Clin Pediatr Emerg Med*. 2018;19(4):340-344. https://doi.org/10.1016/j.cpem.2018.12.007
12. Centers for Disease Control and Prevention. How much and how often to breastfeed. Accessed July 23, 2023. https://www.cdc.gov/nutrition/infantandtoddlernutrition/breastfeeding/how-much-and-how-often.html#
13. Bohanon FJ, Graham BM, Radhakrishnan RS. Neonatal "near misses" encountered in the emergency department. *Clin Pediatr Emerg Med*. 2014;15(3):231-235. https://doi.org/10.1016/j.cpem.2014.07.003
14. Kaveh M, Nazarirad A, Diaz DN, Eshghi T, Eftekhari K. Non-surgical causes of bilious vomiting in neonates admitted in a tertiary center. *Acta Med Iran*. 2021;59(5):308.
15. Zayek M, Bhat J, Bonner K, et al. Implementation of a modified neonatal early-onset sepsis calculator in well-baby nursery: a quality improvement study. *Pediatr Qual Saf*. 2020;5(4), e330. https://doi.org/10.1097/pq9.0000000000000330
16. Gomez B, Mintegi S, Bressan S, et al. Validation of the "step-by-step" approach in the management of young febrile infants. *Pediatrics*. 2016;138(2), e20154381. https://doi.org/10.1542/peds.2015-4381
17. Dysart KC. Neonatal hyperbilirubinemia (Jaundice in Neonates) Merck Manual online. Accessed July 23, 2023. https://www.merckmanuals.com/professional/pediatrics/metabolic,-electrolyte,-and-toxic-disorders-in-neonates/neonatal-hyperbilirubinemia
18. Mitra S, Rennie J. Neonatal jaundice: aetiology, diagnosis and treatment. *Br J Hosp Med (Lond)*. 2017;78(12):699-704.
19. Martin GR, Ewer AK, Gaviglio A, et al. Updated strategies for pulse oximetry screening for critical congenital heart disease. *Pediatrics*. 2020;146(1), e20191650.
20. National Institute for Health and Clinical Excellence. Neonatal jaundice. (Clinical guideline 98.). Accessed July 23, 2023. https://www.nice.org.uk/guidance/cg98/evidence/full-guideline-245411821
21. Langhan ML, Stanton B. Seizures in neonates: diagnosis and management in the emergency department. *Pediatr Emerg Med Pract*. 2020;17(6):1-20.

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Triage: A Global Perspective

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Contribution to Emergency Nursing Practice

- Emergency nurses should be educated on triage processes to ensure that appropriate clinical prioritization occurs.
- A standardized practice increases consistent patient care, access to appropriate resources, and the meeting of quality benchmarks.
- Reviewing triage systems from several countries provides understanding that, despite variation, the principles of triage remain the same.

Abstract

Triage is a process by which patients are assessed, classified, and sorted based on their presenting complaint and clinical urgency, providing assurance for timely access to emergency care. The goal is to get the right person to the right place, in the right amount of time, for the right reason, and within the context of resource availability. In many countries, a standardized triage system, underpinned through the use of guidelines, is used to provide clinicians with support and guidance. Triage is a globally adopted principle, and although triage guidelines are used in many countries, no single system has been internationally adopted. This paper discusses the importance of how triage process standardization improves patient care, resource management, and benchmarking at local, national, and international levels by applying 5 internationally recognized triage systems to fictional case studies. Evaluation of similarities and differences in severity scores, with a gap analysis, occurs.

Key words: Triage; Emergency nursing; Patient safety, Manchester Triage System; Australasian Triage System; Malaysian Triage Scale; Canadian Triage and Acuity Scale

Introduction

Triage is a vital component in the process of assessing and prioritizing patients and defined as "the process of sorting people in need of medical attention in order to determine priority."[1] This role is recognized globally[2,3] as the aim of assigning acuity level and assessing how long the patient can safely wait.[4] Using a recognized and agreed upon triage approach aids clinical staff decision making when dealing with patients in an emergency care setting and assists in determining the severity of the patient's illness before a more detailed medical assessment.[5] The result of the first encounter triage assessment determines multiple outcomes such as where the patient will be treated in an emergency

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department, how quickly they are seen, and by what level of care provider they are subsequently assessed.[6] The ability of the emergency nurse to be familiar with and able to use triage tools is essential for patient flow, patient safety, and service delivery. For triage to work optimally, the system needs to be dynamic, with the option to reassess as required and to have the subsequent resource allocation to support the decision of the triage assessment.

The confidence and competence of emergency nurses globally to undertake triage require a validated triage system, which is easily accessible in each country, reducing the risk of an error. Of the many studies conducted on triage processes and systems, strong reliability in triage scale utilization with clinicians has been proven.[7] The concept of "triage" has its roots in the military setting and was originally used to categorize and clinically prioritize wounded soldiers. The initial aim was to first treat soldiers with the highest potential of returning to fight,[8,9] with the process developing to see and treat the most critically injured first.[10]

During the 2 world wars, there were many civilian casualties, and the triage process was extended from the battlefield to the civilian world. The Korean and Vietnam wars provided important advances in medicine with the use of advanced transportation and therapeutic modalities against shock. The time between a traumatic event and definitive surgical treatment was reduced, resulting in an increased focus on mechanisms to save the most wounded individuals.[9]

Within the civilian setting, the first acknowledgment of a medical triage system was in New Haven, Massachusetts, in 1964, with a shift in emphasis from primary care to the emergency department irrespective of clinical need.[11] A system was required that based categorization on clinical prioritization rather than patient arrival time.

The literature acknowledges that nurses undertook a triage role in the 1970s, but the recognition of this specialized role became apparent in the 1990s with the introduction of nationally standardized triage systems.[12] As individual countries developed their own systems, a diversity of tools developed that required a period of validity testing and the addition of new categories as clinical and situational developments occurred.[13]

Triage Systems Around the World

Numerous triage systems are used worldwide (eg, Nederlandse Triage Standard [Netherland], Japan Acuity and Triage Scale, and Gruppo Formazione Triage [Italy]). This section focuses on the background and use of 5 adopted triage tools: Emergency Severity Index (ESI), United States; Canadian Triage Acuity Scale (CTAS), Canada; Australasian Triage Scale (ATS), Australia; Malaysian Triage Scale (MTS), Malaysia; and Manchester Triage Scale, United Kingdom and Germany. The authors chose these triage systems as representation of their countries of origin.

ATS

In Australia, the National Triage Scale (NTS) was implemented in 1994, due to a growing government interest in measuring triage activity. On application, it was evident that this tool was not fit for universal purpose.[12] There were application issues between metropolitan and rural emergency departments.

During development, observational studies were undertaken to identify key components and actions taken by triage nurses during the patient assessment process that determined the urgency for medical review. From these studies, the Ipswich Triage Scale, a 5-category scale system, was tested and then further implemented and adopted nationally as the NTS[14] (see Figure 1 for initial urgency descriptors). The 1990s saw the evolvement and focus on further studies[13] related to the NTS, driven by the Australasian College for Emergency Medicine, whereby urgency descriptors were replaced by performance standards.[13]

The Ipswich Triage Scale inferred that an emergency patient could wait "days" to be seen. This was not viewed positively by the public and was open to misinterpretation. Further tool development incorporated urgency descriptors alongside performance indicators to guide clinicians.

In November 2000, after extensive validation through research and testing in emergency departments,[13] the ATS was launched, which provided a reliable tool with maximum recommended waiting times centered around timely access to care and patient safety[15] (see Figure 2 for the ATS criteria).

The work undertaken in Australia provided early evidence for Canada and the United Kingdom to use a similar framework. These early adopters provided further improvements and validation on the viability of triage systems.[16] Subsequently there is evidence that many countries have used the foundations of the ATS to develop triage systems.[12,16]

Over the past 20 years, further research, education, and evaluation have been undertaken by emergency nurses and doctors in Australia. Further developments and tools such as the Emergency Triage Education Kit (ETEK) 2009[17] provide emergency triage staff with specific training.[16] In Australia, the

FIGURE 1
The Ipswich Triage Scale[13]

The Ipswich Triage Scale: Urgency test

This patient should under reasonable circumstances be seen by a medical officer within:

1. Seconds
2. Minutes
3. An hour
4. Hours
5. Days

focus has now shifted from the development of triage systems to reducing education variability, which may decrease poor decision making and negative patient outcomes.[18]

CTAS

CTAS was developed by physician member Dr Robert Beveridge from the Canadian Association of Emergency Physicians (CAEP) as a 5-level scale based on an ideal set time to medical intervention and was derived from the Australian NTS.[19] In 1997, the Canadian National Emergency Nurses Association collaborated with CAEP to establish the triage standards for Canada (see Figure 3 for a description of this triage system).[20] The CAEP National Triage Working Group published guidelines in 1999 in collaboration with the National Emergency Nurses Association, L'Association des Medicine d'Urgence due Quebec, and the Canadian Pediatric Society.[19]

This standardized process for triage aims to improve patient care, manage resources, and provide benchmarking standards locally, provincially, and nationally[20] and results in a standardized list of complaints allowing emergency departments to classify and organize clinical presentations (see Figure 4).[20] The further development of the Canadian Emergency Department Information System helps emergency departments evaluate patient populations, resourcing, activity, and acuity with comparative data available to benchmark and review clinical quality improvements and support research.[21]

ESI

ESI, developed by emergency physicians Richard Wuerz and David Eital, is a 5-tier triage tool spanning level 1 (requiring immediate lifesaving interventions) to level 5 (being of least urgency). Since its initial implementation in 1999, the ESI has largely been based on the number of resources that will be needed to address patient care. Levels 1 and 2 are not based on resources; however, the rest of the levels are related to specific resources identified by the authors. Level 1 requires immediate resuscitative care and level 2 revolves around high-risk potential, pain level, and mental status changes. ESI has undergone 5 editions and was acquired by ENA in 2019.[22] ESI usage among United States emergency departments is 94%.[23-25] Research demonstrated a 59% accuracy in assigning acuity.[26,27] ENA recommends appropriate education to improve accuracy in the implementation of the ESI triage model.[22] The ESI 5th Edition Handbook reorganized and simplified the information, clarifying wording to assist with decision making acuity. Fundamentally, the algorithm did not change.[28]

Initially ESI was aimed only at patients older than 14 years.[29] Since then, multiple developments have occurred, including incorporating triage and vital sign criteria for the pediatric patients.[30] Further revisions (see Figure 5), based on physician and nursing staff feedback, include revised criteria limitations for ESI levels 1 and 2 and the introduction of a pediatric fever criteria.[31]

MTS

During the establishment of emergency services, Malaysia used a 3-tier triage system (Figure 6)[32] classifying patients as red (critical), yellow (semicritical), and green (noncritical).[33] This system was introduced by the Ministry of Health and has widespread implementation throughout the country. The Malaysian Emergency Medicine Speciality was established in 1993 by a group of trauma surgeons, anesthesiologists, and emergency physicians.[34] They introduced a triage system, the Malaysian Triage Category.

However, in 2022, there was an initiative by a group of experts to revise the existing triage category. The Ministry of Health introduced the new triage protocol namely the MTS for emergency and trauma departments in Malaysia. It takes effect in April 2023 (see Figure 7 for detailed explanation).[32] The new version was established to improve the existing protocol, which was developed back in year 2011.

Initially, the triage area was staffed by a mixture of assistant medical officers (AMOs) and nurses. However, emergency nurses are now typically assigned to other areas of the emergency department, such as secondary triage, resuscitation, and observation bays resulting in triage being primarily undertaken by the AMO. Where hospitals have no AMO, triage will be staffed by nurses. Within some

The Australasian Triage Scale (ATS)		
Category	**Description**	**Performance standard**
ATS 1	Immediate	100%
ATS 2	10 min	80%
ATS 3	30 min	75%
ATS 4	60 min	70%
ATS 5	120 min	70%

FIGURE 2
The Australasian Triage Scale.[13] ATS, Australasian Triage Scale.

teaching and tertiary hospitals, a medical officer may also be assigned to support triage.

On the patient's arrival, the triage officer performs a primary survey. For a green classification (noncritical) patient, a secondary triage process is undertaken in a separate location. The nurse garners a history, records vital signs including pain score, and performs an electrocardiogram or capillary blood glucose if indicated (see Figure 6).[32] During the secondary triage, the officer will further triage the patients into level 2 (emergency), level 3 (urgent), level 4 (early care), and level 5 (routine). Further investigation or care, such as minor dressings and medications, can be provided if required.

In the new protocol, there is also a complaint list for an adult to guide the triage into level 2 until level 5 such as abdominal pain, allergy/anaphylaxis, altered mental status, burns scalds, chest/abdominal trauma, chest pain, dehydration, dengue suspected, and diarrhea, to name a few. For children, it listed the same complaints but with different characteristics for levels 1 to 4.

Manchester Triage System

The Manchester Triage System was developed by emergency nurses and physicians from 9 hospitals in the English city of Manchester between 1994 and 1996.[37] It uses 54 clinical presentation algorithms containing discriminators that relate to the patient's condition, based on their clinical history and initial assessment.[35,38]

The discriminators are grouped into 5 triage categories in descending order of urgency: red (immediate), orange (very urgent), yellow (urgent), green (standard), and blue (nonurgent)[35] (see Figure 7 for further explanation).[35,36] Urgency is determined systematically through a process of exclusion of the discriminators beginning from the highest triage level before proceeding to the next. Although there is the recommendation of using specific algorithms, using a related or similar algorithm would still yield similar results that determine the urgency of the presenting complaint.[38-40]

Other countries have adopted and/or adapted the MTS; for example, as shown in Figure 7, Germany has adapted a version of the MTS that has included changes to waiting times that better sits within their health care framework. The noticeable adaptations are seen in the changed waiting times for contact with a medical provider, reducing wait times by up to 50% for the yellow, green, and blue classifications. In addition, the clinical algorithm for the abused or neglected child was not adopted in Germany due to legal reasons. A working group reviewed clinical presentations and triage decision making that may have sat outside the discriminators of the algorithm and developed national standards to support triage nurses amending the triage level in Germany, Austria, Switzerland, and Italy.[35,36] Its application within the German-speaking countries has passed validity testing.[37,41]

Application of International Triage Systems

These international triage tools are now applied to fictional case studies with analysis of outcomes.

CASE STUDY 1: ABDOMINAL PAIN

A 24-year-old female presents to the emergency department with a 2-day history of nausea, vomiting, and abdominal discomfort.

FIGURE 3
Canadian Triage Acuity Scale (CTAS) Education Administration Manual, 2013. GCS, Glasgow coma scale; SIRS, systemic inflammatory response syndrome

Levels	Descriptor	Examples
Level 1-Resuscitation Immediate intervention	Conditions that are threats to life or limb (or imminent risk of deterioration) requiring immediate interventions	Cardiac arrest, respiratory arrest, major trauma (shock), shortness of breath (severe respiratory distress), altered level of consciousness (GCS 3-9), violent/ homicidal with intent
Level 2-Emergenti ntervention within 15 minutes	Conditions that are a potential threat to life, limb, or function, requiring rapid intervention	Chest pain, shortness of breath (moderate respiratory distress), vomiting blood (symptomatic), altered level of consciousness (GCS 10-13), Fever (>38C, looks septic with 3 SIRS criteria), chemical eye exposure, suicidal ideation with plan
Level 3 Urgenti ntervention within 30 minutes	Conditions that could potentially progress to a serious problem requiring emergency intervention	Shortness of breath (mild respiratory distress), vomiting and or nausea (mild dehydration), bleeding disorders (mild or moderate bleed), suicidal ideation (no plan)
Level 4-Less Urgenti ntervention within 60 minutes	Conditions that relate to patient age, distress, or potential for deterioration or complications, would benefit from intervention or reassurance within 1-2 hours	Confusion (chronic), UTI complaints (mild symptoms), constipation (mild pain), mild anxiety or agitation, depressed no suicidal ideation
Level 5-Non-urgenti ntervention within 120 minutes	Conditions that may be acute but non-urgent, as well as conditions which may be part of a chronic problem, with or without evidence of deterioration	Diarrhea (mild, no dehydration), minor bites, medication requests, dressing changes, IV antibiotics

Airway: clear. Breaths: respiratory rate 32 breaths per minute. Pulse oximetry of 95% on room air. Circulation: blood pressure 92/60 mm Hg. Heart rate: 124 beats per minute (regular). Disability: alert on alert, voice, pain, and unresponsive (AVPU) scale. Blood glucose within normal parameters. Exposure: pale and clammy. Temperature 35.6 °C (96 °F). Other information: states her pain is 8/10 on the numeric pain scale. She is unable to keep any antiemetic down.

Application and Analysis

ATS. Using the ETEK[17] education guidelines, the patient would be a category 2 due to her elevated pain score, which would be rated as severe due to the quantitative value of between 7 and 10. Her other clinical observations would also lead to a high suspicion of an acute abdomen and shock.

CTAS. This patient meets criteria for level 2 with the Canadian triage system given that she meets the parameters including "Conditions that are a potential threat to life, limb, or function, requiring rapid intervention." She meets 3 of the systemic inflammatory response syndrome criteria with her abnormal vital signs and requires intervention within 15 minutes. Her pain score (7/10, central location) also relates to level 2 criteria.

ESI. The patient is categorized as ESI 2 due to clinical observations of tachycardia and hypotension with acute onset of severe pain in a high-risk female of child-bearing age.

Manchester Triage System. Reviewing the "abdominal pain in adults" clinical triage algorithm, the trigger discriminator is severe pain of 8/10. Other clinical signs and symptoms described, including vital signs and pale

Canadian Emergency Department Information System (CEDIS) Presenting Complaint List (V2.0) Effective Date: April 2012					
Cardiovascular (001–050)	**#**	**Environmental (201–250)**	**#**	**Genitourinary (301–350) cont'd**	**#**
Cardiac arrest (non-traumatic)	001	Frostbite/cold injury	201	Polyuria	309
Cardiac arrest (traumatic)	002	Noxious inhalation	202	Genital trauma	310
Chest pain—cardiac features	003	Electrical injury	203	**Mental Health (351–400)**	**#**
Chest pain—non-cardiac features	004	Chemical exposure	204	Depression/suicidal/deliberate self-harm	351
Palpitations/irregular heart beat	005	Hypothermia	205	Anxiety/situational crisis	352
Hypertension	006	Near drowning	206	Hallucinations/delusions	353
General weakness	007	**Gastrointestinal (251–300)**	**#**	Insomnia	354
Syncope/pre-syncope	008	Abdominal pain	251	Violent/homicidal behaviour	355
Edema, generalized	009	Anorexia	252	Social problem	356
Bilateral leg swelling/edema	010	Constipation	253	Bizarre behaviour	358
Cool pulseless limb	011	Diarrhea	254	Concern for patient's welfare	359
Unilateral reddened hot limb	012	Foreign body in rectum	255	Pediatric disruptive behaviour	360
ENT—Ears (051–100)	**#**	Groin pain/mass	256	**Neurologic (401–450)**	**#**
Earache	051	Nausea and/or vomiting	257	Altered level of consciousness	401
Foreign body, ear	052	Rectal/perineal pain	258	Confusion	402
Loss of hearing	053	Vomiting blood	259	Vertigo	403
Tinnitus	054	Blood in stool/melena	260	Headache	404
Discharge, ear	055	Jaundice	261	Seizure	405
Ear injury	056	Hiccoughs	262	Gait disturbance/ataxia	406
ENT—Mouth, Throat, Neck (101–150)	**#**	Abdominal mass/distention	263	Head injury	407
Dental/gum problem	101	Anal/rectal trauma	264	Tremor	408
Facial trauma	102	Oral/esophageal foreign body	265	Extremity weakness/symptoms of CVA	409

FIGURE 4

CEDIS presenting complaint list.[21] CEDIS, Canadian Emergency Department Information System.

and clammy skin, would result in a category of orange (urgent).

MTS. This patient is triaged as level 21 (resuscitation emergency), due to changes in the hemodynamic status indicating potential shock with low oxygen saturations, pale and clammy, and a pain score of 8/10. It is based on primary triage where the triage officer performs a critical first look on the appearance and checks for the severity of the pain.

CASE STUDY 2: MENTAL HEALTH

A 21-year-old male is brought to the emergency department by the police after attempting to jump off a local bridge. Bystanders were able to subdue him. The patient is angry, yelling "I'm going to kill you."

Airway: clear. Breaths: unable to assess due to combativeness of the patient. Circulation: color pink, unable to assess vitals because the patient is flailing and the police have him in handcuffs. Disability: alert on AVPU. Unable to obtain a blood glucose reading. Unable to assess pupils. Exposure: unable to obtain a temperature. Minor abrasions noted to his face.

Other information: known history of drug abuse. History of suicidal intent requiring hospital admission.

Application and Analysis

ATS. Using the ETEK[17] education guidelines, the patient would be a category 1 (mental health triage guidance) given that there is evidence of danger to life (self or others),

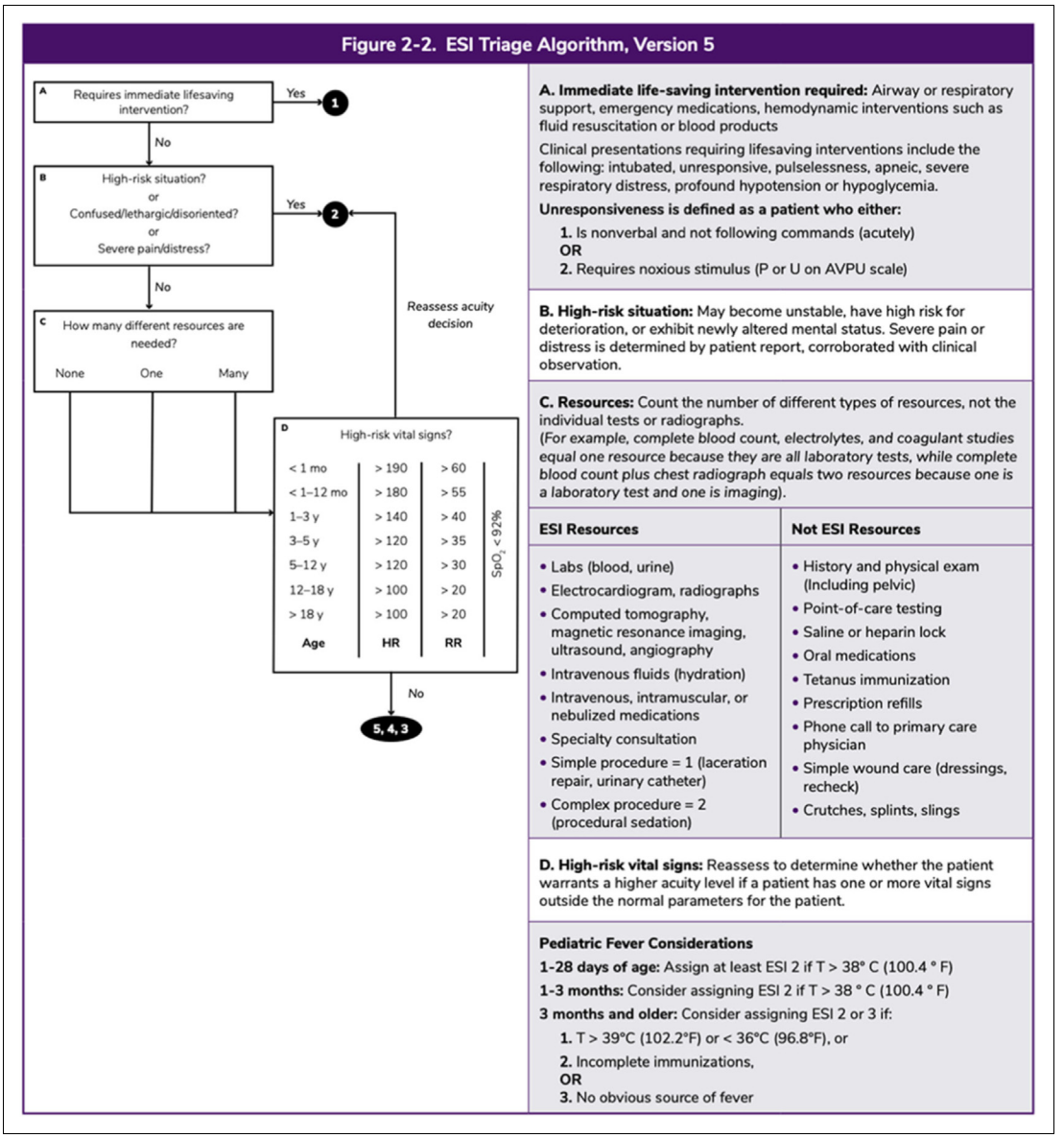

FIGURE 5
Emergency Severity Index tool, ENA University.[28,31]

severe behavioral disorder, and agitation, with immediate threat of violence. The patient will need continuous visual surveillance 1:1 ratio, immediate assessment, and interventions.

CTAS. This patient meets criteria for level 1 (imminent harm to self or others). The patient is also combative so consideration of unknown history such as a head injury or chemical imbalance needs to be considered.

ESI. The patient is categorized as ESI 2 due to the high-risk situation (suicidal intent with a plan, verbalizing homicidal threats and is highly aggressive) with a danger to himself and others.

Manchester Triage System. Reviewing the "behaving strangely" clinical triage algorithm, the trigger discriminator is high risk of harm to others (high level of combativeness and the direct threat of harm), resulting in a classification of orange (urgent).

FIGURE 6
Malaysian Triage Scale classification[32]

Critical first look				
Look for	Level 1–resuscitation	Level 2–emergency	Level 3–urgent	Secondary triage
Appearance	Cardiac arrest; not breathing; major trauma in shock; severe respiratory distress	Not responding to call; severe chest pain; severe pain; ongoing seizures	Altered mental status; cannot communicate; cannot sit/stand unsupported	Walking; talking; not distressed; not aggressive
Rapid assessment				
Check for	Level 1 – Resuscitation	Level 2 – Emergency	Level 3 – Urgent	Secondary triage
Respiratory distress Airway breathing; SpO2	Abnormal sounds; excessive work of breathing, sweating; cannot speak, one word reply; confused, lethargic; require assisted breathing; SpO2, 90% room air	Difficulty to breathe; short phrases only; agitation, anxious; SpO2 90%–92% room air	Wheeze, expiratory rhonchi, airway intact; SpO2 92 – 94% room air; need O2 support	Not breathless; SpO2 >94%; no need O2
Shock state Peripheries; pulses; AVPU	Pale, cyanosed, cold peripheries; Severe tachycardia/ bradycardia; Absent radial pulse	Tachycardia, weak pulses; confused; septic/ toxic; CRT >2 seconds	Peripheries warm, CRT normal; cannot stand/walk unsupported	Warm, pink, pulses normal; alert, walking
Conscious Levels Airway; AVPU; brief neuro	Unresponsive; Airway unprotected	Confused, agitated, disoriented; obvious neuro deficits; ongoing seizures; abnormal posturing	Not fully conscious; cannot sit unsupported	Alert; sit upright
Bleeding Seen external; suspect internal; bleeding disorders; anticoagulant therapy	Arterial limb bleeding; active uncontrolled bleeding; massive vaginal bleed; severe facial injury; severe pelvic injury	Active vomit/cough blood; suspected vascular injury; Suspected intraabdominal bleeding/ectopic /AAA; compartment syndrome	Bleeding from fractures/ dislocations/joints/ wounds; menorrhagia; ENT bleeding; expanding hematoma; bleeding disorders	Minimal / no active bleeding
VITAL sIGNS (aDULT)				
Look for	Level 2 – Emergency	Level 3 – Urgent	Level 4 – Early care	Level 5 - Routine
Vital signs BP; HR; RR; SpO2; temp; GCS; pain score	SBP <90; HR >120, RR >30; BP >220/130 with symptoms; SpO2 <92%; temp >39 or <36; appears septic, ill; immunocompromised; severe pain (8–10); GCS <13 or drop >2	HR 100 – 120; RR 20 – 30; BP >220/130 No symptoms; BP >180/110 mild symptoms; SpO2 92 – 94%; temp 37.5–39 °C; pain score 4–7; appears unwell	Vital signs within normal limits; BP >180/110 No symptoms; history of fever; no documented fever	Vital signs within normal limits; no fever; no pain

ECG 12-lead ECG	Wide complex tachycardia; narrow complex tachycardia >150/min; bradycardia <40; ST elevations or depressions	Atrial fibrillation > 100; frequent ectopics; blocks/ sinus pauses; tall tented T waves	No ECG findings; continuing chest pain	Normal ECG; no ST-T wave changes
Glucose Levels; symptoms	<2.5 mmol/L and symptoms; > 18 mmol/ L and symptoms	<2.5 mmol/L no symptoms; >18 mmol/L no symptoms	2-5 – 4.0 mmol/L; 12 – 18 mmol/L	Normal limits

AVPU, alert, voice, pain, and unresponsive; CRT, capillary refill time; ECG, electrocardiogram; ENT, ear, nose, and throat.

MTS. This patient is triaged to level 2 (emergency) due to the potential threat of harm to himself and others and agitation from the rapid assessment guide. He requires an area away from other patients to maintain a safe environment, including potential actions for physical and chemical restraints.

CASE STUDY 3: PEDIATRIC FEVER

A 2-year-old girl presents to the emergency department with a fever and increased lethargy not relieved by antipyretics. Caregiver states that the girl has had a fever for 2 days and her last dose of Tylenol was 2 hours ago. Weight is 22 kg.

Airway: clear. Breaths: 28 per minute. Pulse oximetry 92% on room air. Circulation: capillary refill time (CRT) 3 seconds. Heart rate 146 beats per minute (regular). Disability: verbal on AVPU. Blood glucose (within normal parameters). Exposure: pale, temperature 39.2 °C (102.5 °F). No rashes noted. Other information: history of sickle cell anemia.

Application and Analysis

ATS. Using the ETEK[17] education guidelines, the patient would be a category 2 (pediatric physiological discriminators tool).[17] There is evidence of circulatory compromise with tachycardia and pallor, alongside hyperthermia despite antipyretic medication and decreased oxygen saturations.

CTAS. This patient is a category 2 due to the fever modifier (temperature is >38.5 °C and she is immunocompromised). Her oxygen saturation, tachycardia, and CRT are first-order modifiers that need to be dealt with emergently.

FIGURE 7
Manchester Triage System including the German wait time adaptation[35,36]

Level	Urgency category	Wait time (in mins) until treatment	Wait time (in mins) until treatment German adaptation	Examples of discriminators
Red	Immediate	0	0	Airway compromise, inadequate breathing, shock
Orange	Very urgent	10	10	Very hot (>105.8 °F, 41 °C), severe pain, significant mechanism of injury
Yellow	Urgent	60	30	Moderate or spasmodic pain, unable to walk
Green	Standard	120	90	Recent mild pain, swelling, recent problem
Blue	Non-urgent	240	120	No specific discriminator–only used when none of the other discriminators match the condition and the patient is stable

TABLE
Case study outcomes

Triage system	Case study 1	Case study 2	Case study 3
Australasian Triage Scale	2	1	2
Canadian Triage System	2	1	2
Emergency Severity Index	2	2	2
Malaysian Triage Scale	2	2	1
Manchester Triage System	Orange	Orange	Orange

ESI. The clinical presentation and recorded vital signs including lethargy reported trigger an ESI 2 allocation. In addition, the history of sickle cell anemia suggests an immunocompromised state.

Manchester Triage System. Reviewing the "Unwell Child" clinical triage algorithm, 2 symptoms (reaction to verbal stimuli and temperature) are discriminators for the orange (urgent) category.

MTS. This child is triaged to level 1 (resuscitation) due to her lethargy, pallor, and changes in the circulation (CRT >2 seconds and tachycardia). Her febrile status, with a history of sickle cell anemia and decreased oxygenation, will also support the level 1 category.

Discussion

Through the use of case studies, the application of the triage tools demonstrates consistency in decision making (Table). Variability exists among countries in terms of nursing scope of practice, health care infrastructure and resources, and accessibility of diagnostics and investigations at first point of patient contact. Further monitoring and development of triage systems will be required to stay up to date in the changing landscape of health care. For example, in recent years, new triage considerations have been required for infectious diseases and mental health presentations. Limitations of use include training and education that are not mandatory in all settings. In addition, due to the individualized application of these tools to these case studies, the outcome may not reflect wider triage practices globally.

Implications for Emergency Nurses

Emergency nurses worldwide require specialized training to undertake a rapid assessment of patients not only to determine the urgency of care required but to also identify early warning signs of potential deterioration. Familiarization with country-specific triage systems, alongside a periodic review of the available clinical evidence that underpins each validated tool, is essential. Triage tools provide support to the emergency nurse, allowing them to undertake rapid assessment and prioritize care within their own health care context.

Conclusion

There are multiple publications on country-specific emergency triage systems; however, there are limited publications on side-by-side reviews of differing systems or detailed evaluation of triage applications against set case studies.[42,43] Using fictional case studies, key differences among 5 validated triage systems have been identified. There has been discussion in emergency nursing forums that a standardized worldwide triage system could be beneficial, allowing comparable data to be evaluated between countries. A limitation of this is the differing global health care context in which triage occurs, with a variation of resources and clinical practice standards. Locally applied, standardized triage care with patient-focused assessment ensures that no matter where in the world you present for care, your projected time to treatment will be consistent.

Author Disclosures

Conflicts of interest: none to report.

REFERENCES

1. *Collins English Dictionary & Thesaurus*. 4th ed. Harpercollins Publishers Ltd; 2000.
2. Reay G, Smith-MacDonald L, Then KL, Hall M, Rankin JA. Triage emergency nurse decision-making: incidental findings from a focus group study. *Int Emerg Nurs*. 2020;48:100791. https://doi.org/10.1016/j.ienj.2019.100791
3. Sánchez-Salmerón R, Gómez-Urquiza JL, Albendín-García L, et al. Machine learning methods applied to triage in emergency services: a systematic review. *Int Emerg Nurs*. 2022;60:101109. https://doi.org/10.1016/j.ienj.2021.101109
4. National Emergency Nurses Association (NENA). Position statement: role of the triage nurse. Published 2019. Accessed February 24, 2023. https://nena.ca/wp-content/uploads/2023/04/Role-of-the-Triage-Nurse-2019.pdf

5. Sutriningsih A, Wahyuni CU, Haksama S. Factors affecting emergency nurses' perceptions of the triage systems. *J Public Health Res*. 2020;9(2):1808. https://doi.org/10.4081/jphr.2020.1808
6. Reblora JM, Lopez V, Goh YS. Experiences of nurses working in a triage area: an integrative review. *Aust Crit Care*. 2020;33(6):567-575. https://doi.org/10.1016/j.aucc.2020.01.005
7. Kuriyama A, Urushidani S, Nakayama T. Five-level emergency triage systems: variation in assessment of validity. *Emerg Med J*. 2017;34(11):703-710. https://doi.org/10.1136/emermed-2016-206295
8. Nakao H, Ukai I, Kotani J. A review of the history of the origin of triage from a disaster medicine perspective. *Acute Med Surg*. 2017;4(4):379-384. https://doi.org/10.1002/ams2.293
9. Mitchell G. A brief history of triage. *Disaster Med Public Health Prep*. 2008;2(Suppl 1):S4-S7. https://doi.org/10.1097/DMP.0b013e3181844d43
10. O'Meara M, Porter K, Greaves I. Triage. *Trauma*. 2007;9(2):111-118. https://doi.org/10.1177/1460408607084180
11. Weinerman ER, Rutzen SR, Pearson DA. Effects of medical "triage" in hospital emergency service. *Public Health Rep (1896)*. 1965;80(5):389-399. https://doi.org/10.1097/DMP.0b013e3181844d43
12. Fry M, Burr G. Review of the triage literature: past, present, future? *Aust Emerg Nurs J*. 2002;5(2):33-38. https://doi.org/10.1016/s1328-2743(02)80018-9
13. Christ M, Grossmann F, Winter D, Bingisser R, Platz E. Modern triage in the emergency department. *Dtsch Ärztebl*. 2010;107(50):892-898. https://doi.org/10.3238/arztebl.2010.0892
14. FitzGerald G, Jelinek GA, Scott D, Gerdtz MF. Emergency department triage revisited. *Emerg Med J*. 2010;27(2):86-92. https://doi.org/10.1136/emj.2009.077081
15. Thawley A, Aggar C, Williams N. The educational needs of triage nurses. *Health Educ Pract J Res Prof Learn*. 2020;3(1). https://doi.org/10.33966/hepj.3.1.14121
16. Van Gerven R, Delooz H, Sermeus W. Systematic triage in the emergency department using the Australian National Triage Scale: a pilot project. *Eur J Emerg Med*. 2001;8(1):3-7. https://doi.org/10.1097/00063110-200103000-00002
17. Australian Government. Department of Health and Ageing. Emergency triage education kit. Published October 2007. Accessed March 4, 2023. https://acem.org.au/getmedia/c9ba86b7-c2ba-4701-9b4f-86a12ab91152/Triage-Education-Kit.aspx
18. Varndell W, Hodge A, Fry M. Triage in Australian emergency departments: results of a New South Wales survey. *Australas Emerg Care*. 2019;22(2):81-86. https://doi.org/10.1016/j.auec.2019.01.003
19. Bullard MJ, Musgrave E, Warren D, et al. Revisions to the Canadian emergency department triage and acuity scale guidelines 2016. *CJEM*. 2017;19(S2 suppl 2):S18-S27. https://doi.org/10.1017/cem.2017.365
20. The Canadian Triage and Acuity Scale: Combined Adult/Pediatric Educational Program. Participant manual, version 2.5b. Canadian Association of Emergency Physicians. Published 2013. Accessed February 24, 2023. http://ctas-phctas.ca/wp-content/uploads/2018/05/participant_manual_v2.5b_november_2013_0.pdf
21. Grafstein E, Unger B, Bullard M, Innes G. Canadian Emergency Department Information System (CEDIS) Presenting Complaint List (Version 1.0). *CJEM*. 2003;5(01):27-34. https://doi.org/10.1017/s1481803500008071
22. Emergency Nurses Association. Emergency Nurses Association acquires ESI triage program. Published 2019. Accessed June 5, 2023. https://www.ena.org/press-room/ena-in-the-news/2019/10/23/emergency-nurses-association-acquires-esi-triage-program
23. Worth M, Davis LL, Wallace DC, Bartlett R, Travers D. Are emergency departments in the United States following recommendations by the emergency severity index to promote quality triage and reliability? *J Emerg Nurs*. 2019;45(6):677-684. https://doi.org/10.1016/j.jen.2019.05.006
24. Chmielewski N, Moretz J. ESI triage distribution in U.S. emergency departments. *Adv Emerg Nurs J*. 2022;44(1):46-53. https://doi.org/10.1097/tme.0000000000000390
25. Wolf LA, AM Delao, Delao AM. Establishing research priorities for the emergency severity index using a modified Delphi approach. *J Emerg Nurs*. 2021;47(1):50-57. https://doi.org/10.1016/j.jen.2020.09.005
26. Jordi K, Grossmann F, Gaddis GM, et al. Nurses' accuracy and self-perceived ability using the Emergency Severity Index triage tool: a cross-sectional study in four Swiss hospitals. *Scand J Trauma Resusc Emerg Med*. 2015;23(1):62. https://doi.org/10.1186/s13049-015-0142-y
27. Mistry B, Balhara KS, Hinson JS, et al. Nursing perceptions of the emergency severity index as a triage tool in the United Arab Emirates: a qualitative analysis. *J Emerg Nurs*. 2018;44(4):360-367. https://doi.org/10.1016/j.jen.2017.10.012
28. ENA University. Emergency Severity Index Handbook 5th Edition. Enau.ena.org. Published 2023. Accessed April 5, 2023. https://enau.ena.org/Public/Catalog/Details.aspx?id=HD7sAbiu6wjN72RIiX1YBw%3d%3d&returnurl=%2fUsers%2fUserOnlineCourse.aspx%3fLearningActivityID%3dHD7sAbiu6wjN72RIiX1YBw%253d%253d
29. Wuerz RC, Milne LW, Eitel DR, Travers D, Gilboy N. Reliability and validity of a new five-level triage instrument. *Acad Emerg Med*. 2000;7(3):236-242. https://doi.org/10.1111/j.1553-2712.2000.tb01066.x
30. Wuerz RC, Travers D, Gilboy N, Eitel DR, Rosenau A, Yazhari R. Implementation and refinement of the emergency severity index. *Acad Emerg Med*. 2001;8(2):170-176. https://doi.org/10.1111/j.1553-2712.2001.tb01283.x
31. Gilboy N, Tanabe P, Travers DA, Rosenau AM, Eitel DR. The emergency severity index, version 4: implementation handbook. Agency for Healthcare Research and Quality. Published May 2005. Accessed May 1, 2023. https://www.sgnor.ch/fileadmin/user_upload/Dokumente/Downloads/Esi_Handbook.pdf
32. Ministry of Health. Malaysian triage scale for emergency and trauma departments, new revised version 2019. Published April 17, 2023. Accessed May 1, 2023. https://www.slideshare.net/MathanRaj581834/malaysian-triage-scale-new-revised-20191pdf
33. Abd Rahman NF, Tuan Kamauzaman TH, Nor Arifin W, Md Noh AY. Development and psychometric evaluation of triage questionnaire (Qtrix): exploratory factor analysis and item response theory analysis. *HK J Emerg Med*. 2020;29:227-235. https://doi.org/10.1177/1024907920908366
34. Alzamani MI. Evolution of emergency medicine in Malaysia. Humanistic Care When It Matters Most. Facebook. Published 2022. Accessed April 4, 2023. https://www.facebook.com/740237522/posts/10158919501137523/?flite=scwspnss

35. Mackway-Jones K, Marsden J, Windle J. *Emergency Triage: Manchester Triage Group*. 3rd edition. Wiley-Blackwell; 2014.
36. Mackway-Jones K, Marsden J, Windle J. Ersteinschätzung in der Notaufnahme. Hogrefe. Published 2020. Accessed May 1, 2023. https://pubengine2.s3.eu-central-1.amazonaws.com/preview/99.110005/9783456958392_preview.pdf
37. Gräff I, Goldschmidt B, Glien P, et al. The German version of the Manchester Triage System and its quality criteria–first assessment of validity and reliability. *PLoS One*. 2014;9(2):e88995. https://doi.org/10.1371/journal.pone.0088995
38. Mirhaghi A, Mazlom R, Heydari A, Ebrahimi M. The reliability of the Manchester Triage System (MTS): a meta-analysis. *J Evid Based Med*. 2017;10(2):129-135. https://doi.org/10.1111/jebm.12231
39. Cooke MW, Jinks S. Does the Manchester triage system detect the critically ill? *Emerg Med J*. 1999;16(3):179-181. https://doi.org/10.1136/emj.16.3.179
40. Azeredo TRM, Guedes HM, Rebelo de Almeida RA, Chianca TCM, Martins JCA. Efficacy of the Manchester Triage System: a systematic review. *Int Emerg Nurs*. 2015;23(2):47-52. https://doi.org/10.1016/j.ienj.2014.06.001
41. Mayerhofer C, Rettl H, Graziadei I, Stummer H. Validierungsstudie des deutschsprachigen Manchester Triage Systems. *Med Klin Intensivmed Notfallmed*. 2022;117(4):283-288. https://doi.org/10.1007/s00063-021-00813-4
42. Hinson J, Martinez D, Cabral S, et al. Triage performance in emergency medicine: systematic review. *Ann Emerg Med*. 2019;74(1):140-152. https://doi.org/10.1016/j.annemergmed.2018.09.022
43. Zachariasse JM, van der Hagen V, Seiger N, Mackway-Jones K, van Veen M, Moll HA. Performance of triage systems in emergency care: a systematic review and meta-analysis. *BMJ Open*. 2019;9(5):e026471. https://doi.org/10.1136/bmjopen-2018-026471

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Transient Adrenal Insufficiency Following Pfizer/BioNTech Coronavirus Disease-2019 Vaccine Overdose

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Contribution to Emergency Nursing Practice

- This paper highlights the importance of monitoring patients for adverse effects following coronavirus disease-2019 vaccination.
- The need for considering adrenal insufficiency in patients presenting with fatigue and presyncope attacks after vaccination is addressed in this review.
- It is vital to continue to raise awareness about potential dosing errors and their impact on patient outcomes.

Key words: COVİD-19; Vaccine; Adrenal insufficiency

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Introduction

The COVID-19 pandemic has already caused more than 6.5 million deaths worldwide.[1] Although vaccines have been instrumental in controlling the pandemic, they have many adverse effects. The most common adverse effects include pain at the injection site, fatigue, headache, myalgia, arthralgia, pyrexia, and nausea.[2,3] Because of the massive scale of vaccinations, there has been an increase in the number of adverse effects, some of which have been due to incorrect application of the vaccine.

Here, we describe the case of transient adrenal insufficiency that developed in a patient who accidentally received a high-dose Pfizer-BioNTech coronavirus disease-2019 (COVID-19) vaccine.

Case Presentation

A 48-year-old female patient presented at a primary care clinic where COVID-19 vaccinations were administered. The patient mistakenly received one vial (6 doses) of the Pfizer-BioNTech COVID-19 vaccine instead of the second dose of the BioNTech vaccine. She had no history of disease other than migraine and irregular use of propranolol. The patient reported no symptoms other than numbness. She was oriented and cooperative, and her initial vital signs were within the normal range: temperature, 36.7 °C (98.06 °F); blood pressure, 138/94 mm Hg; heart rate, 102/min; oxygen saturation, 98%; and respiratory rate, 16/min. Physical and neurological examinations revealed no pathological findings, and electrocardiography showed normal sinus rhythm. The patient's laboratory tests were also normal. She was monitored in the emergency room for 48 hours and then discharged with a request to follow up after 15 days. Patient's severe acute respiratory syndrome coronavirus 2 total antibody levels were >250 U/mL.

On the 18th day, the patient was scheduled for a follow-up visit at the emergency department after consultation with infectious disease specialists. The patient presented with symptoms of dyspnea exacerbated by

TABLE 1
Laboratory values

Lab values	Normal values	Patient's value	Symptom presentation	Medical significance, differential diagnosis, monitoring, follow-up, long-term sequelae	Emergency nursing considerations	Patient interventions
Cortisol	4.82-19.5 μg/dL	9.04 μg/dL *19.3 μg/dL	General malaise, fatigue, presyncope attacks	Transient adrenal insufficiency, isolated ACTH deficiency (IAD)	Monitor for signs of adrenal crisis	Refer to endocrinology department
ACTH	7.2-63.3 ng/L	2.6 ng/L *26.9 ng/L	General malaise, fatigue, presyncope attacks	Possible secondary adrenal insufficiency	Monitor for signs of adrenal crisis	Follow up with endocrinology department
TSH	0.48-4.81 mIU/L	2.19 mIU/L	General malaise, fatigue, presyncope attacks	Rule out thyroid disorders which can present with similar symptoms	Assess for signs of hypothyroidism	Further evaluation for thyroid disorders
Aldosterone	2.21-35.3 ng/dL	10 ng/dL	General malaise, fatigue, presyncope attacks	Rule out mineralocorticoid deficiency	Monitor blood pressure and electrolytes	Further evaluation for mineralocorticoid deficiency
Insulin-like Growth Factor-1 (IGF-1)	80.2-218 μg/L	73.2 μg/L	General malaise, fatigue, presyncope attacks	Assess growth hormone deficiency	Monitor growth and development	Further evaluation for growth hormone deficiency
Prolactin	4.79-23.3 μg/L	13.3 μg/L	General malaise, fatigue, presyncope attacks	Assess pituitary function	Monitor for signs of hyperprolactinemia	Further evaluation for pituitary dysfunction

ACTH, adrenocorticotropic hormone; TSH, thyroid-stimulating hormone.
* The patient's cortisol and ACTH blood test results obtained 1 month later were as follows.

TABLE 2
Naranjo Adverse Drug Reaction Probability Scale

Question	Score	Rationale
Are there previous conclusive reports on this reaction?	2	No previous reports on transient adrenal insufficiency specifically following COVID-19 vaccine overdose have been reported.
Did the adverse event appear after the suspected drug was administered?	2	The symptoms of transient adrenal insufficiency appeared shortly after the administration of the Pfizer-BioNTech COVID-19 vaccine overdose.
Did the adverse reaction improve when the drug was discontinued or a specific antagonist was administered?	1	The patient's symptoms alleviated without specific treatment, indicating a self-limiting course.
Did the adverse reaction reappear when the drug was readministered?	0	The adverse reaction was not re-challenged with the vaccine.
Are there alternative causes that could have caused the reaction?	0	No other potential causes based on the patient's history, physical examination, or medication list could be identified.
Did the reaction reappear when a placebo was given?	0	A placebo was not administered to determine the recurrence of the reaction.
Was the drug detected in the blood or other fluids in toxic concentrations?	0	Drug concentration levels were not assessed in this case.
Was the reaction more severe when the dose was increased or less severe when the dose was decreased?	0	The reaction occurred due to a higher-than-intended dose of the Pfizer-BioNTech COVID-19 vaccine, suggesting a dose-dependent relationship.
Did the patient have a similar reaction to the same or similar drugs in any previous exposure?	0	The patient did not have any previous exposure to similar drugs.
Was the adverse event confirmed by any objective evidence?	1	The laboratory tests indicated low cortisol and ACTH levels, confirming the diagnosis of transient adrenal insufficiency.
Overall Score	6	The Naranjo score of 6 indicates a "probable" adverse drug reaction, suggesting a reasonable temporal sequence and known characteristics of the patient's clinical state do not explain the reaction.

COVID-19, coronavirus disease-2019.

exertion and widespread fatigue. Importantly, the patient indicated that she had not sought medical attention for these symptoms prior to her presentation at our institution. Patient's vital signs at this visit were as follows: temperature, 36.5 °C (97.7 °F); blood pressure, 130/91 mm Hg; heart rate, 77/min; oxygen saturation, 98%; and respiratory rate, 12/min. Physical and neurological examination again revealed no pathological findings, but electrocardiography showed a left bundle branch block. Laboratory tests indicated the following results: serum sodium, 140 mEq/L (136-146 mEq/L); serum potassium, 4.8 mEq/L (3.5-5.1 mEq/L); proBNP, 71.8 ng/L (0-125 ng/L); troponin T-hs, 3 ng/L (0-14 ng/L); and D-dimer, 0.31 mg/L (0-0.5 mg/L) (Table 1). Chest x-ray did not show any

abnormalities. Echocardiography revealed an ejection fraction of 60%, mild mitral and tricuspid regurgitation, and no wall motion defects. The patient's severe acute respiratory syndrome coronavirus 2 total antibody level was >250 U/mL again. Myocardial perfusion scintigraphy showed a left ventricular ejection fraction of >65% and normal wall movements. After evaluation in the emergency department, the patient was discharged with recommendations for further follow-up. She did not report any active symptoms at that time.

One week following discharge, the patient returned to the emergency department seeking further evaluation of symptoms and complaints that had emerged since the previous admission. The patient reported experiencing episodes of hypotension, presyncope, and syncope during the week leading up to the follow-up visit. The patient stated that she had not sought medical attention for these symptoms prior to presenting to our institution. Upon assessment, the patient's vital signs were as follows: blood pressure of 97/70 mm Hg, heart rate of 92 beats per minute, oxygen saturation of 99%, and respiratory rate of 12 breaths per minute. To assess the patient's endocrine function, a hormone panel analysis was performed in the morning after an overnight fast. The results revealed low levels of cortisol (9.04 μg/dL; reference range: 4.82-19.5 μg/dL) and adrenocorticotropic hormone (ACTH) (2.6 ng/L; reference range: 7.2-63.3 ng/L), thyroid-stimulating hormone of 2.19 mIU/L (reference range: 0.48-4.81 mIU/L), aldosterone of 10 ng/dL (reference range: 2.21-35.3 ng/dL), insulin-like growth factor-1 (IGF-1) of 73.2 μg/L (reference range: 80.2-218 μg/L), and prolactin of 13.3 μg/L (reference range: 4.79-23.3 μg/L). Given the presentation and laboratory findings, secondary adrenal insufficiency was suspected. To further investigate, abdominal and cranial magnetic resonance imaging scans were scheduled. However, no abnormalities were detected on the imaging studies. Consequently, the patient was referred to the endocrinology department for further evaluation and management, with a follow-up appointment scheduled for 2 weeks later to monitor the patient's progress.

The patient returned approximately 1 month later and reported alleviation of her symptoms and no additional complaints. This visit was initiated to review the results of the laboratory tests obtained during the previous visit. At 8 AM, the patient's fasting morning lab studies revealed all parameters within reference limits. The cortisol and ACTH values had returned to normal, with cortisol measuring 19.3 μg/dL (4.82–19.5 μg/dL) and ACTH measuring 26.9 ng/L (7.2-63.3 ng/L) (Table 1).

Based on the Naranjo Adverse Drug Reaction Probability Scale, the likelihood of an adverse drug reaction in this patient was considered "probable" with a score of 5[4] (Table 2). This indicates that the reaction followed a reasonable temporal sequence after a drug followed a recognized response to the suspected drug, was confirmed by withdrawal but not by exposure to the drug, and could not be reasonably explained by the known characteristics of the patient's clinical state. Ultimately, it was thought that the patient developed transient adrenal insufficiency due to the vaccine overdose.

TABLE 3
Signs and symptoms of differential diagnoses for symptoms of fatigue, presyncope attacks, and dyspnea on exertion

Condition	Signs and symptoms
Isolated ACTH deficiency	Fatigue, weakness, orthostatic hypotension, electrolyte imbalances
Cardiovascular disorders	Irregular heart rate or rhythm, hypotension, signs of fluid overload or heart failure
Respiratory conditions	Increased respiratory rate, dyspnea on exertion, decreased breath sounds (if pulmonary embolism or lung disease suspected)

ACTH, adrenocorticotropic hormone.

Timeline

Day 0: Accidental overdose of the Pfizer-BioNTech COVID-19 vaccine
Day 18: Follow-up visit at the emergency department
Day 25: Return visit to the emergency department with episodes of hypotension, presyncope, and syncope. Comprehensive hormone panel analysis was performed to evaluate the patient's endocrine function
Day 50: Follow-up visit at the emergency department to review laboratory test results

Discussion

Isolated ACTH deficiency is a rare disorder characterized by secondary adrenal insufficiency with low or absent cortisol production, normal secretion of pituitary hormones other than ACTH, and the absence of structural pituitary defects. In this case, the patient developed symptoms of isolated ACTH deficiency shortly after the administration of the

Pfizer-BioNTech COVID-19 vaccine overdose. It is important to highlight the possibility of ACTH deficiency and the need for close monitoring of patients reporting diffuse fatigue and presyncope attacks after vaccination.

In this case report, we present the occurrence of transient adrenal insufficiency in a 48-year-old female patient who received an accidental overdose of the Pfizer-BioNTech COVID-19 vaccine. The patient did not take any drugs or supplements and had no history of endocrinological problems. The patient presented with common symptoms such as diffuse fatigue, presyncope attacks, and dyspnea on exertion. These symptoms can be indicative of various underlying conditions, and it is crucial to consider differential diagnoses when evaluating the patient.

COVID-19 vaccines, including the Pfizer-BioNTech vaccine, have undergone rigorous assessment for safety and efficacy.[5] However, despite the extensive monitoring and evaluation, there have been reported cases of vaccine overdose, primarily due to errors in the administration process, particularly with multidose vials.[6,7] It is crucial for health care providers to be vigilant in ensuring accurate dosing and administration of vaccines to prevent such incidents.

Adverse effects associated with COVID-19 vaccines have been reported, and while the most common side effects are generally similar across different vaccine preparations, there have been documented cases of endocrinological adverse effects.[8,9] These effects include acute adrenal insufficiency and isolated ACTH deficiency, as seen in our patient.[10,11] Furthermore, hypophysitis following vaccination with mRNA-1273 (Moderna) and adrenal insufficiency caused by bilateral adrenal hemorrhage associated with ChAdOx1 nCoV-19 (AstraZeneca) vaccine-induced immune thrombotic thrombocytopenia has been described in other cases.[12,13] Some authors have suggested that the acute onset of often intense adverse reactions following the ChAdOx1 SARS-CoV-2 vaccine, including high fever and associated stresses, can precipitate an adrenal crisis.[14] However, it is essential to consider other potential causes and perform a thorough evaluation to reach an accurate diagnosis.

Differential diagnoses for the presented symptoms should include adrenal insufficiency, cardiovascular disorders, and respiratory conditions (Table 3). Adrenal insufficiency can manifest with symptoms such as fatigue, weakness, orthostatic hypotension, and electrolyte imbalances. Cardiovascular disorders, including arrhythmias and heart failure, can present with presyncope attacks, dyspnea, and other cardiac symptoms. Respiratory conditions, such as pulmonary embolism or underlying lung disease, can cause dyspnea on exertion.

Clinicians should be aware of the possibility of isolated ACTH deficiency as a potential cause in patients presenting with fatigue, presyncope attacks, and dyspnea after receiving mRNA-based COVID-19 vaccines. Thorough evaluation, including laboratory tests to assess cortisol and ACTH levels, should be conducted to confirm the diagnosis and rule out other differential diagnoses. Collaboration with endocrinologists and other specialists is crucial in managing these cases effectively.

Implications for Emergency Nurses

Emergency nurses play a crucial role in the assessment and care of patients who present with symptoms following COVID-19 vaccination. It is essential for emergency nurses to be aware of the following implications:

In their role as frontline health care providers, emergency nurses should conduct a thorough and comprehensive assessment of patients who present with symptoms such as fatigue, presyncope attacks, and dyspnea after receiving the COVID-19 vaccine. It is important to consider the possibility of adrenal insufficiency as well as other potential conditions that may present with similar symptoms, including cardiovascular and respiratory disorders. A meticulous evaluation and close monitoring of symptoms are necessary for accurate diagnosis and appropriate management.

Emergency nurses should collaborate closely with the health care team, including endocrinologists and other specialists, to ensure a comprehensive evaluation and management plan for patients who present with complex symptoms. Effective interdisciplinary collaboration allows for the sharing of expertise and the provision of holistic care to patients.

Ordering and interpreting appropriate laboratory tests, such as cortisol and ACTH levels, is essential for assessing adrenal function and identifying any hormonal imbalances. By working closely with the health care team, emergency nurses can contribute to the accurate diagnosis and appropriate treatment decisions based on laboratory findings.

In addition to medical interventions, emergency nurses should provide supportive care to patients experiencing symptoms such as fatigue. This includes monitoring vital signs, addressing immediate concerns, and providing comfort measures to alleviate distress and promote patient well-being during their emergency department visit.

Patient education is a crucial component of nursing care. Emergency nurses should take the opportunity to educate patients about the potential adverse effects of COVID-19 vaccination and the importance of promptly

reporting any new or worsening symptoms. Clear and concise information should be provided regarding follow-up care and the need to consult with their primary care provider for further evaluation and management.

By incorporating these implications into their practice, emergency nurses can contribute to the early identification, appropriate management, and support of patients presenting with symptoms following COVID-19 vaccination.

In conclusion, this case highlights the importance of considering isolated ACTH deficiency as a potential cause in patients presenting with specific symptoms after COVID-19 vaccination. Health care providers, including emergency nurses, should be vigilant in monitoring and assessing patients for these symptoms and promptly involve appropriate specialists for further evaluation and management. Thorough evaluation for differential diagnoses, including adrenal insufficiency, cardiovascular disorders, and respiratory conditions, is essential to provide accurate diagnosis and appropriate care.

Data, Code, and Research Materials Availability

The authors confirm that they have obtained appropriate consent forms from both the patient and the patient's relative (husband). In the form, the patient consented to report the clinical information in the journal.

Author Disclosures

Conflicts of interest: none to report.

REFERENCES

1. World Health Organization. Coronavirus (COVID-19) dashboard. Accessed October 4, 2022. https://covid19.who.int
2. Cieślewicz A, Dudek M, Krela-Kaźmierczak I, Jabłecka A, Lesiak M, Korzeniowska K. Pancreatic injury after COVID-19 vaccine—a case report. *Vaccines (Basel)*. 2021;9(6):576. https://doi.org/10.3390/vaccines9060576
3. Tate C, Demashkieh L, Hakmeh W. Isolated tachycardia presenting after Pfizer-BioNTech COVID-19 vaccination. *Cureus*. 2021;13(7):e16706. https://doi.org/10.7759/cureus.16706
4. Naranjo CA, Busto U, Sellers EM, et al. A method for estimating the probability of adverse drug reactions. *Clin Pharmacol Ther*. 1981;30(2):239-245. https://doi.org/10.1038/clpt.1981.154
5. Anand P, Stahel VP. Review The safety of Covid-19 mRNA vaccines: a review. *Patient Saf Surg*. 2021;15(1):20. https://doi.org/10.1186/s13037-021-00291-9
6. Paparella S. The risks associated with the use of multidose vials. *J Emerg Nurs*. 2006;32(5):428-430. https://doi.org/10.1016/j.jen.2006.05.016
7. Raposo F, Lippi G. Antibody response induced by the boost overdose during COVID-19 heterologous prime-boost vaccination strategy. *Clin Chim Acta*. 2021;523:201-204. https://doi.org/10.1016/j.cca.2021.09.022
8. Pujol A, Gómez LA, Gallegos C, et al. Thyroid as a target of adjuvant autoimmunity/inflammatory syndrome due to mRNA-based SARS-CoV2 vaccination: from Graves' disease to silent thyroiditis. *J Endocrinol Invest*. 2022;45(4):875-882. https://doi.org/10.1007/s40618-021-01707-0
9. Menni C, Klaser K, May A, et al. Vaccine side-effects and SARS-CoV-2 infection after vaccination in users of the COVID Symptom Study app in the UK: a prospective observational study. *Lancet Infect Dis*. 2021;21(7):939-949. https://doi.org/10.1016/S1473-3099(21)00224-3
10. González López J, Escorcio Faria D, Riestra Fernández M. Acute adrenal insufficiency in a patient with panhypopituitarism after vaccination against COVID-19 (BNT162b2 Pfizer-BioNTech). *Endocrinol Diabetes Nutr (Engl)*. 2022;69(9):762-763. https://doi.org/10.1016/j.endien.2021.11.035
11. Schimmel J, Alba EL, Chen A, Russell M, Srinath R. Letter to the editor: thyroiditis and thyrotoxicosis after the SARS-CoV-2 mRNA vaccine. *Thyroid*. 2021;31(9):1440. https://doi.org/10.1089/thy.2021.0184
12. Murvelashvili N, Tessnow A. A case of hypophysitis following immunization with the mRNA-1273 SARS-CoV-2 vaccine. *J Investig Med High Impact Case Rep*. 2021;9:23247096211043384. https://doi.org/10.1177/23247096211043386
13. Morita S, Tsuji T, Kishimoto S, et al. Isolated ACTH deficiency following immunization with the BNT162b2 SARS-CoV-2 vaccine: a case report. *BMC Endocr Disord*. 2022;22(1):185. https://doi.org/10.1186/s12902-022-01095-3
14. Efthymiadis A, Khan D, Pavord S, Pal A. A case of ChAdOx1 vaccine-induced thrombocytopenia and thrombosis syndrome leading to bilateral adrenal haemorrhage and adrenal insufficiency. *Endocrinol Diabetes Metab Case Rep*. 2022. 22–0239. https://doi.org/10.1530/EDM-22-0239.

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Unrecognized Extravascular Misplaced Hemodialysis Catheter Leading to Mediastinal Hematoma

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Introduction

Insertion of the hemodialysis catheter resulting in mechanical complications is not uncommon. Most significant morbidities can be reliably evaluated using postprocedural chest radiography, however, an extracava catheter misplacement leading to hemomediastinum is very rare and the radiographic findings may be subtle. If it is not recognized early, a significant morbidity can occur. The radiographic manifestations of mediastinum hematoma include mediastinal or paratracheal stripe widening, apical cap sign, and deviation of trachea or bronchus, but it cannot provide adequate sensitivity or specificity for the diagnostic confirmation. In this paper, we highlight the importance of assessment of the relationship between right paratracheal stripe and catheter position in identifying catheter malposition.

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Case Report

A 65-year-old man with a history of coronary artery disease and end-stage renal disease presented to the emergency department with chest discomfort and hemodialysis catheter dysfunction. One day before this episode, the patient underwent echo-guided right internal jugular vein Permcath replacement for an occluded vein. A routine postprocedural chest radiograph (Figure 1) was obtained, interpreting as a normal finding, and he was discharged. Upon arrival, his vital signs were stable, and his physical examination was unremarkable. Electrocardiography showed no significant ST segment or T wave changes. A retrospective review of the chest radiograph (Figure 2A) showed that the hemodialysis catheter was located more medially away from the right paratracheal stripe, indicating catheter malposition. Fluorography (Figure 3) was performed during the revision and revealed 2 contrast pathways: 1 from the lumen with contrast medium stasis in the mediastinum and the other from the side hole smoothly down through the right paraspinal stripe. These findings confirmed that the catheter was misplaced into the mediastinum. Postprocedural contrast-enhanced computed tomography revealed mediastinal hematoma (Figure 4). The patient underwent conservative treatment and was discharged uneventfully.

Discussion

With the increasing use of sonographic guidance, the incidence of mechanical complications of central venous catheter placement is uncommon.[1] Most significant morbidities, such as pneumothorax, hemothorax, or intravascular catheter malposition, can be reliably evaluated using postprocedural chest radiography. However, without intraoperative fluoroscopy, a vascular injury leads a hemodialysis catheter mispositioning into the mediastinum resulting in hemomediastinum that may be easily overlooked due to subtle radiographic findings and a lack

FIGURE 1

Postoperative chest radiography shows a subtle abnormality, which was initially interpreted as a normal finding.

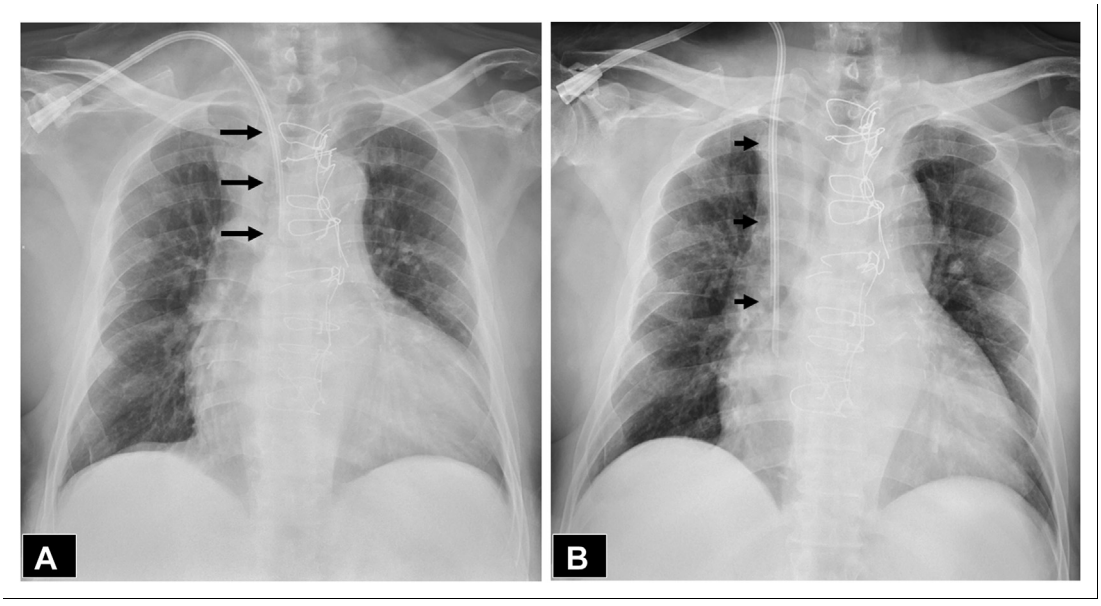

FIGURE 2

Postoperative chest radiography (A) demonstrates that the hemodialysis catheter was located more medially away from the right paraspinal stripe (arrow). Chest radiography after second revision (B) with proper hemodialysis catheter position (arrow) is illustrated.

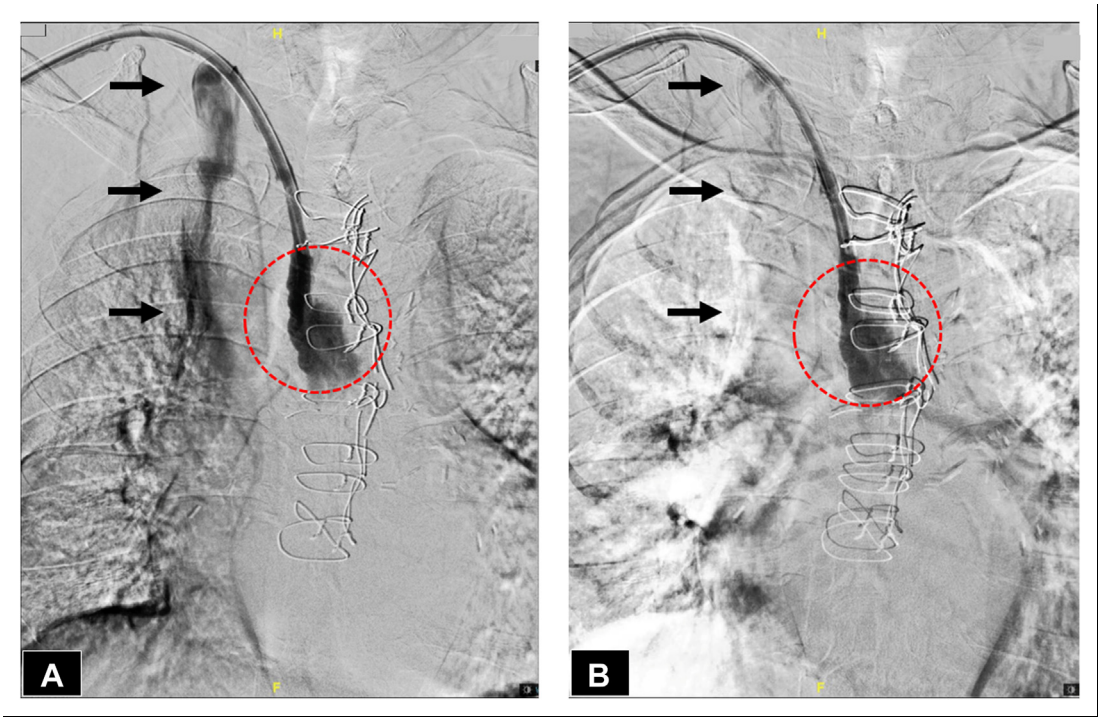

FIGURE 3

Intraoperative fluoroscopy shows 2 contrast pathways. One is from the lumen with contrast medium pooling in the mediastinum (dashed circle). The other is projecting from the side hole smoothly down through the right paraspinal stripe (arrow), indicating catheter malposition.

FIGURE 4

Contrast-enhanced computed tomographic venography of the chest shows a mediastinal hematoma (dashed circle).

of clinical practitioners' awareness.[2] If not recognized early and managed promptly, it can lead to a significant morbidity or even mortality.[3]

The right paratracheal stripe is a chest radiography finding that formed between the right tracheal wall and adjacent pleural surface. It extends from the level of the right clavicle to right main bronchus and is mainly composed of right-side great vessels including superior vena cava. Normally, the hemodialysis catheter should lie within the superior vena cava with its tip located at the cavoatrial junction, making it adjacent to the right paratracheal stripe on a frontal chest radiograph (Figure 2B).[4] A deviation of the catheter such as in our case may be indicative of an extracava catheter misplacement, and further investigation should be undertaken.

Author Disclosures

Conflicts of interest: none to report

This work adheres to all elements of Elsevier's Patient Consent policy.

The authors confirm that appropriate informed consent has been obtained from all participating patients in this study, including obtaining consent for the use of case details, personal information, and images. Measures have been taken to protect the anonymity and privacy of individuals involved, and any identifying details have been removed or altered to ensure confidentiality. The authors affirm that all necessary ethical considerations and legal requirements regarding patient consent and privacy have been followed in the conduct of this study and the publication of its results.

REFERENCES

1. Shaaib H, Al-Otaibi A, Al-Otaibi AKA, et al. A systematic review of complications during insertion of central venous catheterization guided by ultrasound versus anatomical landmark. *Int J Med Res Health Sci*. 2020;9:124-131.
2. Tong MKH, Siu YP, Ng YY, TH Kwan, Au TC. Misplacement of a right internal jugular vein haemodialysis catheter into the mediastinum. *Hong Kong Med J*. 2004;10(2):135-138.
3. Collier PE. Prevention and treatment of dilator injuries during central venous catheter placement. *J Vasc Surg Venous Lymphat Disord*. 2019;7(6):789-792. https://doi.org/10.1016/j.jvsv.2019.06.020
4. Marano R, Liguori C, Savino G, Merlino B, Natale L, Bonomo L. Cardiac silhouette findings and mediastinal lines and stripes: radiograph and CT scan correlation. *Chest*. 2011;139(5):1186-1196. https://doi.org/10.1378/chest.10-0660

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A Closed Degloving Injury: Morel-Lavallée Lesion

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Introduction

Morel-Lavallée lesions (MLLs) occur when the skin and subcutaneous tissue abruptly separate from the underlying muscle fascia plane due to shearing force. This shearing force disrupts the perforating vessels and lymphatic ducts, resulting in a potential space filled with effusion containing lymph, blood, and necrotic fat. However, these effusions may be easily overlooked or misdiagnosed as simple soft tissue hematomas due to their rarity and lack of awareness among clinical practitioners. Prompt diagnosis of a closed degloving injury is crucial; otherwise, complications may include continued expansion, infection, tissue necrosis, and suboptimal outcome.

Case Report

A 42-year-old man experienced a scooter collision that resulted in right leg pain. He required first aid at our hospital, and plain radiography revealed no apparent abnormalities. One day later, he presented to our emergency department because of persistent swelling of the right leg and difficulty walking. On arrival, he was afebrile and vital signs were stable. Physical examination revealed large abrasions on the right calf with surrounding erythema (Figure 1). The physician noted a spindle-shaped soft tissue lesion in the proximal right leg on follow-up radiography (Figure 2). Point-of-care ultrasonography revealed a heterogeneous echogenic fluid-like lesion between the subcutaneous tissue and underlying muscle fascia plane (Figure 3, Video). These findings strongly suggest closed degloving injury. Magnetic resonance imaging (Figure 4) was performed to confirm the diagnosis of MLLs. The patient underwent surgical debridement and was discharged uneventfully.

Discussion

MLLs represent closed degloving injuries that mostly occur in the lateral portions of the hip and thigh. These can also occur in the scapula and lower back but are rarely reported in the leg.[1-3] This subcutaneous fluid may be initially missed because of a lack of awareness among clinical practitioners or because it may take some time to develop. There are several important differential diagnoses of swelling and pain arising from the proximal aspect of the leg, including cellulitis, muscular hematoma, ruptured Baker's cyst, plantaris tear, or deep vein thrombosis. However, many of the presenting manifestations of this disease overlap, making

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FIGURE 1

Physical examination revealed large abrasions on the right calf with surrounding erythema.

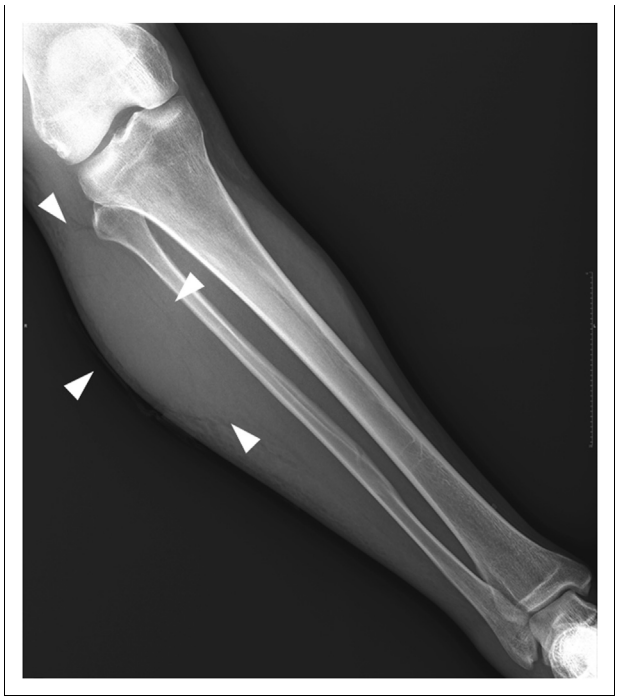

FIGURE 2

Anteroposterior radiograph of the right leg showing a spindle-shaped soft tissue lesion of the lateral aspect of the proximal leg (arrowhead).

the diagnosis challenging. Ultrasound and magnetic resonance imaging are the investigations of choice for this purpose, and the application of ultrasonography allows for timely differentiation.

The typical ultrasonographic appearance of an MLL in the acute stage is a heterogeneous lesion that reflects various components of blood, lymph, fat, and other debris located between the subcutaneous tissue and the underlying fascia. This lesion becomes more homogeneous and well defined in a chronic phase.[4] The characteristics of fluid distribution are different from cellulitis ("cobblestone" appearance of fluid accumulation among subcutaneous fat tissue), muscular hematoma (extravasated blood that accumulates within the muscle group), ruptured Baker's cyst ("speech bubble" configuration cyst with extension of fluid distal and superficial to the medial gastrocnemius muscle), and plantaris tear (hematomas tracking along the muscle plane of the medial gastrocnemius and soleus muscles).[5] The treatment is not well established due to its rarity; however, surgical intervention is frequently required to prevent infection or extended skin necrosis.[1,6]

Ethical Statement

This work adheres to all elements of Elsevier's Patient Consent policy.

The authors confirm that appropriate informed consent has been obtained from all participating patients in this study, including obtaining consent for the use of

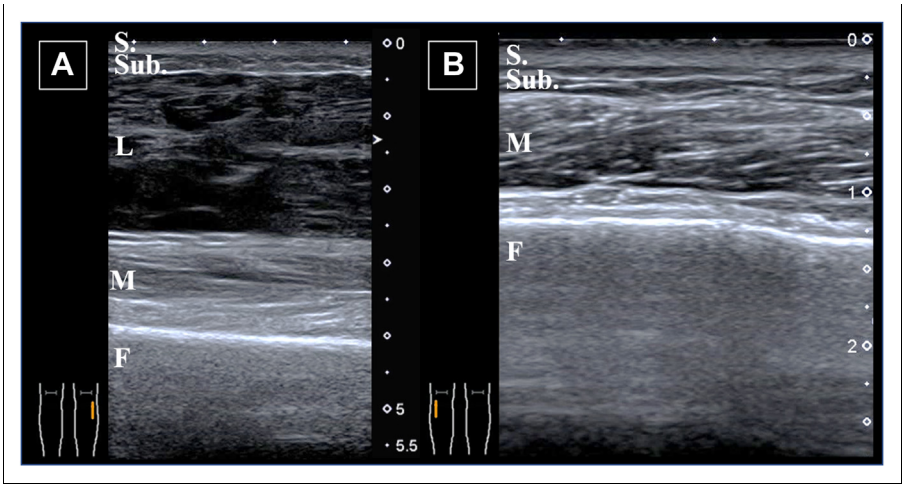

FIGURE 3

Point-of-care ultrasound performed using a curvilinear probe in the longitudinal orientation revealing heterogeneous echogenic fluid-like lesions between the subcutaneous tissue and the underlying peroneus muscle fascia plane (A) compared with the normal ultrasonographic appearance of the left leg (B). F, fibula; L, lesion; M, peroneus muscle; S, skin; Sub, subcutaneous tissue.

case details, personal information, and images. Measures have been taken to protect the anonymity and privacy of individuals involved, and any identifying details have been removed or altered to ensure confidentiality. The authors affirm that all necessary ethical considerations and legal requirements regarding patient consent and privacy have been followed in the conduct of this study and the publication of its results.

Author Disclosures

Conflicts of interest: none to report.

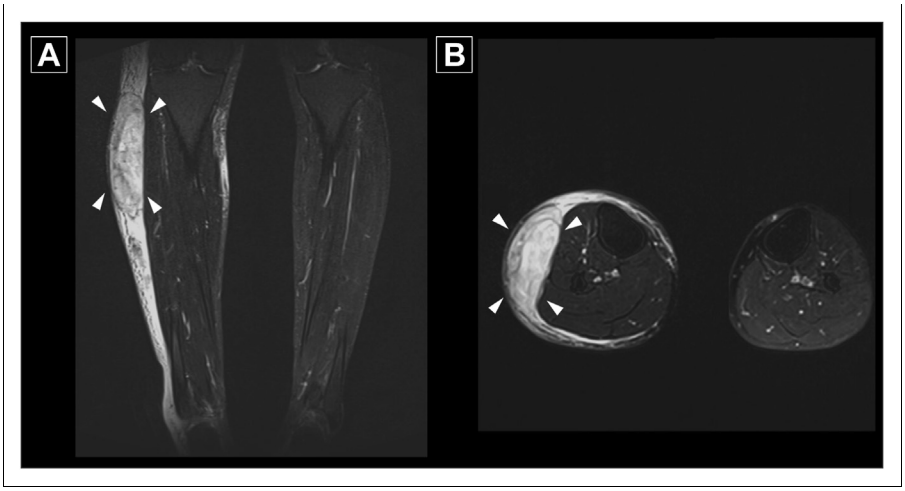

FIGURE 4

Magnetic resonance T2-weighted imaging in the coronal (A) and axial (B) views revealing a well-defined encapsulated subcutaneous hematoma, measuring approximately 7.6 cm (anteroposterior) × 3.3 cm (transverse) × 13.5 cm (sagittal) (arrowhead), accompanied by an edematous change of the surrounding subcutaneous tissue.

Supplementary Data

Supplementary data related to this article can be found at https://doi.org/10.1016/j.jen.2023.07.004.

REFERENCES

1. Scolaro JA, Chao T, Zamorano DP. The Morel-Lavallée lesion: diagnosis and management. *J Am Acad Orthop Surg*. 2016;24(10):667-672. https://doi.org/10.5435/jaaos-d-15-00181
2. Kim WJ, Lee HS, Won SH, et al. A Morel-Lavallée lesion of the proximal calf in a young trauma patient: a case report. *Med (Baltim)*. 2018;97(41):e12761. https://doi.org/10.1097/md.0000000000012761
3. Ramaseshan K, Bauler LD, Mastenbrook J. Morel-Lavallée lesion of the anterior leg: a rare anatomical presentation. *BMJ Case Rep*. 2020;13(2):e233295. https://doi.org/10.1136/bcr-2019-233295
4. Gross JS, Gorbachova T, Guttentag A, Raphael J. Morel-Lavallée lesion of the elbow with ultrasound and MRI correlation. *Radiol Case Rep*. 2014;9(3):958. https://doi.org/10.2484/rcr.v9i3:958
5. Chiu WC, Sun JT, Huang CY, Chu SE, Chang CJ. A woman with right calf pain. *Ann Emerg Med*. 2022;80(2):e13-e14. https://doi.org/10.1016/j.annemergmed.2022.02.012
6. Singh R, Rymer B, Youssef B, Lim J. The Morel-Lavallée lesion and its management: a review of the literature. *J Orthop*. 2018;15(4):917-921. https://doi.org/10.1016/j.jor.2018.08.032

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Where's the Marker? Perceptions of Whiteboards in the Emergency Department

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Abstract

Background: In the emergency department, bedside whiteboards are used to help improve communication, teamwork, and collaboration among health care providers. In addition, previous studies have shown that whiteboards aid the patient with the identification of their health care providers, plan of care, expected length of stay, and overall patient satisfaction.

Purpose: This evidence-based evaluation project assessed the perceptions of emergency department health care providers on their awareness of the effectiveness of bedside whiteboards, whether there are challenges with using them, and whether they are being updated and used consistently.

Method: A survey was utilized to evaluate emergency department health care providers (nurses, patient care technicians, and attending providers) on their perceptions of bedside whiteboards in the patient rooms using a 10-question survey.

Outcomes: The survey was sent via email to 135 emergency department health care providers, with 64 respondents. The survey results showed that 41.3% of the respondents agreed that bedside whiteboards promote patient satisfaction, 36.5% agreed that they promote patient safety, 53.1% agreed they take minimal completion time, and 50% felt they help keep patients informed about care. However, 85.9% of participants felt bedside whiteboards are not updated consistently, and 81.2% felt they are not updated consistently among all 3 shifts. In addition, 73.4% reported that they lack access to materials to update the whiteboards and 38.1% were neutral regarding whiteboards promoting patient safety.

Implications: Proper materials (markers and erasers) are integral to bedside whiteboard use. Continued staff education on the function of bedside whiteboards may improve proper whiteboard use.

Key words: Bedside whiteboards; Emergency department; Nursing communication; Patient satisfaction; Patient safety; Teamwork; Collaboration

Introduction

Bedside whiteboards have become a fixture in every hospital room. Effective communication is essential in health care for improving patient outcomes. Establishing communicative procedures that are practical, functional, and reflective of the service can improve communications with patients.[1] When updated consistently, bedside whiteboards can help keep patients up to date on their plan of care, leading to an increase in patient satisfaction.[2] Bedside whiteboards should be used as a tool to help improve communication among the health care team and to improve communication with patients and family members about their plan of care and what might occur during their visit (eg, laboratory tests, radiographs, and consultations).[2]

Studies have shown that updating patients can increase patient satisfaction scores and increase patient involvement in their care. When surveyed, patients reported feeling meaningfully involved in whiteboard communication, showing increased patient activation.[3] Providing time frames for follow-up on tests or radiological studies and checking back in with the patient, even if results are pending, can lead to better rapport.[4] This is consistent with other studies in the literature emphasizing the importance of updating patients to increase patient satisfaction scores.

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Understanding the process of communication and information between patients and staff in the emergency department is essential to ensuring patients are satisfied with their treatment and care.[1] Bedside whiteboards may also be used to help improve patient safety and reduce falls by reminding patients not to get up without help.

In the fast-paced environment of the emergency department, bedside whiteboards can aid in improving communication among health care providers and help keep patients informed. However, if the whiteboards are not consistently used, this can ultimately hinder communication, patient awareness, patient safety, and patient satisfaction. Staff awareness of the importance of bedside whiteboards is key to improving utilization. The goal of this nonresearch evidence-based evaluation project was to assess the perceptions of ED health care providers on their awareness of the effectiveness of bedside whiteboards, the challenges with using them, and how they are used and updated consistently.

Method

This evidence-based evaluation project took place in the emergency department of a community hospital in New England where bedside patient whiteboards were previously implemented. Whiteboards had not yet been implemented in the satellite ED locations and were being considered. It was determined that more information was needed regarding the benefits, consistency of use, and barriers to use. A total of 135 ED health care providers (registered nurses [RNs], patient care technicians [PCTs], medical doctors [MDs]/physician assistants [PAs]/advanced practice registered nurses [APRNs]) were surveyed on their perceptions of bedside whiteboards in the patient rooms. The nursing team developed a 10-question survey to be distributed to the ED staff. The questions were formatted to assess each participant's perception of the effectiveness of the bedside whiteboards, whether they are being used consistently, and whether there are challenges in updating them.

A 5-point Likert scale was used for 8 of the 10 questions with options ranging from strongly agree to strongly disagree (1 = strongly agree, 2 = agree, 3 = neutral, 4 = disagree, 5 = strongly disagree; Figure 1). The first question was in a multiple-choice format, allowing participants to select their roles (RN, PCT, MD/PA/APRN). The participants were then asked to respond to the following statements using the Likert scale: I feel that whiteboards promote patient satisfaction, I feel that the whiteboards keep patients informed about the plan of care, I feel that whiteboards promote teamwork and collaboration, I feel that whiteboards promote patient safety, I feel that whiteboards take minimal time to update, I feel that the whiteboards in the emergency department are updated consistently, I feel that whiteboards in the emergency department are used by all shifts, and, I have easy access to markers to update the whiteboards. The final question was in free-text format to allow participants to add any additional comments regarding their experience using the whiteboards.

The survey was distributed to the ED staff via hospital staff email with a description of the project. It was asked that only permanent staff who work in the main emergency department, where bedside whiteboards are used in practice, respond to the survey. The participants were given 1 week to complete the survey. A reminder email was sent out the day before the completion date to allow for any remaining staff to participate.

Outcomes

Of the 135 ED providers, 64 (47.4%) completed the survey. Of the total 64 respondents, 48.4% were RNs, 34.4% were providers (MD, PA, APRN), and 17.2% were PCTs. When asked whether the respondents felt that bedside whiteboards promoted patient safety, 41.3% agreed; 36.5% agreed that bedside whiteboards promote patient safety, 53.1% agreed they take minimal completion time, and 50% responded that they help keep patients informed about care. However, 85.9% of participants responded that bedside whiteboards are "not updated consistently," and 81.2% responded that they are "not updated consistently among all shifts." In addition, 73.4% reported that they lack access to materials to update the whiteboards and 38.1% were neutral regarding whiteboards promoting patient safety.

The survey's final question was an optional free-text response asking the respondents to add any additional comments regarding their experiences with using bedside whiteboards. Of the 64 respondents, 22 commented. The additional comments were extremely helpful in clarifying responses and identifying themes and implications.

A few themes were identified, such as "having no access to markers," "not enough time to complete," "unsure of which role was responsible for updating the board," and "inconsistency of use." One respondent stated, "I like the idea (of the whiteboard); I think they can be very beneficial; however, they are rarely utilized." Another wrote, "They provide great information when utilized and are helpful to keep patients and families in the loop…the biggest barrier

for me is having limited to no access to a marker to write with." Some participants wrote that they did not know who was responsible for updating the whiteboards, stating "I'm also not sure who owns this responsibility" and "in an ER with constant turnover of RNs throughout their shifts, and constantly changing PCTs and providers all day, it would be laborious to keep it accurate and I don't know who would be responsible for updating it."

Discussion

Bedside patient whiteboards in the emergency department have the potential to improve communication among staff, patient satisfaction, and patient safety, and to increase patient satisfaction. However, this can be achieved only with staff buy-in and consistent utilization. Encouraging daily use and nurse–physician engagement around this tool may help facilitate communication.[5] Regularly updating the patient whiteboards can aid in providing an estimated duration of their ED stay, allowing patients and family members to plan accordingly.[2] Inconsistent use of patient whiteboards may be a missed opportunity to engage families as partners in care planning and harm prevention.[6]

The survey revealed that many of the ED staff members feel that bedside patient whiteboards in the emergency department can be helpful. However, the staff reported that there are certain challenges making it difficult to update the whiteboard regularly. The fast-paced nature of the emergency department means staff has limited time to fill out the whiteboards and keep them updated with the latest information. The staff also reported not having the appropriate materials to update the boards and keep them clean. Outdated whiteboards with inaccurate information can cause confusion, leading to miscommunication and an unsafe environment. Additionally, findings from the survey indicated that staff lacked clarity on who is responsible for updating the whiteboards. This indicates a need for clear policies and standards for whiteboard use.

Limitations

This evidence-based evaluation project was conducted in a community hospital emergency department and limited to only this 1 emergency department. It may not accurately reflect how other ED health care providers perceive bedside whiteboards. However, the information obtained from this survey may help guide important future interventions relating to the use of bedside whiteboards in the emergency department. The survey results may help determine future protocols, staff training/orientation, and functionality of the bedside whiteboards.

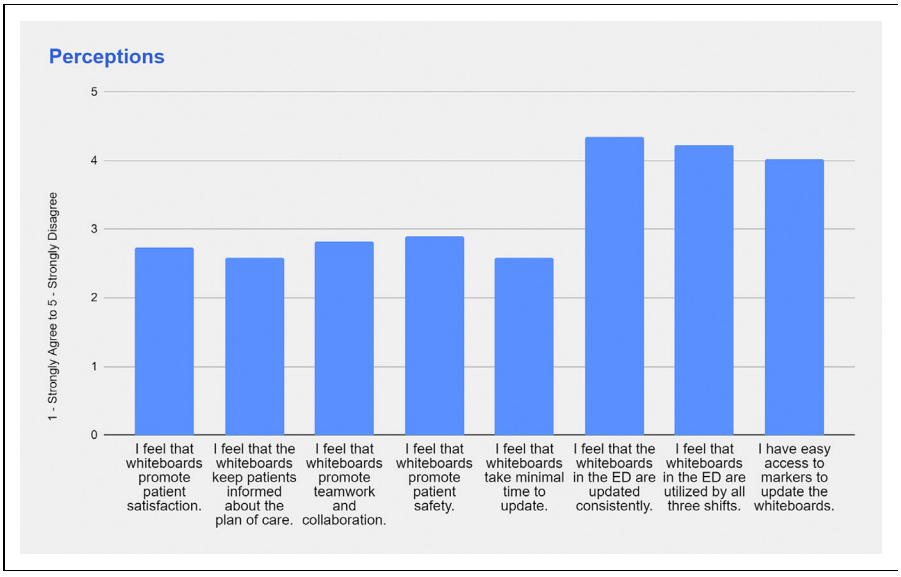

FIGURE 1

Above are the staff responses from the survey.

Implications for Emergency Nurses

When used consistently by all ED providers, bedside whiteboards can help improve communication, improve the patient's ability to recognize their health care providers, improve the patient's involvement in their plan of care, improve patient satisfaction, and improve patient safety. The survey results concluded that 73.4% of the respondents reported a lack of access to materials necessary to update the patient bedside whiteboards. Proper materials (markers and erasers) are integral to bedside whiteboard use. Only 41.3% agreed that bedside whiteboards promote patient satisfaction and only 36.5% agreed that they help promote patient safety. In the free-text comment, the respondents reported that they are unsure who is responsible for updating the whiteboards. This implies that staff education and orientation on the functionality of bedside whiteboards may improve proper whiteboard use. Additional evidence-based projects and formal research can enhance knowledge regarding bedside whiteboard use. All the findings from this evidence-based evaluation project were reported to the ED leadership team and the ED nursing collaborative committee.

Author Disclosures

The authors whose names are listed immediately below certify that they have no affiliations with or involvement in any organization or entity with any financial (such as honoraria; educational grants; participation in speakers' bureaus; membership, employment, consultancies, stock ownership, or other equity interest; and expert testimony or patent-licensing arrangements) or nonfinancial interest (such as personal or professional relationships, affiliations, knowledge, or beliefs) in the subject matter or materials discussed in this manuscript. Emily Riley is a staff RN at a satellite emergency department affiliated with Middlesex Health where this project was conducted. Karen Breda is a nursing professor at the University of Hartford. Elizbeth Molle is a Nurse Scientist at Middlesex Health, where this project was conducted.

REFERENCES

1. Blackburn J, Ousey K, Goodwin E. Information and communication in the emergency department. *Int Emerg Nurs*. 2019;42(1):30-35. https://doi.org/10.1016/j.ienj.2018.07.002
2. Papa A, Lefton C. Whiteboardology. *J Emerg Nurs*. 2016;42(2):167-169. https://doi.org/10.1016/j.jen.2016.02.009
3. Trojano ML, Rucker G, McGillen B. Using standardized whiteboards to improve patient engagement. *J Patient Experience*. 2022;9:23743735221103030. https://doi.org/10.1177/23743735221103030
4. Hermann RM, Long E, Trotta RL. Improving patients' experiences communicating with nurses and providers in the emergency department. *J Emerg Nurs*. 2019;45(5):523-530. https://doi.org/10.1016/j.jen.2018.12.001
5. Goyal A, Glanzman H, Quinn M, et al. Do bedside whiteboards enhance communication in hospitals? An exploratory multimethod study of patient and nurse perspectives. *BMJ Qual Saf*. 2019;29(10):1-2. https://doi.org/10.1136/bmjqs-2019-010208
6. Nowacki K, Gonzalez T, Mehnert J, Jacquemard A, Tyler A. Using patient whiteboards to engage families in harm prevention and care planning: a quality improvement study. *Hosp Pediatr*. 2018;8(6):345-352. https://doi.org/10.1542/hpeds.2017-0174

Hospital Development of a Hybrid Emergency Department—Inpatient Care Observation Unit

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Contribution to Emergency Nursing Practice

- By using evidence-based, pre-set treatment protocols and ED observation unit inclusion criteria, ED-based observation units can be used to treat patients with a wide variety of diagnoses such as cardiac (chest pain, congestive heart failure, atrial fibrillation, etc), neurologic (head trauma, headache, seizure, etc), gastric-related (gastrointestinal bleed, abdominal pain), and other diagnoses (vaginal bleeding, deep vein thrombosis, etc).
- Observation patient length of stay reductions occurred by supporting a hybrid ED-inpatient care model and by assigning high priority status to ED observation medical consultations and diagnostic testing.
- To expedite patient disposition in <24 hours, ED observation unit management must advocate for an ED-like productivity staffing model despite being managed by inpatient staffing managers.

Abstract

Introduction: This project aimed to design and implement an emergency department-managed observation unit that improves inpatient bed and emergency department stretcher capacity, decreases observation patient length of stay, earns high patient satisfaction scores, and generates a positive fiscal impact on the organization.

Methods: This quality improvement project followed a 1-group, pre- and postprogram implementation design.

Results: In the first year of operations, 40% of the total observation patients treated in this hospital were managed in the new observation unit. Emergency department observation unit length of stay across all patient complaints was half of the average length of stay for observation patients located on hospital inpatient units. In most cases, the emergency department observation unit was in the top 25 percentile of hospital Press Ganey inpatient satisfaction categories. The hospital estimates a contribution margin of three-quarters of a million dollars in the first year.

Discussion: This effective and efficient hybrid observation unit possessed specific aspects of inpatient and emergency department patient care models. Placing providers and nurses at the workstation for faster communication expedited care. Prioritizing all observation patient testing, transportation, phlebotomy, and intravenous (IV) services shortened disposition times. Emergency nurses transitioning to the observation unit were challenged to acquire inpatient care knowledge. Observation unit management struggled to maintain staffing while under an inpatient productivity model managed by the inpatient house supervisor. Reducing patient disposition time required clear communication between observation unit and inpatient staffing managers, between physician consultants and advanced practice nursing providers, and among nurses, patients, and providers. Observation units are 1 solution to decrease observation patient length of stay and improve emergency department capacity.

Key words: Clinical observation unit; Emergency service (hospital); Hospital bed capacity; Quality improvement; Length of stay; Patient satisfaction; Emergency nursing

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Introduction

PROBLEM DESCRIPTION

Emergency departments continue to experience increases in patient census and high patient acuity.[1] ED capacity continues to decrease[2] when admitted ED patients cannot be moved out of the emergency department because of a lack of inpatient beds. As a result, hospitals are seeking innovative solutions to increase both inpatient and ED patient bed capacity.

This hospital experienced increasing times of ED patients waiting to be transferred to an inpatient bed in the hospital because of a greater number of higher acuity inpatients requiring longer treatment times. ED patients admitted to inpatient or observation status beds waited extended periods in the emergency department. Compounding this problem was high lengths of stay (LOS) for observation patients admitted to the main hospital because these patients were treated on the same units with fully admitted, higher acuity patients requiring more resources. To reduce LOS for patients held for observation, hospital leaders financed and built an ED observation unit.

Observation units, which are used to manage an assortment of patient populations, have existed with a variety of names, including 23-hour observation units, holding units, chest pain decision units, etc. These units have been in place in a multiplicity of forms since the early 1970s.[3] Evidence and best practices from observation unit studies were used by the project site, a community-based urban medical center, to develop an innovative observation unit that merged inpatient and ED models of patient care.[4-8] This hybridized inpatient/ED care model allowed for lower acuity ED patients that met pre-established criteria to continue to receive around-the-clock testing, treatments, nursing care, and consultations. The hybrid model was implemented in a newly created ED observation unit. The goal for this observation unit was to provide an observation space where patient disposition could occur within 24 hours but no more than 2 midnights.[4,5] Rapid treatment in the ED observation unit allowed for faster patient discharge, freeing up bed capacity in both inpatient units and the emergency department.

AVAILABLE KNOWLEDGE

Best practice evidence generated from other observation unit has accrued. A unit with dedicated physical space and located in close proximity to the emergency department encourages patient comfort, cost savings, and faster transfers out of the emergency department, increasing ED bed capacity.[6,7] Patient care beds in a dedicated observation unit increase hospital patient capacity because they do not count toward the total of licensed hospital beds.[6] A closed unit ensures that metrics used to gauge patient satisfaction come from observation unit patients and not from other patient populations that occupy observation unit beds, such as ED or surgical patients awaiting assignment for an inpatient bed.[8] Evidence-based, protocol-driven treatments provide a direct path to a diagnosis during the short patient stay in the observation unit.[7,9] Pre-existing observation patient treatment protocols can be adapted from a health care system's other observation units or from their emergency departments.[7]

Typical observation unit inclusion criteria include likely patient discharge within 2 midnights or 24 hours to meet Centers for Medicare and Medicaid Services requirements for observation patient status.[7] Additional criteria include stable condition with low likelihood of clinical decompensation, no significant diagnostic uncertainties or active comorbidities, incomplete response to initial therapy in the emergency department, or no anticipated requirement for extensive workups or serial testing that will take the patient beyond the 24-hour discharge window.[8] Historically, observation units only admitted patients with specific diagnoses, but evidence indicates that observation unit criteria can work with a variety of pulmonary, cardiac, gastrointestinal [GI], renal, headache, acute infection, circulation, and psychiatric conditions and diagnoses.[4,7]

Diagnostic testing and follow-up consults must have a priority just below ED and critical care patients or stat orders, to provide faster disposition times, decreasing patient LOS.[8] Physician staffing recommendations include staffing by a single practice group, assuring observation unit patients are treated by providers accustomed to the care requirements of this population in this environment.[7,8] In this hospital observation unit, nurses follow inpatient care guidelines, which are different from ED patient care guidelines, with focused assessment and care.[6] In other words, in the emergency department a patient complaining of abdominal pain would receive an assessment focused on the abdomen, whereas any patient in the ED observation unit, regardless of their diagnosis or chief complaint, would receive a full head to toe assessment along with other inpatient screenings such as medication reconciliation, nutritional screening, etc. The observation unit must be sufficiently staffed to meet inpatient assessment and patient care guidelines, but to allow for rapid disposition and high patient turnover. Staffing recommendations found in the literature range from a 4:1 patient-to-nurse ratio[6] to a 5:1 ratio with 1 nursing assistant to every nurse,[8] or either a 4:1 or 5:1 ratio.[7]

TABLE 1
Expert stakeholder consultation group

Advanced practice nurses
Business analytics director
Chief nursing and chief operating officers
Emergency nurses and physicians
Hospital president
Inpatient nursing director
Observation unit medical director
Medical administrator
Patient experience director

PURPOSE AND AIMS

The purpose of this quality improvement project was to design a novel, emergency department-managed observation unit that improves ED and inpatient capacity, focuses on rapid patient disposition, earns high patient satisfaction scores, and does not incur increased costs. Specific aims were to have a LOS no greater than 24 hours, receive high patient satisfaction scores, and have a positive impact on hospital finances.

Methods

CONTEXT

This quality improvement project occurred between October 2019 and September 2021 with current and ongoing addition of observation unit beds. This summary follows the structure of the SQUIRE 2.0 reporting guidelines (Supplementary Appendix).[10] The project followed a 1-group, pre- and postprogram implementation design. This community-based emergency department is part of an urban medical center licensed for just under 520 beds and is situated in a southeastern United States city with a regional population of 1 million people. The department has 52 beds with a nursing staff of >80 that treated >56,000 patients in 2021. Evidence-based protocols were used to provide consistent treatment plans for ED patients meeting certain symptom criteria.

INTERVENTION

Creating an ED observation unit for continued care of observation patients, which potentially opened up an inpatient bed, began with assembling a consultation group of expert-stakeholders (Table 1). This diverse group of consultants provided perspectives unique to their position to develop and implement this complex unit. Consultants provided input on ED observation unit patient medical management, nursing care operations, unit efficiency, quality analysis, patient satisfaction monitoring, and financial health assessment.[8] The ED observation unit was constructed in a space located next to the emergency department, allowing close proximity of the 2 units for quick transfer from the emergency department. Close proximity can shorten ED stay and prevent issues with staffing, consultations, imaging, and transfer of care.[6] ED observation unit inclusion and exclusion criteria along with 29 evidence-based treatment protocols streamlined the process of deciding to admit the patient to the ED observation unit or to an inpatient bed (Table 2). To improve efficiency and expedite patient disposition, the hospital agreed to prioritize ED observation unit patient diagnostic testing and imaging at a level just below that of stat hospital orders and orders for critical care and ED patients.[8] Best practices for shortening time to disposition and LOS include physician practice agreements to provide ED observation unit consults at any time and on every day of the week.[8] These agreements were in place before the opening of the ED observation unit. The ED observation unit director hired a nursing manager with both inpatient and ED management and patient care experience. The ED observation unit director and nursing manager both supervised the hiring of a nursing staff that had a mix of ED and medical-surgical inpatient experience. Hybrid staff, defined as nurses, technicians, and monitor technicians with both ED and inpatient care skills, training, and experience, provided patient care only in the ED observation unit. The only time the staff provided patient care outside of the ED observation unit was if they were reassigned to inpatient units because of low ED observation unit patient census. ED observation unit staff members were tasked with providing hospital mandated inpatient care and charting with the ED expectation that they collect their patient's biological test specimens and provide transport to/from radiological procedures, treatments, consultations, and patient discharge.[6] Nursing staff ratios were set at 4 patients to 1 nurse, consistent with recommendations from other reports on successful ED observation units.[6] Quality monitoring, essential to assess patient satisfaction processes and efficiency, was performed by comparing ED observation unit Press Ganey[12] patient satisfaction scores with hospital inpatient units. The Press Ganey[12] quality score process did not allow for observation patients on inpatient floors to be isolated and compared with ED observation unit patient satisfaction scores. Therefore, this comparison was not of equal groups

TABLE 2
ED observation unit observation for patient abdominal pain inclusion/exclusion criteria, protocols, and disposition criteria[11]

Exclusion criteria	Inclusion criteria	Protocol flowchart	Disposition criteria
- Unstable vital signs (heart rate > 110 bpm, systolic blood pressure < 100, respiratory rate > 22 cpm) - Immunocompromised patient (acquired immune deficiency syndrome, currently on active chemotherapy, transplant) - Pregnant patient - Suspected other causes of abdominal pain (bowel obstruction, cholecystitis, appendectomy, acute coronary syndrome) - Surgical abdomen—free air, rigidity, rebound tenderness - History of frequent ED visits for abdominal pain—suspected habitual patient/narcotic abuse - Large volume gastrointestinal bleed—active hematemesis, melanotic stools	- Stable vital signs - Ancillary signs/symptoms—anorexia, nausea, and vomiting - Negative pregnancy test for women of childbearing age - Nonsurgical abdomen - High likelihood of discharge within 24 hours	ED interventions - Monitor vital signs - IV fluids, oxygen - Telemetry heart monitoring - Laboratory tests (complete blood count, complete metabolic panel, lipase, lactic acid, urinalysis [if urinary tract infection, kidney stone, or pyelonephritis is suspected], urine pregnancy) stable - Electrocardiogram and cardiac workup, if indicated - Antiemetics started - Imaging negative - Consultation with a specialist (surgical or gastrointestinal) if indicated - Complete documentation in the chart before transfer to observation unit Observation unit interventions - Monitor vital signs - IV hydration, oxygen - Telemetry - Antiemetics - Analgesics on prn basis - Nothing by mouth - Follow-up consultant recommendations (surgical or gastrointestinal), if consulted by the emergency department or as needed - Serial abdominal exams every 4 hours while awake and as indicated	Home - Laboratory test results stabilized, if ordered - Stable vital signs - Negative workup - Improved in clinical symptoms (pain resolved and/or nausea and vomiting resolved within 24 hours) - Able to tolerate solids and liquids by mouth Consider admission to the inpatient hospital admission - No improvement in clinical symptoms despite IV fluids, antiemetics, and analgesics within 24 hours - Unstable vital signs - Workup shows an alternative cause that requires inpatient admission - Cannot tolerate solids and/or liquids by mouth - Surgical abdomen - Consultant preference

IV, intravenous.

(inpatient observation patients and ED observation unit patients), but of hospital inpatient and ED observation unit patient satisfaction scores.

TIMELINE

Unit development started with a business plan in October 2019, which included improving ED throughput, analysis of care costs calculated by averaging the costs for each patient per day of hospital care, and ED observation unit-based reimbursements. Within the first 6 months of 2020, unit design was completed, evidence was gathered to finalize treatment protocols and inclusion/exclusion criteria (Table 2), and the medical consultant coverage process was completed. In July 2020, physical construction began, and 12 months later an ED observation unit manager was hired who finalized ED observation unit staffing. A 4-bed ED observation unit opened in September 2021 and was expanded to 8 beds in October. In January 2022 a third expansion brought the total number of beds up to 12, and the unit reached its current number of beds (16) in March 2022. Currently, 18 ED observation unit nurses (16 full-time, 2 part-time, and 3 pro re natas), 4 monitor technicians, and 8 ED observation unit technicians staff this unit.

MEASURES AND ANALYSIS

To assess whether this ED observation unit would meet project aims, several metrics were analyzed. A financial analysis was undertaken of the costs of observation patients treated in the hospital both in the year before the ED observation unit's opening and during the first fiscal year of the ED observation unit's operation. This analysis was compared with costs of operating the ED observation unit in the first fiscal year of operation. Patient LOS along with average time from discharge order written to actual discharge was also examined. Patient satisfaction data included inpatient units and ED observation unit Press Ganey satisfaction scores. The hospital business analytics director calculated ED observation unit fiscal impact through assessing cost avoidance related to decreased LOS and increased capacity.

Data analysis included descriptive statistics for select patient complaints, whereas *t* tests were used to compare differences between the pre- and postprogram data. Comparisons of LOS, discharge written to actual discharge times, satisfaction scores, and financial data were made between hospital observation patients and ED observation unit patients. These comparisons provided program directors an assessment of whether the investments in the ED observation unit were meeting project aims and worth the investment of finances and personnel in this unit.

ETHICAL COMPLIANCE

The project did not meet the federal definition of human subjects research because it was not deemed a systematic investigation, did not include research questions or hypothesis testing, and was not intended to create generalizable knowledge. The Nursing Research Oversight Team of the Research and Evidence-Based Practice Council at this hospital, following Hastings Center Guidelines, established that this project was not subject to institutional review board oversight and provided ethical approval for this quality improvement project. The hospital's analytics department removed Protected Healthcare Information from the data provided to the project directors.

Results

Since October 2021 and through September 2022 (hospital fiscal year), 2640 patients, or 40.7% of ED patients admitted to observation beds, were admitted to the ED observation unit. Of these ED observation unit patients, just under 20% required an inpatient admission. Hospital inpatient units that received ED observation patients during the same period were used to treat 3836 patients (Table 3). Thus, 6476 observation patients were admitted to the ED observation unit and hospital inpatient observation beds, an increase of 2049 patients, or 46% more observation patients treated than in the previous fiscal year before the ED observation unit opened.

ED observation unit patient LOS ranged from 23.75 hours (chest pain) to 29.93 hours (GI bleed) (Table 4). Across all patient complaints, ED observation unit LOS was half the time of the LOS for hospital observation patients. Compared with hospital observation patients, ED observation unit patient LOS was lower with ruled out transient ischemic attack (54% lower), with chest pain (52% lower), with GI bleeding (64% lower), and with general GI complains (53% lower) (Table 4). Each measure of lower LOS was statistically significant. The range of ED observation unit discharge order to actual discharge time was 64 minutes (for chest pain) to 80 minutes (for patient complaints, not specified). In contrast, the range of hospital observation patient discharge order to discharge times was 193 minutes for patients with general GI to 263 minutes for patients with a transient ischemic attack (Table 4). With only 1 patient

TABLE 3
Discharge order written to actual discharge time in minutes for hospital-located observation patients versus ED observation unit-located observation patients

Time period	October 2020-September 2021*	October 2021-September 2022	
	Hospital observation patients	Hospital observation patients	ED observation unit patients
Patient complaint	Mean minutes (n)	Mean minutes (n)	Mean minutes (n)
Rule out TIA	211 (158)	263 (44)	70 (303)
Chest pain	154 (444)	200 (281)	64 (658)
GI bleed	208 (84)	291 (63)	77 (23)
General GI	190 (409)	193 (442)	78 (196)
Not specified	197 (3331)	260 (3005)	80 (1459)
Foreign body	72 (1)	103 (1)	29 (1)
N	4427	3836	2640

Calculations excluded encounters missing discharge order to discharge info and ED patients assigned to the ED observation unit but awaiting an inpatient bed assignment, left against medical advice, or expired patients.
GI, gastrointestinal; TIA, transient ischemic attack.
* Fiscal year before opening of ED observation unit.

with a foreign body complaint in each time period, the category "foreign body" was not considered.

ED observation unit patient satisfaction scores were, at minimum, better than two-thirds of the hospital inpatient units and in most cases were in the top 25% of all units (Table 5).[12] Patient satisfaction ratings of the hospital, based on their ED observation unit experience, were in the 68th percentile of all hospital units. Care transition, cleanliness of environment, and communication with nurses satisfaction ratings were in the 79th percentile. Response of hospital staff satisfaction ratings were in the 74th percentile. Communication with doctors revealed that satisfaction ratings were in the 89th percentile (Table 5).[12]

The hospital engaged data analytics and hospital finance personnel to assess costs and savings related to the ED observation unit. Factoring in the LOS decrease, additional incremental margin from backfilling the bed from the specific patient complaints, and reduced labor, capital, and other cost components related to direct patient care, the ED observation unit was able to show a positive revenue impact of more than three-quarters of a million dollars for the fiscal year October 2021 to September 2022.

TABLE 4
Length of stay in hours for hospital-located observation patients versus ED observation unit-located observation patients (October 2021-September 2022)

Patient complaint	Hospital observation patient LOS Mean hours (SD)	ED observation unit patient LOS Mean hours (SD)	t test *t*-value (DF)
Rule out TIA	54.04 (57.4)	24.82 (24.8)	3.58 (49)*
Chest pain	49.65 (49.7)	23.75 (9.28)	11.55 (327)†
GI bleed	82.59 (48.4)	29.93 (14.2)	7.91 (85)†
General GI	56.74 (56.7)	26.44 (13.5)	15.44 (649)†
Not specified	63.9 (45.0)	27.9 (17.6)	39.02 (4561)†

DF, degrees of freedom; GI, gastrointestinal; LOS, length of stay; TIA, transient ischemic attack.
* $P < .001$.
† $P < .000$.

TABLE 5
Press Ganey patient satisfaction scores[12]: Compared with inpatient hospital units (observation unit patients and inpatients) (November 2022)

Press Ganey category	ED observation unit rank (of 19 inpatient units)	Percentile rank
Communication with doctors	3	89%
Care transition	4	79%
Cleanliness of environment	4	79%
Communication with nurses	4	79%
Response of hospital staff	5	74%
Rate the hospital based on the unit	6	68%

ED observation unit rank: Indication of the ED observation unit's percentile rank compared with the hospital's 19 inpatient units. Percentile rank: The "Top Box" score or the percent of patients that checked "Always" compared with other hospitals in the Press Ganey database.[13]

Discussion

Evidence from previously successful ED observation units was incorporated into this ED observation unit, and positive outcomes ensued. LOS decreased, which was similar to results found in other reports.[6,14] ED observation unit patient LOS was much lower than inpatient unit observation patients, thus increasing ED and inpatient unit capacity. Patients diagnosed as having and being treated for coronavirus disease 2019 (COVID-19)-related complaints were almost entirely excluded from the ED observation unit related to IV antiviral and oxygen treatments requiring multiple-day admission. Inpatient beds that would have been occupied by patients treated in the ED observation unit were freed up, allowing inpatients being treated for COVID-19-related infections to occupy these hospital beds.

The ED observation unit's strong patient satisfaction scores were in the top 25th-percentile ranking in 4 Press Ganey categories and in the top 66th percentile in 2 other categories.[12] The ED observation unit outperformed most of this hospital's 19 inpatient units. Although the satisfaction scores of ED observation patients are being compared with all inpatients, a reasonable assertion can be made that the excellent performance and efficiency in the ED observation unit did not come at the cost of low-quality patient care.

The ED observation unit significantly and positively affected hospital finances. Shortened LOS meant decreased patient care costs. The opening of the ED observation unit allowed for 146% more observation patients to be seen than in the year before its opening (4427 in fiscal year 2020 vs 6476 patients in fiscal year 2021) (Table 3). Moving patients from the emergency department to the ED observation unit increased ED capacity and may have contributed to shorter ED waiting room time for patients. There were 13% fewer hospital observation patients in fiscal year 2021 (3836) than in fiscal year 2020 (4427) after the opening of the ED observation unit. High acuity patients were able to be placed in inpatient beds previously occupied by hospital observation patients (Table 3). Greater ED volume and larger inpatient capacity increased overall revenue. Decreasing the patient LOS provides more inpatient capacity and can generate more revenue, allowing hospitals to afford the increased expenses of creating an ED observation unit. As at least one other study has indicated, dedicated ED observation units with protocols that demonstrate these outcomes prevented the outflow of significant healthcare systems revenue.[5]

HYBRIDIZATION OF ED AND INPATIENT CARE MODELS

Nursing, medical, and senior hospital leadership carefully planned the hybridization of inpatient and ED patient care models. This hybridization allowed the ED observation unit to meet patient LOS, patient satisfaction, and financial goals. Hybridization involved the combination of hospital inpatient charting and care requirements with ED patient care provision requirements, the understanding of ED flow, and emphasis of rapid treatment and testing turnaround times. ED observation unit patients received an inpatient model of patient assessment and care. They also experienced emergency department-like patient flow processes that increased the speed of diagnostic test results and disposition times.

Leadership fused not only inpatient and ED patient care models but also interprofessional working environments. Advanced practice nurses (APRNs), medical consultants, nurses, nursing assistants, and monitor technicians were located in 1 central location. This work area allowed staff to be immediately available to each other and provide input on the patient's care and discharge plans. Staff also learned each other's work patterns and talents, further reducing delays in patient care provision. Arranging staff work areas in this way contributed to faster patient dispositions.

One aspect of ED patient care in this hybridized care model is the use of APRNs. Around-the-clock APRN presence allowed care decisions to be made 24 hours a day and 7 days a week. APRNs are ideally suited to provide care alongside medical consultants and emergency physicians. Advanced nursing knowledge and standardized treatment protocols allowed APRNs to rapidly reach a disposition decision. ED observation unit care decisions and dispositions were imminently expected at any point in any shift, shortening LOS and reducing the length of time for an ED observation patient to see a provider or receive discharge orders.

APRNs and nurses with both inpatient and ED patient care experience detected patient decompensation more quickly, allowing earlier intervention before a patient safety concern occurred. In addition, the ED observation unit patient selection criteria placed stable, lower acuity patients in this unit. Lower nurse-to-patient staffing ratios provided more frequent contact between patients and nurses or APRNs. All of these factors contributed to safer patient care provision, leading to minimal patient care issues and safety concerns on this unit.

To expedite care and to meet the 24-hour disposition time goal, ED observation unit leadership worked closely with medical consultant groups and various hospital departments such as environmental services, laboratory, radiology, etc. They ensured that ED observation unit patient testing, consults, and housekeeping requests were prioritized after the emergency department, intensive care units, and inpatient stat orders without increasing testing time or delaying care of inpatients. Additional time savings occurred as ED observation unit nurses and nursing assistants completed electrocardiograms/phlebotomy/other specimen collection and transported patients from the emergency department to the ED observation unit and to and from diagnostic testing. The ED observation unit discharge culture is similar to that of the emergency department: discharge and physical movement of patient out of the emergency department at any time of day or night by ED observation unit staff to their transportation, ambulance, etc. LOS decreased because biological specimen collection and patient transportation to and from testing and during physical discharge were performed by ED observation unit staff and not hospital care staff external to the ED observation unit (phlebotomy, transport, volunteers, etc).

HYBRID CARE MODEL CHALLENGES

The ED observation unit presented unique nursing challenges. The hybrid ED/inpatient care model created a steep learning curve for emergency nurses, who had to adapt to inpatient-specific patient care requirements that were quite different from ED patient care requirements. Emergency nurses had to relearn more extensive (compared with ED charting) inpatient charting requirements, how to complete a full assessment rather than a focused ED assessment, and how to educate patients on the importance of preventative care (eg, sequential compression devices). Medication reconciliation and administration of home medications presented a challenge to emergency nurses who were more accustomed to providing treatment-related medications or emergent IV medications.

Maintaining productivity was a particular and early challenge for this unit. The ED observation unit was expected to make disposition decisions and discharges in $<$24 hours. The ED observation unit experienced census variations and patient turnover similar to an emergency department; however, the inpatient house manager made staffing decisions based on inpatient productivity metrics at 5 AM and 5 PM, 2 times of the day when the ED observation unit varied in patient census. To prevent staff from being assigned to inpatient units during low ED observation unit census times, ED observation unit leadership and house management agreed (and learned) to trust the ED observation unit flow process, maintaining ED observation unit staffing even during low census times. An additional concession to maintain ED observation unit staffing was made by ED observation unit nursing leadership, allowing ED observation unit nursing staff to change from a 4:1 to a 5:1 patient to nurse ratio when census demanded. In return, house managers agreed not to assign ED observation unit staff to other inpatient units. However, because few other inpatient units discharge and admit the volume of patients the ED observation unit does, the temptation will always exist for the house manager to cap ED observation unit census and reassign ED observation unit staff to other inpatient units.

ED observation unit nurses educated medical consultants, such as cardiologists, neurologists, etc, about the hybrid

model that focused on making a disposition within 24 hours. Making an observation patient disposition within 24 hours is very different from an exclusively inpatient care model in which providers will wait, often until day-shift staff are present, to do additional testing. Providers may then wait an additional 12 to 24 hours before ordering follow-up testing on observation patients in the hospital. Once the consultants better understood the hybrid model and the necessity of patient dispositions within 24 hours, they more readily coordinated care with the APRNs for much faster dispositions.

Limitations

During the planning phase, this quality improvement project did not use a formal quality improvement model, which would have strengthened the implementation and evaluation of this project. In addition, quality improvement projects by nature are designed for specific facilities. These results, while providing valuable elements for consideration by other hospitals contemplating the development of an ED observation unit, are not generalizable beyond this hospital.

This unit was planned and implemented during the COVID-19 pandemic. Because of limited resources, there was no measurement process in place to assess how individual variables (eg, the influence of standardized medical management or the dedicated prioritization of support services) affected time to disposition. Future projects could plan and measure how individual variables impact specific metrics, such as LOS.

Implications for Emergency Nurses

Emergency nurses and APRNs play a vital role in reducing patient LOS while providing high-quality, safe ED observation unit patient care. The hybrid model provides a unique set of challenges to emergency nurses, who have to (re)learn inpatient assessment and care provision skills. However, active participation in planning for and care provision in an ED observation unit is a unique opportunity for emergency nurses. Being involved in all aspects of patient care (phlebotomy, providing electrocardiograms, transportation, and inpatient assessments and direct care) and facilitating team communication to ensure APRNs are immediately aware of all testing results and treatment outcomes lead to faster disposition times and shortened patient LOS. Emergency nurses and leaders in the ED observation unit bring excellent knowledge of fast patient flow. These skills can be used to educate inpatient nursing staff officers on the necessity of maintaining ED staff ratios in this observation area that is considered an inpatient unit. Emergency nurses are an indispensable and vital part of the ED observation unit meeting LOS, patient care quality, and financial goals.

Conclusions

The ED observation unit decreased observation patient LOS, maintained higher patient satisfaction markers, increased ED and inpatient bed capacity, and demonstrated a positive financial revenue impact. This unit proved its sustainability and will soon expand from 16 beds to 32 beds. Leadership will continue to monitor the effect on hospital consultants and ancillary staff. Next steps include expanding this ED observation unit to other hospitals in this system. As the hybrid model ED observation unit is implemented in other hospitals of this system, continuous metric monitoring will improve ED and inpatient bed capacity, produce a positive fiscal impact, and deliver high-quality, efficient care.

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.2023.07.002.

REFERENCES

1. Peterson SM, Harbertson CA, Scheulen JJ, Kelen GD. Trends and characterization of academic emergency department patient visits: a five-year review. *Acad Emerg Med*. 2019;26(4):410-419. https://doi.org/10.1111/acem.13550
2. Janke AT, Melnick ER, Venkatesh AK. Hospital occupancy and emergency department boarding during the COVID-19 pandemic. *JAMA Netw Open*. 2022;5(9):e2233964. https://doi.org/10.1001/jamanetworkopen.2022.33964
3. Yealy DM, De Hart DA, Ellis G, Wolfson AB. A survey of observation units in the United States. *Am J Emerg Med*. 1989;7(6):576-580. https://doi.org/10.1016/0735-6757(89)90277-5
4. Heeren P, Hendrikx A, Ceyssens J, et al. Structure and processes of emergency observation units with a geriatric focus: a scoping review. *BMC Geriatr*. 2021;21(1):95. https://doi.org/10.1186/s12877-021-02029-9

5. Perry M, Franks N, Pitts SR, et al. The impact of emergency department observation units on a health system. *Am J Emerg Med*. 2021;48:231-237. https://doi.org/10.1016/j.ajem.2021.04.079
6. Plamann JM, Zedreck-Gonzalez J, Fennimore L. Creation of an adult observation unit: improving outcomes. *J Nurs Care Qual*. 2018;33(1):72-78. https://doi.org/10.1097/NCQ.0000000000000267
7. Conley J, Bohan JS, Baugh CW. The establishment and management of an observation unit. *Emerg Med Clin North Am*. 2017;35(3):519-533. https://doi.org/10.1016/j.emc.2017.03.002
8. Silverman M, Chopra P. How to develop a successful observation unit. Accessed December 1, 2019. https://epmonthly.com/article/develop-successful-observation-unit/
9. Southerland LT, Simerlink SR, Vargas AJ, et al. Beyond observation: protocols and capabilities of an emergency department observation unit. *Am J Emerg Med*. 2019;37(10):1864-1870. https://doi.org/10.1016/j.ajem.2018.12.049
10. Ogrinc G, Goodman D, Davies L, et al. Explanation and elaboration of the SQUIRE (Standards for Quality Improvement Reporting Excellence) Guidelines, V.2.0: examples of SQUIRE elements in the healthcare improvement literature. *BMJ Qual Saf*. 2016;25(12):986-992. https://doi.org/10.1136/bmjqs-2015-004480
11. Shah K. Observation Abodominal Pain Protocol. Louisville, KY: Baptist Healthcare Louisville. Accessed March 17, 2023. 1-2; 2019.
12. Press Ganey. PGFusion. Published 2022. Accessed November 28, 2022. https://performance.pressganey.com/
13. North F, Tulledge-Scheitel SM. Patient satisfaction with providers: do patient surveys give enough information to help providers improve specific behaviors. *Health Serv Res Manag Epidemiol*. 2019;6:1-6. https://doi.org/10.1177/2333392819885284
14. Parwani V, Tinloy B, Ulrich A, et al. Opening of psychiatric observation unit eases boarding crisis. *Acad Emerg Med*. 2018;25(4):456-460. https://doi.org/10.1111/acem.13369

Use of Care Guides to Reduce Emergency Department Visits by High-Frequency Utilizers

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Contribution to Emergency Nursing Practice

- High-frequency utilizers contribute to ED overcrowding and misuse of resources, and reduce the efficiency of health care systems.
- Care guides combined with 24-hour case manager or social worker availability can reduce ED utilization by high-frequency utilizers and decrease unreimbursed care.
- Using care guides may assist emergency nurses in providing education to high-frequency utilizers about appropriate settings to receive health care services for their conditions and reduce ED overcrowding.

Abstract

Background: High-frequency utilizers are defined as patients who present 10 or more times to the emergency department in a rolling 12-month period. High-frequency utilizers contribute to emergency department overcrowding and misuse of resources, and reduce the efficiency of health care systems. Care guides have proven to be an effective tool in reducing high-frequency utilizers.

Objective: The objective of this quality improvement project was to determine if implementing a care guide for high-frequency utilizers to address the core needs of the patient and facilitate resources through case management consultation decreases the number of visits and the cost of unreimbursed care to the emergency department from high-frequency utilizers.

Methods: We implemented care guides for high-frequency utilizers in September 2014. Prior to initiating the care guides, we educated the physicians, nurses, case managers, and social workers in the emergency department.

Results: Following the implementation of the care guides, there was a steady decline in the number of high-frequency utilizers (338 in 2013–68 in 2021), the number of total emergency department visits by high-frequency utilizers (6025 in 2013–1033 in 2021), and unreimbursed care ($2,068,063 in 2013–$589,298 in 2021).

Conclusion: The use of care guides was a successful strategy in reducing emergency department visits and the cost of unreimbursed care by high-frequency utilizers by providing them with the education and resources they require to receive health care services in appropriate settings.

Key Words: Case management; Emergency department; Emergency nurse; Health care utilization; Social worker

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Introduction

Emergency departments are becoming busier with higher acuity patients. Initiatives to decrease ED overcrowding are of increasing importance. High-frequency utilizers are defined as patients who present 10 or more times to the emergency department in a rolling 12-month period.[1] High-frequency utilizers contribute to ED overcrowding and misuse of resources, and reduce the efficiency of health care systems.[1] The issues related to high-frequency utilizers and their impact on clinical care and finances of hospital emergency departments have been described in the

literature. One study evaluated cost, number of visits, and length of stay based on utilization of inpatient services.[2] It was identified that 16% of the total cost of care was made up of less than 4% of patients.[2] They recommended a patient-centered approach to address diverse health and social needs with high-frequency utilizers.[2]

Another study looked at high-frequency utilizers to identify any patterns or characteristics to better understand who makes up high-frequency utilizers.[3] Four subgroups were identified: short-term ED high-frequency users (seen for a variety of conditions without any 1 diagnostic group being especially prevalent), heart-related ED high-frequency utilizers (all patients made most of their visits to the emergency department for heart-related conditions), long-term ED high-frequency utilizers (high prevalence of chronic diagnoses), and minor care ED high-frequency utilizers (all patients had visits that resulted in musculoskeletal discharge diagnoses such as sprains and strains).[3] The heart-related ED high-frequency utilizer group had the largest per-person cost and was also the most likely to result in admission.[3] The long-term ED high-frequency utilizers group had the largest total group cost but also had the majority of visits related to a mental health complaint.[3] However, the researchers did not study or suggest any interventions to reduce high-frequency utilizers.[3]

Another study explored the utilization of the emergency department specifically for mental health services by high-frequency utilizers.[4] The researchers identified that patients with schizophrenia and personality disorder diagnoses were the highest utilizers of the emergency department.[4] Additional factors that were associated with higher ED use included past mental health hospitalizations and regular care from an outpatient psychiatric setting in the previous 12 months.[4] They suggested that increasing access to outpatient mental health services may help with unnecessary ED visits.[4]

As the characteristics of ED high-frequency utilizers are becoming clearer, researchers have suggested strategies to reduce high-frequency utilizer visits to the emergency department.[5-8] One study looked at inpatient hospitalizations over a 12-month period after implementing a social work intervention to reduce high-frequency utilizers.[5] This social work-based transitional care intervention addressed medical and social needs and resulted in a reduction in hospitalization cost of high-frequency utilizers by nearly $200,000, ED visits reduced by 2 visits per patient, and the readmission rate was cut in half.[5] Another study found that Medicare patients who received care coordination at patient-centered medical homes were less likely to use ED services.[6] The recommended first step for any emergency department wishing to evaluate this topic was to create a process to identify high-frequency utilizers.[6] Then, the assignment of a primary care physician (PCP) to direct care was the next step, but this was to be insufficient to alter high-frequency utilizers' ED use.[6] It was suggested that in order to reduce visits to the emergency department, greater PCP flexibility, including variable hours, phone access, more urgent appointment availability, and less difficulty obtaining medications, were necessary.[6]

Researchers have agreed that care coordination, in some way, is the key to reducing high-frequency utilizers.[5] Further, case management is an effective strategy to reduce ED visits and ED costs among high-frequency utilizers.[6] The aggressiveness of case manager intervention was associated with the largest decrease in ED usage.[1,7] One study on the use of care guides resulted in a 41% decrease in ED visits per month.[8] Getting to the root cause of a high-frequency utilizer's multiple visits is a priority to reduce cost and resolve the core health care need of the patient.[1]

The purpose of this quality improvement (QI) project was to determine if implementing a care guide for high-frequency utilizers would decrease the number of visits and the cost of unreimbursed care to the emergency department attributed to high-frequency utilizers.

Methods

This QI project was conducted between September 2014 and February 2022.

POPULATION AND SETTING

We implemented care guides in the emergency department of a midwestern, suburban 208-bed level II trauma center and teaching hospital. In the 2013 calendar year, there were 58,234 patients seen in the emergency department. High-frequency utilizers accounted for 6025 (10.3%) of these visits. The average length of stay for high-frequency utilizers in 2013 was 3 hours and 13 minutes. This data was the impetus for this QI project. Patients who met the definition of high-frequency utilizers by having 10 or more ED visits in a rolling 12-month period were the target population for this project. The hospital Institutional Review Board deemed this QI project exempt as it was not considered human subject research.

INTERVENTION: CARE GUIDES

A care guide is a communication tool used by the physician, case manager, social worker, and nurse. The implementation of care guides was selected as the intervention to involve

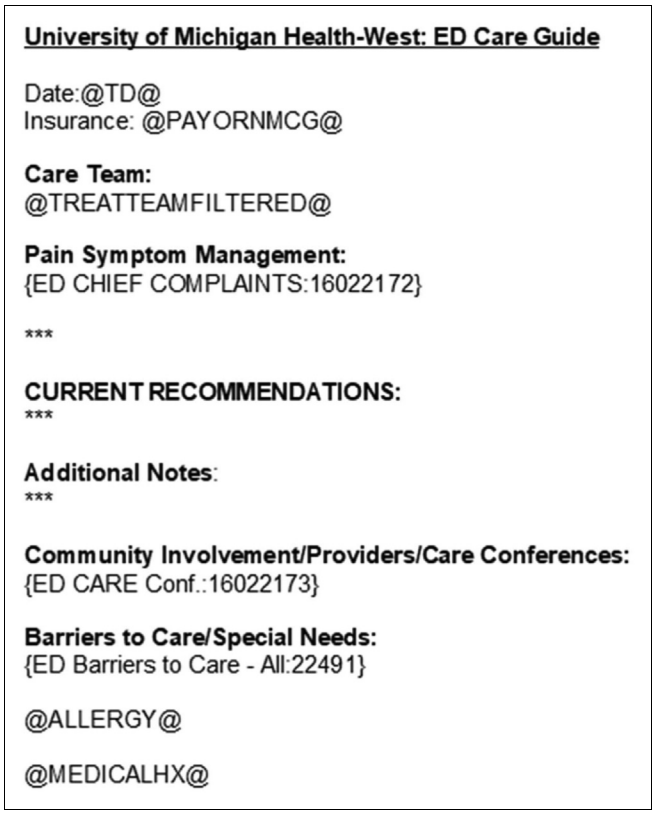

FIGURE 1
Epic Screenshot of Care Guide.

physicians and create consistency in care, thus reducing ED visits by high-frequency utilizers. Care guides were being completed on paper prior to this project and were available in binders but lacked visibility. To increase visibility and compliance, the care guide was added to the patient's problem list so it would be visible on every ED visit and must be resolved/addressed by the physician during their ED visit. "ED care guide" was built as a problem so it would remain active and visible during subsequent visits. The actual care guide is fluid and may be updated during any visit to reflect recommendations to patient management. It is fully electronic. There was also a flag created on the Epic track board for patients with a care guide to be visible to all disciplines and a header on the patient's chart once opened. The care guide was intended to create a standard approach to patient care.

PROJECT PROTOCOL

Prior to the development of the care guide template, a root cause analysis was performed and determined that most high-frequency utilizers presented to the emergency department for 2 reasons: (1) pain (chronic pain, migraine, or back pain) or (2) lack of a PCP to manage their non-emergent health concerns.[8] The care guide template (Figure 1) was developed to be broad enough to address any presenting complaint from a high-frequency utilizer but also contained specific guidance on how to manage these 2 root causes of high-frequency utilizers. The care guide template was developed by the ED quality and safety nurse specialist and underwent content validation by the ED director and ED physician team. It was subsequently incorporated into the electronic medical record, which was Epic at this facility. The program utilized 24-hour social work coverage and 16-hour-a-day case manager coverage 7 days a week to follow up with those patients identified as high-frequency utilizers.

Before initiating the requirement for care guides, case management and social work staff, along with the ED physicians and nurses, were trained on the process and inclusion criteria. Attending and resident physician education included a presentation at their department meeting, subsequent emails, and in-person "show and tell" via Epic on how

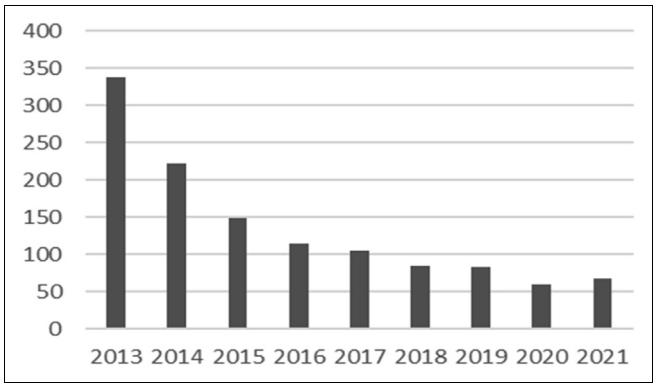

FIGURE 2
Number of high-frequency utilizers per year.

to create a care guide. The physicians were also notified that, if there was an existing care guide and the managing physician for a subsequent visit did not follow the care guide, they would receive a "care guide violation" email, including physician and department leadership for accountability. Staff onboarded after program inception were trained during orientation.

After all staff had been educated, the care guides were rolled out in September 2014. There was a column added to the ED track board to show "yes" if a patient currently being seen in the emergency department had a care guide. This column was added to all disciplines' track-board views in Epic, including nursing leadership. During the first year, the quality and safety nurse watched the track board for high-frequency utilizer patients arriving and would speak to the attending assigned to ask them to start a care guide. Also, patients could be identified by anyone on the care team as high-frequency utilizers and then referred to the social worker or case manager to identify barriers to nonemergent outpatient care, including transportation, insurance, housing, pharmaceutical, and provider availability. The case manager or social worker completed a real-time interview and patient assessment addressing health care needs and setting up appropriate follow-up. Prior to ED discharge, the case manager or social worker follows up with the patient to identify potential barriers that may impede their ability to receive appropriate outpatient care.

DATA COLLECTION

For this project, the data obtained from chart review and financial data included: high-frequency utilizer's reason for ED visit, number of high-frequency utilizer patients, total

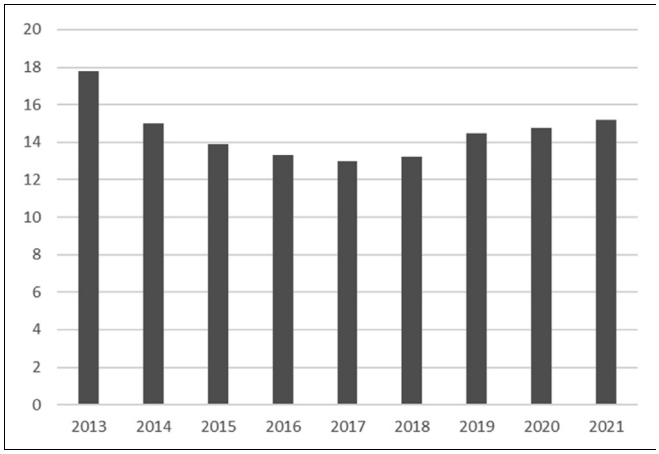

FIGURE 3
Average number of visits per high-frequency utilizer per year.

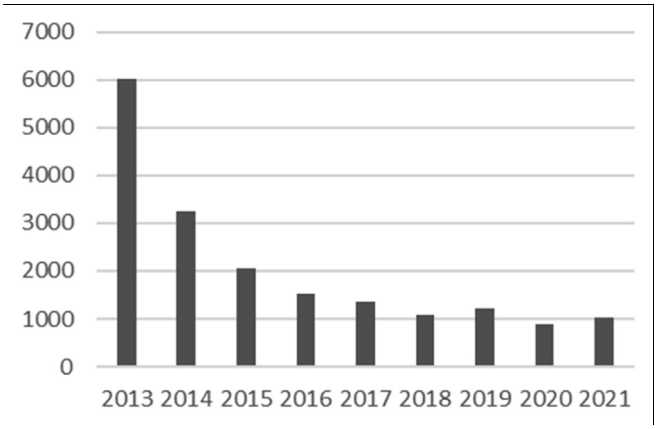

FIGURE 4
Total number of visits by high-frequency utilizers per year.

visits by high-frequency utilizers, and unreimbursed care dollars per year. Requested data were collected by the hospital's data analytics team and exported to an Excel spreadsheet by medical record number with data points reported by calendar year.

DATA ANALYSIS

Data were analyzed using Microsoft Excel for Microsoft 365 MSO (Version 2208 Build 16.0.15601.20072). Bar graph tables were created to illustrate the changes in the number of high-frequency utilizer patients, average number of visits per high-frequency utilizer, total visits by high-frequency utilizers, and unreimbursed care over time before and after the implementation of care guides. Higher-level analysis of the data was not possible due to all data being aggregated.

Results

A root cause analysis for high-frequency utilizers was completed prior to care guide development and implementation. This revealed that the top reasons for an ED visit by high-frequency utilizers were pain management, difficulty getting to a specialist, transportation, lack of flexible hours for a PCP, dental complaints, and mental health complaints. These data points drove the care guide development but were not collected over time.

Since the initiation of care guides, there has been an 80% reduction (from 338-68) in the number of patients who qualify as high-frequency utilizers (Figure 2). There was a 16.5% drop in the number of high-frequency utilizers visits from 2013 (n = 17.8) to 2014 (n = 15) following the initiation of care guides, but since that time, the average number of visits by a high-frequency utilizer remained

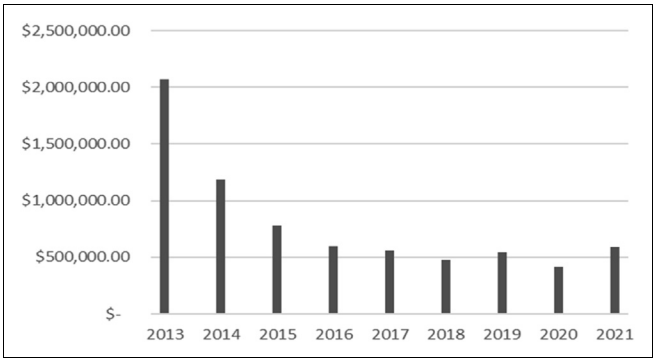

FIGURE 5
Unreimbursed care per year.

relatively stable with a range from 13 to 15.2 (mean 14.1) (Figure 3). The total number of visits by high-frequency utilizers by year decreased by almost 83% from 2013 (n = 6025) to 2021 (n = 1033) (Figure 4). Lastly, the unreimbursed care was reduced by almost $1.5 million per year from 2013 to 2021 (Figure 5), with a potential savings of over $13 million since care guide implementation.

Discussion

The data show that the use of care guides resulted in a steady decline in high-frequency utilizers and their utilization of the emergency department for non-emergent care over the past 9 years. However, there was a temporary increase in high-frequency utilizer visits to the emergency department in 2019. In examining the reason for this increase, it was discovered that the hospital's partnership with a community mental health provider was dissolved and that this increased the utilization of the ED for patients needing mental health services. By the end of 2019, a new community partnership for mental health services had been established, and the high-frequency utilizer visit numbers in 2020 decreased to below the 2018 numbers (Figure 2).

The lowest number of high-frequency utilizers was noted in 2020. It is postulated that the COVID-19 pandemic prevented many patients from seeking care in emergency departments due to concerns about contracting the coronavirus. Although the use of care guides has been in place for 6 years, this drop is still most likely due to the impact of the pandemic.

It can also be seen that the high-frequency utilizers' visits increased in 2021. An investigation revealed that care guide initiation since the start of the COVID-19 pandemic has been inconsistent due to ED overcrowding with COVID patients and staff shortages. There are plans currently underway to deliver provider education as a refresher to improve compliance with the care guides. The care guides are also being updated to improve their relevance to meet current health care challenges because of the pandemic.

Limitations

There were limitations in the performance of this QI project. First, it was performed at a single institution, and the results may not be generalizable in other institutions. A multi-center study using the care guide intervention would provide additional evidence as to the efficacy of this practice to reduce high-frequency utilizer visits to the emergency department. Further, the constant presence of a social worker or case manager is not available in all emergency departments, and this may impact replication of this project in those settings. Lastly, data on the reasons for an ED visit by high-frequency utilizers drove the care guide development but were not collected over time. This limits knowledge as to whether the reasons behind high-frequency utilizer visits changed over time as a result of care guide utilization. Since it has been 10 years since the original root cause analysis was performed, a new root cause analysis may need to be performed to determine if the care guides need revision to address the needs of current high-frequency utilizers.

Implications for Emergency Nurses

This QI project reduced the visits to the emergency department by patients who did not require emergency services to manage their health. While the direct impact of this QI project on the emergency nurses was not studied, the use of care guides can certainly contribute to reducing overcrowding in the emergency department, thus reducing the stress on emergency nurses.[8] Reducing high-frequency utilizers preserves resources in the emergency department that can be utilized for the care of other patients.[1,6]

Conclusion

High-frequency utilizers create a drain on emergency departments and prevent the optimal provision of emergency care to those who require it. The use of care guides was a successful strategy in reducing ED visits by high-frequency utilizers. Having a social worker or case manager available at all times is 1 of the reasons that the care guides were successful at our institution. Institutions without this level of support would need to determine who would be accountable for seeing that the care guide is implemented and executed at the time of patient discharge. Care guides provide high-frequency utilizers with the education and resources they require to receive health care services in appropriate settings. The use of care guides has proven to be effective in reducing the number of high-frequency utilizers, but refresher education for the staff is needed to make certain that this progress is sustained.

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Author Disclosures

Conflicts of interest: none to report.

REFERENCES

1. Kumar G, Klein R. Effectiveness of case management strategies in reducing emergency department visits in frequent user patient populations: a systematic review. *J Emerg Med*. 2013;44(3):717-729. https://doi.org/10.1016/j.jemermed.2012.08.035
2. Ng SHX, Rahman N, Ang IYH, et al. Characterization of high healthcare utilizer groups using administrative data from an electronic medical record database. *BMC Health Serv Res*. 2019;19(1):1-14. https://doi.org/10.1186/s12913-019-4239-2
3. Birmingham LE, Cheruvu VK, Frey JA, Stiffler KA, VanGeest J. Distinct subgroups of emergency department frequent users: a latent class analysis. *Am J Emerg Med*. 2020;38(1):83-88. https://doi.org/10.1016/j.ajem.2019.04.029
4. Kaltsidis G, Bamvita JM, Grenier G, Fleury MJ. Predictors of frequent emergency department utilization for mental health reasons. *J Behav Health Serv Res*. 2021;48(2):259-273. https://doi.org/10.1007/s11414-020-09695-4
5. Xiang X, Zuverink A, Rosenberg W, Mahmoudi E. Social work-based transitional care intervention for super utilizers of medical care: a retrospective analysis of the bridge model for super utilizers. *Soc Work Health Care*. 2019;58(1):126-141. https://doi.org/10.1080/00981389.2018.1547345
6. Ostermeyer B, Baweja NUA, Schanzer B, Han J, Shah AA. Frequent utilizers of emergency departments: characteristics and intervention opportunities. *Psychiatr Ann*. 2018;48(1):42-50. https://doi.org/10.3928/00485713-20171206-02
7. Iovan S, Lantz PM, Allan K, Abir M. Interventions to decrease use in prehospital and emergency care settings among super-utilizers in the United States: a systematic review. *Med Care Res Rev*. 2020;77(2):99-111. https://doi.org/10.1177/1077558719845722
8. Shnowske K, Berg DD, Guntern P, Hop D. Care guide use for repeated non-emergent complaints and its effect on emergency department visit frequency. *Am J Emerg Med*. 2018;36(9):1697-1698. https://doi.org/10.1016/j.ajem.2018.01.036

Outcomes of a Comprehensive Ultrasound Guided Peripheral IV Insertion (USGPIV) Training Program in a Pediatric Emergency Department

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Contribution to Emergency Nursing Practice

- The utilization of point of care ultrasound to attain vascular access in pediatric patients has been shown to improve success rates, requires less time than traditional methods and require fewer attempts.
- In this study, we utilized a novel comprehensive training program in a tertiary pediatric emergency department. This includes an asynchronous learning module and 8 hours of clinical training with a clinical vascular access instructor, followed by the completion of 10 USGPIV insertions with just-in-time feedback. The study highlights how this training program can improve first attempt success rates, particularly in patients with high DIVA scores.
- Consideration should be made to introduce an USGPIV training program in all pediatric emergency departments.

Abstract

Introduction: Timely and reliable peripheral intravenous cannulation is an imperative skill in a pediatric emergency department. Utilization of point-of-care ultrasound guidance has proven to significantly improve first-attempt peripheral intravenous cannulation insertion rates in pediatric patients. We sought to develop, implement, and evaluate an ultrasound-guided peripheral intravenous training program for emergency nurses in a tertiary care pediatric center.

Methods: Twelve emergency nurses underwent a training program that consisted of an interactive asynchronous learning module followed by 8 hours of training by a vascular access clinical instructor. Data was collected on each ultrasound-guided peripheral intravenous insertion via survey methodology.

Results: Complete data for a total of 210 ultrasound-guided peripheral intravenous were recorded over the 9-month period. A total of 65.2% (137/210) of patients who received an ultrasound-guided peripheral intravenous had known difficult intravenous access on history. A total of 89.5% (188/210) of patients had a difficult intravenous access of ≥4. The mean difficult intravenous access score for the patients in which ultrasound-guided peripheral intravenous insertions were attempted was 4.78 (95% confidence interval, 4.55-5.01). A total of 193 of 210 (91.9%) of ultrasound-guided peripheral intravenous were attained successfully. On the first attempt, 86.5% (167/193) ultrasound-guided peripheral intravenous were attained, and 98.96% (191/193) were attained within the first 2 attempts.

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Conclusion: We found that implementing a comprehensive ultrasound-guided peripheral intravenous training program for emergency nurses in a pediatric tertiary care center led to a high first-pass success rate in attaining peripheral intravenous cannulations. It also facilitates vascular access in patients with known difficult intravenous access. Consideration should be made to implementing point-of-care ultrasound intravenous training programs to improve pediatric vascular access in the emergency department, particularly in patients with known difficult intravenous access.

Key words: Point of care ultrasound; Peripheral vascular access; Education; Difficult vascular access

Introduction

Timely and reliable peripheral intravenous cannulation (PIV) is an imperative skill in a pediatric emergency department to facilitate resuscitations, as well as administer fluids and medications. Studies indicate that first attempt PIV insertion success rates utilizing traditional methods in pediatrics have a broad variability ranging from 38.9% to 75%.[1-4] PIV insertion can be particularly challenging in patients under 2 years of age[1] or those with high DIVA scores.[4] In many centers, ultrasound-guided peripheral intravenous (USGPIV) access is utilized as an escalation strategy when traditionally placed PIV cannulas are not successful. In recent years, several systematic reviews have found numerous benefits to USGPIV placement in adults, including increased likelihood of success,[3,5] improved first pass success rate,[6] and longer survival times.[7] Although a meta-analysis has not shown similar benefits of USGPIV insertion in pediatric populations,[8] large-scale data in pediatrics is lacking. Various studies have shown the benefit of ultrasound-guided vascular access in pediatric patients. Aouad-Maroun et al found that ultrasound guidance for pediatric arterial cannulization reduced the number of attempts and complication rate.[9] A recent randomized control trial found that USGPIVs improved first-attempt success and PIV longevity in pediatric patients with predicted DIVA access.[10] Taken together, these studies provide early evidence that USGPIV insertion in pediatric populations is a beneficial skill set in attaining vascular access and may be particularly useful in patients with known DIVA.

Multiple studies in the literature support the use of short-term training programs to disseminate and adequately train both nurses and physicians in USGPIV.[11-14] Our primary aim was to develop, implement, and evaluate a USGPIV training program for pediatric emergency nurses in a tertiary care pediatric center. Our secondary aim was to determine if the USGPIV training program improved PIV access in patients traditionally deemed "difficult" (ie, high DIVA scores, multiple attempts, and the need to call the vascular access team).

Methods

STUDY DESIGN AND SETTING

This was a pilot project with the goal of training 12 emergency nurses on obtaining PIV access with the use of point of care ultrasound. This study took place in a tertiary care pediatric emergency department. The emergency department has greater than 80,000 pediatric visits annually. The study was approved by the hospital's quality improvement committee. The project was completed over a 9-month period from March 2021 to January 2022.

PARTICIPANT SELECTION

All emergency nurses were invited to participate in the USPIV pilot if they met the following criteria: (1) ≥0.6 full-time equivalent, (2) worked as an emergency nurse for at least 1 year, and (3) were motivated to train future emergency nurses in USGPIV. Emergency nurses that were interested in participating in the USGPIV pilot applied for the position. The application process included a curriculum vitae, cover letter, and interest statement of their goals and objectives for joining the USGPIV pilot. The candidates were reviewed by the senior clinical manager for the emergency department, and qualified applicants were enrolled. Initially, 10 emergency nurses were selected, however, due to staff turnover, additional nurses joined the pilot program during the course of the project. In total, 12 emergency nurses completed training for the pilot study. The study was supported by the senior clinical manager as well as the division head of the emergency department. Staff were renumerated through "education hours." Education hours are holiday or vacation hours that are converted toward education on a voluntary basis. As the program occurred during the coronavirus disease pandemic, nursing shortages in our emergency department led to challenges in reducing clinical time to facilitate training, and therefore, education hours were utilized instead.

TABLE 1
Competency checklist

Supervised insertion according to the criteria in the insertion checklist. Must have 10 successful insertions.					
1st	**2nd**	**3rd**	**4th**	**5th**	
Supervisor's Initials					
					1. Reviews electronic order for PIV insert and allergies
					2. Verifies patient using 2 independent identifiers
					3. Explains procedure to patient and family, offers pain management and comfort strategies
					4. Demonstrates the use of aseptic technique no touch (ANTT) when preparing supplies, equipment, and patient for the procedure
					5. Assembles appropriate supplies for USGPIV insertion
					6. Setup of ultrasound machine:
					a. Turns on machine
					b. Selects correct probe
					c. Applies sterile probe cover
					d. Adjusts to appropriate depth, gain, and focus
					e. Correctly identifies probe orientation in transverse view
					7. Assesses vascular anatomy, selects appropriate vein and catheter:
					a. Preps site with antiseptic solution
					b. Applies ultrasound medium
					c. Identifies relevant limb anatomy (veins, arteries, nerves)
					d. Identifies suitable vein
					e. Confirms vessel is venous (compression)
					f. Measures depth and diameter of vein
					g. Maps vein proximally to assess path of vessel
					h. Selects appropriate intravenous catheter in terms of gauge and length
					8. USGPIV insertion and placement confirmation:
					a. Applies tourniquet
					b. Preps site with antiseptic solution
					c. Applies sterile ultrasound medium
					d. Inserts PIV at appropriate angle and distance from probe
					e. Locates tip of needle and cannulates vein in transverse approach
					f. Continues to advance catheter following needle tip with ultrasound (either in transverse plane or switching to longitudinal plane)

continued

TABLE 1
Continued

Supervised insertion according to the criteria in the insertion checklist. Must have 10 successful insertions.				
1st	**2nd**	**3rd**	**4th**	**5th**
Supervisor's Initials				

g. Confirms catheter placement (note blood return and flush, or flush with ultrasound assessing vein in longitudinal plane)
9. Secures PIV device
10. Records image or video of insertion
11. Evaluates patient response to procedure
12. Documents USGPIV in electronic chart

The checklist was utilized during the hands-on training with the vascular access clinical educator for each of the 10 successful USGPIV insertions the participants completed during the hands-on training portion.
PIV, peripheral intravenous; USGPIV, ultrasound-guided peripheral intravenous.

Qualifying patients were selected based on a convenience sample of patients who were defined as complex in their pre-existing chart or had one or more failed PIV attempts during their current visit to the emergency department.

TRAINING PROGRAM

The initial step of the training program was the creation and dissemination of an interactive asynchronous learning module through the internal iLearn platform. The iLearn

TABLE 2
The DIVA score

Variable	**Description**	**Score**
Visibility	The vein is visible after a tourniquet is applied	Visible 0 Not visible 2
Palpability	The vein is palpable after the tourniquet is applied	Palpable 0 Not palpable 2
Age	Age of the child	> 3 y 0 1-2 y 1 < 1 y 2
Prematurity	History of prematurity	Not premature 0 Premature 0
Difficult IV access	History of known difficult peripheral IV insertion	No 0 Yes 2
Total	*4 considered difficult IV access < 4: IV not expected to be difficult	Total Score (/10)

IV, intravenous; DIVA, difficult intravenous access.
The DIVA score described by Yen et al[2] is comprised of 4 variables: (1) visibility of the vein after a torniquet is applied, (2) palpability of the vein after a tourniquet is applied (3) a history of prematurity and (4) known history of IV access. The associated scores for each of the variables are shown.
Scores of ≥4 were associated with more difficult IV access with a 50% failure rate on the first attempt.[2]

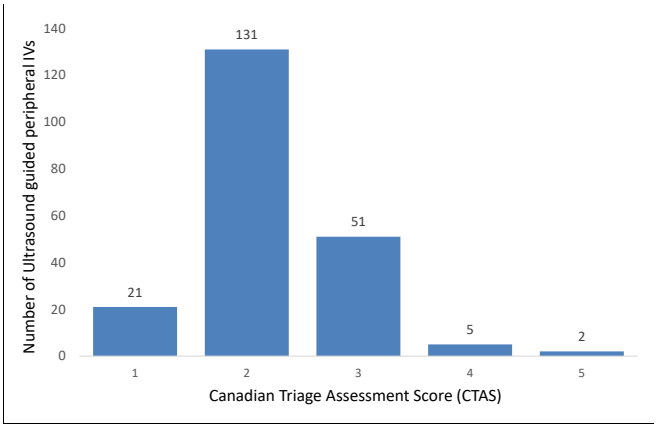

FIGURE 1

Canadian Triage Assessment Score (CTAS). The number of ultrasound-guided peripheral IVs (USGPIVs) attempted on patients presenting to the ED by CTAS score (1-5) from highest acuity (CTAS 1) to lowest (CTAS 5). The total number of patients for each CTAS is shown above each bar in the bar graph. The majority of patients 72.9% (152/210) were either CTAS 1 or 2, which is considered a high acuity patient in the ED setting. CTAS, Canadian Triage Assessment Score; ED, emergency department; USGPIV, ultrasound-guided peripheral intravenous.

consisted of indications and contraindications of USGPIV insertions, correct identification of the vein utilizing ultrasound, the equipment required, a technique for dynamic visualization with ultrasound during PIV cannulation, common pitfalls, and demonstration of the technique. Participants were tested on their knowledge throughout the module. This was followed by 2 4-hour hands-on practical sessions with the vascular access clinical educator. In the first session, participants engaged in didactic learning and practice simulation, which included an orientation to the ultrasound machine and hands-on instruction using a simulation ultrasound vascular access model. After successfully completing 5 USGPIV insertions on the simulator, the participants moved on to supervised clinical training on real patients. Within the 2 4-hour sessions, participants had to attain at least 10 successful USGPIV insertions and competencies attained via a checklist (Table 1). Just-in-time feedback on technique and troubleshooting strategies was provided during these hands-on sessions.

DATA COLLECTION AND ANALYSIS

Study data were collected and managed using Research Electronic Data Capture (REDCap) hosted on the hospital database. REDCap is a secure, web-based application designed to support data capture for research studies.[15,16] For each USGPIV insertion attempt, a REDcap survey was completed. The operator, date, time, and Canadian Triage Assessment Score (CTAS) were collected. Further, to ascertain whether the USGPIV may be difficult or not, 3 variables were collected. This included (1) it was known that the patient had a history of difficult PIV access, (2) the determination of the DIVA score, which was calculated using the 4 parameters of visibility, palpability, age, and prematurity (Table 2),[2] and (3) if there was a need to call the vascular access team for assistance. With respect to the DIVA score, a score of 4 or more was deemed to be "difficult," as these patients are 50%

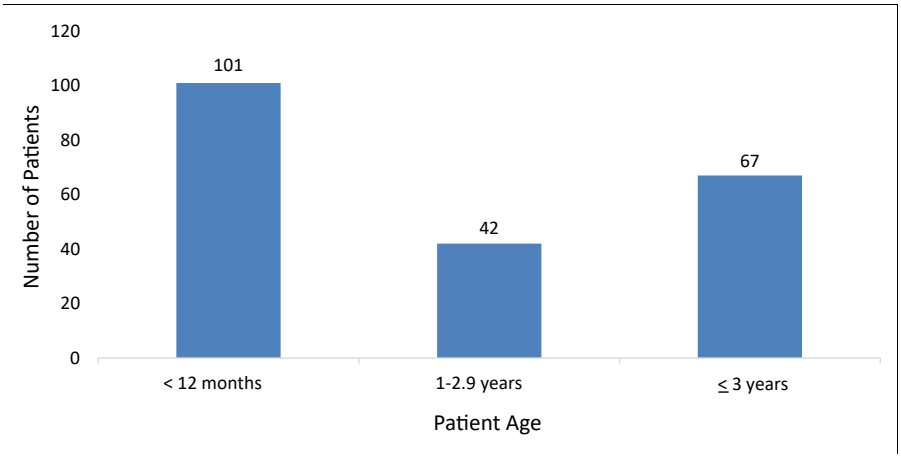

FIGURE 2

The age of the patients undergoing USGPIV attempts. Patients were categorized as being <12 months of age, 1 to 2.9 years and ≥3 years. The total number of patients in each category is shown as a number above each of the bars in the bar graph. 48% (101/210) of USGPIVs were attempted in patients less than 1 year of age. USGPIV, ultrasound-guided peripheral intravenous.

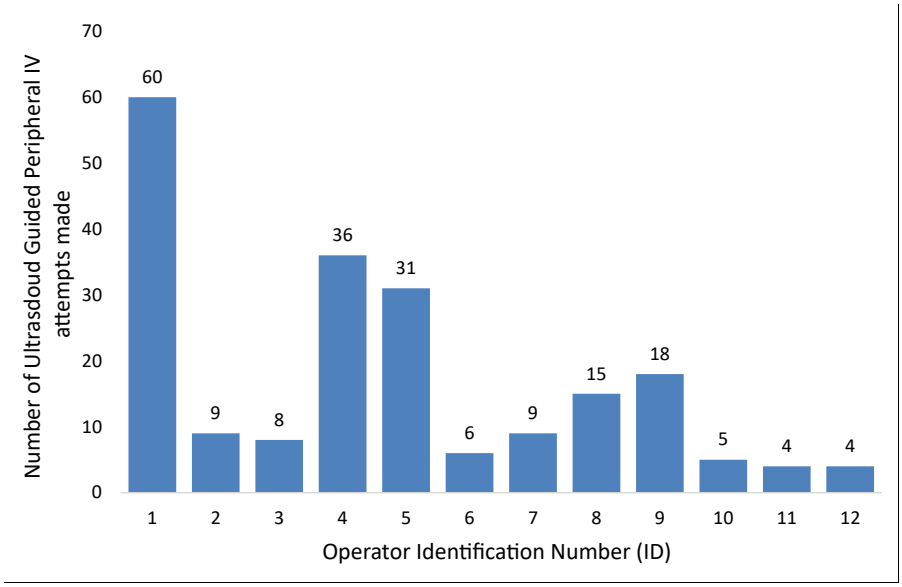

FIGURE 3

Operator distribution. The number of USGPIV attempts done by each operator. Operators are deidentified and listed as numbers from 1 to 12, representing the 12 participants in the pilot study. Operator data was missing for 5 of the entries, so the total USGPIV attempts recorded by operator was 205. 61.9% (127/205) of USGPIV attempts were done by operators 1, 4, and 5. USGPIV, ultrasound-guided peripheral intravenous.

more likely to have a failed PIV placement on first attempt.[2] For outcome measures, the total number of PIV attempts without ultrasound was recorded, as well as the total number of USGPIV attempts. The mechanism in which the PIV was successfully attained (with ultrasound vs without) was documented. The time to successful PIV was recorded. Finally, data on the total number of calls made to the vascular access team from the emergency department were recorded monthly.

Results

DESCRIPTIVE STATISTICS

A total of 213 USGPIV was recorded over the 9-month period. Three of the USGPIV attempts were excluded from the study due to missing data ($n = 210$). Of the 210 records, 5 records were missing data on the operator ID only. These were included in the analyses; however, for all data pertaining to the operator(s), an n of 205 was utilized for the analysis. The vast majority of USGPIV attempts, 72.3% (152/210), were done in high acuity patients (CTAS 1 and 2) (Figure 1). These patients are more likely to require the administration of medications or fluids during resuscitative efforts. Figure 2 shows categorical data of the patient's age. Patients were categorized as being <12 months of age, 1 to 2.9 years and, 3 years, with 48% (101/210) of USGPIVs attempted in patients less than one year of age. The majority of USGPIV insertions were attempted by 3 nurses, 62% (127/205) (Figure 3). For 5 of the USGPIV attempts made, the operator was not recorded, so these were excluded for the operator data only ($n = 205$). The majority of USGPIV insertion attempts were done during the day (0800-1700), 44.2% (93/210), followed by the evening (1700-2400), with 34.8% (73/210) attempts made. The lowest number of USGPIV insertions were attempted overnight (2400-0800), 21% (44/210) (Figure 4).

DIFFICULT IV ACCESS

Patients were asked, either on history or based on the chart review prior to USGPIV insertion attempt, whether they had known DIVA. Of the 210 attempts, 65.2% (137/210) of patients who received a USGPIV had known difficult access (Figure 5). The frequency of DIVA scores for USGPIV attempts is shown in Figure 6. A total of 89.5 % (188/210) patients had a DIVA score of ≥4 (considered difficult access). The mean DIVA score for the patients in which USGPIVs were attempted is shown in Table 3 (mean 4.78 [95% confidence interval, 4.55-5.01]).

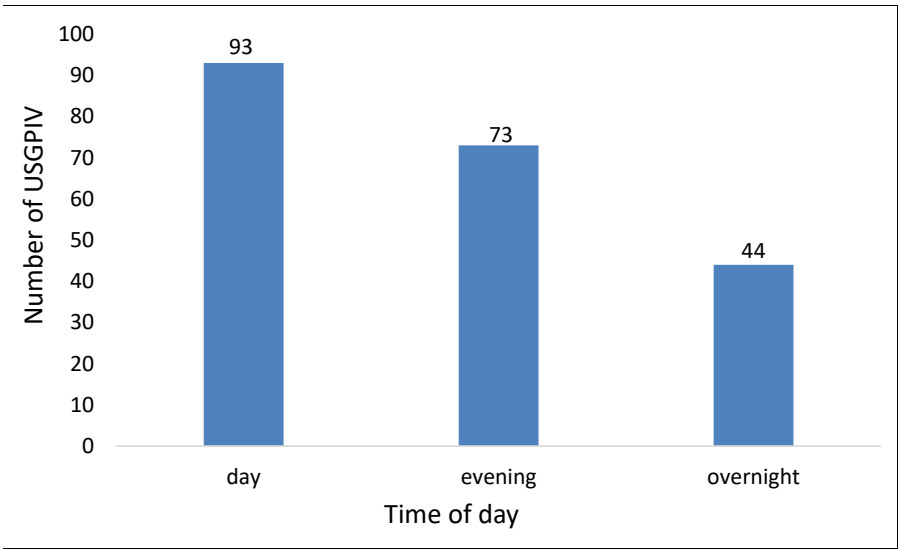

FIGURE 4

Number of USGPIVs attempted by time of day. The majority of USGPIV attempts were made during daytime hours, and the least amount was attempted overnight. Daytime hours were 800-1700, evening hours were 1700-2400, and overnight was defined as 2400-0800. USGPIV, ultrasound-guided peripheral intravenous.

OUTCOMES

A total of 193 out of 210 (91.9 %) of USGPIVs were attained successfully. Two of the PIVs that were attempted initially with ultrasound were not successful and were subsequently attained without ultrasound. On the first attempt, 86.5% (167/193) USGPIVs were attained, and 98.96% (191/193) were attained within the first 2 attempts (Figure 7). Figure 8 shows the total number of PIV attempts per patient using both ultrasounds (green) and without ultrasound (blue).

Only 21/210 (9.8%) of the USPIV attempts ended in a call to the vascular access team for assistance (Table 4.) However, there was not a significant reduction in the calls made from the ED to the vascular access team for assistance with PIV access in the ED over the period of the study (Table 5).

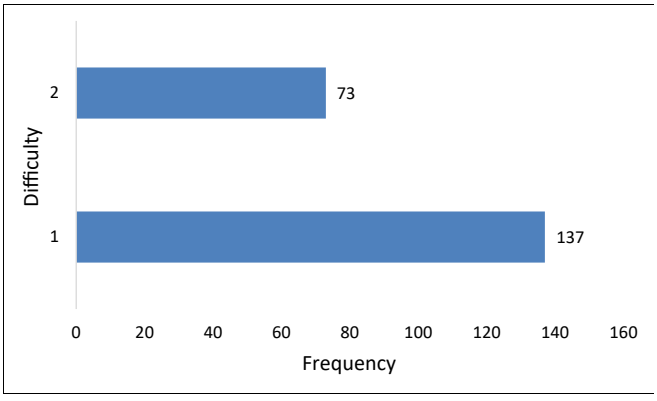

FIGURE 5

History of known difficult IV access. The frequency of known difficult PIV access for patients who underwent USGPIV is based on history either attained from the parents or the patient's chart. 65.2% (137/210) patients in which USGPIV insertion was attempted had a known history of difficult IV access. The total number of attempts in each category is shown as a number above the bar in the bar graph. IV, intravenous; PIV, peripheral intravenous; USGPIV, ultrasound-guided peripheral intravenous.

Discussion

In this pilot study, we show that a USGPIV training program consisting of an iLearn, in-class learning with simulation and supervised clinical training with a vascular access instructor can lead to the successful implementation of USGPIVs in a tertiary care pediatric emergency department.

Use of ultrasound for PIV insertion had a high first-pass insertion rate, with 86.5% of PIVs being attained successfully on the first attempt. Studies on nonultrasound methods for attaining vascular access show success rates that vary between 38.9% to 75%,[1-4] this was a high first pass success rate. Further, in our pilot, we found that USGPIVs were particularly useful in patients with high DIVA scores. When encountering a failed PIV insertion, our institution has an intravenous (IV) escalation pathway

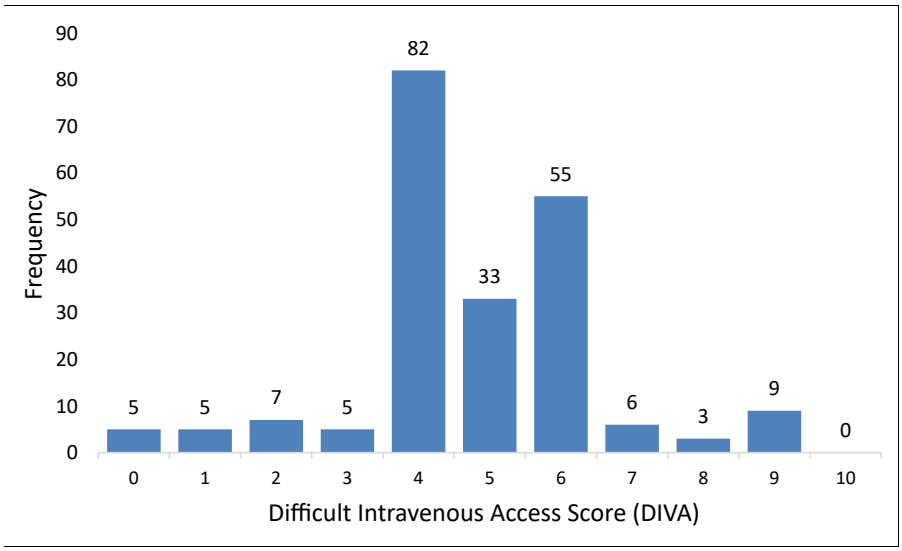

FIGURE 6

Difficult Intravenous Access (DIVA) score for ultrasound-guided peripheral intravenous access (USGPIV) attempts. Frequency of the DIVA scores of the 210 USGPIV attempts made in the ED. 89.5% (188/210) patients had difficult IV access, as predicted by a DIVA score of ≥4. DIVA, difficult intravenous access; IV, intravenous; USGPIV, ultrasound-guided peripheral intravenous.

that first involves the vascular access team and then escalates to anesthesia consultation and finally to interventional radiology consultation. This process results in multiple painful PIV attempts, delayed PIV access, and an increased strain on resources. Our study, showing a high success rate (86.5% first attempt success rate and 98.96% were attained in the first 2 attempts) with patients with DIVA supports (mean 4.78, 95% confidence interval [4.55-5.01]), demonstrates the benefit of incorporating USGPIV insertion into the IV escalation pathway as the standard of care for patients with known DIVA.

Some challenges in our project were the result of staffing turnover and the use of experienced nurses for nonbedside roles such as triage. While USGPIV training was enthusiastically completed, ongoing USGPIV usage during

TABLE 3

Mean DIVA score, SD, and confidence interval for USGPIV attempts

DIVA score	
Mean	4.78
Standard error	0.12
SD	1.71
Total	213
Confidence level (95.0%)	0.23
95% CI (upper)	5.01
95% CI (lower)	4.55

CI, confidence interval; DIVA, difficult intravenous access; USGPIV, ultrasound-guided peripheral intravenous.

The mean DIVA score was found to be 4.78 (95% CI 4.55-5.01) with a standard error of 0.12 for the 210 USGPIV attempts in this study.

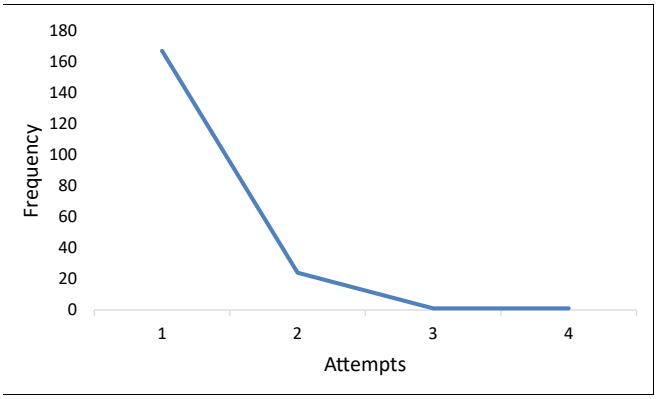

FIGURE 7

Number of Attempts. The frequency of the number of USGPIV attempts made to successfully attain a PIV is shown. 86.5% (167/193) of USGPIVs were attained successfully on the first attempt, while 98.9% (191/193) of USGPIVs were attained successfully on the first 2 attempts. PIV, peripheral intravenous; USGPIV, ultrasound-guided peripheral intravenous,

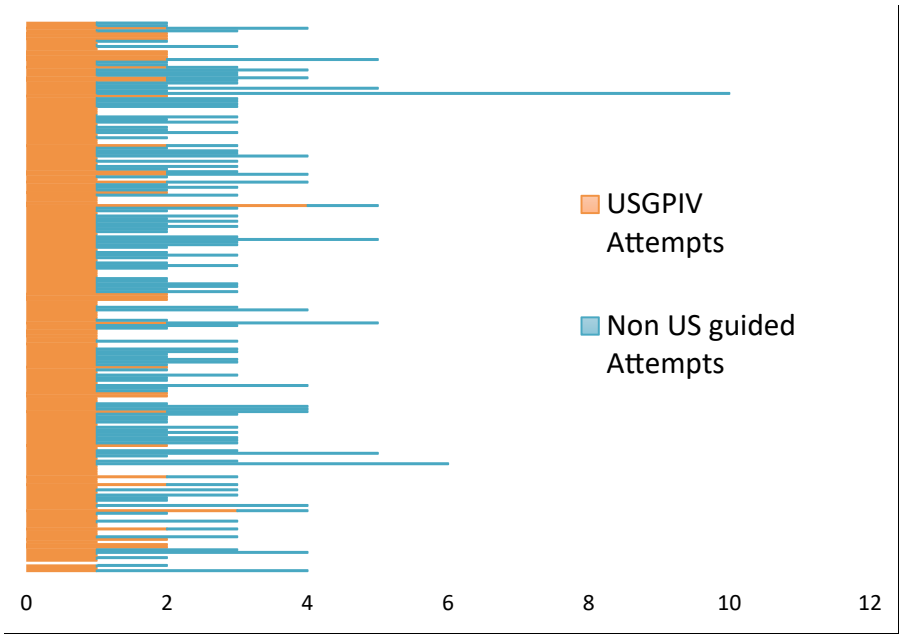

FIGURE 8

Total number of PIV attempts by method. Each bar represents 1 of the 210 peripheral IV insertions attempted. The ultrasound-guided peripheral intravenous access (USGPIV) attempts are shown in orange, and the non-ultrasound-guided peripheral intravenous access attempts are shown in blue. IV, intravenous; PIV, peripheral intravenous; USGPIV, ultrasound-guided peripheral intravenous.

the pilot project time frame was limited for many participants due to these competing factors. Moving forward, skill retention will be a key priority for us to address, as we hope to scale up our training while providing opportunities for the original pilot project, USGPIV nurses, to maintain their ultrasound skills.

USGPIV training programs have been shown to improve confidence in attaining USGPIVs[17] and improve first-attempt cannulations.[18] Various studies have also addressed the experience required to obtain competence with USGPIVs in children. A recent study found that to achieve a 70% probability of attaining a USGPIV successfully, participants had to complete 9 USGPIV attempts after a 2-hour training session.[19] An adult study found that for a 70% success rate for USGPIVs, new learners needed to place 4 USGPIVs; however, a success rate of 88% or

TABLE 4

Calls were made to the vascular access team for assistance in the ED for the 210 USGPIV attempts through the standard IV escalation pathway

Need to activate IV team	Frequency
No	189
Yes	19
Unknown	2
Total	210

IV, intravenous; USGPIV, ultrasound-guided peripheral intravenous.

TABLE 5

Calls avoided by the vascular access team to the ED are collected on a monthly basis

Month	Calls avoided
April 2021	24
May 2021	39
June 2021	49
July 2021	33
August 2021	37
September 2021	49
October 2021	35
November 2021	29
December 2021	27
January 2022	16

There was no reduction to the calls made to the vascular access team over the study period. ED, emergency department.

more required 15 to 26 attempts.[20] In our study, participants placed 10 USGPIVs under supervision prior to attaining competency. The success rate of USGPIVs in our sample was quite high (91.9%) compared to the 70% cited in the literature required to obtain competency. This high success rate was likely multifactorial; the majority of the USGPIVs placed in the study were done by a single provider who had gained proficiency in the skill. Moreover, the nurses selected to participate in the training program were senior nurses with expertise in vascular access and were not classified as novices.

Limitations

This study was limited to a single center, which may affect generalizability to other providers or centers. As the study took place during the time of the coronavirus disease pandemic with significant staff turnover, many of the senior nurses that were USGPIV trained were providing care outside of patient care areas (ie, triage) and were therefore not available to do USGPIVs. As this was a pilot study consisting of only 12 nurses, we did not see a significant decrease in the need to call the vascular access team or escalate further up the IV escalation pathway. As more nurses receive training and become competent in USGPIVs, we hypothesize that the vascular access team will be required less in the emergency department. Future studies will evaluate the impact of USGPIVs on patient care in the pediatric emergency department.

Implications for Emergency Nurses

Implementing a comprehensive training program for USGPIV in a pediatric emergency department requires longitudinal support and clinical and educational expertise, as well as support from ED leadership to facilitate the necessary training and support. Training our nurses in USGPIV insertion led to seamless, timely, and expert care that benefited our patients. It was also a strengths-based approach, building capacity from within our team by empowering nurses to provide this challenging care. While not directly measured by the project, participant feedback tells us that the development of new, high-yield skills such as USGPIV in experienced nurses can lead to greater job satisfaction and encourage further skill development within the emergency department. Consideration should be made to introducing a USGPIV training program in all pediatric emergency departments.

Conclusion

In our pilot project, we found that the use of a comprehensive training program for attaining USGPIVs in a pediatric tertiary care center for emergency nurses leads to a high first-pass success rate. In this study, the USGPIV training program facilitated vascular access in patients with known difficult access through history or high DIVA scores. Consideration should be made to implement USGPIV training programs to improve pediatric vascular access in the emergency department.

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.2023.05.007.

REFERENCES

1. Lininger RA. Pediatric peripheral i.v. insertion success rates. *Pediatr Nurs*. 2003;29(5):351-354.
2. Yen K, Riegert A, Gorelick MH. Derivation of the DIVA score: a clinical prediction rule for the identification of children with difficult intravenous access. *Pediatr Emerg Care*. 2008;24(3):143-147. https://doi.org/10.1097/PEC.0b013e3181666f32
3. Stolz LA, Stolz U, Howe C, Farrell IJ, Adhikari S. Ultrasound-guided peripheral venous access: a meta-analysis and systematic review. *J Vasc Access*. 2015;16(4):321-326. https://doi.org/10.5301/jva.5000346
4. de Freitas Floriano CM, Machado Avelar AF, Sorgini Peterlini MA. Difficulties related to peripheral intravenous access in children in an emergency room. *J Infus Nurs*. 2018;41(1):66-72. https://doi.org/10.1097/NAN.0000000000000262
5. Heinrichs J, Fritze Z, Vandermeer B, Klassen T, Curtis S. Ultrasonographically guided peripheral intravenous cannulation of children and adults: a systematic review and meta-analysis. *Ann Emerg Med*. 2013;61(4):444-454.e1. https://doi.org/10.1016/j.annemergmed.2012.11.014
6. Berlanga-Macias C, Diez-Fernandez A, Martinez-Hortelano JA, et al. Ultrasound-guided versus traditional method for peripheral venous access: an umbrella review. *BMC Nurs*. 2022;21(1):307. https://doi.org/10.1186/s12912-022-01077-9
7. Fung CM, Stayer DR, Terrasi JJ, et al. Extended dwell and standard ultrasound guided peripheral intravenous catheters: comparison of durability and reliability. *Am J Emerg Med*. 2021;47:267-273. https://doi.org/10.1016/j.ajem.2021.05.005
8. Kleidon TM, Schults J, Paterson R, Rickard CM, Ullman AJ. Comparison of ultrasound-guided peripheral intravenous catheter insertion with

landmark technique in paediatric patients: a systematic review and meta-analysis. *J Paediatr Child Health*. 2022;58(6):953-961. https://doi.org/10.1111/jpc.15985

9. Aouad-Maroun M, Raphael CK, Sayyid SK, Farah F, Akl EA. Ultrasound-guided arterial cannulation for paediatrics. *Cochrane Database Syst Rev*. 2016;9(9):CD011364. https://doi.org/10.1002/14651858.CD011364.pub2
10. Vinograd AM, Chen AE, Woodford AL, et al. Ultrasonographic guidance to improve first-attempt success in children with predicted difficult intravenous access in the emergency department: a randomized controlled trial. *Ann Emerg Med*. 2019;74(1):19-27. https://doi.org/10.1016/j.annemergmed.2019.02.019
11. Feinsmith S, Huebinger R, Pitts M, Baran E, Haas S. Outcomes of a simplified ultrasound-guided intravenous training course for emergency nurses. *J Emerg Nurs*. 2018;44(2):169-175.e2. https://doi.org/10.1016/j.jen.2017.10.001
12. Ballard HA, Tsao M, Robles A, et al. Use of a simulation-based mastery learning curriculum to improve ultrasound-guided vascular access skills of pediatric anesthesiologists. *Pediatr Anesth*. 2020;30(11):1204-1210. https://doi.org/10.1111/pan.13953
13. Briggs CV, Smith-Steinert R, Bakis M. Continuing education for the certified registered nurse anesthetist: ultrasound-guided peripheral intravenous access. *J Contin Educ Nurs*. 2021;52(10):489-492. https://doi.org/10.3928/00220124-20210913-09
14. Calcutt T, Brady R, Liew K. Paediatric ultrasound-guided vascular access: experiences and outcomes from an emergency department educational intervention. *J Paediatr Child Health*. 2021;58(5):830-835. https://doi.org/10.1111/jpc.15848
15. Harris PA, Taylor R, Minor BL, et al. The REDCap consortium: building an international community of software platform partners. *J Biomed Inform*. 2019;95:103208. https://doi.org/10.1016/j.jbi.2019.103208
16. Harris PA, Taylor R, Thielke R, Payne J, Gonzalez N, Conde JG. Research Electronic Data Capture (REDCap)–a metadata-driven methodology and workflow process for providing translational research informatics support. *J Biomed Inform*. 2009;42(2):377-381. https://doi.org/10.1016/j.jbi.2008.08.010
17. Spencer TR, Bardin-Spencer AJ. Pre- and post-review of a standardized ultrasound-guided central venous catheterization curriculum evaluating procedural skills acquisition and clinician confidence. *J Vasc Access*. 2020;21(4):440-448. https://doi.org/10.1177/1129729819882602
18. Wagner M, Hauser K, Cardona F, et al. Implementation and evaluation of training for ultrasound-guided vascular access to small vessels using a low-cost cadaver model. *Pediatr Crit Care Med*. 2018;19(11):e611-e617. https://doi.org/10.1097/PCC.0000000000001721
19. Anderson AP, Taroc AM, Wang X, Beardsley E, Solari P, Klein EJ. Ultrasound guided peripheral IV placement: an observational study of the learning curve in pediatric patients. *J Vasc Access*. 2021;23(2):250-256. https://doi.org/10.1177/1129729820987958
20. Stolz LA, Cappa AR, Minckler MR, et al. Prospective evaluation of the learning curve for ultrasound-guided peripheral intravenous catheter placement. *J Vasc Access*. 2016;17(4):366-370. https://doi.org/10.5301/jva.5000574

"Feeling Like an Island": Perceptions of Professional Isolation Among Emergency Nurses

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Contribution to Emergency Nursing Practice

- Professional isolation is a multidimensional concept expressed as a deficiency in one's network of social relations at work. It is claimed to have a potential for negative implications on nurses in their specialized departments, especially those who are working in the emergency departments of low-resource environments.
- This paper provides qualitative data describing the perceptions of professional isolation among emergency nurses working in a low-resource environment; it explains the mechanisms that could be used as an intervention for managing professional isolation.
- This paper further sustains the impression that communities of practice may have a significant role in addressing professional isolation among emergency nurses working in low-resource environments.

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Abstract

Introduction: Professional isolation, feelings of being isolated from one's professional peers and lacking mentoring and opportunities for professional interaction, collaboration, and development, is a challenge for workers across the labor market. The notion of professional isolation is particularly prevalent in low-resource health care settings and is common among emergency nurses.

Methods: This study explored the perceptions of professional isolation among emergency nurses working in a low-resource environment using individual interviews with 13 participants in 5 settings in Lesotho.

Results: The data were analyzed using qualitative content analysis and revealed an overarching theme of "feeling like an island" containing 3 categories, namely lack of interprofessional collaboration and consultation, skills mismatch, and enforced loneliness.

Discussion: This study suggests that lack of interprofessional collaboration and consultation, skills mismatch, and enforced loneliness have influenced feelings of professional isolation among emergency nurses working in low-resource environments. The findings of this research lend support to the idea that communities of practice may have a potential impact in addressing professional isolation.

Key words: Low-resource environments; Low-resource settings; Professional isolation; Emergency nurses; Lack of interprofessional collaboration and consultation; Skills mismatch; Enforced loneliness

Introduction

The emergency department is characterized by unpredictable arrival of patients, uncontrolled and unpredictable workload, time-sensitive highly stressful decisions often

being made under intense pressure, and interventions being required with sometimes incomplete information about the patient.[1] These circumstances render the emergency department a complex, challenging, and dynamic environment that requires highly skilled personnel and collaborative decision making.[2] This unique environment can potentially expose the employees to feelings of professional isolation due to limited interaction.[3,4]

Professional isolation is defined by the Services for Australian Rural and Remote Allied Health (2018) as a sense of isolation from professional peers and lack of mentoring and opportunities for professional interaction, collaboration, and development. It is a multidimensional concept that may be geographic (a distance between), social (a lack of contact), or ideological (being a social outcast) and has the potential to cause a series of adverse effects in the workplace.[5,6] A cross-sectional survey conducted in Turkey with a sample of 138 nurses revealed that the impact of professional isolation is confined not only to job performance and job satisfaction but has the potential to impact an individual's health.[7] According to Williams et al,[8] professional isolation is an emergent dynamic health epidemic with significant consequences including severe physical health problems comparable with smoking 15 cigarettes a day.[9]

Professional isolation has primarily been studied in developed countries such as Australia, the United Kingdom, and the United States[5,10]; however, it has been suggested that professional isolation is more common among health professionals deployed in low-resource environments.[11] A low-resource environment is an environment with marginalized access to clinical information and decision support, varied availability of specialty consultation, and hindered interaction with colleagues.[12] Nurses, being the largest and possibly the most valuable resource of the health care industry,[13] are reported to be the most common group of health professionals to experience professional isolation.[7,14] Nurses, particularly those working in low-resource environments, might also be more likely to work alone with fewer opportunities for interprofessional contact and collaboration.[15] Moreover, Sekhon and Srivastava[16] affirm that working in the emergency departments of a low-resource environment can potentially expose nurses to feelings of professional isolation. However, Kutoane et al[17] suggest that mentorship and continuous professional development programs through communities of practice could provide a mechanism to reduce or manage professional isolation.

Emergency nursing is a unique and evolving specialty in Sub-Saharan Africa,[18] supporting the care of individuals of all ages with perceived or actual physical or emotional alterations in health that are undiagnosed or require further interventions and are unstable, often presenting unexpectedly.[19] These interventions are common to many nursing specialities, the key difference being that emergency nurses integrate knowledge, skills, abilities, and judgment to appropriately manage patients when a diagnosis has not yet been made nor the cause of the problem known.[20] In addition, the complexity of the specialty requires emergency nurses to exercise a broader range of complex clinical skill sets to engage in constant interaction with other colleagues, and intensive mentorship from supervisors is needed to function effectively.[2] As Sahai et al[21] indicated, to do otherwise risks professional isolation and the mere nature of specific professions, for example, teachers, auditors, and nurses, means that working in marginalized groups predisposes employees to professional isolation.

In Sub-Saharan Africa, many health care challenges exist, including immense disease burdens and fragile health care systems exacerbated by extreme poverty, underdevelopment, conflict, and political instabilities.[22] Furthermore, the region is characterized by inadequate distribution of resources and communication deficiencies including transportation and general infrastructure deficits, including lack of a comprehensive approach to emergency care.[1] According to Dreher-Hummel et al[4] and Holst et al,[22] these challenges further limit collaborative efforts to share expertise, build professional relationships, and reflect on professional practice.

The health care system in Lesotho is influenced by the nation's health care challenges including HIV/AIDS, tuberculosis, poverty, and its rugged mountainous geographic layout.[23] There is no formal training toward the specialty of emergency nursing, but like assertions made by Brysiewicz et al,[15] nurses are usually the first and may be the only point of care for patients in the emergency department. According to the National Emergency Nurses Association,[20] emergency nurses face challenges while also being required to possess a broader range of clinical skill sets to function effectively in the atmosphere of unpredictability and uncertainty, and in performing the process of decision making, they frequently find themselves without sufficient staff or adequate training to meet the patient's needs. The practice environment in this country may predispose health care workers, particularly the scarce emergency nurses, to high levels of professional isolation that have the potential to lower their standard of practice.

This study aimed to explore and describe the perceptions of professional isolation among emergency nurses working in a low-resource environment and initially asked the participants to explain what professional isolation meant to them and whether they felt they experienced professional isolation. Further probing questions asked them to describe what factors (if any) they felt contributed to their

professional isolation, how it had affected their clinical practice, and what strategies they believed could be used to manage their professional isolation.

Methods

STUDY DESIGN AND APPROACH

This qualitative descriptive study was part of a larger action research, developing an intervention to manage professional isolation among emergency nurses working in low-resource environments. This qualitative descriptive approach was underpinned by the emancipatory nursing praxis model[24] that informed the questions on the interview guide, thereby guiding the data collection and analysis of the study. The qualitative method provided an opportunity for authentic descriptions of the perceptions of professional isolation among emergency nurses working in low-resource environments.[25]

STUDY SETTING AND PARTICIPANTS

The settings for data collection were 5 hospitals in the northern and central regions of Lesotho that had emergency departments. These hospitals included:

- One government tertiary-level hospital (initially a public-private partnership) (The facility is the only national referral hospital with a total of 425 beds and an ED staff complement of 17 emergency nurses across different shifts.)
- Two state-funded hospitals, 1 regional hospital with a total of 200 beds and an ED staff complement of 3 nurses, and 1 district hospital with a total of 128 beds and an ED staff complement of 2 nurses
- One Christian Health Association of Lesotho hospital (primary level) with a total of 150 beds and emergency department staffed by 2 nurses
- One privately funded hospital with a total of 40 staff and an emergency department staffed by 1 nurse

These settings provide emergency care services to communities in the rural and urban areas of the northern and central regions of Lesotho. The 5 hospitals were chosen as the research contexts on the basis that they provide a representative reflection of the population diversity of the target population. The participants were selected through purposeful sampling.[26] Inclusion criteria comprised nurses registered with the Lesotho Nursing Council (either a diploma or degree in nursing), currently working in the emergency departments of the research settings. Nurses, with or without additional emergency nursing training, were included if they had at least 3 months of work experience in any of these emergency departments.

DATA COLLECTION

This qualitative study was based on individual interviews conducted with 13 emergency nurses from 5 different settings in Lesotho over 6 months (August 2020 to February 2021). Initially, 4 face-to-face interviews were conducted in the emergency departments at the convenience of the participants. Due to the coronavirus disease 2019 (COVID-19) pandemic restrictions, the researcher then switched to telephonic data collection for 5 participants, and as COVID-19 restrictions eased, 3 more participants were interviewed face-to-face. A semistructured interview guide was used to explore the emergency nurses' perceptions of professional isolation. Each face-to-face interview was approximately 30 to 70 minutes whereas each telephonic interview was 20 to 45 minutes long; all conducted at a time and venue deemed suitable by the participants. Most telephonic interviews tended to be of shorter duration, possibly affected by difficulties in building rapport while being unable to see each other, the calls potentially interrupting the participants social/home life, and the loss of contextual and nonverbal data. For data assurance purposes, all interviews were conducted in English, audio recorded, transcribed verbatim each day, and complemented with the field notes by the researcher (M.K.). To ensure the data emerging from the semistructured interviews were appropriate to the research questions, dependable, and reliable, a semistructured interview schedule was developed to allow the interviewer to ask pre-established questions and an opportunity for probing questions, allowing supplementary interrogation of data emerging from responses and reactions of the participants.[27] After 13 participants had been interviewed and the data analysis completed, the research team jointly determined that no new categories were emerging and that data redundancy had been reached.[28]

DATA ANALYSIS

Data were analyzed using an inductive qualitative content analysis method.[29,30] All interviews were recorded, transcribed verbatim, and read and re-read to make sense of the data as a whole. Attention was given to both manifest

TABLE
Example of content analysis coding and categorization

Meaning unit	Condensation	Coding	Categories
"When someone is specializing in a particular field, then is working in a different environment that does not do anything to do with what he/she is specializing in."	Different environment—nothing to do with what he/she is specializing in	Misallocated	Skills mismatch
"So, if I interact with that person, I would have a clearer understanding of what I should expect after giving a patient a particular drug rather than relying on my knowledge."	Interacting with a person…should give a clearer understanding	Interprofessional collaboration	Lack of interprofessional collaboration and consultation
"I might have the knowledge and other colleagues might not have the same knowledge and in return, you find I am on my own, I have no one to share with, and I am actually lonely."	I am on my own….I am actually lonely	Lonely	Enforced loneliness

and latent content.[30] Subsequently, the text was manually divided into meaning units and then condensed to reveal the central meaning and code assigned for each meaning unit. Similar codes were then combined into categories. Codes and categories were discussed and critiqued by all 3 authors until a consensus was reached (see Table); variation between participants was also considered, and categories were then finally grouped into an overarching theme.[29]

RIGOR

Establishing rigor in qualitative research is significant to enable research findings to have integrity and impact.[31] In this study, rigor was achieved through credibility, transferability, dependability, and confirmability criteria. The credibility was enhanced through the audio-tape recordings of the interviews to depict the exact words of the respondents that were captured.[32] The researcher had a professional relationship with some of the participants (4) and had to build trust and rapport with the remainder by spending 6 months collecting the data.[32] Moreover, 3 authors independently analyzed the data (recorded interviews and transcripts) and then compared and discussed the results to safeguard against the risk of bias in the interpretation of data. Transferability was achieved through a detailed description of the participants, study context, research procedures, and the provision of quotes from the interviews to enrich findings and allow the reader to determine whether the findings were transferable to their setting.[33,34] Dependability was achieved through peer debriefing with the 2 experienced qualitative researchers (P.B. and T.S.) to confirm categories and the theme.[32,33] Confirmability was achieved by validating audio recorded and transcribed transcripts against categories and themes through constant comparison.[35] Reflexivity, which included researchers' critical reflections examining biases, preconceptions, and research relationships, was used to promote confirmability.[36]

ETHICAL CONSIDERATIONS

Ethical approval was obtained from the university ethics committee (reference: HSS/0051/019D), the Ministry of Health of the Government of Lesotho (Reference: ID 189-2019), and permission from the respective hospitals included in the study. The researcher provided the participants with an information sheet to explain the nature of the study and what was requested of them. Participants gave a written informed consent and a telephonic consent (for telephonic interviews) to participate in the research and for their interviews to be recorded. Participants were informed of their right to refuse to participate or to withdraw from the study at any time. All data were securely

stored in the researcher's computer protected by fingerprint password and treated as confidential, only accessible to the research team.

Results

DEMOGRAPHIC CHARACTERISTICS

The sample comprised 4 men and 9 women, aged between 23 years and 45 years of age (mean age of 34 years). The participants' experience in emergency departments ranged from 6 months to 21 years, and they had completed diplomas (n = 5), bachelor's degrees (n = 3), or postgraduate studies (n = 5) in nursing, and 5 had just enrolled in an adult nursing postgraduate program that entailed an emergency nursing component.

The data analysis revealed the overarching theme: "feeling like an island" with 3 categories, namely lack of interprofessional collaboration and consultation, skills mismatch and decay, and enforced loneliness.

FEELING LIKE AN ISLAND

Comparable with an island, a piece of detached land surrounded by water and therefore unreachable, the participants described themselves as being alone and emotionally and professionally distant and having a sense of solitude, while at the same time being surrounded by other health care professionals outside of emergency care. This theme includes 3 categories described below and is supported with participant quotes, where [Px] refers to the participant number.

LACK OF INTERPROFESSIONAL COLLABORATION AND CONSULTATION

Participants explained how they experienced a lack of collaboration and interaction with other health professionals. One participant described this situation as being "when a person with special skills…but [is] working alone and has no one to share work challenges with or there is no one providing professional support if needed." (P9)

This was a challenge and created difficulties for the participants as explained by the following quotation:

> "Sometimes you want to confirm with someone who understands better or has higher knowledge, or sometimes you wish to refer because you are stuck." (P5)

One other participant continued,

> "I think mainly [the] lack of interaction contributes to our professional isolation you know…. I do not know how it comes about, but you find that there is [a] demarcation line between [emergency nurses] and other nurses." (P7)

SKILLS MISMATCH AND DECAY

Participants explained how they were often allocated in departments outside of the emergency department that do not match their skill set, thus making them feel different from other staff members there, finding it difficult to fit in, and not being able to use their skills because the rest of the team say it is not necessary. A participant explained,

> "When someone is specializing in a certain field, then is working in a different environment that does not do [have] anything to do with what they are specializing in…..they end [up] losing their skills." (P1)

One participant further explained that the mismatch of skills to job roles leads to the decay of their skills.

> "When an individual with certain skills…but now this person is not using his skills, they die away." (P2)

Another participant agreed;

> "You are going to work in a rural area where there are not many emergencies or surgeries done, you end up having less exposure, and your skills may disappear." (P9)

ENFORCED LONELINESS

Participants expressed an invisible but pervasive barrier that segregated them from other nurses because of their advanced knowledge and skills, consequently rendering them emotionally distant and thus resulting in feelings of solitude;

> "We have developed certain skills which are lacking [in] other cadres of nursing. Our knowledge level is not equal, so, because of these skills and knowledge which are more advanced compared to other nurses, we feel isolated because others may not fully understand how we do certain things." (P4)

Another participant explained that the emotional distance that leads to loneliness may also be linked to the

remoteness of the emergency departments where the emergency nurses are deployed;

> "Remoteness in the sense that there are few people who are actually experts in trauma and emergency care, moreover, the facilities themselves are usually remote from the rest of the hospital…they are isolated." (P9)

Some participants related their loneliness to lack of contact because of geographic location where they find themselves being far away from their colleagues;

> "Being far away from the people that I can discuss, my concerns regarding whatever we are doing. The people that I can discuss issues about our daily practice are far away and I am not able to contact them, or they are not able to contact me." (P12)

Discussion

This study contributes to the extremely limited literature on professional isolation among health professionals and specifically emergency nurses. The current literature on professional isolation focuses on other professions[17] and multiple disciplines of health care professionals, for example, doctors and nurses[37] or pharmacists and other health care teams.[38] By exploring the perceptions of professional isolation among emergency nurses working in low-resource environments, the results of this study may strengthen the understanding of professional isolation among emergency nurses, its origins, and the possible coping strategies.

The results of this study highlight that emergency nurses linked their professional isolation to a lack of interprofessional collaboration and consultation. They expressed that they felt disconnected from the rest of the health professionals; McLoughlin et al[39] suggest that improving the level of interaction among the nurses themselves or nurses with other health professionals may decrease the sense of professional isolation.

From the results of this study, emergency nurses described how they were often allocated in departments that did not match their skill set, with the result that their expert skills and knowledge of emergency nursing were not being used, thus ultimately leading to loss of their skills. This skills mismatch and decay created feelings of dissociation and lack of a sense of belonging among colleagues. In addition, a lack of professional support or mentorship contributed to their professional isolation. This finding is consistent with that of Comyn and Strietska-Ilina[40] in that the consequences of skills mismatch reach all levels of the labor market, including individuals, organizations, and nationals. Health care is reported to have the highest level of skills mismatch in the overall economy, especially nursing, which is an extremely fast-paced job with new challenges arising daily.[41,42] However, this concept has not been thoroughly explored in the health care sector, particularly among emergency nurses working in emergency departments of low-resource environments. This is a gap in the literature that requires systematic examination.

Similar to other findings,[5,6,10,43] this study has generated an understanding of the sources of professional isolation including geographic location (being in a remote or rural location), lack of opportunities for knowledge sharing, and lack of support or supervision. In this study, emergency nurses highlighted enforced loneliness as another barrier that isolated them from other nurses because of their advanced knowledge and skills that made them emotionally distant and lonely. The participants expressed that advanced knowledge and skills have the potential to create a communication barrier between the emergency nurses and other nurses, thus making them "feel like an island," whereas Aizenberg and Oplatka[5] acknowledged educational projects and professional development to be among various professional strategies that could be used to cope with feelings of professional isolation at work. Furthermore, Mwape et al[44] and Pimmer et al[43] suggested that participants with advanced knowledge and skills exhibited fewer feelings of professional isolation than their counterparts. Most importantly, the trajectory of professional isolation may be improved or changed less dramatically by encouraging employees to share knowledge, skills, experiences, and professional challenges.[45]

Therefore, these findings imply that professional support and mentorship, interaction, and interprofessional collaboration through a safe professional platform may potentially assist emergency nurses working in low-resource areas to address professional isolation. These findings were reinforced in the early work of Bonnici[46] who acknowledged that collaboration and networking are also essential in developing strategies that can help reduce professional isolation.

Limitations

This study had some limitations reflecting the limitations inherent to descriptive qualitative methodology including sampling, data collection methods, and transferability of

the findings. This study focused only on emergency nurses working in emergency departments that may limit the contexts for implications and application of the results. The restrictions of the COVID-19 pandemic had a significant limitation given that the interview method was changed to telephonic as opposed to face-to-face interviews. This increased data collection time and many of the participants were still overwhelmed, distracted, and stressed by the pandemic. Moreover, data collection was also affected by the nurses' strikes in 1 of the settings that had most participants; therefore, access to participants was limited, hence the delay in data collection.

Implications for Emergency Nurses

This research suggests that the nature of emergency departments, particularly in low-resource environments, often predisposes emergency nurses to feelings of professional isolation attributed to a lack of interprofessional collaboration and consultation, skills mismatch and decay, and enforced loneliness. An intervention or strategy for managing professional isolation among emergency nurses must be developed and implemented. In a health care system, emergency nurses are often at the forefront of patient care and many are the gatekeepers in the emergency departments and therefore are in a key position to use current research. Emergency nurses may use their education to develop hospital-wide policies on managing professional isolation and raise awareness among their colleagues on the subject.

Conclusion

The findings from this study suggest that lack of interprofessional collaboration and consultation, skills mismatch and decay, and enforced loneliness have influenced feelings of professional isolation among emergency nurses working in low-resource environments. The findings of this research lend support to the idea that communities of practice may have a potential impact in addressing professional isolation.

Author Disclosures

Conflicts of interest: none to report.

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REFERENCES

1. Kannan VC, Tenner A, Sawe HR, et al. Emergency care systems in Africa: a focus on quality. *Afr J Emerg Med*. 2020;10(Suppl 1):S65-S72. https://doi.org/10.1016/j.afjem.2020.04.010
2. Marsh RH, Rouhani SA. Gaps in physical access to emergency care in sub-Saharan Africa. *Lancet Glob Health*. 2018;6(3):e240-e241. https://doi.org/10.1016/s2214-109x(18)30026-3
3. Bekkink MO, Farrell SE, Takayesu JK. Interprofessional communication in the emergency department: residents' perceptions and implications for medical education. *Int J Med Educ*. 2018;9:262-270. https://doi.org/10.5116/ijme.5bb5.c111
4. Dreher-Hummel T, Nickel CH, Nicca D, Grossmann FF. The challenge of interprofessional collaboration in emergency department team triage-an interpretive description. *J Adv Nurs*. 2021;77(3):1368-1378. https://doi.org/10.1111/jan.14675
5. Aizenberg M, Oplatka I. From professional isolation to effective leadership: preschool teacher-directors' strategies of shared leadership and pedagogy. *Teach Teach*. 2019;25(8):994-1013. https://doi.org/10.1080/13540602.2019.1688287
6. Jung HS, Song MK, Yoon HH. The effects of workplace loneliness on work engagement and organizational commitment: moderating roles of leader-member exchange and coworker exchange. *Sustainability*. 2021;13(2):948. https://doi.org/10.3390/su13020948
7. Amarat M, Akbolat M, Unal O, Güneş Karakaya B. The mediating role of work alienation in the effect of workplace loneliness on nurses' performance. *J Nurs Manag*. 2019;27(3):553-559. https://doi.org/10.1111/jonm.12710
8. Williams CY, Townson AT, Kapur M, et al. Interventions to reduce social isolation and loneliness during COVID-19 physical distancing measures: a rapid systematic review. *PLOS ONE*. 2021;16(2):e0247139. https://doi.org/10.1371/journal.pone.0247139
9. Murthy V. Connecting at work: We're more connected than ever, but loneliness is epidemic. Work is part of the problem, now it is must be part of the solution. Harvard Business Review. Accessed March 21, 2022. https://hsc.unm.edu/school-of-medicine/education/assets/doc/wellness/murthy-loneliness.pdf
10. Arslan A, Yener S, Schermer JA. Predicting workplace loneliness in the nursing profession. *J Nurs Manag*. 2020;28(3):710-717. https://doi.org/10.1111/jonm.12987
11. Frey JJ. Professional loneliness and the loss of the doctors' dining room. *Ann Fam Med*. 2018;16(5):461-463. https://doi.org/10.1370/afm.2284
12. Hall B. *Reducing remote work isolation and loneliness* 2020. Accessed November 23, 2021. https://www.interactsoftware.com/blog/reducing-remote-work-isolation-and-loneliness/

13. Kennedy A. *The International Council of Nurses (ICN) shares its perspective on how nurses play a vital role in achieving universal health coverage;*. International Council of Nurses: Why Nurses Are so Important for UHC [blog]; 2019. Accessed January 15, 2019. https://www.uhc2030.org/news-and-events/news/partner-insights/international-council-of-nurses-why-nurses-are-so-important-for-uhc-555297/
14. Kupcewicz E, Mikla M, Kadučáková H, Grochans E. Loneliness and satisfaction with life among nursing students in Poland, Spain and Slovakia during the COVID-19 pandemic. *Int J Environ Res Public Health*. 2022;19(5):2929. https://doi.org/10.3390/ijerph19052929
15. Brysiewicz P, Scott T, Acheampong E, Muya I. Facilitating the development of emergency nursing in Africa: operational challenges and successes. *Afr J Emerg Med*. 2021;11(3):335-338. https://doi.org/10.10162
16. Sekhon SK, Srivastava M. Conquering workplace loneliness Individual or organization accountability. *Hum Resour Manag Int Dig*. 2019;27(1):1-3. https://doi.org/10.1108/HRMID-09-2018-0182
17. Kutoane M, Brysiewicz P, Scott T. Interventions for managing professional isolation among health professionals in low resource environments: a scoping review. *Health Sci Rep*. 2021;4(3):Fhsr2.361. https://doi.org/10.10022
18. Zohray T, Lalit N, Thomas H. Postgraduate medical education in sub-Saharan Africa: a scoping review spanning 26 years and lessons learned. *J Grad Med Educ*. 2019;11(4s):34-46. https://doi.org/10.43002/JGME-D-19-00170
19. South African Nursing Council. Competencies for emergency nursing. Accessed November 23, 2021. https://www.sanc.co.za/wp-content/uploads/2020/06/SANC-Competencies-Emergency-Nurse.pdf
20. Emergency Nurses Association. Emergency nursing scope and standards of Canadian practice 3rd ed. Accessed November 28, 2019. https://nena.ca/wp-content/uploads/2023/03/Standards-of-ED-Nursing-Practice-2018.pdf
21. Sahai S, Ciby MA, Kahwaji AT. Workplace isolation: a systematic review and synthesis. *Int J Manag*. 2020;11(12):2745-2758. https://doi.org/10.34218/IJM.11.12.2020.257
22. Holst C, Sukums F, Radovanovic D, Ngowi B, Noll J, Winkler AS. Sub-Saharan Africa—the new breeding ground for global digital health. *Lancet Digit Health*. 2020;2(4):e160-e162.
23. Partners in Health. Lesotho rural health initiative. Accessed November 23, 2021. https://www.pih.org/country/lesotho
24. Walter RR. Emancipatory nursing praxis: a theory of social justice in nursing. *Adv Nurs Sci*. 2017;40(3):225-243. https://doi.org/10.1097/ans.0000000000000157
25. Rosenthal M. Qualitative research methods: why, when, and how to conduct interviews and focus groups in pharmacy research. *Curr Pharm Teach Learn*. 2016;8(4):509-516. https://doi.org/10.1016/j.cptl.2016.03.021
26. Laerkner E, Egerod I, Hansen HP. Nurses' experiences of caring for critically ill, non-sedated, mechanically ventilated patients in the Intensive Care Unit: a qualitative study. *Intensive Crit Care Nurs*. 2015;31(4):196-204. https://doi.org/10.1016/j.iccn.2015.01.005
27. Kakilla C. *Strengths and weaknesses of semi-structured interviews in qualitative research: a critical essay* 2021. Accessed March 11, 2022. https://doi.org/10.20944/preprints202106.0491.v1
28. Saunders B, Sim J, Kingstone T, et al. Saturation in qualitative research: exploring its conceptualization and operationalization. *Qual Quant*. 2018;52(4):1893-1907. https://doi.org/10.1007/s11135-017-0574-8
29. Erlingsson C, Brysiewicz P. A hands-on guide to doing content analysis. *Afr J Emerg Med*. 2017;7(3):93-99. https://doi.org/10.1016/j.afjem.2017.08.001
30. Graneheim UH, Lundman B. Qualitative content analysis in nursing research: concepts, procedures and measures to achieve trustworthiness. *Nurse Educ Today*. 2004;24(2):105-112. https://doi.org/10.1016/j.nedt.2003.10.001
31. Hadi MA, José Closs S. Ensuring rigour and trustworthiness of qualitative research in clinical pharmacy. *Int J Clin Pharm*. 2016;38(3):641-646. https://doi.org/10.1007/s11096-015-0237-6
32. Shenton AK. Strategies for ensuring trustworthiness in qualitative research projects. *Educ Inf*. 2004;22(2):63-75. https://doi.org/10.3233/EFI-2004-22201
33. Forero R, Nahidi S, De Costa J, et al. Application of four-dimension criteria to assess rigour of qualitative research in emergency medicine. *BMC Health Serv Res*. 2018;18(1):1-11. https://doi.org/10.1186/s12913-018-2915-2
34. Morse JM. Critical analysis of strategies for determining rigor in qualitative inquiry. *Qual Health Res*. 2015;25(9):1212-1222. https://doi.org/10.1177/1049732315588501
35. Cypress BS. Rigor or reliability and validity in qualitative research: perspectives, strategies, reconceptualization, and recommendations. *Dimen Crit Care Nurs*. 2017;36(4):253-263. https://doi.org/10.1097/dcc.0000000000000253
36. Nowell LS, Norris JM, White DE, Moules NJ. Thematic analysis: striving to meet the trustworthiness criteria. *Int J Qual Methods*. 2017;16(1):1609406917733847. https://doi.org/10.1177/1609406917733847
37. Schot E, Tummers L, Noordegraaf M. Working on working together. A systematic review on how healthcare professionals contribute to interprofessional collaboration. *J Interprof Care*. 2020;34(3):332-342. https://doi.org/10.1080/13561820.2019.1636007
38. Zielińska-Tomczak Ł, Cerbin-Koczorowska M, Przymuszała P, Marciniak R. How to effectively promote interprofessional collaboration?–a qualitative study on physicians' and pharmacists' perspectives driven by the theory of planned behavior. *BMC Health Serv Res*. 2021;21(1):1-13. https://link.springer.com/article/10.1186/s12913-021-06903-5
39. Mcloughlin C, Patel KD, O'callaghan T, Reeves S. The use of virtual communities of practice to improve interprofessional collaboration and education: findings from an integrated review. *J Interprof Care*. 2018;32(2):136-142. https://doi.org/10.1080/13561820.2017.1377692
40. Comyn P, Strietska-Ilina O. Skills and jobs mismatches in low- and middle-income countries. International Labour Organization. 2019. Accessed January 15, 2021. https://www.ilo.org/wcmsp5/groups/public/—ed_emp/documents/publication/wcms_726816.pdf
41. Gimbel M, Sinclair T. Larger skills gap in healthcare than in overall economy. Hiring Lab. Accessed November 3, 2022. https://www.hiringlab.org/2019/03/20/healthcare-skills-gap/
42. Vasic V. *Skills Mismatch Measurement in Serbia*. European Training Foundation; 2019. Accessed November 23, 2021. https://www.etf.europa.eu/en/publications-and-resources/publications/skills-mismatch-measurement-serbia

43. Pimmer C, Brühlmann F, Odetola TD, Oluwasola DO, Dipeolu O, Ajuwon AJ. Facilitating professional mobile learning communities with instant messaging. *Comput Educ*. 2019;128:102-112. https://doi.org/10.1016/j.compedu.2018.09.005

44. Mwape L, Wahila R, Makukula MC, Lyambai K, Pimmer C. WhatsApp messaging for sharing best practices and prevention of professional isolation: a case of HIV nurse practitioners in Zambia. *Creat Educ*. 2018;9:393-405. https://doi.org/10.4236/ce.2018.93028

45. Peng Y, Liu C, Su S, Rosenblatt A. The hidden performance costs of professional isolation? A latent change score model of professional isolation during the early stage of COVID-19 pandemic, 10.1111/apps.12420 *Appl Psychol*. 2022. https://doi.org/10.1111/apps.12420

46. Bonnici N. The professional isolation experienced by novice Heads of Primary State Schools during their professional and organisational socialisation. Malta J Educ. 2021;2(2):28–52. Accessed 3 November 2022. https://ife.gov.mt/wp-content/uploads/2023/03/N02255-Institute-for-Education-Symposium-Third-Journal-A5-Booklet-ONLINE-LR-28-52.pdf

Randomized Controlled Study in the Use of Aromatherapy for Pain Reduction and to Reduce Opioid Use in the Emergency Department

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Contribution to Emergency Nursing Practice

- Current literature suggests that aromatherapy with essential oils could be beneficial for the perception of pain. However, other researchers have noted that there is a lack of strong research on aromatherapy for use in pain control and is a barrier to widespread implementation.
- This study provides stronger evidence to what other studies have suggested; aromatherapy is effective in reducing pain. A difference between a placebo effect and a true therapeutic effect of aromatherapy was demonstrated.
- The nurse can initiate aromatherapy early in the triage process of the emergency department as an alternative or complementary therapy to medicine and nursing treatment for pain. Aromatherapy could alleviate symptoms in a timely manner, enhancing patient satisfaction.

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Abstract

Introduction: This study aimed to evaluate the effects of aromatherapy on emergency department patients' perception of pain and its ability to reduce the use of opioids in an emergency department.

Methods: This randomized, controlled, single-blinded study was conducted in a suburban/rural freestanding emergency department with a therapeutic group, sham group, and control group.

Results: A total of 230 patients, 171 females and 59 males, completed the study. Of those who received the therapeutic agent, an average reduction in pain of 1.04 points on the pain scale was reported, whereas the sham group averaged 0.38 and the control group 0.23. There was a statistically significant reduction of pain scores in the therapeutic group. A total of 13 received opioid pain medication during their visit. Of these, the therapeutic group averaged a total of 2.67 morphine milligram equivalents for their visit compared with 3.63 in the sham group and 4.36 in the control group; however, statistical significance was not achieved.

Discussion: This study supported what other studies have found, indicating that aromatherapy is effective in reducing pain. A difference between the placebo effect and a true therapeutic effect was seen by using a control group apart from the sham and therapeutic groups. Despite the small effect size (0.3), implementation of aromatherapy into standard practice may be practical considering the anxiolytic effects that have been shown in other studies. Aromatherapy with essential oils should be considered as another tool to use in a multimodal approach in the treatment of pain in the emergency department setting.

Key words: Aromatherapy; Pain; Emergency department; Lavender; Sweet marjoram; Pink grapefruit; Opioids

Introduction

In 2017 two-thirds of deaths in the United States related to overdoses involved an opioid.[1] In 2019 more than 22,000 died from unintentional opioid-related overdoses in the United States.[1] One study reported a 220% increase of identified opioid misuse in older adults (age >65 years) presenting to emergency departments.[2] In the midst of the incontrovertible opioid epidemic, there is a push for the use of a multimodal approach to the treatment of pain.[3] The goal of multimodal therapy is to produce an effective treatment for pain, while reducing the amount of habit-forming opioids administered.[4] The American Academy of Emergency Medicine's position on acute pain management is that treatment is based on appropriate nonpharmacologic and pharmacologic approaches.[3] One potential source of analgesics that can be used as a nonpharmacologic intervention to pain control is aromatherapy with essential oils. Many hospitals across the country are beginning to implement aromatherapy performed by competent nurses for the treatment of a variety of diagnoses.[5] However, the lack of strong research leaves many health care professionals to question the practice of aromatherapy as a legitimate treatment regimen and is therefore a barrier to widespread implementation.[6]

Addressing a patient's pain is an important part of nursing care but is often poorly understood due to its subjective nature.[7] The International Association for the Study of Pain proposes that a person's report of pain should be respected, it is always a personal experience, and it may have adverse effects on function, social, and psychological well-being.[8] Pain causes negative effects on nearly every body system, and poorly controlled acute pain can lead to debilitating chronic pain.[9] In the emergency department, pain of various etiologies is a common driving force for patient presentation.[9] Two-thirds of all ED visits have a chief complaint of pain.[9] As the patient waits for treatment and continues to experience unabated pain, they begin to have chronic changes in their pain perception.[10] The Centers for Medicare and Medicaid Services recognizes the need to improve the speed in treating pain caused by long bone fractures and has made it a quality measure for emergency departments.[11] As our understanding of pain evolves, nurses are well positioned to take the lead in advocating for the appropriate treatment.

Emergency departments in the United States are frequently overburdened, which results in long delays in the treatment of pain. In a 2007 multicenter study, 60% of patients received an analgesic after a median time of 90 minutes, and 74% were discharged in moderate to severe pain.[12] During the triage process, a nurse will assess a patient's severity of pain, which would be an ideal time to begin addressing it. However, during times of high volume, the nurse must send the patient to wait even as the patient requests respite from their suffering. To evaluate a nurse-driven treatment for pain, reduce opioid utilization, and empower nurses by providing evidence-based nonpharmacologic tools to lessen pain's severity, this study seeks to add aromatherapy to the nurse's tool kit.

Aromatherapy has been used since ancient times for the suspected benefits in a myriad of ailments.[13] However, in the modern era it has been overlooked in scientific studies in favor of pharmacologic treatments. Aromatherapy uses natural essential oils distilled from various parts of aromatic plants. The odiferous molecules adhere to the olfactory epithelium and stimulate a response of the limbic system. It is theorized that stimulating the limbic system with aromatherapy can trigger a release of hormones and neurotransmitters to achieve the desired effect.[13] Historically, the use of aromatherapy has been advocated by 8 major nursing theorists beginning with Florence Nightingale and continues with the contemporary Jean Watson.[13]

Aromatherapy has specifically been suggested to be beneficial in the area of pain perception. For example, the use of aromatherapy reduced pain scores during the placement of peripheral venous cannulation in a prospective randomized study.[14] However, their study was limited in the aspect of ruling out a placebo effect due to the use of water that has no odor as opposed to using a nontherapeutic odor. A systematic review and meta-analysis of the effectiveness of aromatherapy in the reduction pain in 2016 found that aromatherapy can be effective in treating pain for a variety of medical conditions.[6] The researchers go on to say that the sample size of available studies is small and further research is needed to fully understand its clinical application.[6] We aim to bridge this knowledge gap by using an appropriate sample size with more effective sham controls.

PURPOSE

The purpose of this study is to evaluate the effectiveness of a blend of *Lavandula angustifolia* (lavender), *Origanum majorana* (sweet marjoram), and *Citrus* × *paradisi* (pink grapefruit) on a patient's perception of pain and differentiate between a placebo response and a true therapeutic reduction in pain through the use of a sham and a control group and, secondarily, examine the ability of aromatherapy to reduce the use of opioids administered during the emergency department visit. These interventions and evaluations take place in an ED setting beginning at triage and initiated by clinical nursing staff.

Methods

STUDY DESIGN AND SETTING

This randomized, controlled, single-blinded study was conducted in a suburban/rural freestanding emergency department associated with a larger health system in the area, located in the southeastern United States, that sees approximately 32,000 patients annually. Participants were randomized into 1 of 3 groups: a therapeutic intervention, a sham intervention, and no intervention. The participants receiving therapeutic intervention and sham intervention were blinded to knowing whether they were receiving the therapeutic or the sham intervention. The therapeutic group received an aromatic blend of lavender, sweet marjoram, and pink grapefruit oils. The sham group received an aroma of vanilla-infused jojoba oil. The control group received no intervention.

SAMPLE

Participants were recruited from patients who present to the emergency department. The inclusion criteria were ages 18 to 75 years with complaints of pain and those who had not taken an analgesic within 1 hour of presentation. Exclusion criteria were minors younger than 18 years and patients older than 75 years, pregnant females, those whose systolic blood pressure was less than 90 mm Hg, those with history of reactive airway disease, and those with a history of adverse reactions to essential oils. When selecting sample size, we saw previous literature that ranged from 50 to 123 participants and we sought to double that number for an improved confidence level.[15,16] We desired a sample size of 300 patients with 100 in each group; however, the study extended into the beginning of the coronavirus disease 2019 pandemic that severely limited our recruitment abilities, and the study was closed. Over a 4-month period, a total of 230 patients were consented for the study including 170 females and 60 males (Figure 1).

ETHICAL CONSIDERATIONS

The study was approved by the health system's institutional review board, and input was received from the clinical nurse specialist who oversees aromatherapy. Two principal investigators attended an aromatherapy competency class to be able to administer aromatherapy to patients. Each patient who participated in the study signed a consent form for participation and was given the opportunity to ask questions. All participants were informed that they may receive standard of care analgesic at any time during the study but doing so would be implied as a voluntary withdrawal from the study. There was a total of 2 participants that withdrew because they received additional analgesics before the final assessment point.

INTERVENTION

Both the therapeutic group and sham groups received an aromatic inhalation device (Figure 2). These devices are commonly known as nasal inhaler tubes and are made of plastic. The plastic device encloses a fabric core that is impregnated with the essential oil and then sealed by a tightly fitted end cap. A plastic sheath fits over the core chamber as an occlusive cover. This ensures that the aroma was only delivered to the intended patient and decreased the chances of direct contact with the oils. This delivery method also decreases cross contamination by having a single patient use delivery device.[17] For the study, we purchased generic nasal inhaler tubes in bulk. Oils were sourced from a local company that was able to provide gas chromatography–mass spectrometry analysis of the oils to ensure purity. Five to 6 drops of the blended oils were applied to the core of the inhalation device then sealed.

The therapeutic group received a batched blend with a ratio of 4 drops of lavender, 1 drop of sweet marjoram, and 2 drops of pink grapefruit 100% pure essential oil that was mixed and saturated on the fabric core in the inhalation device. Lavender was chosen for its analgesic, antispasmodic, and anti-inflammatory properties.[18] It also has been shown to calm the mind.[18] Sweet marjoram was chosen for its analgesic and antispasmodic properties and its ability to strengthen and relax the nerves.[18] Pink grapefruit was included to make the aroma more pleasing and because of its uplifting and reviving effects.[18] The sham blend consisted of a vanilla-infused jojoba oil saturated on the inhaler's core. Vanilla was chosen because of the pleasing aroma but does not adhere to the classical definition of an essential oil and due to its large molecular size is not absorbed through the inhalation route.[5]

A third group was designated as the control group. They did not receive any inhalation device. Participants in the control group had their pain assessed just as all other groups, which is further described in the measures and procedures below. This group is to account for the natural waxing and waning of pain in various conditions.

The principal and coinvestigators of this study previously attended an 8-hour aromatherapy class and successfully completed a competency test in accordance to the health system's clinical aromatherapy policy. Additional

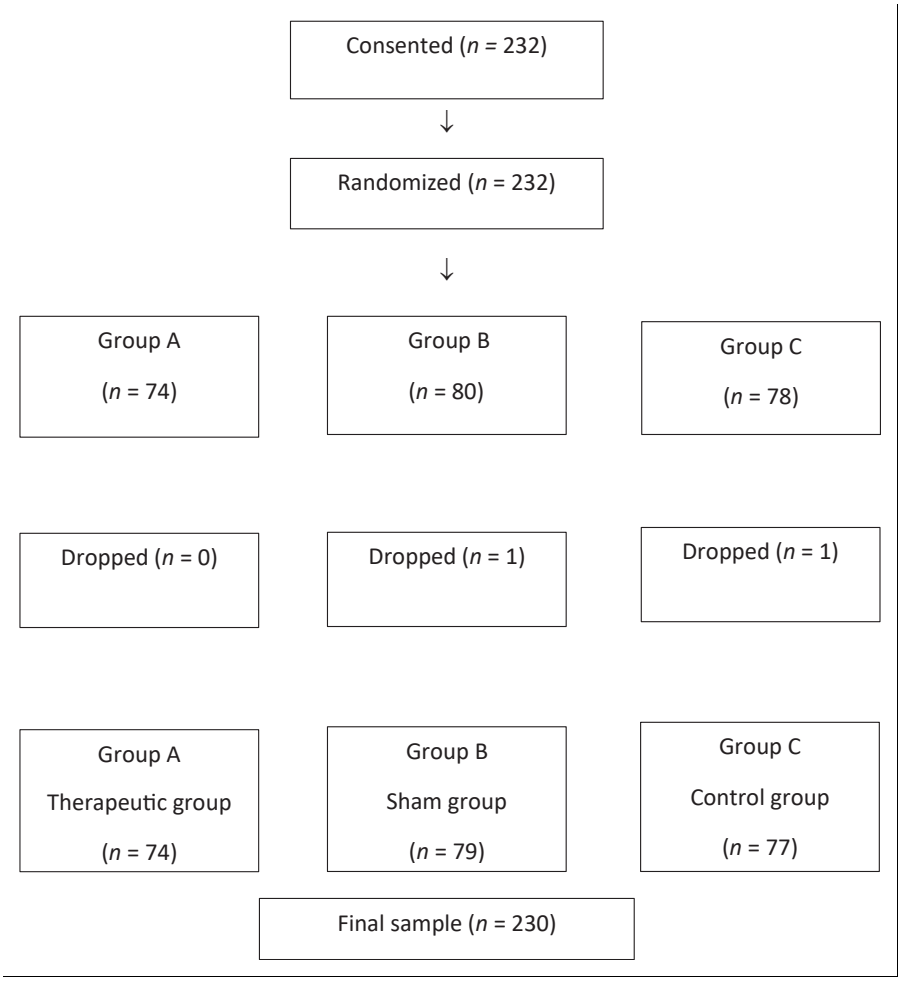

FIGURE 1
Enrollment.

staff nurses in the department assisted with the reassessment of pain. An in-service was given to all the nurses in the department who were interested in assisting with the study. The in-service was developed by the clinical nurse specialist who heads the aromatherapy program. It was a condensed version of the 8-hour aromatherapy competency class and was created solely for this study. The in-service consisted of an information sheet outlining what aromatherapy is and its benefits, safety information regarding aromatherapy, management of adverse reactions, and information on how to explain aromatherapy usage to the patients. The in-service also consisted of information on the blend of oils that were used during the study. Nurses read the in-service and had a chance to ask questions to the principal or coinvestigator.

VARIABLES AND MEASURES

Pain was assessed using the visual analog scale (VAS) before and after administering the aromatherapy. Research shows that the VAS is a highly reliable instrument in measuring acute pain.[19] For descriptive purposes patient satisfaction was measured using a 0 to 10 numeric Likert style scale with 0 being extremely dissatisfied, 5 being neutral, and 10 being extremely satisfied.

PROCEDURES

Patients presenting to the emergency department with a complaint of pain who chose to participate in the study were consented for participation. They were presented

FIGURE 2
Preparation of nasal inhaler tubes.

with a sealed envelope that assigned them to 1 of 3 groups: the therapeutic group, sham group, or the control group. Participants remained blinded as these forms were labeled with only A, B, or C, and only the investigators/interventionalist knew which group each letter corresponded to. The envelope consisted of the consent form, which contained the group designation, and a data collection form. The data collection form listed the inclusion/exclusion criteria for the enrolling nurse to review. The patients' pain was assessed using the VAS and documented with the time on the data collection form. The patients assigned to the therapeutic group or the sham group were provided with an aroma to inhale once every 2 to 3 minutes until they were reassessed. Those assigned to the control group did not receive a therapy. Pain assessments for the 3 groups were performed upon enrollment and reassessed no sooner than 30 minutes from treatment time or, in the case of the control group, the initial pain assessment time. No analgesic of any kind was given during the time between the pain assessments. Analgesics are defined as pharmacologic such as opioid or nonopioid analgesics and nonpharmacologic interventions such as ice, heat, or massage. It was made clear to all clinical staff that no analgesia was to be withheld, and if a patient needed an intervention, it was considered an implied voluntary withdrawal from the study. Opioids were given at the provider's discretion after the pain and satisfaction scores were recorded and the study had ended. Prescribing providers were blinded and did not know which patients were part of the study.

DATA ANALYSIS

The initial data were examined for completeness and personal identification information was removed for analysis. Opioid medication dose administered was converted to morphine milligram equivalents (MMEs) for comparison. The data were entered into a Microsoft Excel spreadsheet (Microsoft) and a new data point called "change in pain score" was created. Descriptive statistical analysis was completed on the data. After data cleanup, the spreadsheet was loaded in the R statistical analysis program (R Foundation). We performed tests of normality on the data and found that the data were not normally distributed. Next, we compared the pain scores before and after treatment for each patient using the Wilcoxon signed rank test. If there was any difference in the variance among the treatment groups, the Kruskal-Wallis rank sum test was used. Given that the Kruskal-Wallis rank sum test yielded statistically significant results, pairwise comparisons were performed using Wilcoxon rank sum test to find from where the variance among all the treatment groups arose. Finally, the effect size was calculated using the Kruskal-Wallis effect size calculation for clinical significance.

Results

The initial sample was 232 participants with 2 dropping out when pain medications were given. One removed participant was in group A, the sham group, and 1 was in group C, the control group. Of the remaining 230 participants, 171 were female whereas 59 were male (Table). The average age of participants was 43 years (SD 15) with a median age of 40 years. Age did not seem to be a clinical factor in a patient's perception of their pain. Spearman correlation coefficients of age against initial pain scores, pain after treatment scores, and change in pain scores all yielded *P* values above our alpha level of .05. The *P* values were .67, .70, and .77, respectively. Acuity used the Emergency Severity Index and participants had an average of 3.54 (SD 0.56) and a median Emergency Severity Index of 4. The average time of reassessment after intervention was 113 minutes (SD 0.73) and a median of 39 minutes.

The mean initial pain score was 6.93 with a standard deviation of 2.18 and the mean post-treatment pain was 6.35 with a standard deviation of 2.68. Therefore, the average change in participants' pain score as a population was a reduction of 0.58 with a standard deviation of 1.45 (Figure 3). We can say with 95% confidence that these means are statistically significant as statistical test yielded a *P* value of 1.01e-09, which was below our set target level of 0.05.

TABLE
Enrollment characteristics

	Therapeutic group	Placebo group	Control group
Inhaled	Lavender, sweet marjoram, and pink grapefruit*	Vanilla-infused jojoba oil	No aroma or analgesic treatment
Participants ($N = 230$)	74	79	77
Gender breakdown			
Male	19	17	23
Female	55	62	54
Average age	40 (21-65)	42 (19-71)	45 (22-70)
Admission status			
Admitted	1	2	4
Discharged	73	77	73

* Pink grapefruit added for aesthetic purposes and has no known analgesic properties.

Given that we had 3 treatment groups, we wanted to know whether there were any differences in pain scores among the 3 groups. The therapeutic group had a mean post-treatment pain score of 5.81 (SD 2.64) whereas the post-treatment pain score was 6.46 (SD 2.84) and 6.75 (SD 2.50) in the sham and control groups, respectively. The Kruskal-Wallis rank sum test yielded a *P* value of 1.01e-09, which is <.05 and indicated that there is a statically significant change in the pain score among the 3 different groups. Further statistical analysis revealed that the difference among the groups was between the therapeutic and sham groups and therapeutic and control groups because our *P* values for these pairs were <.05. This means that the treatment offered to the therapeutic group does show a statistically significant reduction in the pain score. A calculation of the effect size for the therapeutic group compared with the control was 0.3. This means the therapeutic group shows a small effect size.

In pain management when converting from 1 narcotic to another, MME is calculated and provides standardization of dosage. In examining the dose of opioids given to each group, narcotic doses given were computed in MME. The therapeutic group averaged a total of 2.67 MMEs during their visit compared with 3.63 in the sham group and 4.36 in the control group (Figure 4). In the therapeutic group, 96% of the participants received no opioids compared with 95% in the sham group and 93% in the control group. A Kruskal-Wallis rank sum test revealed a *P* value of .18, which is larger

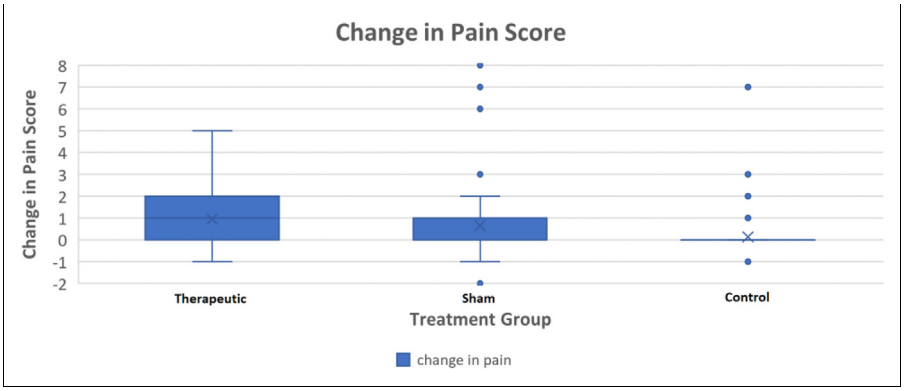

FIGURE 3
Change in pain score.

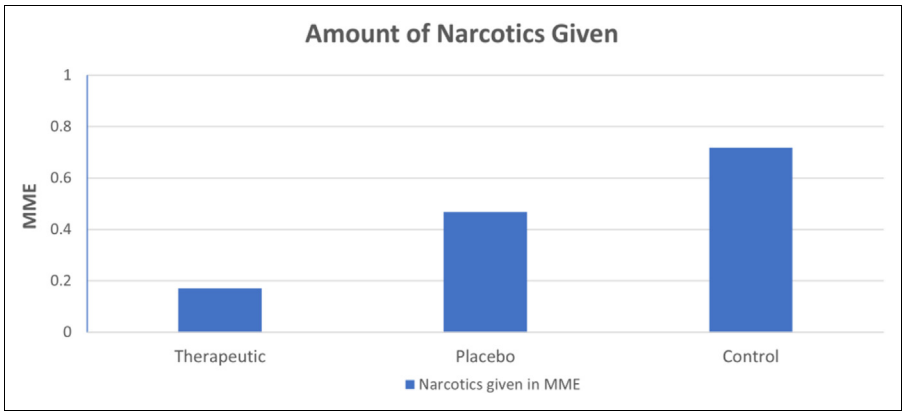

FIGURE 4

Amount of narcotics given. *There was no statiscally significant difference in the amount of narcotics given between groups.

than our alpha of .05, leading to the conclusion that there is not a statistically significant difference in the amount of opioids given to each treatment group.

Discussion

The primary objective of this study was to determine whether the implementation of aromatherapy as an intervention would reduce patients' pain perception and reduce opioid administration. Our study supported what other studies have found, indicating that aromatherapy is effective in reducing pain.[14-16] In addition, we were able to demonstrate a difference between the placebo effect and a true therapeutic effect by using a control group apart from the sham and therapeutic groups.

This study has several strengths. First, this study did not discriminate in the types of pain that were treated such as headaches, abdominal pains, fractures, and sickle cell crisis, nor did it exclude patients with known opioid dependence. This allowed us to see the effects of aromatherapy on all types of pain in the broadest sense. Second, this study was performed in a freestanding emergency department, which provided a different perspective of using aromatherapy to reduce pain and to evaluate the impact on decreasing the number of opioids used.

Limitations

There were a few limitations in this study. The sample population came from only 1 freestanding suburban/rural emergency department in the southeastern part of the United States and findings cannot be generalized. Generalization was also limited due to representation of gender. There were nearly 3 times the number of women (n = 171) compared with men (n = 59). This could indicate that women are more likely to be receptive to this treatment, but it is uncertain at this time why this inequity exists. Administration of nonopioid analgesia was not tracked after the final pain and satisfaction scores were recorded. This further limited our ability to evaluate the impact of opioid utilization after treatment. There is a need to continue to study the effects of aromatherapy on pain reduction to better understand its clinical impact, such as its effectiveness when combined with other modalities.

Implications for Emergency Nurses

Aromatherapy being used for pain control has been theorized and used since ancient times. Many anecdotal stories are in support of its therapeutic effects. Few studies that withstand modern scientific rigor also lend support to this claim.[6,14,20] This study provides new insight to the practice and adds to the current literature available. Aromatherapy can be used in the clinical setting as an alternative or complementary therapy to medicine and nursing treatment. The implication for nurses is that they can confidently implement aromatherapy programs that can be initiated in triage by nurses while the patient is waiting to see the ED provider. Aromatherapy could enhance patient satisfaction by alleviating symptoms in a timely manner. Pain is 1 of the most common complaints in the emergency department.[9] In the emergency department, we see a vast array

of patients with multiple types of conditions, many of which cause pain. This study found that aromatherapy is 1 modality that can be used to help alleviate pain and, as other studies noted, decrease the anxiety that the pain may cause.[6]

This study's results indicate that aromatherapy should be considered a safe addition to current pain management procedures in the emergency department given that no adverse effects were reported in any of the participants. In addition, the cost associated with aromatherapy is far less than the cost associated with standard pain management treatment.

Conclusion

Aromatherapy has many benefits to the body, including the reduction of the perception of pain. Despite the small effect size (0.3), we believe that implementation into standard practice may be practical considering the anxiolytic effects that have been shown in other studies.[14,21] The emergency department waiting process combined with the experience of unrelieved pain can cause significant stress on the patients and affects their satisfaction and receptiveness of their care. Aromatherapy with essential oils should be considered as another tool to use in a multimodal approach in the treatment of pain. Emergency departments can confidently implement aromatherapy programs as a nurse-led intervention to reduce pain, especially in the absence of a provider assessment. This can be especially valuable during periods of long wait times in the emergency department. There is limited research available on this topic, so more research is needed to determine the true benefits of aromatherapy on the treatment of pain.

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REFERENCES

1. Wilson N, Kariisa M, Seth P, Smith IV H, Davis N. Drug and opioid-involved overdose deaths-United States, 2017-2018. *MMWR Morb Mortal Wkly Rep*. 2020;69(11):209-297. https://doi.org/10.15585/mmwr.mm6911a4
2. Carter MW, Yang BK, Davenport M, Kabel A. Increasing rates of opioid misuse among older adults visiting emergency departments. *Innov Aging*. 2019;3(1):1-13. https://doi.org/10.1093/geroni/igz002
3. Motov S, Strayer R, Hayes BD, et al. The treatment of acute pain in the emergency department: a white paper position statement prepared for the American Academy of Emergency Medicine. *J Emerg Med*. 2018;54(5):731-736. https://doi.org/10.1016/j.jemermed.2018.01.020
4. Duncan RW, Smith KL, Maguire M, Stader DE. Alternatives to opioids for pain management in the emergency department decreases opioid usage and maintains patient satisfaction. *Am J Emerg Med*. 2019;37(1):38-44. https://doi.org/10.1016/j.ajem.2018.04.043
5. Buckle J. *Clinical Aromatherapy: Essential Oils in Practice*. 2nd ed. Churchill Livingstone; 2003. https://doi.org/10.1016/B978-0-443-07236-9.X5001-2
6. Lakhan SE, Sheafer H, Tepper D. The effectiveness of aromatherapy in reducing pain: a systematic review and meta-analysis. *Pain Res Treat*. 2016;2016:1-13. https://doi.org/10.1155/2016/8158693
7. Kahsay DT, Pitkäjärvi M. Emergency nurses' knowledge, attitude and perceived barriers regarding pain Management in Resource-Limited Settings: cross-sectional study. *BMC Nurs*. 2019;18(1):1-13. https://doi.org/10.1186/s12912-019-0380-9
8. International Association for the Study of Pain. Terminology. Published 2021. Accessed December 1, 2021. https://www.iasp-pain.org/resources/terminology/
9. Marmo L, D'Arcy YM. *Compact Clinical Guide to Critical Care, Trauma, and Emergency Pain Management: An Evidence-based Approach for Nurses*. Springer Publishing Company; 2013.
10. Yang S, Chang MC. Chronic pain: structural and functional changes in brain structures and associated negative affective states. *Int J Mol Sci*. 2019;20(13):3130. https://doi.org/10.3390/ijms20133130
11. Pain C.M.S. Measures. Accessed August 21, 2023. https://www.nursing.theclinics.com/article/S0029-6465(20)30047-5/fulltext
12. Knox TH, Ducharme J, Choiniere M, et al. Pain in the emergency department: results of the pain and emergency medicine initiative (PEMI) multicenter study. *J Pain*. 2007;8(6):460-466. https://doi.org/10.1016/j.jpain.2006.12.005
13. Farrar AJ, Farrar FC. Clinical aromatherapy. *Nurs Clin North Am*. 2020;55(4):489-504. https://doi.org/10.1016/j.cnur.2020.06.015
14. Karaman T, Karaman S, Dogru S, et al. Evaluating the efficacy of lavender aromatherapy on peripheral venous cannulation pain and anxiety : a prospective, randomized study. *Complement Ther Clin Pract*. 2016;23:64-68. https://doi.org/10.1016/j.ctcp.2016.03.008
15. Kim JT, Wajda M, Cuff G, et al. Evaluation of aromatherapy in treating postoperative pain: pilot study. *Pain Pract*. 2006;6(4):273-277. https://doi.org/10.1111/j.1533-2500.2006.00095.x
16. Bagheri-Nesami M, Espahbodi F, Nikkhah A, Shorofi SA, Charati JY. The effects of lavender aromatherapy on pain following needle insertion into a fistula in hemodialysis patients. *Complement Ther Clin Pract*. 2014;20(1):1-4. https://doi.org/10.1016/j.ctcp.2013.11.005
17. Pace S. *Essential oils in hospitals: the ethics, safety, cost and application of clinical aromatherapy*. Tisserand Institute; Published online 2019.

Accessed October 29, 2021. https://tisserandinstitute.org/essential-oils-in-hospitals/

18. Battaglia S. *The Complete Guide to Aromatherapy*. 3rd ed. Black Pepper Creative; 2018.
19. Bijur PE, Silver W, Gallagher EJ. Reliability of the visual analog scale for measurement of acute pain. *Acad Emerg Med*. 2001;8(12):1153-1157. https://doi.org/10.1111/j.1553-2712.2001.tb01132.x
20. Yayla EM, Ozdemir L. Effect of inhalation aromatherapy on procedural pain and anxiety after needle insertion into an implantable central venous port catheter: a quasi-randomized controlled pilot study. *Cancer Nurs*. 2019;42(1):35-41. https://doi.org/10.1097/NCC.0000000000000551
21. Ho SSM, Kwong ANL, Wan KWS, Ho RML, Chow KM. Experiences of aromatherapy massage among adult female cancer patients: a qualitative study. *J Clin Nurs*. 2017;26(23-24):4519-4526. https://doi.org/10.1111/jocn.13784

A Survey of Emergency Nurses' Perceptions and Practices to Support Patients' Families as Surrogate Decision Makers

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Contribution to Emergency Nursing Practice

- There is an urgent need to identify how to give nursing support to patient families who are responsible for surrogate decision making in the emergency setting because the approaches used have not been fully investigated.
- With relevant tools such as using an original 25-item questionnaire to capture emergency nurses' perceptions and practice of supporting patients' families who are surrogate decision makers, the related nursing competencies can be expanded.
- Our study identified factors for support and factors that indicate the current state of practice, as perceived by emergency nurses, suggesting that emergency nurses should emphasize empathic support and collaboration with other professionals as family support in the emergency setting.

Abstract

Introduction: Family members acting as surrogate decision makers for severely ill patients in emergency and critical care centers face psychological burdens. This study aimed to investigate the actual situation of emergency nurses' perceptions and practices to support patients' families and its structural elements.

Methods: We created an original 25-item questionnaire and surveyed 164 emergency nurses from 64 emergency and critical care centers regarding their perceptions of caring for people making surrogate decisions. Participants averaged 35.6 years old and 5.1 years as emergency nurses.

Results: Cronbach's α coefficients for importance and practice on the original questionnaire were 0.936 and 0.933, respectively. We identified 4 elements of necessary support for patient families making surrogate decisions according to emergency nurses: "collaboration in understanding the condition of the patient as well as empathetic support," "care that addresses the needs of patient's family members," "confirming the role of nurses and surrogate decision making," and "participation in meeting with a doctor and patient families." In addition, we identified 5 elements that indicate the current state of practice: "support from specialists such as nurses and other professionals," "compassionate care for family members and those who are providing support to family members," "empathetic support for family members," "support for making arrangements that address the needs of family members," and "considerations for family members."

Discussion: According to the findings of this study, emergency nurses should coordinate with other professionals and talk with family members and physicians to increase their understanding of the need to assist in surrogate decision making. In addition, emergency nurses also need to explain to patients' relatives how to support them in surrogate decision making.

Key words: Surrogate decision making; Emergency nurses; Family support; Perception; Questionnaire

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Introduction

In emergency situations, the patient's condition can change quickly, so important decisions need to be made rapidly. Emergency and critical care centers receive many severely ill patients whose level of consciousness has decreased and whose ability to communicate and make decisions has been impaired.[1] However, patients who are in a life-threatening situation often cannot make decisions on their own,[2] so the patient's family has to make decisions for therapeutic strategies by acting as surrogate decision makers (SDMs).[3] Most of the time in the intensive care unit (ICU) the patient's family members, as SDMs, are in charge of most treatment decisions.[1,4] However, SDMs cannot make decisions under normal circumstances and several difficulties exist.[5] Some SDMs also make decisions based on the wishes of family members, raising concerns that the patient's wishes are not always the basis for surrogate decision making.[6]

An informed consent, in which patients and their families are provided with sufficient information regarding medical treatment, is fundamental to treatment decision making.[7] Previous studies have shown that patients who actively make decisions are more satisfied with their medical care and experience better health.[8] People have become more interested recently in advanced directives (AD), living wills, and advance care planning (ACP), which allow patients, their families, and health care providers to discuss future procedures and treatments in advance and make clear decisions about how to live their lives according to their terms.[9] In Japan, activities to promote ACP have become more active over the past few years.[6] In the ACP process, medical care decisions are given to others when a person cannot make them on their own.[10] The guidelines also advise that patients must appoint an SDM to represent them before they cannot convey their desires.[10] However, when there is no concern about the current state of health, there is little motivation to make an AD and it is rare to have 1 prepared. Furthermore, in traditional Japanese culture, death-related issues are generally considered taboo. Japanese culture tends to be hesitant to express its views on death and death-related issues because discussing these creates a sense of discomfort and unease.[11] Therefore, in Japan, the prevalence of ACP discussions among Japanese adults has more than doubled from 20% in 2006 to 40% in 2017, but neither mandatory AD nor legislation to support ACP have been legally enacted in Japan.[12] The increase in prevalence of ACP may be partly caused by the rapid increase in the elderly population and the growing interest regarding future end-of-life care, although the prevalence in Japan is still low compared with the United States (67%) and Canada (52%).[12,13] In the absence of ACP, surrogate decision-making family members are not fully aware of the patient's demands and needs.[14]

Due to time limits in an emergency setting, SDMs must make crucial decisions rapidly. A United States report found that 48% of SDMs in acute care hospitals reported having to make crucial decisions regarding life-sustaining treatment within 48 hours of admission.[15] Communication problems between clinicians and SDMs in the emergency setting are well known.[16] These problems include a lack of timely interdisciplinary meetings with the family,[17,18] missed opportunities for emotional support for SDMs[19,20] and inadequate discussion of comfort-oriented treatment options,[21] communication breakdowns regarding expensive and burdensome treatments that do not match the patient's values, and long-term symptoms of psychological distress in the proxy.[22,23] However, to the best of our knowledge, intervention studies and evaluation studies of assessment tools have been considered,[24-26] but no helpful nursing support has been identified to help surrogates cope with the emotional and cognitive stress of surrogate decision making in the emergency setting.

In Japan, there are no established guidelines for explaining procedures and specific nursing support methods for families making surrogate decisions in emergency and intensive care. In this context, treatment decisions are currently made on the basis of (1) advance directives, (2) surrogate decisions, and (3) criteria for best benefits to the patient in the absence of decision-making capacity of the patient in emergency settings. Therefore, nurse assistance is required to help the patient's family make the best decision despite time constraints, psychological instability, and other peculiarities associated with the emergency care setting.[27] Although emergency nurses generally prioritize nursing care to ensure patient survival,[28] they should attend family meetings whenever possible[29] and be prepared to play a role in supporting SDMs without fear or conflict.[30]

Emergency nurses have noted the problems in giving care resulting from a lack of knowledge about interacting with troubled families and the lack of recognized systems for patient support. Nurse-led interventions are essential to improve surrogate decision making in critically ill patients.[29] Thus, nurses occupy a pivotal position in facilitating communication between the medical team and the patient's family. Their sustained involvement with SDMs and family members fosters a more comprehensive understanding and acceptance of the patient's current condition, thereby mitigating distress.[1] By strategizing their interactions, emergency nurses can potentially alleviate the psychological stress experienced by the patient's family.

The role of emergency nurses in providing surrogate decision-making support to families in the emergency setting has not yet been fully appreciated; therefore, there is an urgent need to establish a guideline for nursing support for SDMs. However, because there are no previous studies addressing perceptions of the importance and practice of nursing support for SDMs, the purpose of this study was to evaluate emergency nurses' perceptions of the importance of support and the reality of their practice and to clarify the structure of the relationship between the categories of importance and practice to explore the nature of support.

Methods

STUDY PARTICIPANTS

To conduct this study, we emailed 288 emergency care facilities affiliated with the Japanese Association for Acute Medicine with a brief description of the goals. A request form containing a QR code and URL for the questionnaire was sent to the 64 facilities (22.2%) that agreed to participate. The head nurse of each facility asked the nurses working there to cooperate and respond to the questionnaire on a voluntary basis. We recruited 177 emergency nurses from 64 facilities. We included partially completed answers in the legitimate responses and 164 participants (93.8%) in the analysis.

In Japan, emergency nurses are certified by the Japanese Nursing Association through their training. A master's degree in nursing is essential for critical care nurses. To become a certified emergency nurse, one must complete a rigorous training program. In detail, certified emergency nurses work in emergency and critical centers and emergency departments and have the knowledge and skill to provide early intervention and support to patients in crisis with a wide variety of illnesses, trauma, cerebrovascular disorders, and poisoning, as well as nursing care to deal with their families.[31]

ESTABLISHMENT OF THE ORIGINAL QUESTIONNAIRE

A questionnaire with 25 original items for the online survey was created based on a database search regarding nursing patients' family support for SDMs as following steps. Before constructing the questionnaire, informed consent was obtained from all nurses at the university hospital, where the researcher is a member.

(1) The Ichushi-Web and Cumulative Index to Nursing and Allied Health Literature databases were searched for literature published between 2008 and 2017 using the following key words: lifesaving, life-sustaining treatment, surrogate decision making, and family nursing.
(2) Articles related to selecting treatment options for terminal patients who have time to prepare for end-of-life care were excluded because emergency nursing support is not provided to such patients, and original full articles and research reports were selected.
(3) Six books and 24 articles were selected to construct the original questionnaire. Categories and subcategories were extracted from each of the retrieved articles and research reports and were grouped into similar items to avoid loss of semantic content and then extracted as question content.
(4) As a preliminary study, the validity of the questionnaire was preliminarily investigated by administering it to 22 emergency nurses, including emergency nurses and critical care nurses, followed by a discussion.
(5) To amend the original questionnaire, 3 critical care nursing researchers and a nurse specialist in acute and critical care nursing discussed and examined nursing support for surrogate decision making in lifesaving treatment and refined the questions based on practical knowledge and hypotheses of nursing support. Questionnaires were added when necessary. The reviewed questions were then checked for appropriateness and phrasing clarity to ensure the survey's validity and reliability.
(6) The construct validity of each item was confirmed before finalizing the 25 question items. Cronbach's α coefficients were obtained for each item to ensure internal consistency. Exploratory factor analysis was conducted to determine the validity of each factor and subitem using the maximum likelihood method and Promax rotation, and the construct validity of each was confirmed. It is important to identify the structure of perceptions of "importance and practice" by covariance from the factor analysis.[31,32] We decided that it would be appropriate to conduct an exploratory factor analysis first, followed by the maximum likelihood method and Promax rotation.

STUDY PROTOCOL

We surveyed the perception of emergency nurses in emergency and critical care centers around Japan to learn more about how they support SDMs in the real world. We used

TABLE 1
Survey questionnaire form

Category	#	Question items
Care that considers the needs of patients' family members	1	Communicate the patient's current situation to the family in an easy-to-understand manner.
	2	Well groom the patient before the family visits so the family does not feel sad.
	3	Coordinate the physician's explanation of the situation so that it can be discussed with less confused family members.
	4	Make an effort to answer any questions the patient's family has about the patient's condition, following the physician's explanation.
	5	Observe the family's reactions and ensure they understand the physician's explanation of the patient's condition.
	6	Make an effort to consider the condition of family members.
	7	If the family has any requests or questions after the surrogate decision making, make efforts to connect them with a physician.
Support with comprehending the patient's current condition	8	Check whether the patient has an advance directive or living will.
	9	Before asking for surrogate decision making, ask the family to check the patient's current condition while explaining the patient's need for nursing care.
	10	Make it clear to the family that the nurse is there to support surrogate decision making.
	11	Be proactive in interacting with the family, ensuring that questions about surrogate decision making are answered.
	12	Observe and interact with the family to determine whether more individuals can provide support.
	13	Attend the physician's explanation of the patient's condition to the family.
Compassionate support for family members	14	Listen to the patient's family member when they talk about difficulties they face when acting as a surrogate decision maker.
	15	Listen to family members to see whether the surrogate decision maker and other family members hold contradictory views.
	16	If the surrogate decision maker and other family members have contradictory perspectives, arrange a health professional meeting.
	17	Make it clear that family members can take their time making a surrogate decision.
	18	Arrange an opportunity for the family surrogate decision maker to reflect on and settle on their decision if they have to decide under time constraints.
	19	Engage with family members while anticipating that they may start questioning their decision after surrogate decision making.
	20	Inform family members that they can express their opinions at any time and review the treatment plan they had previously chosen.

continued

TABLE 1
Continued

Category	#	Question items
Support from other professionals	21	Arrange an opportunity for family members to receive satisfactory explanations from a doctor or other professionals on the treatment plan for which they made a surrogate decision.
	22	Arrange the schedule so that a briefing can be held with other professionals.
	23	Discuss with other professional surrogate decision making with the patient and their family.
	24	Collaborate with other professionals, and make efforts to provide support to family members acting as surrogate decision makers.
	25	After surrogate decision making, provide support (follow-up care) to the surrogate decision maker who may be experiencing regret, self-blame, and hesitation.

an original questionnaire with 25 items concerning the surrogate decision to understand the importance and actual practice situation for the support of SDMs.

The final survey form, which was prepared and made available online between July 18 and August 18, 2017, is presented in Table 1. The participants used a rapid response code or a URL link to enter the website. A higher response rate was sought during the research, so 2 emails were sent to the institution's representative. Anonymous data collection and role-based secure login access were used to protect data privacy.

STATISTICAL ANALYSIS

For the reliability of the survey form, Cronbach's α coefficient was obtained for each item, and the internal consistency was verified. Exploratory factor analysis was used as the factor structure of the questionnaire, and the maximum likelihood method was selected because it established agreement even if normality was not obtained. For the factor rotation, we adopted the Promax rotation, which is close to the hypothesis of this study.[32]

All statistical parameters, including validity, were incorporated in the consultation with experts in statistics. IBM SPSS Ver.25 for Windows and IBM SPSS Amos ver. 25 were used for the analysis. The level of significance for statistical tests was set at $P < .05$. Moreover, nurses' perceptions of nursing support were obtained from survey questions. A 4-point Likert scale with answers ranging from "always consider it important" to "consider it completely unimportant" was used to assess the perception of the practice. Higher scores indicated that the participants considered the given method important and implemented it frequently. As a goodness-of-fit index, we calculated the comparative fit index (CFI), and the criterion for goodness of fit was set at CFI > 0.90.[33,34] The path diagram validated using the goodness-of-fit index and CFI is presented in Figure.

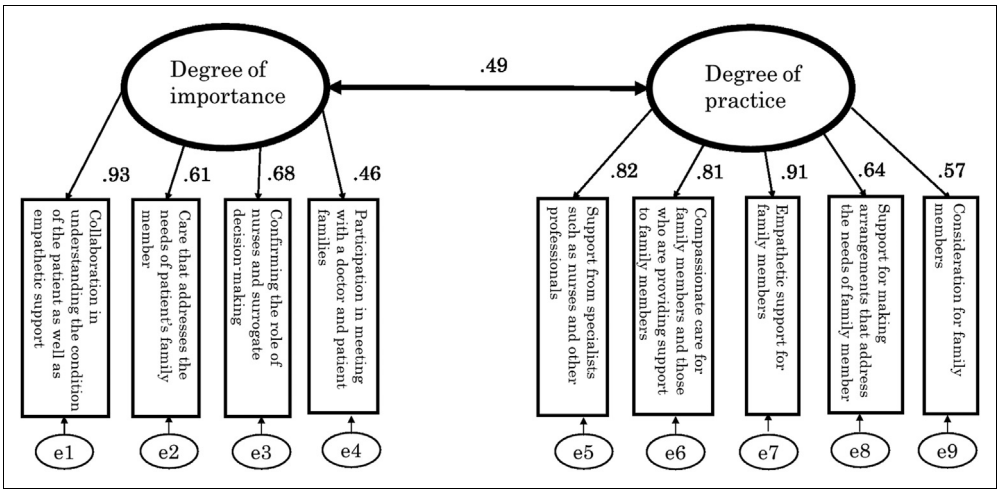
ETHICAL CONSIDERATIONS

This study complied with the ethical principles of the Japanese Nursing Association, which are based on "an ethics statement for nurses and the ethical guidelines for nursing studies." Before commencing this study, approval was obtained from the Iryo Sosei University Research Ethics Committee (approval number: 17-03).

Results

The characteristics of the study participants are presented in Table 2. The study participants had a mean age of 35.6 (SD = 8.1) years, a mean length of working as a nurse of 13.2 (SD = 7.9) years, and a mean length of service as an emergency nurse of 5.1 (SD = 4.2) years. In terms of job title, 131 participants answered "other," meaning that most of them did not have a senior position such as "head nurse" or "supervisor." The summary of the emergency care system of the facilities participating in the study is presented in Table 3. As a result, most facilities participating (90.2%) in this study were tertiary emergency hospitals.

We first validated the reliability and validity of our established questionnaire form. The Cronbach's α



coefficient for "the degree of importance perceived by emergency nurses in providing support to family SDMs" was 0.936, whereas that for "the degree of practice perceived by nurses in providing support to family SDMs" was 0.933. Meanwhile, the Cronbach's α coefficient for each category of "the degree of importance perceived by nurses in providing support to family SDMs" and "the degree of practice perceived by nurses in providing support to family SDMs" was approximately 0.7 to 0.9. In addition, the Kaiser-Meyer-Olkin measure of sampling adequacy was 0.9 or higher for "the degree of importance perceived by nurses in providing support to family surrogate decision makers" and "the degree of practice perceived by nurses in providing support to family SDMs." Furthermore, the confidence coefficient of the 25 question items for the degrees of importance and perceived practice was 0.9 or higher. Based on these results, we concluded that the questionnaire we developed was appropriate for use in the purpose of this study.

We then evaluated a factor analysis of emergency nurses' degrees of importance and practice in supporting family SDMs, as shown in Tables 4 and 5.

We identified 4 factors related to the degree of importance and 5 related to the degree of practice, with an eigenvalue of ≥1.0. by Promax rotation analysis of 24 items. The factor items were categorized based on their factor loading (0.3 or greater). The details of the factor analysis are presented as the degree of perceived importance (Table 4) and the degree of practice perceived (Table 5). We identified 4 elements of necessary support for patient families making surrogate decisions as perceived by emergency nurses: "collaboration in understanding the condition of the patient as well as empathetic support," "care that addresses the needs of patient's family members," "confirming the role of nurses and surrogate decision making," and "participation in meeting with a doctor and patient families." In addition, we also identified 5 elements of practice for patient families making surrogate decisions as perceived by emergency nurses: "support from specialists such as nurses and other professionals," "compassionate care for family members and those who are providing support to family members," "empathetic support for family members," "support for making arrangements that address the needs of family members," and "considerations for family members." A covariance structure analysis was performed to analyze the relationship between the categories of the degrees of importance and practice obtained through factor analysis. The results of the covariance structure analysis, as shown in the Figure, indicate significant standardized estimates for all relationships. The goodness-of-fit index was CFI = 0.912, suggesting a sufficient level of goodness of fit. An examination of categories starting with the one with the highest standardized estimate found that the coefficient between "the degree of importance perceived by nurses in providing support for surrogate decision making" and "collaboration in understanding the condition of the patient as well as empathetic support" was 0.93.

In addition, the coefficients between "the degree of practice perceived by nurses in providing support for surrogate decision making" and the categories "empathetic support for family members," "support from specialists such as nurses and other professionals," and "compassionate

TABLE 2
Overview of the study participants ($N = 164$)

Study participants	$N = 164$
Age	35.6 ± 8.1
Duration of nurse's experience (y)	13.2 ± 7.9
Duration of working at an emergency center (y)	5.1 ± 4.2
Type of qualification	
Nurse specializing in acute care and seriously ill patients	2 (1.2)
Certified nurse specializing in emergency nursing	9 (5.5)
Certified nurse specializing in intensive care	3 (1.8)
Specialist/certified nurse in another field	4 (2.4)
Another certificate related to emergency and critical care centers	29 (17.7)
Another certificate not related to emergency and critical care centers	6 (3.7)
Job title	
Head nurse	8 (4.9)
Supervisor (deputy head nurse)	19 (11.6)
Deputy supervisor	6 (3.7)
Other (the staff with non-managerial position)	131 (79.9)

Mean ± standard deviation; numbers (%).

TABLE 3
Summary of the facilities participating in the study and their emergency medical care systems ($N = 64$)

Facilities participating	$N = 64$
Number of nurses for each ward	29.8 ± 8.4
Number of doctors dedicated to the ward	6.6 ± 6.9
Emergency care system	
Primary emergency hospital	4 (2.4)
Secondary emergency hospital	12 (7.3)
Tertiary emergency hospital	148 (90.2)

Mean ± standard deviation; numbers (%).

care for family members and those who are providing support to family members" were 0.91, 0.82, and 0.81, respectively. Moreover, the coefficient between "the degree of importance perceived by nurses in providing support for surrogate decision making" and "the degree of practice perceived by nurses in providing support for surrogate decision making" was 0.49.

Discussion

SDMs are tasked with making life-sustaining treatment decisions during a period of uncertainty and worry. In clinical practices, which are conducted according to the patient's consent, such as advance directives and living wills, the SDMs need to be supported throughout the care delivery process by the clinical and nursing teams.[23,35,36] They frequently feel unprepared for this job, are burdened by representation, and are emotionally drained by having to make life-or-death treatment decisions in a short period.[23] Approximately 80% of family members of critical care patients in the ICU have been reported to suffer from post-traumatic stress disorder,[22] and severe post-traumatic stress reactions were associated with increased rates of anxiety and depression and reduced quality of life. It has also been reported that 1 in 3 SDMs experiences psychological sequelae such as regret, which can linger for months after the patient's death.[23] Nearly half of the families experienced conflicts with health care providers during their family member's hospitalization, and most of these conflicts were related to what they perceived as poor communication.[37] In addition, a French study found that half of the family members did not understand the diagnosis, prognosis, and treatment after meeting with the doctor.[38] The following is a discussion of our findings regarding the importance of support for SDMs and their current status.

COMPOSING ELEMENTS OF NURSES' PERCEPTION IN PROVIDING SUPPORT TO FAMILY SDMS

This study revealed that emergency nurses perceive "collaboration in understanding the condition of the patient as well as emphatic support" as the most essential support. In contrast, compared with the high level of perception, the level of practice was found to be low in relation to "support from specialists such as nurses and other professionals" and "support for making arrangements that address the needs of family members." In response to this current situation, multidisciplinary support for the patient's situation may be necessary to provide professional support and support procedures in line with the needs of the family first, communicate effectively between the patient's family and the medical team, and improve the quality of the patient's treatment.

TABLE 4
Results of factor analysis for the degree of importance perceived by nurses in providing support to surrogate decision makers

Question #	Mean	Factor loading			
		Factor 1	Factor 2	Factor 3	Factor 4
[Collaboration in understanding the condition of the patient and empathetic support]	50.0				
24		0.83	0.42	0.61	0.21
23		0.79	0.44	0.53	0.26
21		0.78	0.50	0.42	0.52
25		0.76	0.55	0.38	0.39
16		0.74	0.44	0.48	0.47
15		0.74	0.44	0.33	0.49
19		0.72	0.57	0.36	0.59
18		0.70	0.45	0.45	0.50
17		0.69	0.49	0.38	0.58
14		0.68	0.47	0.36	0.57
20		0.66	0.53	0.41	0.59
11		0.66	0.59	0.46	0.54
22		0.61	0.25	0.35	0.32
12		0.57	0.39	0.40	0.41
9		0.56	0.53	0.52	0.42
[Care that addresses the needs of patient's family member]	26.1				
7		0.44	0.70	0.25	0.42
2		0.31	0.64	0.25	0.30
4		0.28	0.61	0.22	0.32
1		0.30	0.60	0.16	0.16
5		0.40	0.59	0.28	0.45
6		0.42	0.55	0.30	0.33
3		0.33	0.41	0.32	0.32
[Confirming the role of nurses and surrogate decision making]	6.8				
10		0.55	0.37	0.95	0.31
8		0.56	0.52	0.57	0.36
[Participation in meeting with a doctor and patient families]	4.0				
13		0.41	0.31	0.26	0.58
Interfactor correlation					
Factor 1		1.000	0.611	0.593	0.545
Factor 2		0.611	1.000	0.426	0.555
Factor 3		0.593	0.426	1.000	0.298
Factor 4		0.545	0.555	0.298	1.000

Factor extraction method: maximum likelihood estimation; rotation method: Promax with Kaiser normalization.

TABLE 5
Results of factor analysis for the degree of practice perceived by nurses in providing support to surrogate decision makers

Question #	Mean	Factor loading				
		Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
[Support from specialists such as nurses and other professionals]	16.7					
23		0.90	0.54	0.60	0.37	0.45
24		0.80	0.60	0.62	0.29	0.48
22		0.79	0.47	0.46	0.20	0.21
10		0.62	0.52	0.49	0.41	0.37
8		0.53	0.44	0.53	0.49	0.35
13		0.40	0.39	0.34	0.16	0.12
[Compassionate care for family members and those who are providing support to family members]	12.2					
14		0.54	0.86	0.62	0.41	0.35
15		0.55	0.81	0.63	0.36	0.42
16		0.65	0.65	0.50	0.40	0.23
12		0.46	0.56	0.47	0.41	0.37
[Empathetic support for family members]	25.3					
21		0.57	0.64	0.78	0.46	0.43
17		0.59	0.72	0.76	0.49	0.34
18		0.65	0.64	0.75	0.42	0.40
20		0.52	0.58	0.74	0.42	0.31
19		0.45	0.47	0.70	0.32	0.52
11		0.55	0.63	0.65	0.49	0.51
25		0.61	0.46	0.61	0.44	0.41
[Considerations for family members]	16.2					
1		0.11	0.20	0.22	0.70	0.32
9		0.52	0.45	0.56	0.67	0.34
5		0.20	0.33	0.48	0.59	0.38
4		0.32	0.41	0.48	0.57	0.53
3		0.39	0.35	0.36	0.52	0.32
[Support for making arrangements that address the needs of family members]	10.0					
7		0.38	0.31	0.50	0.36	0.64
2		0.21	0.24	0.30	0.42	0.63
6		0.41	0.40	0.40	0.34	0.61
Interfactor correlation						
Factor 1		1.000	0.660	0.680	0.420	0.430
Factor 2		0.660	1.000	0.720	0.490	0.420
Factor 3		0.680	0.720	1.000	0.570	0.540
Factor 4		0.420	0.490	0.570	1.000	0.490
Factor 5		0.430	0.420	0.540	0.490	1.000

Factor extraction method: maximum likelihood estimation; rotation method: Promax with Kaiser normalization.

To help patients' families as SDMs, a care team of nurses and other professionals will be needed to prioritize the patients' and their families' needs.

According to published literature, the shared decision-making approach is essential to family support to improve the quality of decision making at end of life[39] and in emergency settings.[40] This is also true in Japanese emergency and intensive care settings, consistent with the findings that collective choices by a team of medical experts, including the clinicians and nurses accountable for the patient, are necessary.[41]

In addition, few emergency nurses recognized that they should "participate in the meeting with doctors and family members." However, emergency nurses are expected to participate in family meetings whenever possible so that they can provide emotional care to the family,[29] and there is a need to reconsider the perception of the nurse's role during informed consent. This team-based approach will significantly enhance psychological assistance for family members. This team should encourage families to make well-informed decisions instead of relying on their emotions.

Family members have apprehensions in approaching the patient relying on mechanical life support devices and tubing, leading to their having feelings of "living with dying."[42] The factor analysis results demonstrated that the nurses in this circumstance offer support to the family members as indicated by the factor "empathetic support for family members." They also provide support that facilitates collaboration within the family and helps family members approach the patient while considering the patient's condition. Nurses should help family members understand and accept the critical nature of the patient. The process of families coping with various difficulties in surrogate decision making in the ICU has shown that they need a team of professionals, including physicians, nurses, and social workers, to build trust and provide emotional support with the SDMs.[43] If family members as SDMs can be provided the correct information and possible options for treatment by emergency nurses, it will be easier for them to make decisions without being influenced by the situation or circumstances.

STRUCTURE OF THE DEGREES OF IMPORTANCE AND PRACTICE PERCEIVED BY NURSES IN PROVIDING SUPPORT TO FAMILY SDMS

To promote surrogate decision making, nurses need to be aware of the importance of their role and put it into practice, according to the findings of this study.

Support for SDMs from nurses was grouped into 2 categories: "partnership in understanding the patient's condition and offering sympathetic support" and "confirming nurses' function and the role of surrogate decision making." Nurses must provide physical and psychological assistance to family members functioning as SDMs, reducing their demands and allowing them to grasp the patient's circumstances better.

This is considered necessary in supporting surrogate decision making for health professionals to avoid subjective bias and concentrate on the patient.[44] An earlier study also mentioned this aspect as a factor of family support.[39] In the present study, the highest path coefficient was observed for the importance of support for surrogate decision making. This may be because interprofessional collaboration involving doctors and nurses is key to adequate family support and because such collaboration significantly affects support quality.

Meanwhile, the path coefficient for the observation variables of the degree of practice perceived by nurses was 0.80 or more significant for the following 3 items: "empathetic support for family members," "support from specialists such as nurses and other professionals," and "compassionate care for family members and those who are providing support to family members." Nurses and other health professionals support SDMs while upholding ethical standards in situations where it is unlikely that the patient completely recovers. Thus, as suggested in this study, nurses need to understand the characteristics of family members who act as SDMs in emergency medical settings. While keeping the dilemma between professional and personal values under check, nurses should support them while anticipating the possible consequences that they may face.

In emergency medicine, treatment options need to be urgently selected. Health professionals must explain the prognosis associated with the treatment, including the advantages and disadvantages of the chosen option, to family members without making them feel that they are forced to select specific opportunities so that they understand the situation and make effective decisions.[1] Such explanations can help prevent family members from developing anxiety and exhibiting signs of post-traumatic stress disorder due to vague or incoherent answers.[45]

In the structure elements, emergency nurses perceive, to support SDMs, the degrees of importance and practice that mutually affect each other. For nurses to put support for surrogate decision making into practice, they should work with other professionals based on the intentions of the patient and family members and examine and discuss the opinions of the care team with family members during the decision-making process. Although it has been shown that surrogate decision making requires a consensus-building process involving a multidisciplinary medical

team and sufficient repeated discussions until a decision is made, our results are consistent with those reported in a previous study,[46] which found that such coordination is complex in the emergency setting and that multidisciplinary involvement in the decision-making process is insufficient.

Limitations

Because the results of this study were based on only nurses working at emergency and critical care centers, it focused only on the aspect of nursing support as support for proxy decision making, despite the need for collaboration between other professions. In the future, doctors and other professionals such as caregivers and mental health professionals should be studied, and also research in different regions is needed.

In addition, inexpensive tools have been developed in recent years to assist distressed patient families.[24] Although our study was conducted with emergency nurses, it is necessary to examine the effectiveness of nursing support using tools and other methods with Japanese patient families.

Furthermore, during the recent COVID-19 pandemic, family members had limited interaction with patients and health care professionals, making proxy decision-making support even more difficult.[47] In addition, during treatment, rapid treatment decisions and procedures are required, placing a heavy burden on family members.[48] This particular situation calls for new ways of patient support and therefore new research is required to prepare for the spread of infection.

Implications for Emergency Nurses

Based on the findings of this study emergency nurses should work collaborately with the healthcare team to support families when they need to make proxy decisions for their loved ones.

Conclusion

Compassionate support for family members, help from specialists such as nurses and other professionals, and empathetic care for and offering of support to family members all contributed to valuable practice. We found that emergency nurses' perceptions of importance and practice were closely linked. Collaborative comprehension of the patient's condition and sympathetic support were considered to be the most critical factors in this study.

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Author Disclosures

Conflicts of interest: none to report.

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REFERENCES

1. Bibas L, Peretz-Larochelle M, Adhikari NK, et al. Association of surrogate decision-making interventions for critically ill adults with patient, family, and resource use outcomes: a systematic review and meta-analysis. *JAMA Netw Open*. 2019;2(7):e197229. https://doi.org/10.1001/jamanetworkopen.2019.7229
2. Silveira MJ, Kim SY, Langa KM. Advance directives and outcomes of surrogate decision making before death. *N Engl J Med*. 2010;362(13):1211-1218. https://doi.org/10.1056/NEJMsa0907901
3. Kon AA, Davidson JE, Morrison W, et al. Shared decision making in ICUs: an American College of Critical Care Medicine and American Thoracic Society policy statement. *Crit Care Med*. 2016;44(1):188-201. https://doi.org/10.1097/CCM.0000000000001396
4. Zahuranec DB, Anspach RR, Roney ME, et al. Surrogate decision makers' perspectives on family members' prognosis after intracerebral hemorrhage. *J Palliat Med*. 2018;21(7):956-962. https://doi.org/10.1089/jpm.2017.0604
5. Miller JJ, Morris P, Files DC, Gower E, Young M. Decision conflict and regret among surrogate decision makers in the medical intensive care unit. *J Crit Care*. 2016;32:79-84. https://doi.org/10.1016/j.jcrc.2015.11.023
6. Tanaka M, Ohnishi K, Enzo A, Okita T, Asai A. Grounds for surrogate decision-making in Japanese clinical practice: a qualitative survey. *BMC Med Ethics*. 2021;22(1):1-12. https://doi.org/10.1186/s12910-020-00573-4
7. Spatz ES, Krumholz HM, Moulton BW. The new era of informed consent: getting to a reasonable-patient standard through shared decision making. *JAMA*. 2016;315(19):2063-2064. https://doi.org/10.1001/jama.2016.3070

8. Miller TA, DiMatteo MR. Physician–patient communication. In: Sweeny K, Robbins ML, Cohen LM, eds. *The Wiley Encyclopedia of Health Psychology*. John Wiley & Sons; 2020:469-474.
9. Miller B. Nurses preparation for advanced directives: an integrative review. *J Prof Nurs*. 2018;34(5):369-377. https://doi.org/10.1016/j.profnurs.2018.07.001
10. Sudore RL, Lum HD, You JJ, et al. Defining advance care planning for adults: a consensus definition from a multidisciplinary Delphi panel. *J Pain Symptom Manage*. 2017;53(5):821-832. https://doi.org/10.1016/j.jpainsymman.2016.12.331
11. Wu AM, Tang CS, Yogo M. Death anxiety, altruism, self-efficacy, and organ donation intention among Japanese college students: a moderated mediation analysis. *Aust J Psychol*. 2013;65(2):115-123. https://doi.org/10.1111/ajpy.12003
12. Miyashita J, Shimizu S, Azuma T, et al. Experience as an informal caregiver and discussions regarding advance care planning in Japan. *J Pain Symptom Manage*. 2021;61(1):63-70. https://doi.org/10.1016/j.jpainsymman.2020.07.010
13. Teixeira AA, Hanvey L, Tayler C, et al. What do Canadians think of advanced care planning? Findings from an online opinion poll. *BMJ Support Palliat Care*. 2015;5(1):40-47. https://doi.org/10.1136/bmjspcare-2013-000473
14. Thiede E, Levi BH, Lipnick D, et al. Effect of advance care planning on surrogate decision makers' preparedness for decision making: results of a mixed-methods randomized controlled trial. *J Palliat Med*. 2021;24(7):982-993. https://doi.org/10.1089/jpm.2020.0238
15. Schenker Y, Barnato A. Expanding support for "upstream" surrogate decision making in the hospital. *JAMA Intern Med*. 2014;174(3):377-379. https://doi.org/10.1001/jamainternmed.2013.13284
16. White DB, Angus DC, Shields A-M, et al. A randomized trial of a family-support intervention in intensive care units. *N Engl J Med*. 2018;378(25):2365-2375. https://doi.org/10.1056/NEJMoa1802637
17. Black MD, Vigorito MC, Curtis JR, et al. A multifaceted intervention to improve compliance with process measures for ICU clinician communication with ICU patients and families. *Crit Care Med*. 2013;41(10):2275-2283. https://doi.org/10.1097/CCM.0b013e3182982671
18. Kodali S, Stametz R, Clarke D, et al. Implementing family communication pathway in neurosurgical patients in an intensive care unit. *Palliat Support Care*. 2015;13(4):961-967. https://doi.org/10.1017/s1478951514000650
19. Curtis JR, Engelberg RA, Wenrich MD, Shannon SE, Treece PD, Rubenfeld GD. Missed opportunities during family conferences about end-of-life care in the intensive care unit. *Am J Respir Crit Care Med*. 2005;171(8):844-849. https://doi.org/10.1164/rccm.200409-1267OC
20. Selph RB, Shiang J, Engelberg R, Curtis JR, White DB. Empathy and life support decisions in intensive care units. *J Gen Intern Med*. 2008;23(9):1311-1317. https://doi.org/10.1007/s11606-008-0643-8
21. Schenker Y, Tiver GA, Hong SY, White DB. Association between physicians' beliefs and the option of comfort care for critically ill patients. *Intensive Care Med*. 2012;38(10):1607-1615. https://doi.org/10.1007/s00134-012-2671-4
22. Azoulay E, Pochard F, Kentish-Barnes N, et al. Risk of post-traumatic stress symptoms in family members of intensive care unit patients. *Am J Respir Crit Care Med*. 2005;171(9):987-994. https://doi.org/10.1164/rccm.200409-1295OC
23. Wendler D, Rid A. Systematic review: the effect on surrogates of making treatment decisions for others. *Ann Intern Med*. 2011;154(5):336-346. https://doi.org/10.7326/0003-4819-154-5-201103010-00008
24. Suen AO, Butler RA, Arnold R, et al. Developing the family support tool: an interactive, web-based tool to help families navigate the complexities of surrogate decision making in ICUs. *J Crit Care*. 2020;56:132-139. https://doi.org/10.1016/j.jcrc.2019.12.002
25. Suen AO, Butler RA, Arnold RM, et al. A pilot randomized trial of an interactive web-based tool to support surrogate decision makers in the intensive care unit. *Ann Am Thorac Soc*. 2021;18(7):1191-1201. https://doi.org/10.1513/AnnalsATS.202006-585OC
26. Drury A, Muscat DM, Wibrow B, Jacques A, Anstey M. Integrating the choosing wisely 5 questions into family meetings in the intensive care unit: a randomized controlled trial investigating the effect on family perceived involvement in decision-making. *J Patient Experience*. 2022;9:23743735221092623. https://doi.org/10.1177/23743735221092623
27. Pignatiello G, Hickman Jr RL, Hetland B. End-of-life decision support in the ICU: where are we now? *West J Nurs Res*. 2018;40(1):84-120. https://doi.org/10.1177/0193945916676542
28. Hov R, Hedelin B, Athlin E. Good nursing care to ICU patients on the edge of life. *Intensive Crit Care Nurs*. 2007;23(6):331-341. https://doi.org/10.1016/j.iccn.2007.03.006
29. White DB, Cua SM, Walk R, et al. Nurse-led intervention to improve surrogate decision making for patients with advanced critical illness. *Am J Crit Care*. 2012;21(6):396-409. https://doi.org/10.4037/ajcc2012223
30. Azoulay E, Chaize M, Kentish-Barnes N. Involvement of ICU families in decisions: fine-tuning the partnership. *Ann Intensive Care*. 2014;4:37. https://doi.org/10.1186/s13613-014-0037-5
31. Kondo A. Advanced practice nurses in Japan: education and related issues. *J Nurs Care S*. 2013;5:2167-2168. https://doi.org/10.4172/2167-1168.S5-004
32. Dielman TE, Cattell RB, Wagner A. Evidence on the simple structure and factor invariance achieved by five rotational methods on four types of data. *Multivariate Behav Res*. 1972;7(2):223-242. https://doi.org/10.1207/s15327906mbr0702_7
33. Hooper D, Coughlan J, Mullen MR. Structural equation modelling: guidelines for determining model fit. *Electron J Bus Res Methods*. 2008;6(1):53-60. https://doi.org/10.11153/jaccn.9.6
34. Kline RB. *Principles and Practice of Structural Equation Modeling*. Guilford publications; 2015.
35. You JJ, Dodek P, Lamontagne F, et al. What really matters in end-of-life discussions? Perspectives of patients in hospital with serious illness and their families. *CMAJ*. 2014;186(18):E679-E687. https://doi.org/10.1503/cmaj.140673
36. Kon AA, Davidson JE, Morrison W, Danis M, White DB. Shared decision-making in intensive care units. Executive summary of the American College of Critical Care Medicine and American Thoracic Society policy statement. *Am J Respir Crit Care Med*. 2016;193(12):1334-1336. https://doi.org/10.1164/rccm.201602-0269ED

37. Abbott KH, Sago JG, Breen CM, Abernethy AP, Tulsky JA. Families looking back: one year after discussion of withdrawal or withholding of life-sustaining support. *Crit Care Med*. 2001;29(1):197-201. https://doi.org/10.1097/00003246-200101000-00040
38. Azoulay E, Chevret S, Leleu G, et al. Half the families of intensive care unit patients experience inadequate communication with physicians. *Crit Care Med*. 2000;28(8):3044-3049. https://doi.org/10.1097/00003246-200008000-00061
39. Kryworuchko J, Hill E, Murray MA, Stacey D, Fergusson DA. Interventions for shared decision-making about life support in the intensive care unit: a systematic review. *Worldviews Evid-Based Nurs*. 2013;10(1):3-16. https://doi.org/10.1111/j.1741-6787.2012.00247.x
40. Lu Q, Ji J, Lu X, Yin Q, Yang Y. The perspectives of surrogates and healthcare providers regarding SDM (shared decision-making). *Dis Markers*. 2023;2023:6251492. https://doi.org/10.1155/2023/6251492
41. Chikada A, Takenouchi S, Nin K, Mori M. Definition and recommended cultural considerations for advance care planning in Japan: a systematic review. *Asia Pac J Oncol Nurs*. 2021;8(6):628-641. https://doi.org/10.4103/apjon.apjon-2137
42. Sinuff T, Giacomini M, Shaw R, Swinton M, Cook DJ. CARENET. "Living with dying": the evolution of family members' experience of mechanical ventilation. *Crit Care Med*. 2009;37(1):154-158. https://doi.org/10.1097/CCM.0b013e318192fb7c
43. Sui W, Gong X, Qiao X, et al. Family members' perceptions of surrogate decision-making in the intensive care unit: a systematic review. *Int J Nurs Stud*. 2023;137:104391. https://doi.org/10.1016/j.ijnurstu.2022.104391
44. Ho KM, English S, Bell J. The involvement of intensive care nurses in end-of-life decisions: a nationwide survey. *Intensive Care Med*. 2005;31(5):668-673. https://doi.org/10.1007/s00134-005-2613-5
45. Fridh I. Caring for the dying patient in the ICU–the past, the present and the future. *Intensive Crit Care Nurs*. 2014;30(6):306-311. https://doi.org/10.1016/j.iccn.2014.07.004
46. Miyanaga R, Poudyal H. Participation of nurses and care workers in the decision-making process for people with dementia in Japan: discussion paper. *Int J Nurs Stud*. 2019;96:91-98. https://doi.org/10.1016/j.ijnurstu.2019.02.011
47. Fusi-Schmidhauser T, Preston NJ, Keller N, Gamondi C. Conservative management of COVID-19 patients-emergency palliative care in action. *J Pain Symptom Manage*. 2020;60(1):e27-e30. https://doi.org/10.1016/j.jpainsymman.2020.03.030
48. Van Buren NR, Weber E, Bliton MJ, Cunningham TV. In this together: navigating ethical challenges posed by family clustering during the Covid-19 pandemic. *Hastings Cent Rep*. 2021;51(2):16-21. https://doi.org/10.1002/hast.1241

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What Are the Care Needs of Families Experiencing Sudden Cardiac Arrest? A Survivor- and Family-Performed Systematic Review, Qualitative Meta-Synthesis, and Clinical Practice Recommendations

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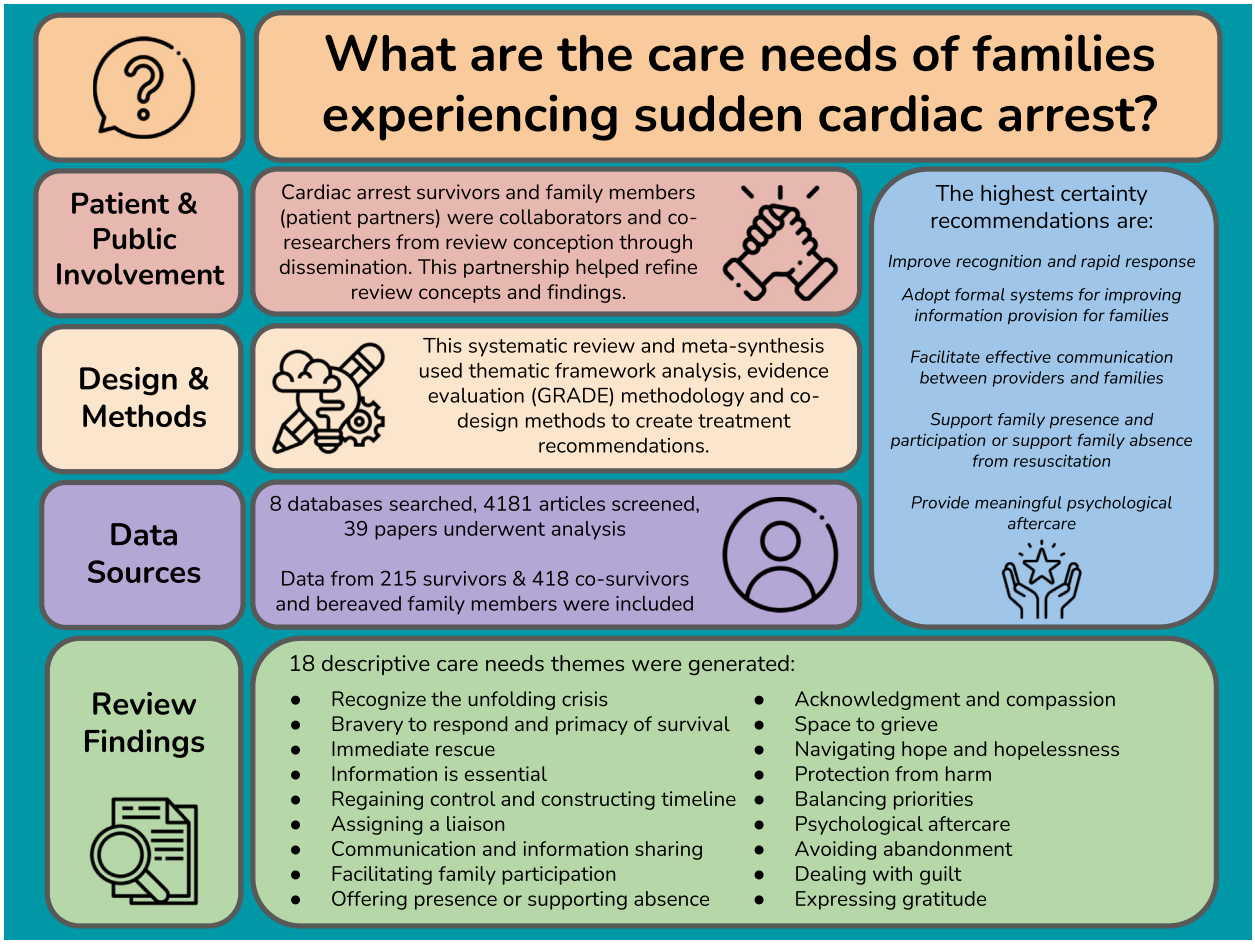

What Are the Care Needs of Families Experiencing Sudden Cardiac Arrest? A Survivor- and Family-Performed Systematic Review, Qualitative Meta-Synthesis, and Clinical Practice Recommendations

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Contribution to Emergency Nursing Practice

- Meeting the priority care needs of families experiencing cardiac arrest requires the action of individual nurses and supportive health systems that allow for the sharing of information, sharing decision making, accommodating family preferences and cultural needs, and aftercare and follow-up.
- This project exemplifies the nurse-patient and family partnerships that are possible in health research, quality improvement and co-design.
- Emergency nurses who provide cardiac arrest care have an important role in helping the families of the victims in both the intra-arrest and postarrest periods. Meeting the priority, high-certainty care needs of families experiencing cardiac arrest requires the action of individual nurses and supportive health systems that allow for the sharing of information, sharing decision making, accommodating family preferences and cultural needs, and aftercare and follow-up.

Abstract

Introduction: Cardiac arrest care systems are being designed and implemented to address patients', family members', and survivors' care needs. We conducted a systematic review and a meta-synthesis to understand family experiences and care needs during cardiac arrest care to create treatment recommendations.
Methods: We searched eight electronic databases to identify articles. Study findings were extracted, coded and synthesized.

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Confidence in the quality, coherence, relevance, and adequacy of data underpinning the resulting findings was assessed using GRADE-CERQual methods.

Results: In total 4181 studies were screened, and 39 met our inclusion criteria; these studies enrolled 215 survivors and 418 family participants—which includes both co-survivors and bereaved family members. From these studies findings and participant data we identified 5 major analytical themes: (1) When the crisis begins we must respond; (2) Anguish from uncertainty, we need to understand; (3) Partnering in care, we have much to offer; (4) The crisis surrounding the victim, ignore us, the family, no longer; (5) Our family's emergency is not over, now is when we need help the most. Confidence in the evidence statements are provided along with our review findings.

Discussion: The family experience of cardiac arrest care is often chaotic, distressing, complex and the aftereffects are long-lasting. Patient and family experiences could be improved for many people. High certainty family care needs identified in this review include rapid recognition and response, improved information sharing, more effective communication, supported presence and participation, or supported absence, and psychological aftercare.

Key words: Family; Family-centered care; Cardiac arrest

Introduction

Each year, sudden cardiac arrest affects millions of families worldwide,[1] resulting in profound psychological and psychosocial consequences regardless of the patient's survival.[2-4] Bereavement is associated with increased mortality risk, decreased physical and mental health, and higher health care service use.[5] Families of critically ill patients, including cardiac arrest survivors, can experience psychological issues, reduced quality of life, unemployment, and lifestyle changes after discharge.[6]

Addressing families' needs in health care is a growing priority. Family-centered approaches, originating in pediatrics, have been used for over 3 decades[7,8] and have led to increased patient-reported quality of care, particularly regarding informational needs.[9] Recently, comprehensive guidelines for family-centered critical care have been published and widely adopted.[10] However, family-centeredness in cardiac arrest care is an emerging topic, with research prioritization starting in 2020.[11]

A 2021 scoping review identified 5 care needs domains for families experiencing cardiac arrest,[12] whereas a 2022 qualitative analysis of Canadian emergency medical services guidelines revealed gaps in family-centered care during out-of-hospital cardiac arrest.[13] Excluding families from resuscitation occurs in both prehospital and in-hospital care systems, despite its positive impact on patients, families, and staff.[14]

Although the potential care needs of families during cardiac arrest have been described in individual studies, no evidence evaluation has been conducted to inform treatment recommendations. This systematic review and meta-synthesis aims to analyze and synthesize descriptions of family experiences and care needs during cardiac arrest to understand how to provide positive experiences for families in cardiac arrest care.

Methods

Our review was registered (CRD42021236431) and our review protocol was peer reviewed and published.[15] We developed our search strategy in consultation with a librarian information specialist and conducted our systematic review and thematic meta-synthesis of qualitative studies reported in accordance with Preferred Reporting Items for Systematic Reviews and Meta-Analyses guidelines.[16] We included studies where the focus was on the experience and self-expressed care needs of families, including survivors, and followed methods used by previous meta-synthesis exploring patient and family preference and satisfaction with care.[17]

REVIEW QUESTIONS

Our review was designed to answer the following questions:

(1) What are the experiences and perceptions of individuals experiencing cardiac arrest of their family member?
(2) What care needs do family members (including survivors) express for themselves and/or the person in cardiac arrest?
(3) What strategies for meeting care needs do family members (including survivors) identify for the prearrest and intra-arrest periods, up until the early postarrest phase—discharge from hospital of the survivor or bereaved family, up to 7 days after.

We defined cardiac arrest event duration (ie, when it begins and when it ends) as beginning with loss of responsiveness, collapse, irregular breathing, seizure, and/or an alarm on a cardiac monitor, lasting until the deceased family member becomes inaccessible (ie, is moved to the morgue) or there was greater certainty about the family member's survival status (which could be many days or months after).[12] Notably, this family- and survivor-developed definition differs from the prevailing biomedical definition that limits cardiac arrest to the period of circulatory standstill to return of spontaneous circulation or declaration of death that has been used in past reviews. We made the revised definition after being advised of its importance and relevance to survivors, cosurvivors, and family members.

Our research question was conceptualized using the SPIDER format (see Table 1) that facilitates rigor in research by defining key elements of nonquantitative research questions.[18]

TABLE 1
Research question framework (in "SPIDER" format)

Sample	Persons experiencing cardiac arrest care of a family member in any setting, both in and out of hospital. Family membership is determined by the patient or, in the case of minors or those without decision-making capacity, by their surrogates. Family members may be unrelated to the patient; they are individuals who provide support and with whom the patient has a significant relationship.[10]
Phenomena of interest	Cardiac arrest and cardiac arrest care including recognition, activation of the emergency response system, cardiopulmonary resuscitation, defibrillation, etc. The cardiac arrest care period of interest for this review is limited to prearrest and intra-arrest periods, up until the early postarrest phase—discharge from hospital of the survivor or bereaved family and 7 days after. The needs of families including formal and informal services and tangible and intangible supports. This may include (but is not limited to) information, presence, resources, and follow-up.
Design	Meta-synthesis of research using interviews, focus group discussions, observation, and in-depth or key informant interviews
Evaluation	Narrative findings describing family members' experience of cardiac arrest and any care needs, preferences, or wishes they express
Research type	Qualitative research and no time or language restrictions

APA, American Psychological Association; SPIDER, sample, phenomena of interest, design, evaluation and research type.

CRITERIA FOR INCLUSION

Study Characteristics

We sought only qualitative studies examining the views and experiences of cardiac arrest of affected families, including survivors. We excluded studies if they only looked at health care providers. There were no time limits applied to our search and no language restriction was imposed. We excluded protocols, single case studies, conference abstracts, and unpublished doctorate or master's theses.

Patient and Family Characteristics

Cardiac arrest of traumatic and nontraumatic etiology were included. Family membership was defined as any individual who provides support and with whom the patient has a significant relationship including persons related or unrelated to the patient.[10] We did not consider the long-term survivor, cosurvivor, and family needs that extend beyond the acute cardiac arrest period, that is, 1 week after discharge from hospital, as defined by our survivor and family coresearchers.

Studies enrolling the families of unborn and stillborn children were excluded; otherwise, there were no age restrictions on the person in cardiac arrest. Studies enrolling persons with a "do not resuscitate" or "do not attempt resuscitation" order in place or where the death was expected were also excluded.

Study Setting

We included studies from any geographical region and any setting, both in and out of hospital, as well as private and public spaces. Given that it was a priority to identify literature from low- and middle-income countries, we engaged

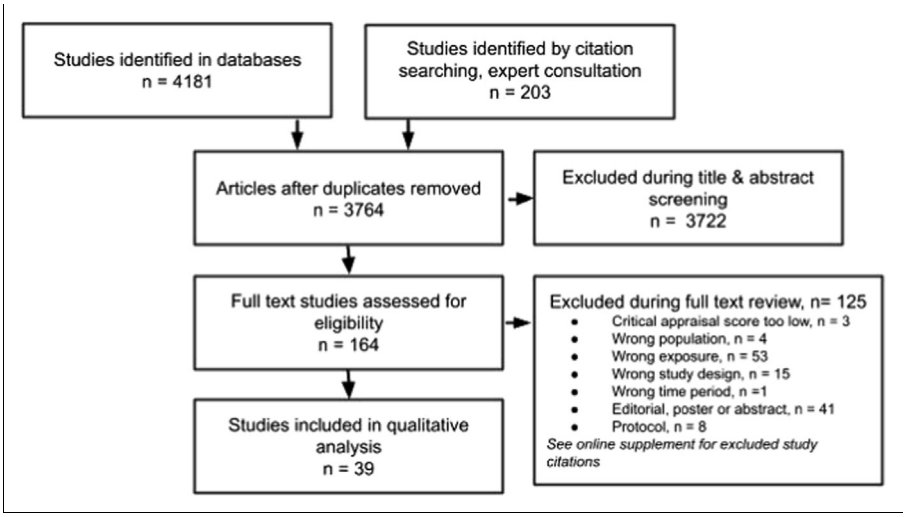

FIGURE 1
Preferred Reporting Items for Systematic Reviews and Meta-Analyses flow diagram.

resuscitation scientists from multiple international resuscitation councils in our search.

Rigor and Reflexivity

Quality standards for rigor in qualitative research[19] require authors undertake deliberate consideration of how their perspectives and opinions influence study design and execution. Throughout the review process, we inventoried, discussed, and considered team member perspectives and biases when making key decisions relating to the review and analysis. Disconfirming data for potential team member biases were consciously sought, to ensure we did not overemphasize data that reinforced our existing positions. This review was completed in collaboration with persons with lived experience of cardiac arrest care. We acknowledge that we are a team that believes that making cardiac arrest care more "family centered" is a worthwhile undertaking and that doing so would improve the experience of care for both family members and providers. Based on our team's work as health care providers, advocates, and change agents and drawing on our lived experiences, we expected to be able to identify feasible strategies to improve the care of families experiencing cardiac arrest.

SEARCH METHODS AND SELECTION OF STUDIES

Our search strategy followed the Cochrane Qualitative Research Methods group recommendations.[20] We searched 8 databases (MEDLINE, Embase, CINAHL, Theses and Dissertations Global, SocIndex, Scopus, Web of Science, PsycINFO) and Google Scholar. We contacted many of the authors of included studies and performed forward citation searching. See study protocol for pilot search and expanded description of search strategy.[15]

Our search strategy was developed in collaboration with an academic librarian search specialist (L.D.). We collated records into Covidence and removed duplicates and irrelevant records. The full texts of studies published in languages other than English were translated into English using freely available online software (ie, Google Translate). To minimize selection bias, at least 2 team members (M.J.D., C.M., K.E.S., K.R., S.A., T.G.) independently screened search results at both the abstract and full-text stages. Selections were compared and disagreements were resolved by discussion and consensus including the review lead (M.J.D.). A kappa statistic was calculated to assess interrater reliability.[21] See Figure 1 for the search flow diagram.

QUALITY ASSESSMENT

We used the Critical Appraisal Skills Program (CASP) quality assessment tool for qualitative studies (Critical Appraisal Skills Program, 2018, and 2020[22]). Two team members independently applied the CASP tool (M.J.D., C.M.). Disagreements were resolved by discussion and consensus. Studies were allocated a score from A to D, where A represented a study with no or few flaws, having high credibility, transferability, dependability, and confirmability; B was a study with flaws, unlikely to affect the credibility, transferability, dependability, and/or confirmability of the study;

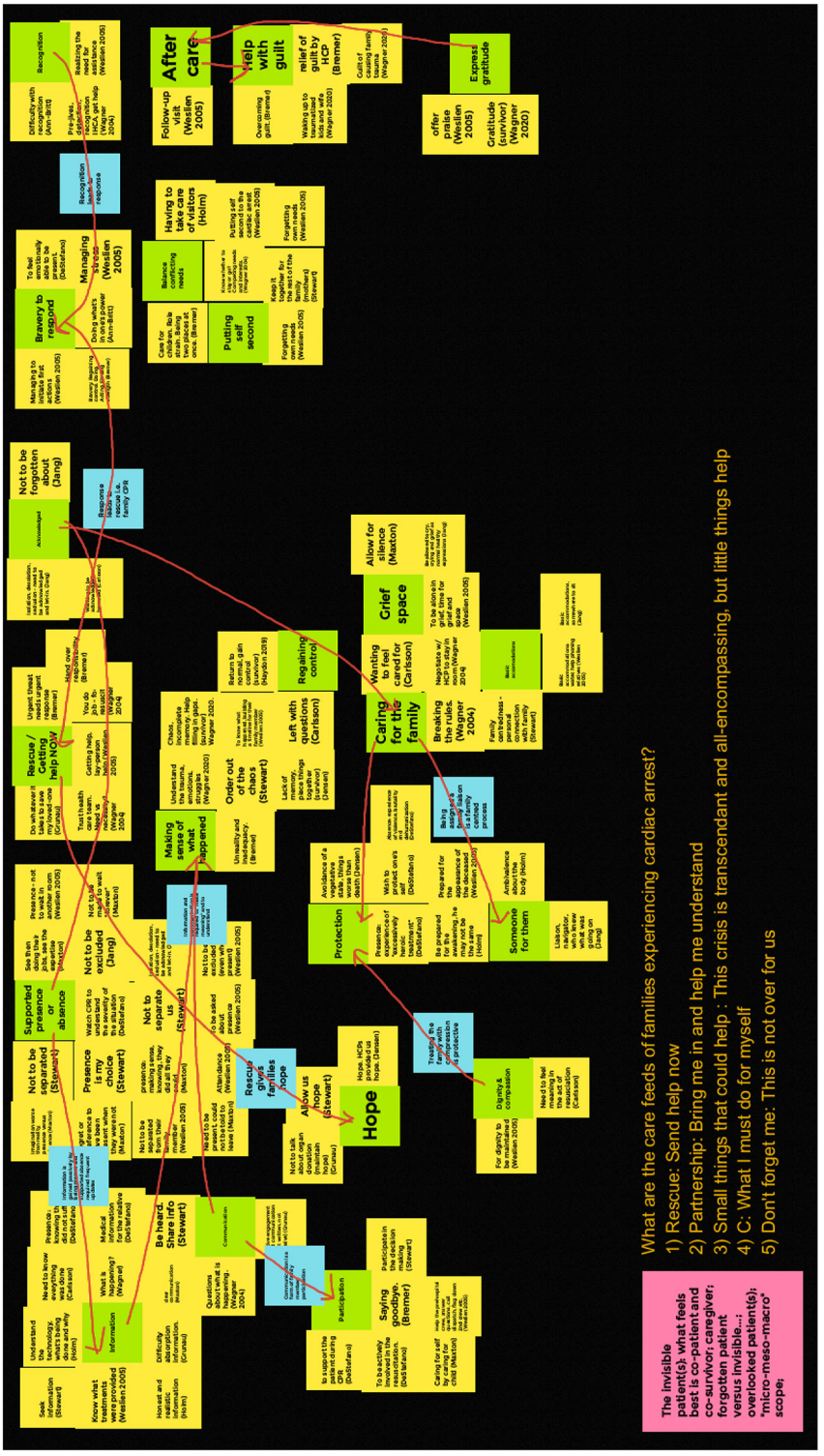

FIGURE 2
Jamboard illustration of cocoding and meta-synthesis.

C was assigned to a study with flaws that may affect the credibility, transferability, dependability, and/or confirmability of the findings; and D was a study with significant flaws that are very likely to affect the credibility, transferability, dependability, and/or confirmability of the study.[19] Studies of adequate quality (score C+ and above) informed the final analysis as part of the Grading of Recommendations Assessment, Development, and Evaluation Confidence in the Evidence from Reviews of Qualitative Research (GRADE-CERQual) approach for assessing confidence in the findings of the systematic review.[23,24] The complete CASP quality assessment for each study reviewed can be found in Supplementary Table 2, in the online supplement.

DATA EXTRACTION AND ANALYSIS

After piloting and refinement, we used a standardized data extraction form to capture relevant data from included studies (see Supplementary Table S2 in the online supplement). We extracted data regarding the first author, publication year, journal, language, participants, setting (country, rural/urban, and type of facility), research methods (method of data collection and analysis framework used), and potential or actual care needs of involved family members. Two authors (M.J.D., C.M.) and a research assistant independently extracted data in duplicate. Any disagreements were resolved through consensus.

DATA SYNTHESIS

We used a 5-stage thematic framework analysis approach to analyze and synthesize data[25,26]: (1) familiarization with the data, (2) identifying the thematic framework, (3) indexing, (4) charting, and (5) mapping and interpretation. We started by reading the included papers closely and repeatedly. We identified an index paper that best reflected the focus of our review and resonated most with our team members with lived experience.[27] The themes and findings identified by the study authors of the index paper were coded and entered into a Jamboard (Alphabet Company, Mountain View, CA) codesign tool for use with other coresearchers with lived experience and a spreadsheet to develop our initial thematic framework (see Figure 2). The remaining papers' findings were coded and mapped to the Jamboard and spreadsheet framework, and the theme names were revised and refined. The process used required the identification of both similar and dissimilar themes between studies. For the disconfirming process (ie, searching for dissimilar themes), we looked for data that could contradict our identified themes and our previous beliefs related to the review topic. We performed both data extraction and data synthesis concurrently. Our team members with lived experience created descriptive themes developed from the qualitative data.

ASSESSMENT OF CONFIDENCE

The GRADE-CERQual approach to assess and report confidence in the evidence from qualitative evidence syntheses was used.[28] This draws on the GRADE approach to assessing confidence in review findings.[23] The GRADE-CERQual method assesses the studies contributing to a review finding for methodological limitations and relevance to the review question and the adequacy of data supporting a review finding and the coherence of the review finding. Based on these criteria, review findings were graded for confidence using a classification system ranging from "high" to "moderate" to "low." The complete GRADE-CERQual quality assessment appears in Supplementary Table S2 in the online supplement. After the CERQual assessment, the review findings were grouped into higher-order analytical themes, and the final framework was agreed upon by the authors. A summary statement of the review findings was developed to give an overarching conceptual proposition to provide insight into what family care needs are during cardiac arrest care of a family member.

REPORTING

We report this systematic review in accordance with Preferred Reporting Items for Systematic Reviews and Meta-Analyses guidelines.[16] We report our synthesis of qualitative research in accordance with the Enhancing Transparency in Reporting the Synthesis of Qualitative Research statement.[29] Furthermore, we report patient and public involvement in accordance with the Guidance for Reporting Involvement of Patients and the Public.[30] See online supplement for reporting checklists.

PATIENT AND PUBLIC INVOLVEMENT

We engaged cardiac arrest survivors and family members of survivors and nonsurvivors as collaborators and coresearchers through a philosophy of equitable collaboration, from review conception through dissemination of findings. This meta-synthesis is part of a larger codesign initiative, the Family Centered Cardiac Arrest Care Project (https://osf.io/fxp5g/). The project team lead is a nurse and doctoral student whose grandfather died at home of a sudden cardiac arrest. Other team members include cardiac arrest survivors and cosurvivors

who are also physicians, a university professor, a theologian, an unpaid caregiver, and a yoga teacher. Bereaved team members include a business executive and an allied health professional, both mothers to a cardiac arrest victim, and a medical student and a trades person, who were a cousin and a sibling to a cardiac arrest victim. By partnering with persons with lived experience, we have refined the concepts relevant to our metasynthesis objectives and our findings according to the priorities of our patient and public partners. We found the engagement of our survivors and family member partners to be very time and resource intensive, both prolonging the project duration and increasing its scope and project management requirements. However, our review is much better for it and the full participation of our "experience experts" that outweighs the costs. We believe our findings are more impactful because of their valuable contributions. See in the online supplement for the Guidance for Reporting Involvement of Patients and the Public short form for further descriptions of patient and public involvement.

Results

Our search was performed on April 19, 2022, updated monthly ending on December 22, 2022, identifying 4181 citations and resulting in 39 studies being included in our final analysis. Eighty-two studies were excluded during full-text review, including 3 that were rejected due to low critical appraisal scores[31-33] (see online supplement for the list of studies excluded during full-text screening). Study characteristics for the 39 studies that underwent analysis can be found in Table 2. Our overall kappa statistic reported in Covidence (Melbourne, AUS) was 0.78 (see Figure 1).

Fifteen studies were published between 2022 and 2020,[27,34-46] and the remainder in the 15 years prior. Eighteen included studies originated in the Nordic region,[27,34,39,40,43,44,47-58] 13 in North America,[35-37,41,42,59-66] 3 in Australia,[38,46,67] 2 in the United Kingdom,[45,68] 2 in Europe,[69,70] and 1 in Asia.[71] The qualitative data within the included studies were obtained through interviews in 34 studies[34-42,45,47-49,51-57,59-71] and focus groups in 5 studies.[27,43,44,46,58] Sixteen of the included studies were assessed as high quality,[27,34,35,40,42-45,47,50,53,54,59,68,71] 10 as high-moderate quality,[37,41,46,49,56-58,60,64,69] and 13 as moderate quality.[36,38,39,47,48,52,55,61,63,65-67,70]

CARDIAC ARREST CHARACTERISTICS

The most commonly reported cardiac arrest setting was out of hospital ($n = 19$)[27,35,36,39,40,43-45,47-52,57,58,60,68,69] versus in-hospital ($n = 4$).[37,55,59,67] Four studies enrolled both in- and out-of-hospital cardiac arrest survivors and families.[34,38,42,56] Time elapsed from arrest to data collection varied widely—as short as 24 hours after cardiac arrest in 1 study[66] and as long as 5 years (mean), ranging from 18 to 168 months in another.[42] The cause of arrest in the included studies was presumed or known cardiac etiology except 1 study that included a mixed sample of intensive care patients with either postarrest hypoxic brain injury or severe isolated traumatic brain injury.[41]

Five included studies reported the functional status of survivors through nonstandardized measures, giving counts of survivors with any disability ($n = 6$ of 11),[59] or reported some survivors being discharged to nursing homes ($n = 2$ of 9)[56] or having returned to work ($n = 2$ of 8)[61] at the time of data collection. Two studies described survivor status as excellent ($n = 13$), very good or good ($n = 15$), affected or fair ($n = 7$), or very affected ($n = 6$).[35,61]

Three studies enrolled the parents of children. One study enrolled 28 parents of 20 deceased young people from a sudden cardiac death cohort of 15- to 35-year-olds.[57] Another study included 21 legal guardians who were in the room or within proximity of their children who were resuscitated in a hospital setting ($n = 17$).[59] The third study recruited 8 parent couples of 8 critically ill children with congenital cardiac abnormalities from a pediatric intensive care unit after a resuscitation attempt.[67]

Study Participant Characteristics

Family membership was defined in several ways: spouses, unmarried partners, adult children, siblings, noncohabitant partners, in-laws, grandparents, and close friends. Family member participants across all studies totaled 418 people. Included family members discovered the cardiac arrest and called 911,[34,36,40,45,49,50,52,56,57,61-63,69] initiated cardiopulmonary resuscitation (CPR),[34,45,49,50,52,57,61] witnessed CPR by others,[40,45,49,52,53,56,57,63,66,67,69,71] and experienced postresuscitation care including critical care admission.[40,41,43,52,54,55,59,60,66,67] Most survivors and family study participants were adults in their 5th and 6th decades.[58] The sex ratio of participants was 1:1.7 male to female.[34,36,39,40,49,50,55,56,59]

Included studies enrolled families of deceased cardiac arrest victims ($n = 117$)[34,46,49,57,62,69,71] and families of survivors ($n = 152$).[40,43,52-55,58,60,65,66] Five studies enrolled the family of survivors and nonsurvivors (total family members $n = 85$, survivors $n = 28$, deceased $n = 28$).[41,50,56,59,67] Six studies enrolled the cardiac arrest survivor and their family as participants (survivor $n = 96$, family $n = 70$).[35,39,45,63,64,68] Ten studies enrolled cardiac arrest

TABLE 2
Characteristics of included studies and summary of qualitative findings

ID	Author	Study aim	Method	Participant	Setting	Time since arrest	Victim or survivor description	Family description	Family resuscitation	Quality rating*	Relevant study findings
1	Ann-Britt et al[49] 2010 Sweden	Describe spouses' experiences of witnessing their partners' CA at home, including the time before the event and when it happened.	Interviews Content analysis	Bereaved	OHCA Sudden cardiac arrest of nontraumatic etiology	Median 22 mo Range 10-27 mo	Victim ages all younger than 80 y	15 spouses 12 male 3 female Age range 48-87 y Median age 69 y 5 were <65 y 6 were 65-74 y 4 were >74 y	5 spouses started CPR 6 spouses instructed to start CPR 3 of these patients received CPR by others before the arrival of the ambulance	B+	Domain 1: "Time before the cardiac arrest" 1. Lack of early warning signs 2. Difficulty interpreting early warning signs 3. Interpreting signs in the light of previous illness 4. Denial of serious illness Domain 2: "The cardiac arrest event" 1. Perceiving the seriousness 2. Being unable to influence 3. Doing what is in one's power Spouses who experience OHCA demonstrated a lack of confidence in their initial recognition and response to cardiac arrest (starting CPR). The support from the emergency call taker and responders and previous CPR training was acknowledged as helpful and important.
2	Bremer 2009[50] Sweden	Describe the experiences of significant others present at OHCA, focusing on ethical aspects and values.	Interviews Phenomenology	Bereaved and cosurvivors	OHCA 5 in home 1 in street 1 in ambulance Sudden cardiac arrest of nontraumatic etiology, "presumed cardiac"	Range 6 mo to 4 y	7 victims 3 survivors 4 deceased (3 pronounced at scene, 1 in ED)	4 wives 1 husband 1 son 1 son in law Age range 39-64 y	2 participants initiated CPR	A-	The meaning of experiencing OHCA (1) Unreality in reality, (2) overwhelming responsibility, (3) inadequacy and limitation, (4) hope and hopelessness, (5) ethical considerations, (6) insecurity about the future, (7) the trembling of life Providers have a duty to offer understanding and support to significant others who experience feelings of inadequacy and unreality when a loved one dies. Providers require awareness, sensitivity, and openness to significant others' implicit or explicit questions and needs in the acute phase and informing them honestly and straightforwardly. When patients die at home, there is a need to remain close at hand for as long as necessary to provide adequate support and care to significant others. Most essential is assessing significant others' needs at all OHCA events. Usually, this can be done by prehospital emergency personnel who are competent and trained to handle significant others' acute grief reactions in crisis situations such as OHCA. An alternative is to provide referrals to other experts when needed.

continued

TABLE 2
Continued

ID	Author	Study aim	Method	Participant	Setting	Time since arrest	Victim or survivor description	Family description	Family resuscitation	Quality rating*	Relevant study findings
3	Burns et al[60] 2018 Canada	Describe the lived experience of families of patients undergoing successful targeted temperature management after cardiac arrest	Interviews Descriptive phenomenological inquiry	Cosurvivors	Not reported	Range 3-24 mo	Not reported	9 participants 7 female 2 male Range 34-69 y Wife Husband Sister Sister-in-law Daughter Mother Father	None called emergency services or performed CPR	B	Extremely traumatic, stressful, and critical event Hoped-for awakening is a daunting, intensely stressful, and emotionally ambivalent experience Need for constant reassurance Lifelessness to life Family relationship and role adoption Existential challenges Families seek spiritual support; this need often goes unaddressed by nurses. Families want written material during treatment in ICU. Patients transferred to a center a significant distance away is a burden on families. A clinical nurse specialist in this area would provide a significant step forward in improving the care of family members.
4	Carlsson et al[34] 2020 Sweden	Illuminate meanings of lived experiences of losing a close person following death by sudden cardiac arrest.	Interviews Phenomenological hermeneutical method Interpretive design	Bereaved	2 IHCA 8 OHCA (3 not were transported) Sudden cardiac arrest of nontraumatic etiology Presumed causes of arrest owing to cardiac and lung diseases	Range 6-16 mo	10 nonsurvivors 4 female 6 male Average age 73.5 y Age range 33-83 y	8 female 4 male 4 spouse 7 daughter/son 1 sibling 1 daughter in law Median age 50.5 y Range 25-78	1 participant initiated CPR	A-	Experience of pending between life and sudden loss - Fluctuating between hope and despair during resuscitation - Needing to feel meaning in the act of resuscitation - Wanting to feel taken care of by health care professionals - Needing to know that everything possible was done Proceeding with life after sudden loss - Being left with questions, some without answers - Seeking consolation in the sudden nature of death - Being reminded of death as a part of life - Experiencing an unfamiliar body - Wanting to be acknowledged as a bereaved family member - Suddenly losing life as it was known Losing a close person after cardiac arrest means searching for coherence and meaning in the transitions to proceed with life. In these transitions, the narrations of the cardiac arrest event are essential when incorporating the sudden loss and reestablishing meaning in life. Health care professionals have a unique opportunity to provide support and show compassion, both "here and now" and over time. Through structural support such as follow-up meetings, professionals can provide family members with answers that facilitate a coherent narration of their loss.
5									Not reported	A	

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TABLE 2
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ID	Author	Study aim	Method	Participant	Setting	Time since arrest	Victim or survivor description	Family description	Family resuscitation	Quality rating*	Relevant study findings
	Dainty et al[35] 2021 Canada	Understand what survivorship means to survivors and their families	Interviews Phenomenologically informed Constant comparative thematic analysis	Survivor and cosurvivor	OHCA Sudden cardiac arrest of nontraumatic etiology	Average 4 y Range 6 mo to 14 y	21 survivors 16 male 5 female Outcome 10 excellent 10 good 6 affected 6 very affected Average 50 y Age range 27-75 y	11 family members 1 male 10 female 5 over 60 y 5 between 50 and 60 y 1 between 40 and 50 y			The lives of survivors from sudden cardiac arrest have been deeply affected by their cardiac arrest experience. The themes emerged from the study were psychological and psychic recovery, physical recovery, work identity and return to work, social support, and relationship needs after experiencing sudden cardiac arrest. Little attention was paid to the psychological impact of the arrest by providers. This included their struggle with existential issues, as well as their fear of a repeat event, feelings of loneliness or isolation, and mental health issues including depression and symptoms of posttraumatic stress. The ability to return to work seemed to be a crucial marker of "recovery" for many of the participants in this study. The key role that spouses and family members played in survivors' ongoing recovery came up repeatedly in the interviews. The study concluded that there is more to survival from sudden cardiac arrest than physical healing. Psychological recovery is an ongoing, long-term, and dynamic process. This work indicates that psychological assessment, return to work status, and family input are key domains to be considered.
6	De Stefano et al[69] 2016 France	Understand how families experience CPR of a relative, by detailing the emotional meaning of the benefits and disadvantages of their presence.	Interviews Qualitative interpretative approach guided by grounded theory and based on a technique of constant comparison	Bereaved	OHCA (at home) Sudden cardiac arrest of nontraumatic etiology	3 mo	Nonsurvivors only Average age 50 y Standard deviation 15 y	17 partners, husband, or wife 13 children Average age 50 y Standard deviation 15 y 18 (60%) offered to witness CPR	Not reported	B+	The analysis showed 4 main themes: 1. Choosing to be actively involved in CPR: to be actively involved in the resuscitation process, to feel emotionally able to be present, to support the patient during CPR, to see the efforts of the resuscitation team, to protect one's self. 2. Communication between family members and the emergency team, medical information for the relative, satisfaction (or dissatisfaction) with the medical team's intervention 3. Perception about the reality of death and experience, awareness of death at the arrival of the emergency team, watching CPR, and the conduct of the participants 4. Experience and reaction of the relative witnessing (or not) the resuscitation; Presence: feeling of relief in relation to the patient's distress; Presence:

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TABLE 2
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ID	Author	Study aim	Method	Participant	Setting	Time since arrest	Victim or survivor description	Family description	Family resuscitation	Quality rating*	Relevant study findings
											experience of excessively heroic treatment and intrusion of shocking images; Absence: experience of violence, brutality, and dehumanization. The study concluded that the practice of offering family members the choice of whether or not to view resuscitation has an emotionally protective effect in the face of this potentially traumatic event.
7	Dichman et al[58] 2021 Denmark	Generate knowledge about how relatives of OHCA survivors experience the transition between hospital and daily life.	Focus groups Phenomenological hermeneutics Ricoeur's interpretive theoretical framework	Cosurvivors	OHCA Sudden cardiac arrest of nontraumatic etiology	Range 3-134 mo	OHCA survivors	23 participants 17 female 5 male Age range 31-90 y 11 married or cohabitants 10 married or cohabitants with children 1 mother-in-law 1 noncohabitant partner	not reported	B+	The main themes that emerged were: 1. A necessary presence The focus of the participants in this phase was on survival. The participants described deep concerns during the hospital admission. Participants felt they carried an emotional burden on top of the traumatic experience. Being close to the survivor was important. 2. Communication with health care professionals on the cardiac ward Participants found it important to receive information to help them cope with feelings of anxiety and responsibility during hospital admission. Daily communication was important to understand both the cardiac condition and the cognitive impairments. 3. Abrupt disappearance of the system Most participants experienced that cognitive impairments did not form a part of the discharge communication. Relatives felt the discharge to be a premature process described as an abrupt break. Relatives of OHCA survivors describe the transition from hospital to daily life as being left responsible but unsupported. Health care professionals need to understand and communicate with relatives of OHCA survivors during the whole pathway, including both the cardiac situation and the risk of cognitive impairments with their potential impact on daily life.
8	Doolittle and Sauvé[63] 1995 United States	Identify and explore phenomena experienced by aborted sudden cardiac death survivors and their spouses, and to determine implications for care	Interviews Phenomenological interpretive method	Survivors and cosurvivors	NR 34 VF 4 VT 2 unknown	Within 3 weeks 6-8 week intervals until 24 weeks	40 survivors 34 male 6 female	30 spouses	28/40 arrests witnessed by spouse 1 did CPR	B+	Spouse reference point is the arrest Concerns: fear of recurrence and guilt over the arrest Spousal protectiveness leading to conflict with survivor and social isolation for both survivor and spouse Fear around leaving survivor alone, vivid memories of the event, survivor desire to return to previous activities Survivor reference point is their prearrest life

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TABLE 2
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ID	Author	Study aim	Method	Participant	Setting	Time since arrest	Victim or survivor description	Family description	Family resuscitation	Quality rating*	Relevant study findings
											Concerns: returning to meaningful activities Conflict with spouse leading to social isolation when faced with protectiveness Impact of spousal protectiveness experienced as entrapment
9	Dougherty et al[64] 2000 United States	Explore individual and family experiences after sudden cardiac arrest and automatic internal cardioverter defibrillator implantation	Interviews Grounded theory	Survivors and cosurvivors	OHCA Primary cause ventricular fibrillation	Hospital discharge, 1 mo 3 mo 6 mo 12 mo after discharge	2 female survivors 13 male survivors Average age 57 +/- 11 y of age 2 survivors died before 6 mo interview	15 partners of survivors 13 female 2 male Age range 46-64 y 1 partner and survivor relationship ended during study period	Not reported	B+	Applied strategies for survivor and caregiver. Education programs failure: Goals of care include preparing for independent management: (1) Prevention Need to answer "why" (2) Emotional challenges Join external support groups (3) Activities of daily living Strive for independence (4) Health care providers Caregiver inclusion & attendance (5) Partner relationships Mutual expressions of needs (6) Dealing with ICD shocks Emergency preparedness (7) Physical changes Sleep troubles
10	Dougherty et al[65] 2004 United States	Describe intimate partners' strategies to deal with recovery concerns after cardiac arrest survivors first year after internal cardioverter defibrillator implantation	Interviews Grounded theory	Cosurvivors	OHCA Presumed cardiac etiology	Hospital discharge, 1 mo 3 mo 6 mo 12 mo after discharge	2 female survivors 13 male survivors Average age 57 +/- 11 y of age 2 survivors died before 6-mo interview	15 partners of survivors 13 female 2 male Age range 46-64 y 1 partner and survivor relationship ended during study period	Not reported	B+	Eight domains of concern were identified for intimate partners after SCA and ICD implantation during the first year: (1) care of the survivor, (2) my (partner) self-care, (3) relationship, (4) ICD, (5) money, (6) uncertain future, (7) health care providers, and (8) family. Five categories of strategies to deal with the domains of concerns were identified: (1) care of the survivor, (2) my (partner) self-care, (3) relationship, (4) uncertain future, and (5) controlling the environment. Interventions should include the partner of SCA survivors and target: (1) information on ICD function, (2) normal progression of physical and emotional recovery experiences, (3) safety and maintenance of the ICD, (4) activities of daily living after an ICD, (5) strategies to assist with the survivors care, and (6) strategies to assist with partner self-care.
11	Forslund et al[47] 2014 Sweden	Elucidate meanings of survivors' lived experiences after an OHCA.	Interviews Phenomenological hermeneutical method	Survivors	OHCA MI etiology	1 mo after event	11 survivors 9 male 2 female Average age 63 y Age range 49-73	Not applicable	Not reported	A	There were 2 themes, (1) returning to life and (2) revaluing life, and 5 subthemes, (1a) waking up and missing the whole picture, (1b) realizing it was not time to die, (2a) wondering why and seeking explanations, (2b) feeling ambiguous in relations, and (2c) wondering whether

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TABLE 2
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ID	Author	Study aim	Method	Participant	Setting	Time since arrest	Victim or survivor description	Family description	Family resuscitation	Quality rating*	Relevant study findings
											life will be the same. - Meanings of surviving a cardiac arrest seem to entail a search to fill the black box with information about what happened - Experienced memory loss and needed to communicate with people who had been present during the time they were dead/unconscious - Participants wanted to find a reason for the MI so they would be able to make changes in their life
12	Forslund et al[51] 2013 Sweden	Describe risk factors and lifestyle among survivors of sudden cardiac arrest	Interviews Manifest content analysis	Survivors	OHCA Presumes cardiac etiology	4-17 y	13 survivors 10 male 3 female Median age 68 y Age range 52-81 y	Not applicable	Not reported	B	Significance of lifestyle - Finding joy and strength in meaningful relationships - Feeling well and doing things of their choice Modifying the lifestyle to the new life situation - Finding a reason why it happened and making lifestyle changes - Making your own assessment of a risk behavior A changed view on life - Feeling grateful for a second chance at life - Finding motivation for lifestyle changes and wishing to influence family members to adopt lifestyle changes - Challenging one's fears and adopting a positive outlook on life
13	Grunau et al[36] 2021 Canada	Understand the experiences with information sharing, end-of-life care, organ donation, and perceived value of ECPR of patients and families treated by ECPR for OHCA.	Interviews Qualitative descriptive approach Narrative case study	Survivors and cosurvivors	OHCA Sudden cardiac arrest of nontraumatic etiology	A minimum of 12 mo	3 male victims Aged 30, 60, and 60 y 2 survivor participants	1 mother 1 sister 1 wife Ages not reported	2 family members provided CPR	B	Findings showed that participants felt that an information pamphlet would have been helpful for family members, although preferred language, complexity, and content varied. Families have individual information needs. It was concluded that individuals affected by ECPR may have different information-sharing preferences; several media options may be valuable. The timing of organ donation discussions is complex and with varying opinions.
14	Harrod et al[37] 2021 United States	Understand IHCA survivors' long-term recovery experiences and identify strategies of adaptation that they felt aided their recovery.	Interviews Thematic analysis	Survivors	IHCA Various medical diagnoses: abdominal aneurysm, septicemia, MI, atrial and ventricular fibrillation,	Range 4-5 y	19 veteran survivors Average age 62 y	Not applicable	Not applicable	B+	Thematic analysis generated 3 themes: 1) Ongoing challenges to recovery: although participants talked about their IHCA, they also spoke about their continuing struggles. 2) Reconceptualizing independence: independence, both cognitive and physical, was important. Participants felt they had to make adaptations to how they lived to maintain some

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TABLE 2
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ID	Author	Study aim	Method	Participant	Setting	Time since arrest	Victim or survivor description	Family description	Family resuscitation	Quality rating*	Relevant study findings
					dilated cardiomyopathy						independence. 3) New engagements: a few of the participants found it helpful to engage in new activities. For each theme, participant-identified strategies or resources they felt helped them in their recovery were also identified. Survivors of IHCA experience challenges several years after their IHCA. Far too many have to give up activities because of lack of support and/or resources. Intervention programs and follow-up care should provide long-term support so that survivors can re-engage in their activities. Emphasis on systems of care that focus on coordinating care and communication across multidisciplinary providers involved in recovery is needed.
15	Haydon et al[38] 2021 Australia	Explore survivors' experiences of surviving cardiac arrest in the immediate time before and just after the event.	Interviews Narrative inquiry approach	Survivors	IHCA 5 OHCA 12 8 while exercising 4 while at rest	Range 3 mo to 36 y	17 cardiac arrest victims 4 females 13 males Age range 48-92 y	Not applicable	Not reported	B	Analysis showed 7 threads: (1) Ordinary to extraordinary, (2) cardiac pain, (3) waking up in chaos, (4) resuscitation pain, (5) drawing on spirituality, (6) luck, (7) surviving death The immediate time after a cardiac arrest is a complex time where existential questions about luck, spirituality, and survival are intense. Although survivors are in the liminal space, their need for support may be increased so they may move forward in their recovery. Nurses and other clinicians need to consider the survivor's experience of the event and provide time for the person to express their story. By listening to patients' stories nurses and other clinicians can gain knowledge to provide holistic care that can promote positive health outcomes and improve quality of life.
16	Holm et al[52] 2012 Norway	Examine what partners experience during their loved ones' cardiac arrest and ensuing hypothermia treatment in the ICU.	Interviews Phenomenological approach	Cosurvivors	OHCA Sudden cardiac arrest of nontraumatic etiology	Range 5 mo to 13 mo	Age and sex not reported Patients received hypothermia treatment after sudden cardiac arrest and survived without serious brain damage	Participants were partners/spouses. 2 in 7th decade 1 in 5th decade 4 in 4th decade 1 in 3rd decade 1 in 2nd decade	4 participants initiated CPR 2 participants present during CPR	C+	Key finding of the study included: (1) Terrified by witnessing the cardiac arrest, (2) ambivalence toward the ICU room and the patient's cold body, (3) needs for honest and realistic information, (4) anticipating the awakening, (5) social network as support and burden, (6) the frightening homecoming Partners experience fear and relief. Partners should be prepared for and understand the rationale behind treatment. The findings suggest a relationship between what partners experienced before

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TABLE 2
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ID	Author	Study aim	Method	Participant	Setting	Time since arrest	Victim or survivor description	Family description	Family resuscitation	Quality rating*	Relevant study findings
											entering the ICU, their experience of and reactions to the intensive hypothermia treatment, and the period after discharge.
17	Jang and Choe[71] 2019 Korea	Describe relatives' bereavement experience after the death of an older family member in the ED.	Interviews Descriptive phenomenological approach	Bereaved	Location of initial arrest not reported All transported to ED Sudden cardiac arrest of nontraumatic etiology	Range 5 mo to 8 mo	Not reported Age range 33-81 y	6 sons 1 spouse 1 younger sister	Not reported	A	Bereavement experience of older family members death in the ED consisted of 4 themes: (1) "Lack of control of emotions" that occurred when they first witnessed the family member's cardiac arrest; (2) "enduring fear in a desolate emergency department," which focused on the period when the family member was in the resuscitation room; (3) after death had been declared, participants responded with "denial or silent acceptance"; (4) thereafter some experienced a feeling of emptiness characterized as "living with longing for the deceased in everyday" The bereavement experiences were intense and their pain, fear, and sorrow were arguably exacerbated by feelings of alienation from providers during resuscitation. Families in these circumstances require support, a good explanation of the situation, and words of kindness and comfort. Relatives may feel disillusioned with providers who want to quickly send the deceased to the mortuary as relatives might need time to be with the deceased family member in a quiet private space after the death declaration.
18	Jensen et al[39] 2020 Denmark	Explore how narrative sense-making processes following OHCA shapes everyday life in a long-term perspective among older survivors and their spouses.	Interviews Narrative analysis	Survivors and cosurvivors	OHCA Sudden cardiac arrest of nontraumatic etiology	Range 12 mo to 66 mo Average 30 mo	5 male survivors 5 underwent therapeutic hypothermia Average age 70 y 2 – aged 60-69 3 – aged 70-79	5 females Average age 71 y 2 aged 60-69 2 aged 70-79 1 aged 80-89	Not reported	B	Survivors perspective: - Lack of memory described OHCA suddenly occurred - Absence of patient identity and did not consider themselves to be ill - Survivors distanced themselves from identifying as "patients" - Feelings of annoyance and concern - Frequently narrated that their spouses had a continuous need to monitor their daily activities, which caused annoyance since they perceived it as unnecessary overprotection Spouse perspective: - Confusion, anxiety, and panic - The event emotionally affected spouses - Biography used to make sense of the cardiac arrest OHCA is a complex and dynamic process

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TABLE 2
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ID	Author	Study aim	Method	Participant	Setting	Time since arrest	Victim or survivor description	Family description	Family resuscitation	Quality rating*	Relevant study findings
											between the survivor and spouse leading to challenges resulting in unmet needs. It was concluded that OHCA shapes the life trajectory of both survivor and spouse and relationship between them.
19	Ketilsdottir et al[48] 2014 Iceland	Describe survivors' experiences after sudden cardiac arrest to gain knowledge of the effect of this experience on their needs and concerns.	Interviews Interpretive phenomenology	Survivors	OHCA Etiology of coronary heart disease	Range 9-24 mo	7 survivors Age range 50-54 y	Not applicable	Not reported	B	Themes: Feelings of insecurity and the need for support Striving to regain former life Emotional challenges Responding to symptoms A new view on life Interventions should aim at: • Enhancing security and support by providing opportunity to discuss experiences and feelings • Providing guidance regarding limitation in daily activity • Assessing emotional challenges and identifying helpful coping mechanisms • Evaluating cognitive and physical functions to optimize recovery • Identifying obstacles for responding to symptoms • Involving families and assess need for support
20	Larsen et al[40] 2023 Denmark	Explore relatives' experiences with the OHCA and the following mo after.	Interviews Phenomenological hermeneutic methodology	Cosurvivors	OHCA Sudden cardiac arrest of nontraumatic etiology	Average 9 mo Range 2 and 18 mo	Not reported	12 relatives average age of 65 y 2 aged 45-64 y 4 aged 65-74 y 6 aged 75-85 y 9 wives 2 common-law husbands 1 common-law wife	7 participants present none provided CPR	A	Relatives experienced OHCA with shock and were unprepared. They struggled to understand the chaotic situation, the trajectory after the cardiac arrest, and the OHCA survivor's subsequent recovery. OHCA have an existential, emotional, physical, social, and familial impact and influenced relatives' experiences. Main themes: 1. Being confronted with the possibility of bereavement - uncertainty, powerlessness, and worrying - waiting time, balance between doubt and hope - losing control, a collapse of daily life - desolation and being alone with the sorrow 2. Watching with fearful eyes - time after discharge filled with anxiety and edginess - monitor the partner; alertness and awareness - taking responsibility for helping the survivor - protecting the survivor 3. Adapting to new normality in everyday

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TABLE 2
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ID	Author	Study aim	Method	Participant	Setting	Time since arrest	Victim or survivor description	Family description	Family resuscitation	Quality rating*	Relevant study findings
											life - unmet need for support from health care professionals - feeling alone, needing mental strengths after discharge - overshadowed by the risk of a new OHCA - changing roles within the family Relatives of OHCA survivors are challenged, experiencing a high level of distress and anxiety. Relatives take on responsibility, always watching with fearful eyes for a new cardiac arrest. Existential concerns and thoughts are omnipresent leading to stress for the family caregiver.
21	Larsson et al[53] 2013 Sweden	Describe relatives' experiences during the next of kin's hospital stay after surviving a cardiac arrest treated with hypothermia at an ICU.	Interviews Qualitative description	Cosurvivor	Not reported	Range 1.5 to 6 w	Not applicable	13 female 7 males Age range 20-70 y Average age 52 10 participants were husband or wife 3 were partners 6 were children 1 was parent .	11 participants present during arrest	A	1. The first period of chaos Difficulties taking in what had happened Feeling fear Waiting in uncertainty Painful to see a relative seriously ill 2. Feeling secure in a difficult situation Receiving support Receiving information Feeling variations in the quality of care 3. Living in a changed existence Feeling increased demands and responsibility Concerns for the future The next of kin has changed Keeping in touch with family was demanding. Information booklets about ICU, continuing care, and rehabilitation are needed. Families need to be prepared for change in level of care in the general ward before leaving ICU. Follow-up visits for families need to be considered. Rehabilitation plan by a multidisciplinary team required.
22	Lau et al,[61] 2010 United States	Understand sudden cardiac arrest survivors' beliefs about complex issues that arise in the immediate post arrest period and explore advance care planning	Interviews Qualitative description	Survivors	OHCA Presumed cardiac etiology.	Average 6.2 y	9 survivors 2 female 7 male Average age 66.3 y Age range 30-79 y Outcome 3 excellent 4 very good 1 good 1 fair 0 poor	Not applicable	1 survivor wife CPR at home	B	Four domains: (1) patient and family perception of medical providers' prognostication, (2) patient definitions of death, (3) use of advanced directives, and (4) perceptions about health and organ donation In the immediate postarrest phase, subjects believed medical professionals made errors in giving poor prognosis. Patient and family perception of medical providers' prognostication—conflict resulted and family advocacy was required. Survivors go through emotional ups and downs. You are very happy you survived, but at some other period, you

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TABLE 2
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ID	Author	Study aim	Method	Participant	Setting	Time since arrest	Victim or survivor description	Family description	Family resuscitation	Quality rating*	Relevant study findings
											might be in deep melancholy. None of the participants with advanced directives at the time of their arrest made changes to their documents postarrest. Despite participants' positive classification of their health, only 3 subjects were registered organ donors. Reason for not registering as organ donors was poor perception of health.
23	Löf et al[54] 2010 Sweden	Describe experiences of close relatives of survivors of cardiac arrest treated with therapeutic hypothermia.	Interviews Qualitative content analysis	Cosurvivors	Not reported Cardiac arrest presumed nontraumatic etiology	Recruited during ICU admission.	Cardiac arrest survivors who underwent therapeutic hypothermia and selected family member participant.	8 family members of survivors treated with therapeutic hypothermia 1 wife 3 daughters 2 sons 1 brother 1 son-in-law Age range 30-72 y Median age 45	Not reported.	A	Relatives described the event of the cardiac arrest as frightening. Seeing the patient connected to tubes and equipment induced a feeling of unreality; the patient was experienced as cold, lifeless, and hard to recognize. The relatives faced an anxiety-filled future not knowing what the outcome for their relatives would be. Relatives supported each other during this difficult time and kept hoping that the patient would survive injury. A sudden change in life - Being involved in the patient's cardiac arrest - Feeling that the patient was cold and lifeless - Everything else feels less important Feeling trust and support - Feeling safe - Feeling hope - Wanting to know and understand Worrying about the future - Living in uncertainty - Feeling distrust and frustration
24	Maxton[67] 2008 Australia	Provide in-depth understanding of the meaning for parents who were present or absent during a resuscitation attempt on their child in the PICU.	Interviews Framework analysis, hermeneutic phenomenology	Bereaved and Cosurvivors	IHCA pediatric intensive care Sudden cardiac arrest of nontraumatic etiology Congenital cardiac abnormalities	1 week after CA	8 children with congenital cardiac abnormalities Age range 6 mo to 5 y 4 survived, 4 did not survive	6 parent couples (n = 16)	CPR by medical staff	C+	Experiences the parents went through had 4 themes: (1) being only for a child, (2) making sense of a living nightmare, (3) maintaining hope in the face of reality, (4) living in a relationship with staff. Parents' compelling need to be with their child overrides any perceived fears they may have about being present during resuscitation. This need was an instinctive, automatic act and the alternative, not to stay, was not considered. Being present was, for parents, their role within the resuscitation and comforted them.
25	Mayer et al[62] 2013 United States	Describe the bereavement experiences of families who	Interview Narrative analysis	Bereaved	Setting not reported 2 VF 2 Aortic rupture	Average 2.1 y	7 nonsurvivors Average age 51 y Age range 44-54 y	17 family members Average age 41.8 y Age range 22-60 y 5/17 spouse or	Not reported	B	4.1. Theme 1: Sudden cardiac death …boom 4.1.1. A story of questions: why did the death occur?

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TABLE 2
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ID	Author	Study aim	Method	Participant	Setting	Time since arrest	Victim or survivor description	Family description	Family resuscitation	Quality rating*	Relevant study findings
		survived the sudden cardiac death of a family member and identify meanings of loss.			2 myocardial infarct 1 cardiac arrest			partner 8/17 children 2 sisters 1 niece 1 friend			4.2. Theme 2: Saying goodbye 4.2.1. A "cool" goodbye story 4.3. Theme 3: Grief unleashes volatile emotional reactions 4.3.1. A story of self-blame 4.4. Theme 4: Life goes on … but never back to normal 4.4.1. A family farm story 4.5. Theme 5: Meanings in loss 4.5.1. A story of unanswered questions Providing information about the cause of death to bereaved families and allowing family members to share stories of loss are important components of clinical practice when interacting with bereaved families after SCD.
26	Muehlschlegel et al[41] 2022 United States	Understand the experiences and needs of families of patients with severe acute brain injury from the perspectives of multiple stakeholders.	Interview and workshops Inductive analytical approach	Bereaved and Cosurvivors	Mixed etiology Traumatic brain injury and cardiac arrest	Not reported	phase 1 2 survivors 1 nonsurvivor phase 2 7 survivors 1 nonsurvivor	phase 1 = 19 participants 7 family members 4 parents 3 spouses 12 providers phase 2 = 29 participants 17 family members 8 parents 9 spouses 2 providers	Not reported	B+	The needs of the participants were: 1. Information needs (a desire for information about illness and prognosis for recovery and the challenges of uncertainty) 2. Communication needs (identifying gaps in provision of logistical information and support) 3. Emotional needs (importance of communicating compassion), sharing uncertainty, and responding to emotional needs 4. Sociocultural needs (equitable treatment and socioculturally appropriate communication to ensure that families feel respected and are treated without bias) 5. Physical needs (physical, tangible, or logistical issues, including the location and hours of the cafeteria, visitor parking locations, a comfortable private space within the hospital) Four major needs were identified: 1. Challenges in coping with uncertainty in early prognostication 2. Inattention to physical needs of family 3. Deficits in compassionate and consistent communication 4. Need for engagement with families as stakeholders in improving future practices Participants' recommendations included: 1. Ways to communicate more clearly and consistently 2. Better assistance with navigating resources and access to places for families to care for themselves

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TABLE 2
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ID	Author	Study aim	Method	Participant	Setting	Time since arrest	Victim or survivor description	Family description	Family resuscitation	Quality rating*	Relevant study findings
											3. Opportunities for families to remain connected with their loved ones, social support networks, and the clinical team
27	Palacios-Ceña et al,[70] 2011 Spain	Investigate life experiences of survivors of a sudden cardiac death.	Interviews Husserl's framework, Giorgi phenomenological method of analysis	Survivors	Not reported Presumed cardiac etiology	Not reported	9 survivors 4 female 5 male Age range 24-53 y no cognitive, or neurologic, impairments 2 died 1 hospitalized during study	Not applicable	Not reported	C+	4 themes (1) Facing fear: This theme unit refers to experiencing a continued state of fear. This feeling took over all aspects of SCD patients' life, affecting their performance at work and the relationship with their partner and interfering with their ability to take care of their children (2) The search for meaning: This theme unit refers to the need to ascribe a meaning to the SCD episode that was suffered by these patients, to their need to find answers as to "Why?", "How?", and "Why then?", and to address their own possible responsibility in bringing about this tragedy, regardless of the real causes (3) Feeling death up close and personal: This theme unit describes how the SCD survivors experienced death and their own mortality at very close quarters. Death was not seen simply as a possible outcome of their condition, but instead it was experienced as a tangible reality (4) Loneliness and estrangement: This theme unit describes the feelings of loneliness and estrangement that were reported by survivors after they were released from the hospital. Their interaction with the health care professionals who treated them ceased to be continuous. These patients were not followed up by the same team of professionals. Thus, survivors felt neglected by their health care professionals
28	Presciutti et al[42] 2022 United States	(1) Better understand cardiac arrest survivorship challenges. (2) Identify ways to improve cardiac arrest survivorship.	Interviews Thematic analysis using framework method	Survivors	11 OHCA 4 IHCA Sudden cardiac arrest of nontraumatic etiology	Average 60 mo Range 18-168 mo	15 survivors of cardiac arrest 8 female 7 male Average age 51 y Age range 34-71 y 13 received an ICD 7 received therapeutic hypothermia	Not applicable	Not applicable	A	Challenges and extracardiac symptoms experienced by survivors of cardiac arrest included: - Feeling unprepared to confront survivorship - Lack of resources for treating extracardiac symptoms - Little education/knowledge of condition - Lack of accurate expectations for recovery - Difficulty returning to work - Difficulty managing medications - Feeling abandoned by providers - Lack of emotional support - Difficulty adapting to a new normal

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TABLE 2
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ID	Author	Study aim	Method	Participant	Setting	Time since arrest	Victim or survivor description	Family description	Family resuscitation	Quality rating*	Relevant study findings
											Survivors' recommendations to improve cardiac arrest survivorship Systemic 1. Provide resources to manage extracardiac symptoms 2. Provide appropriate expectations and education about cardiac arrest survivorship 3. Educate providers about cardiac arrest survivorship 4. Follow-up with survivors 5. Include caregivers in treatment planning whenever possible Social 1. Attend peer support groups 2. Spend time with family and friends 3. Provide emotional support resources for family and caregivers Individual coping 1. Acceptance 2. Resilient coping 3. Regain control in life 4. Seek treatment for extracardiac symptoms 5. Focus on meaning and purpose
29	Rosenkilde et al[43] 2023 Denmark	Explore how family caregivers of OHCA survivors experience the potential burden	Focus groups Phenomenological hermeneutic approach	Cosurvivors	OHCA Presumed cardiac etiology	Not reported	Not reported	25 family caregivers (spouses, partners, and adult children) 8 male caregivers 17 female caregivers Average 55 y Age range 31-89 y	Not reported	A	Feeling unexpectedly alone and invisible Emotional burden Feeling shock, fear, anxiety, and hopelessness Alone with the responsibility for shared life Being overlooked The forbidden thoughts Fear of loss Without warning, anxiety, uncertainty, and fear Frustrations and argument sin the relationship Being the control center Troubled nights, insufficient sleep Adjusting to a new everyday life The cognitive and emotional impairments of the survivor An existential crisis—the new life incorporating the OCHA Being socially isolated Uncertainty about the future; work and finances Life is precious and fragile—seizing the joy in everyday life
30	Stewart[59] 2019 United States	Elucidate the experiences of parents during and after their child's	Interviews Thematic analysis	Bereaved and cosurvivors	IHCA Neonatal ICU 1 Labor and delivery 6 ED 5 Pediatric ICU 4	Not reported	Newborn to 1 y of age – 10 1-10 y of age – 8 14-17 y of age – 3 Outcome:	21 parents 15 female 6 male 13 participants first resuscitation	Not reported	A-	Thematic analysis, experiences of parents during child's resuscitation 1. Overwhelming chaos (so much coming to you, they didn't listened to me, forced separation, I didn't know what was

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TABLE 2
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ID	Author	Study aim	Method	Participant	Setting	Time since arrest	Victim or survivor description	Family description	Family resuscitation	Quality rating*	Relevant study findings
		resuscitation in the hospital setting.			Pediatric ward 4 Clinic 1 Sudden cardiac arrest of nontraumatic etiology		11 survived no change 6 survived with disability 4 died Victim sex not reported	experience 8 participants had previous resuscitation experience			going on) 2. Getting through it (family-centered connection, level of presence to be my choice, seeking information, allow us hope, keeping it all together) 3. Cognitive presence (alternate reality, abrupt reality) 4. Joy mixed with heartache (unmet expectations, present but not really) During a child's resuscitation parents perceive a sense of overwhelming chaos, yet still have an innate need to be present and know what is going on. Although emotional support is appreciated, most important is the ability to be physically present, to receive real-time clinical information from health care staff, and to see and feel that the team is personally invested in their child. All interprofessional clinical staff should work to facilitate these elements into routine practice when involved in the resuscitation of newborns in the delivery room or inpatient pediatric/neonatal units.
34	Uren and Galdas[68] 2015 United Kingdom	Explore how masculinities shape the experiences of men and their partners after survival from out-of-hospital cardiac arrest	Interview Interpretive description using thematic approach	Survivors	OHCA Nontraumatic, presumed cardiac etiology	previous 24 mo	7 male survivors in the previous 24 mo 6 married 1 divorced 3 returned to work 4 were retired	6 married female partners Participants age range 29-81 y	Not reported.	A	Loss of "self-reliance" - Driving ban affecting independence - Reliance on partner for care/support - Health care use Psychological vulnerability - Anxiety/uncertainty - Depressive symptoms - Emotional support, openness or reticence Not a "He-man" anymore - Realizing limitations - Positive, stoical attitude - Coping responses Three themes were prominent in the experiences of the participants: (1) support and self-reliance, (2) dealing with emotional (in) vulnerability, and (3) no longer a "He-man."
31	Wagner[66] 2004 United States	Describe the experiences, thoughts, and perceptions of family members of critically ill patients during cardiopulmonary	Interviews Thematic analysis	Cosurvivors	Location of initial arrest not reported Sudden cardiac arrest of nontraumatic etiology	Within 24 hours	Not reported	6 adult family members of patients who received cardiopulmonary resuscitation All survived	Not reported	C+	One major theme: Should we go or should we stay? 2 subthemes emerged: What is going on? and You do your job. Breaking-the-Rules Phase After a patient's condition was stabilized, his or her family members moved into the breaking-the-rules phase. For most

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TABLE 2
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ID	Author	Study aim	Method	Participant	Setting	Time since arrest	Victim or survivor description	Family description	Family resuscitation	Quality rating*	Relevant study findings
		resuscitation in the ICU.									participants, this phase meant maintaining vigilance at the hospital and waiting to receive information about what was going on and what was going to happen next. Patients' family members place an enormous amount of trust in the health care team. They expect the team to do its job in resuscitating patients and to provide care after resuscitation. In most instances, a patient's family has no choice but to trust the health care professional. Patients' families lose autonomy and do not gain ground when they attempt to negotiate their way into the resuscitation room. By controlling a patient's family during CPR, the members of the health care team deny the family the ability to watch out for the family's loved one and provide protection. When families are not provided information during resuscitation, they cannot determine what is going on. Families are in crisis and need reassurance and informational support to cope effectively.
32	Wagner et al[27] 2021a Denmark	Explore the lived experiences among out-of-hospital SCA survivors.	Focus groups Phenomenological hermeneutic approach	Survivors	OHCA Sudden cardiac arrest of nontraumatic etiology 21 caused by ischemic heart disease 10 caused by arrhythmia	Median 16 mo Range 3-132 mo	32 cardiac arrest victims 24 male 8 female Median age 60 y Age range 40-83 y	Not applicable	Not applicable	A+	Two main themes emerged from the analysis and interpretation: (1) a lack of support from the health system in the transition from hospital to daily life and (2) feeling understood for the first time. The findings revealed that out-of-hospital survivors experience a knowledge gap struggling for support. Attending the program, gaining knowledge, and experiencing peer support were described as a revelation for them. Subthemes - The challenging transition from hospital to daily life - Being on your own - The suffering survivor - Lack of support - Lack of information - Lack of coordination - Lack of systematized interventions - Lack of guidance and plans The findings suggest survivors felt understood for the first time when attending a cardiac arrest program. A postarrest pathway is needed led by a

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TABLE 2
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ID	Author	Study aim	Method	Participant	Setting	Time since arrest	Victim or survivor description	Family description	Family resuscitation	Quality rating*	Relevant study findings
											coordinating cardiac arrest specialist nursing service together with allied health care professionals. Focus on hypoxic brain injuries, emotional burdens, and supportive strategies are essential in the transition to daily life. Facilitated peer support is warranted.
33	Wagner et al[44] 2021b Denmark	Explore and gain in-depth understanding of how OHCA survivors experience the short- and long-term consequences on daily life.	Focus groups Phenomenological hermeneutic approach	Survivors	OHCA Sudden cardiac arrest of nontraumatic etiology 21 caused by ischemic heart disease 10 caused by arrhythmia	Median 16 mo Range 3-132 mo	32 cardiac arrest victims 24 male 8 female Median age 60 y Age range 40-83 y	Not applicable	Not applicable	A+	Three main narratives illuminate the participants' experiences of the hospital phase, their returning to daily life and the long-term follow-up after resuscitation: 1. "A fragmented memory at the mercy of the system" 2. "Living in the shadow of anxiety and mixed feelings" 3. "The lost sense of self" Characterized by distinct bodily impairments, mental suffering, and the lost sense of self, patients surviving OHCA experience a disrupted daily life from early on to several years after resuscitation. The findings suggest that the role of a postarrest health care team is emphasized as significant to the return to daily life after resuscitation. The findings highlight that a transitional care program led by a coordinating expert cardiac arrest nurse between the in-hospital setting and the community might be the needed organizational link to reconcile with early bodily losses and accompanying prolonged emotional reactions, suffering and a lost sense of self. To ease the return to daily life it seems important that screening for and education on bodily losses is given at an early stage, support is provided on the emotional reactions, and referral for further psychological and neurologic follow-up and rehabilitation is addressed in a systematic manner.
35	Wallin et al[55] 2013 Sweden	Describe relatives' experiences of needing support and information and of the impact on everyday life 6 mo after a significant other survived cardiac	Interviews Qualitative content analysis	Cosurvivors	IHCA Sudden cardiac arrest of nontraumatic etiology	6 mo	Not reported	20 family members 14 women 6 men Relationships were 9 wives 5 daughters 4 husbands 1 adult son 1 parent	not reported	B	Analysis showed 3 main themes: 1. Difficulties managing a changed life situation (subthemes change in the significant other after cardiac arrest, feeling of helplessness, loss of control, feeling of increased demands) 2. Feeling like I come second (subthemes feeling neglected, limitations in everyday life, emotional chaos) 3. Feeling new hope for the future

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TABLE 2
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ID	Author	Study aim	Method	Participant	Setting	Time since arrest	Victim or survivor description	Family description	Family resuscitation	Quality rating*	Relevant study findings
		arrest treated with therapeutic hypothermia at an ICU.						Average age 55 y Age range 20-70 y			(subthemes support from people you trust, feeling gratitude, feeling of confidence) The study concluded that everyday life of relatives of the CA survivors was still affected 6 mo after the event and was characterized by: - Increased domestic responsibilities - Constant concern for the significant other - A lack of information and support from the health care system after discharge from hospital A follow-up visit would provide an opportunity for relatives to discuss their own worries and clarify issues, and it would help them in processing the event. Furthermore, health care personnel need to improve the oral and written information they provide and to repeat already given information.
36	Weslien et al[56] 2005 Sweden	Provide insight into family members' experiences of such situations owing to a cardiac arrest and to assess the relation between them and the involved staff.	Interviews Descriptive, analytical and inductive methods	Bereaved	IHCA 1 OHCA 16 11 at home 1 in park 4 in ambulance 1 in ED Sudden cardiac arrest of nontraumatic etiology	Average 15 mo Range 5-34 mo	17 patients 14 patients died during resuscitation 1 died within 12 hours of admission 1 survivor died 11 mo after (discharged to nursing home) 1 survivor went back to work	17 participants 14 wives 1 husband 2 sons Median age 71 y Age range 38-77 y	Not reported	B+	Family members' experiences related to cardiac arrest was presented in categories and corresponding subcategories. 1. The event occurs to the patient (realizing the need for assistance, managing to initiate first actions) 2. The emergency medical service arrives (feeling of stress, forgetting their own needs) 3. The staff takes over at the hospital (receiving sympathy, encountering distance) In this study, the experience of families after cardiac arrest vary widely: when the event occurred, when EMS arrived and when staff took over at the hospital. The findings should be generalized with care because of the descriptive research design and the few family members involved. The study illuminates that the health care staff involved have a tremendous impact and a unique position, in guiding the family members to regain their state of equilibrium.
37	Whitehead et al[45] 2020 United Kingdom	Improve understanding of the consequences of surviving cardiac arrest, the natural history of recovery, and the unmet needs of survivors and their partners	Interviews Interpretive phenomenological approach	Survivors and cosurvivors	OHCA	Range 3-12 mo	8 survivors 5 male 3 female Age 63 y Standard deviation 14 y	3 partners 1 husband 2 wives	2 present for CPR	A-	The key (superordinate) theme of being "trapped in a disrupted normality" was identified within the data. Five related subordinate themes included existential impact, physical ramifications, emotional consequences, limiting participation in social activities, and altered family roles. An overwhelming sense of being unable to move on in life was present. Participants saw their prearrest health as their "gold

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TABLE 2
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ID	Author	Study aim	Method	Participant	Setting	Time since arrest	Victim or survivor description	Family description	Family resuscitation	Quality rating*	Relevant study findings
											standard," using this as a goal against which to assess their recovery. There was a wish to return to a previous standard of living. Although survivors were grateful for being alive, their perception of life was changed by their experience Goals associated with progress postdischarge should focus on establishing a "new normal," rather than trying to return to a physical and social position associated with someone's precardiac arrest self. This may mean helping individuals to identify and incorporate important, personal values into their "new normality" and into any assessment conducted by health care professionals.
38	Wisten and Zingmark[57] 2007 Sweden	Elucidate perceived support and the needs of bereaved parents confronted with sudden cardiac death.	Interviews Qualitative content analysis	Bereaved	OHCA Sudden cardiac arrest of nontraumatic etiology	Average 8 y Range 5-12 y	20 cardiac arrest victims (deceased)	28 parents 14 witnessed arrest 13 informed by telephone 2 informed by personal visit 19 contact with ED 10 no contact with ED	8 found family member in cardiac arrest 6 provided CPR	B+	Findings of the study showed that most parents experienced a lack of follow-up care; they had been left mainly to themselves to find information and support. Four factors were identified as being particularly important for the parents: evidence, reconstruction, explanation, and sensitivity. - If resuscitation attempts are ongoing, the parents/next-of-kin should be offered to witness the resuscitation. - A physician should give understandable information. - After death has occurred the physician should explain the forthcoming procedures. - A nurse or paramedic should offer to sit and talk - The bereaved should be encouraged to sit by the deceased - A priest or a counselor should be offered - Appointment of a contact person, eg, a social worker or registered nurse - A leaflet with information about autopsy routines, the name/telephone number of their contact person, and educational material about the grieving process should be given. - The bereaved should be invited to a debriefing meeting at the hospital – The results from the autopsy should be given as decided. - The contact person should have a follow-

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TABLE 2
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ID	Author	Study aim	Method	Participant	Setting	Time since arrest	Victim or survivor description	Family description	Family resuscitation	Quality rating*	Relevant study findings
											up contact with the bereaved after 3-6 mo. - The authors propose a support program to be used in cases of sudden, unexpected death in or out of hospital.
39	Yeates et al[46] 2022 Australia	To codesign an online support intervention for families after sudden cardiac death in the young	Focus groups Thematic analysis	Bereaved	Not reported	Not reported	Not reported	6 family members who had experienced a young sudden cardiac death participated in 4 focus groups 1 peer researchers participated in 4 focus groups Age ranged 32-65 y 6 parents and 1 sibling in relationship to cardiac arrest victims	Not reported	B+	Focus group 1: exploring high level ideas The desire for a caseworker Gaps in the medical system The need for peer support Focus group 2: brainstorming content Uncertainty Individual coping Family and systems coping Information needs: - Participants raised the desire to meet with other SCD families recognizing the benefit of peer support. - Participants discussed the need for information, particularly around causes of death, coronial process, and next steps for their family. - Participants sought help with coping after a sudden cardiac death. - Participants sought help with coping in the context of the wider family. - Participants discussed the different ways they would like information presented.

CA, cardiac arrest; CPR, cardiopulmonary resuscitation; ECPR, extracorporeal cardiopulmonary resuscitation; ED, emergency department; EMS, emergency medical services; ICU, intensive care unit; ICD, implanted cardioverter defibrillator; IHCA, in-hospital cardiac arrest; MI, myocardial infarction; OHCA, out-of-hospital cardiac arrest; SCD, sudden cardiac death.

* Score derived from Critical Appraisal Skills Program (CASP) quality assessment tool for qualitative studies.

survivors as participants ($n = 132$).[27,37,38,42,44,47,48,51,61,70] One study enrolled the family of survivors and nonsurvivors and cardiac arrest survivors (family of survivor $n = 2$, family of nonsurvivor $n = 1$, survivor $n = 2$).[36]

Review Findings

We generated 18 review-finding descriptive themes with confidence ratings from high to low certainty. From these we constructed 5 higher-order analytical themes: (1) When the crisis begins we must respond; (2) Anguish from uncertainty, we need to understand; (3) Partnering in care, we have much to offer; (4) The crisis surrounding the patient, ignore us the family, no longer; and (5) Our family's emergency is not over, now is when we need help the most. Review findings and confidence ratings are presented in Table 3. A summary description of family care needs during cardiac arrest care is provided in Figure 3.

Analytical Theme 1: When the Crisis Begins We Must Respond

Cardiac arrest may start with chest pains, dizziness, or seizure, which out-of-hospital family members must recognize, get help, and find the bravery to respond.[49,56,63,66] The family member may pull the victim to the floor, roll them supine, and perform assessments, chest compressions, and resuscitative maneuvers.[49,50,56,58,63,69] Families describe desperation when resuscitating and waiting for rescuers.[36,49,50,56,63,66]

Analytical Theme 2: Anguish From Uncertainty, We Need to Understand

Families need information and their information needs are diverse, urgent, and long-lasting.[34-36,41,42,46,52,55,56,58,60,62,64,66,67,69] Their needs are practical (eg, how do we arrange a funeral?),[64] explanatory (did CPR hurt them?),[58] and existential (why did they survive or die?).[47]

Families described wanting to know the cause, what was known versus unknown, who provided care, what was done, what is being done now, what will happen next, and whether this could happen again to the victim or a relative.[41,53,55,59,62,66] Many wanted to know their family member did not suffer and that all that could be done had been done. Survivors, families of survivors, and nonsurvivors all want to know what they can do to heal and recover and what to expect from the days and weeks to come.[46,57,66,72]

The way information is shared matters. Families prefer plain language, honest and realistic information,[52] and written information to supplement verbal.[36,46,57] Having someone to respond to questions was valued by families. Families, including survivors, work to make sense of cardiac arrest by constructing a narrative timeline and assigning meaning to different events.[27,38-40,44,46,47,50,53,56,59,66] Cardiac arrest care is often described as chaotic and unreal.[38,42,53,59] Families (and survivors) explain attempts to find normality by controlling some aspects of care and their surroundings.[65]

Analytical Theme 3: Partnering in Care, We Have Much to Offer

Assigning a person to provide informational and emotional support for families in the intra- and postarrest phases (regardless of outcome) was essential.[34,57,59] The need to be heard, share information, and engage the care team by sharing helpful information was important to families.[36,41,58,59,61,71]

Families may want to be near the victim; they want to be offered presence to observe the resuscitation.[57-59,67,69,71] They may join in caring for the victim through speaking to, touching (even during CPR), saying goodbye, performing prayer and religious customs, and participating in shared decision making.[54,59,67,69,71] For most families, removing them or denying access was painful. The benefits of being present during cardiac arrest care included seeing the care providers working hard and caring.[59,69] Family presence addressed negative experiences such as isolation, exclusion, being made to wait, uncertainty, and distress.[57]

Analytical Theme 4: The Crisis Surrounding the Patient, Ignore Us the Family, No Longer

There is a near-universal desire of families to be acknowledged and respected and to have their experience and distress recognized and addressed openly.[34,41,46,50,59,71] For many family members, it is the worst day(s) of their lives, and the actions of the health care team can be helpful or harmful. Comfort was perceived in provider expressions of hope (eg, sharing of good news, honest interpretations of prognosis, and being told their family member did not suffer), regardless of the outcome.[34,36,39,50,52,55,67]

Families believe the health care team could (and should) protect them from harm by preparing them for the image of their loved one undergoing cardiac arrest care and dehumanizing technology, and preparing them for the possibility of a poor outcome.[34,39,50,52,54,69] Families wanted protection from resuscitation with no possibility of survival or a poor neurologic state.[61]

TABLE 3
A framework of themes identified in the data

Descriptive theme (review finding)	Supporting studies	Supporting data	Confidence in the evidence*	Explanation of confidence in the evidence assessment	Analytical theme
Recognize the unfolding crisis – Chest pains, dizziness, unresponsiveness, abnormal breathing, and seizure can be the signs of a cardiac arrest that can make recognition difficult. When the arrest occurs in the presence of family, they need to recognize the emergency and activate the emergency response system. Emergency call takers can be an important resource to aid in the recognition of the severity of the situation.	Ann-Britt et al[49] Wagner[66] 2004 Weslien et al[56]	"I asked how he was. 'I don't know,' he said. So he began to feel... he didn't say it was anything, but he was a bit irritated and curt in some way. It was just as if his body didn't fit him but he couldn't... so I know I said, I think we have to eat, I think we are hungry. We have been going since lunch" (interview person (IP) 15). Ann-Britt et al[49] [H]e . . . sat slithered down with the legs out. I saw exactly when he died and I flew up and [said], 'Oh my God! You are not dying?' I shook him, but I understood that he died. . . . One has to think for one's self. I couldn't think clearly. . . . I went to the phone and called 112. (FM4) Weslien et al[56] 2005	High	3 studies with minor to moderate methodological limitations	When the crisis begins we must respond
Find the bravery to respond and the primacy of survival – Whether through previous training and knowledge or guided by the emergency call-taker, family members describe the necessity to overcome their fears and do what must be done, wade into the unfamiliar and frightening, pulling their loved one to the floor, performing assessments, providing chest compressions and other resuscitative maneuvers.	Ann-Britt et al[49] Bremer et al[50] De Stefano et al[69] 2016 Dichman et al[58] 2021 Weslien et al[56]	"During the time I received instructions from the ECS on what I should do, lay her down and what to do.... try to do massage and blow in the mouth and something like that, which I have no knowledge of and have never done before. So I felt very insecure... but I tried my best" (IP7). Ann-Britt et al[49] [S]omeone [from the ECS] asked me if I had knowledge in Basic CPR. I had [a certificate]. She asked me to begin and [said] that the ambulance is coming shortly. . . . I did heart massage. . . . Sometimes one gains strength. One doesn't consider how to cope, but after all one does. One tries to do everything. (FM2) Weslien et al[56] 2005	Moderate	5 studies with minor to moderate methodological limitations and some indirectness	
Immediate rescue – Families describe their desperation, attempting resuscitation while waiting for rescuers to respond and their need to give up the sole responsibility for their loved one's survival. They do not want to be alone, and be their loved-one's only chance for survival. They want to cut out the waiting and processes they do not value, to focus on whatever increases the likelihood of survival. They want help immediately including directions over the telephone.	Ann-Britt et al[49] Bremer et al[50] Grunau et al[36] Wagner[66] 2004 Weslien et al[56]	"Great! Hold on! Are you on your mobile phone or there?" or something. "No, I'm on my way in the car." "Okay, stay on the phone until you get there and then you can tell us what it looks like!" Something like that she could have said, perhaps: "Oh, yes, is it like this or that." "I see! Then you should do . . . " Perhaps she could have helped me over the phone and done something. Bremer et al[50] I was hardly able to answer the questions [from ECS]. . . . Perhaps it was 20 questions. I said, 'I can't answer these questions.' . . . They asked, 'Are you able to do this and that?' 'I can't do anything because I am so shocked.' Then they asked, 'Do you know any younger person you can ask?' . . . Then I run to a neighbor who went with [me] and talked to them. (FM7) Weslien et al[56] 2005	High	5 studies with minor to moderate methodological limitations High coherence between studies Thick data	
Information is essential – The information needs of families are diverse, pressing and long-lasting. The needs are practical, explanatory and existential. Families repeatedly described wanting to know what is wrong with their loved one, what is known and unknown, who is providing care, what was done, what is being done now and what happens next. Many wanted to know their family member did not suffer and that all that could be done had been done. They wanted to know how to optimize outcomes, moving forward. The way information is shared matters as families emphasize preferences for plain language, honest and realistic information as well as a desire for written information to supplement verbal and aid understanding. When excluded, and not informed, families expressed despair and disappointment with their treatment.	Carlsson et al[34] Dainty et al[11,35] De Stefano et al[69] 2016 Dichman et al[58] 2021 Grunau et al[36] Holm et al[52] Maxton[67] Muehlschlegel et al[41] Presciutti et al[42] Stewart[59] Wagner[66] 2004 Wallin et al[55] 2013 Weslien et al[56] Yeates et al[46]	'I am entitled to know what the actual situation is. And I think that also means a higher level of trust. If it had turned out that he (the doctor) told me a lot of nonsense because he did not want to tell me how serious this was ... then I would have lost confidence in him. I would not have believed a word he told me after that (...) The first doctor we spoke to told us, "I don't know how this will end. If he starts to bleed, there is nothing more we can do for him. We nearly lost him in the emergency room (...)." And I think that was good (that he was honest).' Holm et al[52] We sat in here [parents' room] for the whole time and I was an absolute mess ... I said '... I can't stand not knowing.'.. I know they do everything they can to help but waiting ... but when you sit there and you don't know what's happening, it's a horrible feeling, sitting waiting ... 5 minutes seems like 5 hours. Maxton[67]	High	14 studies with minor to moderate methodological limitations High coherence between studies Thick data regarding the importance of information	Anguish from uncertainty, we need to understand

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TABLE 3
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Descriptive theme (review finding)	Supporting studies	Supporting data	Confidence in the evidence*	Explanation of confidence in the evidence assessment	Analytical theme
Make sense of the chaos and regaining control through constructing a timeline of events – The experience of cardiac arrest care is most often described as chaos, unreality and out-of-body. Families (including survivors) describe the importance of being understood by constructing a timeline of the cardiac arrest and struggles to fill-in the events and their meaning or significance. Health care processes can worsen the experience of powerlessness and hopelessness. Families (and survivors) explain attempts to find normality and to control some aspect of care and their surroundings.	Bremer et al[50] Haydon et al[38] Jensen et al[39] Larsen et al[40] 2023 Stewart[59] Wagner[66] 2004 Wagner et al[27] 2021a Wagner et al[44] 2021b Weslien et al[56] Yeates et al[46]	Then everyone says, "Yes, I understand." There is not one person who can understand what another one feels! But that's what you say. It is . . . if you instead say, "Yes, I can try to understand," then you're a bit closer to the truth. You don't really know yourself how, how you really are doing! Bremer et al[50] "I can wake up at night like: Is he here? It haunts me ... I never really sleep anymore. And he can't leave the bed either. If anything happens to him ... I've been seized with fear." (spouse 1) Jensen et al[39]	Moderate	7 studies with minor to moderate methodological limitations Moderate coherence between studies Fairly thick data	
Assign us a liaison, someone to help us – Assigning a member of the resuscitation team to the family was seen as a valuable resource. The navigator or liaison role fulfills many of the identified care needs such as the provision of information, engaging in communication and supporting presence. It also demonstrates that care of the family is a priority.	Carlsson et al[34] Stewart[59] Wisten and Zingmark[57]	'I wanted someone who knew what they were on about.' Carlsson et al[34] If you've got somebody there who's able to translate what's going on in roughly real time, information calms people. Even if it's bad news. Having the news is better than the anxiety of not knowing. Stewart[59,72]	Moderate	3 studies with minor to moderate methodological limitations Adequate data, high coherence	Partnering in care, we have much to offer
Communication, we need to be heard and have information to share – Families want to be able to engage the team, share information that might be helpful and ask questions specific to the situation. There was an expressed desire to be heard, especially when sharing medical information and goals of care.	Dichman et al[58] 2021 Grunau et al[36] Jang and Choe[71] Muehlschlegel et al[41] Stewart[59]	"The word of a human being to emotional disturbed loved family member is hundred thousand times more important than giving him piece of paper, and saying " Go and read" ." [Mr. A's mother] Grunau et al[36] They didn't realize that we were the experts on her. There was nothing [in their communication to us] that said, 'hey, you know, obviously you've got a significantly ill child here Stewart[59]	High-Moderate	5 studies, 3 with minor methodological issues and 2 with moderate methodological issues Adequate data with moderate coherence	
Facilitate family participation, we must also care for them – Families have their own tasks they value and believe are required of them during cardiac arrest care such as directly supporting the patient (even during CPR), saying goodbye, performing prayer and cultural-religious customs and participating in decision making. In some cases,being involved and caring for their loved-one was seen as an act of self care for the family, that the act of caring was benefiting both the patient and the family.	De Stefano et al[69] 2016 Jang and Choe[71] Maxton[67] Stewart[59]	They let me access her port—not many people can get it. Then we asked tons of questions. What are the vitals? What is the epinephrine doing? Her pediatrician was our communicator with the ED. I have a feeling, had she not been there we would have been carted off to a waiting room and just left. Stewart[59] I was there for [the resuscitation] because I wanted to hear what they were all saying to make sure they were all on the same page, things can easily get missed. I was going to stay there to make sure they got it right. Stewart[59]	High	4 studies with minor to moderate methodological issues Thick data and high coherence Minor indirectness for 1 study	
Offer us presence or support our absence – Families want their proximity to their loved one in cardiac arrest to be their choice. They want to be offered presence to observe the resuscitation. For many, it was untenable to be removed from the scene or denied access to their loved one. Being absent was hurtful. The benefits to family members, by being present during resuscitation were numerous and included reality was better than what they imagined was happening before being present, the opportunity to see the health care professionals doing their jobs and demonstrating their skill and caring, and feeling seen and acknowledged. Presence also addressed negative experiences such as isolation, exclusion, being made to wait, and greater uncertainty and distress.	De Stefano et al[69] 2016 Dichman et al[58] 2021 Jang and Choe[71] Maxton[67] Stewart[59] Wisten and Zingmark[57]	"I was alone in the corridor in front of the resuscitation room while my wife was receiving resuscitation. I was just crying alone. At that time, I felt like I was standing in the middle of a desert. I was very scared and it was painful." (Junsung, 71, husband). Jang and Choe[71] ... we stayed out of the way and watched them ... and that gave us a very different perspective of them about what they do ... they're all working around the bed, it's like controlled chaos ... busy and frantic ... everyone knew their job and what to do … Maxton[67]	High	6 studies with minor to moderate methodological issues Thick data and high congruence	
Acknowledge us and approach us with dignity and compassion—there is a nearly universal desire by the families experiencing cardiac arrest to be acknowledged and respected, to have their experience and distress recognized and addressed, and to have their relationship and grief recognized. For some family members, the cardiac arrest of their loved-one is the worst day of their lives and simple actions by the health care team are seen as caring or harmful. There are times when, whether present or not, that families felt abandoned, isolated, and invisible during cardiac arrest care.	Bremer et al[50] Carlsson et al[34] Jang and Choe[71] Muehlschlegel et al[41] Stewart[59] Yeates et al[46]	The staff said: 'You may stay as long as you want.'/ ... /Nobody really asked 'How are you?' or 'Do you need anything?'/ ... /It almost felt like ... that we were in their way, because they were short on staff and ... we didn't feel taken care of. Carlsson et al[34] In the ED they kept asking what happened over and over; asking me questions. They were so busy working on her. No one talked to me except to ask questions. I just sat in the corner by myself—watching and crying. Stewart[59]	High-Moderate	6 studies with minor to moderate methodological issues Thick data and moderate congruence	The crisis surrounding the victim, ignore us, the family, no longer

continued

TABLE 3
Continued

Descriptive theme (review finding)	Supporting studies	Supporting data	Confidence in the evidence*	Explanation of confidence in the evidence assessment	Analytical theme
Give us space to grieve – Families described how their expressions of grief, such as crying, were seen as their 'not coping.' Families wanted space to be in their grief, to be allowed to feel and express their grief without having to negotiate with health care professionals about remaining present or being talked to about things they thought were needless and distracting. They also wanted the infrastructure to care for themselves, charge phones, call family and friends, bathe, and sleep.	Maxton[67] Muehlschlegel et al[41]	You just cope, you have a cry and then cope ... you'd go for a walk outside and have a bit of a cry and get it out your system and that was good. Maxton[67] 'I was crying, he'd had a second arrest and she said 'hush, be quiet, I can hear your tears all over the ward' and I thought ... she tells me to hush ... she was so hard and my son was dying.' Maxton[67]	Low	2 studies with minor methodological issues Fairly thick data	
Navigate through hope and hopelessness – Many families took comfort in and valued expressions of hope provided by the resuscitation team, regardless of the outcome. They perceived hope in the sharing of good news, honest interpretations of prognosis, as well as being told their family member did not suffer or experienced a good death.	Bremer et al[50] Carlsson et al[34] Grunau et al[36] Holm et al[52] Jensen et al[39] Maxton[67] Wallin et al[55] 2013	Then they [the rescue team] had said that he was dead; however, the last words our neighbor said to me were, 'They're holding on. So, there can be ...' The neighbor gave me a little shred of hope and we drove to the hospital. Maybe he will be sitting there acting as if nothing has happened. Carlsson et al[34] "I was just hoping [for the best at the hospital], and I tried to tell myself, "It'll be okay." And they [health care professionals] provided us with hope, pointing out that he was in good shape and that it seemed as if he would be okay." (spouse 2) Jensen et al[39]	Moderate	7 studies with minor to moderate methodological issues Thick data and moderate congruence	
Protection from harm – Families thought the health care team could (and should) protect them from harm such as preparing them for the image of their loved one undergoing cardiac arrest care and dehumanizing technology and preparing them for the possibility of a poor outcome. They also wanted to be protected from excessively heroic treatment, needless dehumanizing procedures, and resuscitation with no help of survival or a persistently vegetative state.	Bremer et al[50] Carlsson et al[34] De Stefano et al[69] 2016 Holm et al[52] Jensen et al[39]	In the beginning I thought, "She [the ambulance nurse] was going on and on, and it was all lines [on the electrocardiogram monitor]." So I thought, "Why do they carry on?" That was my thought. "Why do they carry on for so long?" I thought it would be better that they just pronounced [him dead]. Bremer et al[50] "... if it was to resuscitate a vegetable, I prefer being in our situation today, even though I'm a widow, than to go to see my husband at the hospital as a vegetable (relative #519)" De Stefano et al[69] 2016	Moderate-Low	5 studies with minor to moderate methodological issues Thick data, moderate congruence, some indirectness	
When to put their loved one or themselves first – Families are certain that the initial priority is the survival of the person in cardiac arrest. However, as cardiac arrest care continues, family members (especially spouses, partners, parents and caregivers) experience role strain as they are pulled in multiple directions, ie, do they stay home to care for others or travel with their loved on to the hospital or do they leave the hospital to fulfill family obligations or do they stay at the bedside. They must attend to visitors and social networks which could be both a source of strength or additional burden. Furthermore, as their grief and distress escalate, the family may want the attention and help of the health care team but not know how to navigate their needs versus the loved one with greater physiological care needs.	Dichman et al[58] 2021 Holm et al[52] Maxton[67]	'Sometimes we had to take care of the visitors. And then I thought: "No. I am here to be with him now. I don't want any more visitors right now... I want to go to see him, and I don't want the whole bunch to come with me." And then everything was fine when they left in the evening. I could be alone with him for a while. I just sat at his bedside, I took his hand and... had a chat...' Holm et al[52] 'you don't want somebody yakking in your ear about you know, how you're feeling ... You'd say 'what are you doing? Get over there and do something!' Maxton[67]	Moderate	3 studies, 1 with minor and 2 with moderate methodological issues Thick data and high congruence	
Psychological aftercare – After the cardiac arrest, upon declaration of death, or when the patient is stabilized, families express a need for debriefing, an early intervention to help defuse and manage their distress. The sense of loss, grief, and trauma that may result from the cardiac arrest (leading to death or uncertain survival) transcends the initial event, lasting weeks, months, and sometimes years. Families want follow-up to help address unanswered questions, process their grief, and transition to a new normal—whether they are bereaved or living with the possibility of future cardiac arrest. Survivors also have significant care needs to reconcile their health, mortality, and how they fit back into their lives and families.	Bremer et al[50] Dainty et al[11,35] Dichman et al[58] 2021 Holm et al[52] Jensen et al[39] Muehlschlegel et al[41] Wagner 2020 Wallin et al[55] 2013 Wisten and Zingmark[57] Yeates et al[46]	"(...)we'd benefit from a follow-up from the municipality. There's been nobody [health care professionals] in our home since the first year. I'd have liked it if they'd ... visited one year after their first visit, so we could've had a chat about how everything was going." (spouse 4) Jensen et al[39] It is so hard.... To be with your children and family... (crying). I have trouble going into my bedroom where it happened [cardiac arrest]. I cannot sleep in there.... I'm having a hard time with ambulances, the sound of the computer, and when people are running. It sounds like when you are having a cardiac arrest. It is in my head (7). Wagner 2020	High	9 studies with minor to moderate methodological limitations High coherence between studies Thick data	Our family's emergency is not over, now is when we need help the most.

continued

TABLE 3
Continued

Descriptive theme (review finding)	Supporting studies	Supporting data	Confidence in the evidence*	Explanation of confidence in the evidence assessment	Analytical theme
Do not let us be abandoned, help us to help ourselves – Families of survivors, including the cosurvivors, are often caregivers who are required to perform complex case management, coordinating follow-up with specialists and rehabilitation while balancing their own need for self-care and support. Discharge is often experienced abruptly as a withdrawal of all available help and is punctuated by sleeplessness and fear. Many families will then access information online and struggle to determine its applicability to their situation. Survivors need help returning to work and recreation, and families need help connecting with other persons with similar experiences and need help accessing hidden resources. Families identified numerous barriers to accessing support and assistance, often without any remedy.	Dainty et al[11,35] Dichman et al[58] 2021 Harrod et al[37] Holm et al[52] Larsen et al[40] 2023 Muehlschlegel et al[41] Presciutti et al[42] Wallin et al[55] 2013 Wisten and Zingmark[57] Whitehead et al[45] Yeates et al[46]	I like the idea of long-term [follow-up], even let's say 6 months, that you get a call from the doctor or the hospital to check on you, to say, 'Hey, we're looking at your stuff. We know you're out there. 'Cause you don't get that, you feel you're an island. Presciutti et al[42] Like he [doctor] recommended I get you know more therapy and stuff like that but like I say, I don't have no way to get there, I live 64 miles round trip where I go to my doctor, it's 64 miles round trip and I have to ride that hot bus and I, like I say, I don't have the finances to do that. (ID# 665) Harrod et al[37]	High-Moderate	11 studies with minor to moderate methodological issue Thick data and high congruence	
Dealing with guilt – An experience from some family members after the cardiac arrest of a loved-one is guilt. It is often connected to thoughts that the family member could have prevented the event or should have recognized or responded sooner. Overcoming guilt is described as part of many families' recovery and healing after experiencing cardiac arrest.	Bremer et al[50] Maxton[67]	Then finally he [the doctor] almost said, "So, do you blame yourself almost or do you feel guilt?" That's how he felt. "Yes, obviously you do!" I said perhaps I could have done something if I had known, if I had had [the cardiopulmonary resuscitation] training then. Bremer et al[50] And, '... I should have been there ... it might not have happened if I'd stayed.' Maxton[67]	Moderate	2 studies with minor to moderate methodological issues Thick data and high congruence	
Expressing gratitude – Many families (including survivors) shared feelings of gratitude and appreciation for their rescuers. Many wish to connect with and express their gratitude to the many first responders, health care providers, bystanders, lay-rescuers, and others who cared for their loved one and their family.	Weslien et al[56] Wagner 2020	Ten minutes went where I was actually dead. They fought and never gave up' (4) Wagner 2020 I stood there and what should I do. She told me, 'They [the EMS] are on the way and you can't do anything.' . . . Thank God, she [the woman from ECS] talked to me on the phone until the ambulance arrived. This felt good. (FM8) Weslien et al[56]	Low	2 studies with minor to moderate methodological issues Fairly thick data and high congruence Some indirectness	

CPR, cardiopulmonary resuscitation.
* Score derived from Critical Appraisal Skills Program (CASP) quality assessment tool for qualitative studies and the Grading of Recommendations Assessment, Development, and Evaluation Confidence in the Evidence from Reviews of Qualitative Research (GRADE-CERQual) approach.

Summary of survivor and family-Informed care needs and clinical practice recommendations

Pre-arrest phase:

- The "event" may begin before cardiac arrest, with early warning signs like chest pain, syncope, or seizure.
- Essential pre-arrest care includes recognizing the developing emergency, which may require an emergency 911/999 call-taker or another person.

Intra-arrest phase:

- The intra-arrest stage starts when cardiac arrest is recognized.
- Immediate help is vital to save the victim's life.
- Actions may include calling emergency services, providing CPR, or initiating a hospital code blue response.
- Family members often desire presence during resuscitation to understand the situation; however, when being absent is preferable, attendance and support are equally necessary.
- Families appreciate having a liaison or support person present, for their support during the resuscitation.
- Additional needs include being treated with dignity, communicating with the resuscitation team, and partaking in care.
- Information about the providers, the patient's condition, and the next steps are important.
- Respecting the family's culture and traditions is crucial.
- The phase lasts until the patient is no longer accessible or has return of spontaneous circulation.
- In the end, families desire a debriefing to help them understand the event and start healing.

Post-arrest phase:

- Families recognize and prioritize their needs, which may involve addressing grief, guilt, fatigue, and other worries.
- Organ donation may be a priority for some families.
- They may also face physical and psychological impacts of survivorship or bereavement.
- The needs include practical, emotional, and psychosocial support from peers and healthcare providers.
- Sudden discharge from the hospital can often feel like abandonment.
- Follow-up healthcare is important to address unanswered questions and further healthcare services, such as rehabilitation.
- Support for survivors to return to their previous activities and employment is necessary.
- Bereavement care is essential for non-survivor families.
- Some families may wish to express gratitude to care providers or contribute to charity or research.

FIGURE 3

Summary of survivor and family-Informed care needs and clinical practice recommendations. CPR, cardiopulmonary resuscitation.

Families require the infrastructure to care for themselves, charge phones, call family and friends, bathe, and sleep. Not having to negotiate and renegotiate with each new health care provider about remaining present or having access to things they require (eg, blankets, food or drink, chairs) is also a family need. Physical accommodation to process and express their grief without being labeled as "not coping" was identified as a need.[41,67] Although families are certain that the initial priority is victim survival, as care continues, family members (especially spouses, partners, parents, and caregivers) experience role strain as they are pulled in multiple directions.[42,52] They may struggle to attend to visitors and social networks, which could be a source of strength or an additional burden.[72] As their grief and distress escalate, the family may need the attention and help of the health care team but not know how to reconcile their psychological and socioemotional needs with the victim's physiological needs.[52,58,65,67]

Analytical Theme 5: Our Family's Emergency Is Not Over, Now Is When We Need Help the Most

After the cardiac arrest (death or survivor stabilization), families need debriefing—an early intervention to help defuse and manage distress.[27,35,39,41,43,46,50,52,55,57,58,63,64,68,70] Discharge is often experienced abruptly as a withdrawal of all help punctuated by anxiety, sleeplessness, and fear.[40,52,58,72] The sense of loss, grief, and trauma that

may result from the cardiac arrest transcends the initial event, lasting weeks and sometimes years.

Families want follow-up to address unanswered questions, process grief, and transition to a new normal—whether bereaved or caregiver to a survivor.[35,37,40-43,45,46,48,51-53,55,57,58,63-65,68,70] Some family members experience guilt connected to thoughts they could have prevented the event, recognized, or responded sooner or better.[43,50,62,63,67] Survivors need to reconcile their new bodies fit into their old lives.[35,43,45]

Families of survivors are often caregivers required to perform complex case management and coordinate follow-up with specialists, rehabilitation, and "hidden resources" while balancing their need for self-care and support.[48,65,72] Many families will access information online and struggle to determine its applicability. Families identified numerous barriers to accessing support and assistance, often without remedy.[27] Many families (including survivors) wish to connect with and express gratitude to the first responders, health care providers, lay rescuers, and others who cared for their family.[27,56]

Discussion

INTERPRETATION

Our meta-synthesis describes the experience and care needs of survivors and family participants who experienced cardiac arrest care—which includes both cosurvivors and the bereaved. Using GRADE-CERQual methods, we developed high-confidence findings that support cardiac arrest care providers and organizations to improve recognition and rapid response, improve information provision for families, facilitate effective communication between providers and families, support family presence and participation or supported absence from resuscitation, and provide meaningful aftercare.

CONTRIBUTION TO EXISTING LITERATURE

Our findings overlap with a recent scoping review that described family care needs during cardiac arrest as survival, closeness, information, shared decision making, consideration of culture, debriefing, and follow-up.[12] An important distinction between the previous review and ours is the importance of psychological aftercare and the need for help caregiving and health system navigation for survivors and families. Our findings also reinforce those of a previous meta-synthesis exploring cardiac arrest survivors' quality of life that found more information sharing and physical and psychological support were needed for cardiac arrest survivors when discharged from the hospital.[73]

Some of our findings are not new. A 1971 study exploring the attitudes of cardiac arrest survivors and spouses found they struggled after discharge with knowledge and self-care deficits.[31] A psychological examination of cardiac arrest survivors from 1972 described them as having striking reactions to cardiac arrest and resuscitation that went unrecognized and untreated.[32] Similarly, a recent survey of 123 survivors and 39 family members about their postarrest care needs identified early follow-up, multidimensional assessment of arrest sequelae, determination of arrest etiology, screening for emotional problems, treating mental fatigue, and supporting sex after cardiac arrest.[74] Arguably, enough is known about cardiac arrest survivor and family member experiences and care needs, and now rigorous interventional studies to measure the impact of survivor and family focused interventions are required.

Limitations

Strengths of our work include the full participation of survivors and family members in our review and the rigorous review methods followed. In addition, our findings come from many participants with diverse cardiac arrest experiences. There are also noteworthy weaknesses. The full participation of survivors and family members throughout the process may have introduced bias. Study participants were largely homogenous, coming from urban North American and Western European settings; furthermore, researchers did not regularly report participant ethnicity or culture, so commenting further on diversity and inclusion is not possible. Moreover, our effort to identify the universal care needs of families has been achieved at the expense of more nuanced and detailed care need identification of population subgroups (such as adults experiencing the cardiac arrest of an elderly parent in the home compared with parents experiencing the cardiac arrest of a child in pediatric intensive care). We made 1 significant deviation from our initial protocol—our survivor and family review team members recommended including studies with survivor participants because they have insight into family care needs and are often enrolled in studies with family members where they receive care together.

Implications for Emergency Nurses

This paper adds to the emergency nursing knowledge base and practices in several ways: if emergency nurses were not previously aware of the support and care needs

of families experiencing cardiac arrest, this paper describes those needs; furthermore, many nurses may facilitate family-witnessed resuscitation, but may not know how to meet the needs of families who do not wish to be present. Finally, the major takeaway message is that this work illustrates the temporality of care needs as transcending the prearrest, intra-arrest, and postarrest periods. Emergency nurses have a role in each of these 3 stages.

Conclusion

This systematic review meta-synthesized the experiences and care needs of families (including survivors) who experienced cardiac arrest. Measures of certainty of review findings were provided. The high-certainty review findings relevant to providers and systems of cardiac arrest care are as follows: improve recognition and rapid response, adopt formal systems for improving information provision for families, facilitate effective communication between providers and families, support family presence and participation or support family absence from resuscitation and provide meaningful psychological aftercare. This review was performed with the participation of survivors and families with diverse cardiac arrest experiences as team members. Therefore, we feel our findings have relevance for many cardiac arrest care settings and circumstances. Research evaluating the impact of survivor and family-centered interventions is urgently required.

Author Disclosures

Conflicts of interest: none to report.

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Supplementary Data

Supplementary data related to this article can be found at https://doi.org/10.1016/j.jen.2023.07.001.

REFERENCES

1. Rao BH. Global burden of sudden cardiac death and insights from India. *Indian Heart J*. 2014;66(suppl 1):S18-S23. https://doi.org/10.1016/j.ihj.2013.11.009
2. Compton S, Levy P, Griffin M, Waselewsky D, Mango L, Zalenski R. Family-witnessed resuscitation: bereavement outcomes in an urban environment. *J Palliat Med*. 2011;14(6):715-721. https://doi.org/10.1089/jpm.2010.0463
3. Jabre P, Tazarourte K, Azoulay E, et al. Offering the opportunity for family to be present during cardiopulmonary resuscitation: 1-year assessment. *Intensive Care Med*. 2014;40(7):981-987. https://doi.org/10.1007/s00134-014-3337-1
4. Shear MK, Ghesquiere A, Glickman K. Bereavement and complicated grief. *Curr Psychiatry Rep*. 2013;15(11):406. https://doi.org/10.1007/s11920-013-0406-z
5. Stroebe M, Schut H, Stroebe W. Health outcomes of bereavement. *Lancet*. 2007;370(9603):1960-1973. https://doi.org/10.1016/S0140-6736(07)61816-9
6. Stayt LC, Venes TJ. Outcomes and experiences of relatives of patients discharged home after critical illness: a systematic integrative review. *Nurs Crit Care*. 2019;24(3):162-175. https://doi.org/10.1111/nicc.12403
7. Committee on Hospital Care, Institute for Patientand Family-Centered Care. Family-centered care and the pediatrician's role. *Pediatrics*. 2003;112(3 Pt 1):691-696. https://doi.org/10.1542/peds.112.3.691
8. Kuo DZ, Houtrow AJ, Arango P, Kuhlthau KA, Simmons JM, Neff JM. Family-centered care: current applications and future directions in pediatric health care. *Matern Child Health J*. 2012;16(2):297-305. https://doi.org/10.1007/s10995-011-0751-7
9. van Mol MM, Boeter TG, Verharen L, Kompanje EJ, Bakker J, Nijkamp MD. Patient- and family-centred care in the intensive care unit: a challenge in the daily practice of healthcare professionals. *J Clin Nurs*. 2017;26(19-20):3212-3223. https://doi.org/10.1111/jocn.13669
10. Davidson JE, Aslakson RA, Long AC, et al. Guidelines for family-centered care in the neonatal, pediatric, and adult ICU. *Crit Care Med*. 2017;45(1):103-128. https://doi.org/10.1097/CCM.0000000000002169
11. Dainty KN, Seaton MB, Cowan K, et al. Partnering with survivors & families to determine research priorities for adult out-of-hospital cardiac arrest: a James Lind Alliance Priority Setting Partnership. *Resusc Plus*. 2021;7:100148. https://doi.org/10.1016/j.resplu.2021.100148
12. Douma MJ, Graham TAD, Ali S, et al. What are the care needs of families experiencing cardiac arrest?: a survivor and family led scoping review. *Resuscitation*. 2021;168:119-141. https://doi.org/10.1016/j.resuscitation.2021.09.019
13. Loch T, Drennan IR, Buick JE, et al. Caring for the invisible and forgotten: a qualitative document analysis and experience-based co-design project to improve the care of families experiencing out-of-hospital cardiac arrest. *Can J Emerg Med*. 2023;25(3):233-243. https://doi.org/10.1007/s43678-023-00464-8
14. Vardanjani AE, Golitaleb M, Abdi K, et al. The effect of family presence during resuscitation and invasive procedures on patients and families: an

umbrella review. *J Emerg Nurs*. 2021;47(5):752-760. https://doi.org/10.1016/j.jen.2021.04.007

15. Douma MJ, Graham TAD, Bone A, et al. What are the care needs of families experiencing cardiac arrest care? A survivor and family-performed systematic review and qualitative meta-synthesis protocol. *Int J Qual Methods*. 2021;20:16094069211048600. https://doi.org/10.1177/16094069211048600
16. Page MJ, McKenzie JE, Bossuyt PM, et al. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. *Syst Rev*. 2021;10(1):89. https://doi.org/10.1186/s13643-021-01626-4
17. Finlayson K, Crossland N, Bonet M, Downe S. What matters to women in the postnatal period: a meta-synthesis of qualitative studies. *PLoS One*. 2020;15(4):e0231415. https://doi.org/10.1371/journal.pone.0231415
18. Cooke A, Smith D, Booth A. Beyond PICO: the SPIDER tool for qualitative evidence synthesis. *Qual Health Res*. 2012;22(10):1435-1443. https://doi.org/10.1177/1049732312452938
19. Walsh D, Downe S. Appraising the quality of qualitative research. *Midwifery*. 2006;22(2):108-119. https://doi.org/10.1016/j.midw.2005.05.004
20. Flemming K, Booth A, Garside R, Tunçalp Ö, Noyes J. Qualitative evidence synthesis for complex interventions and guideline development: clarification of the purpose, designs and relevant methods. *BMJ Glob Health*. 2019;4(suppl 1):e000882. https://doi.org/10.1136/bmjgh-2018-000882
21. Viera AJ, Garrett JM. Understanding interobserver agreement: the kappa statistic. *Fam Med*. 2005;37(5):360-363.
22. Long HA, French DP, Brooks JM. Optimising the value of the critical appraisal skills programme (CASP) tool for quality appraisal in qualitative evidence synthesis. *Res Methods Health Sci*. 2020;1(1):31-42. https://doi.org/10.1177/2632084320947559
23. Lewin S, Booth A, Glenton C, et al. Applying GRADE-CERQual to qualitative evidence synthesis findings: introduction to the series. *Implement Sci*. 2018;13(suppl 1):2. https://doi.org/10.1186/s13012-017-0688-3
24. Lewin S, Bohren M, Rashidian A, et al. Applying GRADE-CERQual to qualitative evidence synthesis findings—Paper 2: how to make an overall CERQual assessment of confidence and create a Summary of Qualitative Findings table. *Implement Sci*. 2018;13(suppl 1):10. https://doi.org/10.1186/s13012-017-0689-2
25. Dixon-Woods M. Using framework-based synthesis for conducting reviews of qualitative studies. *BMC Med*. 2011;9:39. https://doi.org/10.1186/1741-7015-9-39
26. Thomas J, Harden A. Methods for the thematic synthesis of qualitative research in systematic reviews. *BMC Med Res Methodol*. 2008;8:45. https://doi.org/10.1186/1471-2288-8-45
27. Wagner MK, Berg SK, Tang LH, Stenbæk DS, Hassager C, Missel M. Understanding the lived experiences of short- and long-term consequences on daily life after out-of-hospital cardiac arrest. A focus group study. *J Adv Nurs*. 2021;77(3):1442-1452. https://doi.org/10.1111/jan.14707
28. Lewin S, Glenton C, Munthe-Kaas H, et al. Using qualitative evidence in decision making for health and social interventions: an approach to assess confidence in findings from qualitative evidence syntheses (GRADE-CERQual). *PLOS Med*. 2015;12(10):e1001895. https://doi.org/10.1371/journal.pmed.1001895
29. Tong A, Flemming K, McInnes E, Oliver S, Craig J. Enhancing transparency in reporting the synthesis of qualitative research: ENTREQ. *BMC Med Res Methodol*. 2012;12:181. https://doi.org/10.1186/1471-2288-12-181
30. Staniszewska S, Brett J, Simera I, et al. GRIPP2 reporting checklists: tools to improve reporting of patient and public involvement in research. *BMJ*. 2017;358:j3453. https://doi.org/10.1136/bmj.j3453
31. Dobson M, Tattersfield AE, Adler MW, McNicol MW. Attitudes and long-term adjustment of patients surviving cardiac arrest. *BMJ*. 1971;3(5768):207-212. https://doi.org/10.1136/bmj.3.5768.207
32. White RL, Liddon SC. Ten survivors of cardiac arrest. *Psychiatry Med*. 1972;3(3):219-225. https://doi.org/10.2190/W3JV-22HD-MGE1-TL8G
33. Simons LH, Cunningham S, Catanzaro M. Emotional responses and experiences of wives of men who survive a sudden cardiac death event. *Cardio-Vasc Nurs*. 1992;28(3):17-22.
34. Carlsson N, Bremer A, Alvariza A, Årestedt K, Axelsson L. Losing a close person following death by sudden cardiac arrest: bereaved family members' lived experiences. *Death Stud*. 2020;46(5):1139-1148. https://doi.org/10.1080/07481187.2020.1799453
35. Dainty KN, Bianca Seaton M, Richard Verbeek P. Moving from physical survival to psychologic recovery: a qualitative study of survivor perspectives on long-term outcome after sudden cardiac arrest. *Resusc Plus*. 2021;5:100055. https://doi.org/10.1016/j.resplu.2020.100055
36. Grunau B, Dainty K, MacRedmond R, et al. A qualitative exploratory case series of patient and family experiences with ECPR for out-of-hospital cardiac arrest. *Resusc Plus*. 2021;6:100129. https://doi.org/10.1016/j.resplu.2021.100129
37. Harrod M, Kamphuis LA, Hauschildt K, et al. Getting better or getting by?: A qualitative study of in-hospital cardiac arrest survivors long-term recovery experiences. *SSM Qual Res Health*. 2021;1:100002. https://doi.org/10.1016/j.ssmqr.2021.100002
38. Haydon G, van der Riet P, Inder K. A narrative inquiry of survivors' experiences of the time just before and after a cardiac arrest. *Collegian*. 2021;28(2):190-196. https://doi.org/10.1016/j.colegn.2020.06.008
39. Jensen AN, Bonnén KB, Kristiansen M. "We don't talk about his heart": narrative sense-making and long-term readjustment among older out-of-hospital cardiac arrest survivors and their spouses. *Resusc Plus*. 2020;3:100024. https://doi.org/10.1016/j.resplu.2020.100024
40. Larsen MK, Mikkelsen R, Budin SH, Lamberg DN, Thrysoe L, Borregaard B. With fearful eyes: exploring relatives' experiences with out-of-hospital cardiac arrest a qualitative study. *J Cardiovasc Nurs*. 2023;38(1):E12-E19. https://doi.org/10.1097/JCN.0000000000000893
41. Muehlschlegel S, Perman SM, Elmer J, et al. The experiences and needs of families of comatose patients after cardiac arrest and severe neurotrauma: the perspectives of national key stakeholders during a National Institutes of Health–funded workshop. *Crit Care Explor*. 2022;4(3):e0648. https://doi.org/10.1097/CCE.0000000000000648
42. Presciutti A, Siry-Bove B, Newman MM, et al. Qualitative study of long-term cardiac arrest survivors' challenges and recommendations for

improving survivorship. *J Am Heart Assoc*. 2022;11(14):e025713. https://doi.org/10.1161/JAHA.121.025713

43. Rosenkilde S, Missel M, Wagner MK, et al. Caught between competing emotions and tensions while adjusting to a new everyday life: a focus group study with family caregivers of out-of-hospital cardiac arrest survivors. *Eur J Cardiovasc Nurs*. 2023;22(3):320-327. https://doi.org/10.1093/eurjcn/zvac056
44. Wagner MK, Kikkenborg Berg S, Hassager C, Joshi VL, Stenbæk DS, Missel M. Feeling understood for the first time: experiences of participation in rehabilitation after out-of-hospital sudden cardiac arrest. *Eur J Cardiovasc Nurs*. 2021;20(8):767-774. https://doi.org/10.1093/eurjcn/zvab002
45. Whitehead L, Tierney S, Biggerstaff D, Perkins GD, Haywood KL. Trapped in a disrupted normality: survivors' and partners' experiences of life after a sudden cardiac arrest. *Resuscitation*. 2020;147:81-87. https://doi.org/10.1016/j.resuscitation.2019.12.017
46. Yeates L, Gardner K, Do J, et al. Using codesign focus groups to develop an online COmmunity suPporting familiEs after sudden cardiac death (COPE-SCD) in the young. *BMJ Open*. 2022;12(8):e053785. https://doi.org/10.1136/bmjopen-2021-053785
47. Forslund AS, Zingmark K, Jansson JH, Lundblad D, Söderberg S. Meanings of People's lived experiences of surviving an out-of-hospital cardiac arrest, 1 month after the event. *J Cardiovasc Nurs*. 2014;29(5):464-471. https://doi.org/10.1097/JCN.0b013e3182a08aed
48. Ketilsdottir A, Albertsdottir HR, Akadottir SH, Gunnarsdottir TJ, Jonsdottir H. The experience of sudden cardiac arrest: becoming reawakened to life. *Eur J Cardiovasc Nurs*. 2014;13(5):429-435. https://doi.org/10.1177/1474515113504864
49. Ann-Britt T, Ella D, Johan H, Åsa AB. Spouses' experiences of a cardiac arrest at home: an interview study. *Eur J Cardiovasc Nurs*. 2010;9(3):161-167. https://doi.org/10.1016/j.ejcnurse.2009.12.005
50. Bremer A, Dahlberg K, Sandman L. Experiencing out-of-hospital cardiac arrest: significant others' lifeworld perspective. *Qual Health Res*. 2009;19(10):1407-1420. https://doi.org/10.1177/1049732309348369
51. Forslund A-S, Lundblad D, Jansson J-H, Zingmark K, Söderberg S. Risk factors among people surviving out-of-hospital cardiac arrest and their thoughts about what lifestyle means to them: a mixed methods study. *BMC Cardiovasc Disord*. 2013;13:62. https://doi.org/10.1186/1471-2261-13-62
52. Holm MS, Norekvål TM, Fålun N, Gjengedal E. Partners' ambivalence towards cardiac arrest and hypothermia treatment: a qualitative study. *Nurs Crit Care*. 2012;17(5):231-238. https://doi.org/10.1111/j.1478-5153.2012.00490.x
53. Larsson IM, Wallin E, Rubertsson S, Kristoferzon ML. Relatives' experiences during the next of kin's hospital stay after surviving cardiac arrest and therapeutic hypothermia. *Eur J Cardiovasc Nurs*. 2013;12(4):353-359. https://doi.org/10.1177/1474515112459618
54. Löf S, Sandström A, Engström Å. Patients treated with therapeutic hypothermia after cardiac arrest: relatives' experiences: patients treated with therapeutic hypothermia. *J Adv Nurs*. 2010;66(8):1760-1768. https://doi.org/10.1111/j.1365-2648.2010.05352.x
55. Wallin E, Larsson I-M, Rubertsson S, Kristoferzon M-L. Relatives' experiences of everyday life six months after hypothermia treatment of a significant other's cardiac arrest. *J Clin Nurs*. 2013;22(11-12):1639-1646. https://doi.org/10.1111/jocn.12112
56. Weslien M, Nilstun T, Lundqvist A, Fridlund B. When the unreal becomes real: family members' experiences of cardiac arrest. *Nurs Crit Care*. 2005;10(1):15-22. https://doi.org/10.1111/j.1362-1017.2005.00094.x
57. Wisten A, Zingmark K. Supportive needs of parents confronted with sudden cardiac death—a qualitative study. *Resuscitation*. 2007;74(1):68-74. https://doi.org/10.1016/j.resuscitation.2006.11.014
58. Dichman C, Wagner MK, Joshi VL, Bernild C. Feeling responsible but unsupported: how relatives of out-of-hospital cardiac arrest survivors experience the transition from hospital to daily life–a focus group study. *Nurs Open*. 2021;8(5):2520-2527. https://doi.org/10.1002/nop2.779
59. Stewart SA. Parents' experience during a Child's resuscitation: getting through It. *J Pediatr Nurs*. 2019;47:58-67. https://doi.org/10.1016/j.pedn.2019.04.019
60. Burns M, McInnis-Perry G, MacQuarrie C, Murray C. Anticipating the awakening: the lived experience of families of patients undergoing successful targeted temperature management after cardiac arrest. *Can J Crit Care Nurs*. 2018;29:17-24.
61. Lau B, Kirkpatrick JN, Merchant RM, et al. Experiences of sudden cardiac arrest survivors regarding prognostication and advance care planning. *Resuscitation*. 2010;81(8):982-986. https://doi.org/10.1016/j.resuscitation.2010.03.031
62. Mayer D, Rosenfeld AG, Gilbert K. Lives forever changed: family bereavement experiences after sudden cardiac death. *Appl Nurs Res*. 2013;26(4):168-173. https://doi.org/10.1016/j.apnr.2013.06.007
63. Doolittle ND, Sauvé MJ. Impact of aborted sudden cardiac death on survivors and their spouses: the phenomenon of different reference points. *Am J Crit Care*. 1995;4(5):389-396.
64. Dougherty CM, Benoliel JQ, Bellin C. Domains of nursing intervention after sudden cardiac arrest and automatic internal cardioverter defibrillator implantation. *Heart Lung*. 2000;29(2):79-86. https://doi.org/10.1067/mhl.2000.105759
65. Dougherty CM, Pyper GP, Benoliel JQ. Domains of concern of intimate partners of sudden cardiac arrest survivors after ICD implantation. *J Cardiovasc Nurs*. 2004;19(1):21-31. https://doi.org/10.1097/00005082-200401000-00006
66. Wagner JM. Lived experience of critically ill patients' family members during cardiopulmonary resuscitation. *Am J Crit Care*. 2004;13(5):416-420. https://doi.org/10.4037/ajcc2004.13.5.416
67. Maxton FJ. Parental presence during resuscitation in the PICU: the parents' experience. Sharing and surviving the resuscitation: a phenomenological study. *J Clin Nurs*. 2008;17(23):3168-3176. https://doi.org/10.1111/j.1365-2702.2008.02525.x
68. Uren A, Galdas P. The experiences of male sudden cardiac arrest survivors and their partners: a gender analysis. *J Adv Nurs*. 2015;71(2):349-358. https://doi.org/10.1111/jan.12499
69. De Stefano C, Normand D, Jabre P, et al. Family presence during resuscitation: a qualitative analysis from a national multicenter randomized clinical trial. *PLoS One*. 2016;11(6):e0156100. https://doi.org/10.1371/journal.pone.0156100

70. Palacios-Ceña D, Losa-Iglesias ME, Salvadores-Fuentes P, Fernández-de-las-Peñas C. Sudden cardiac death: the perspectives of Spanish survivors: Spanish sudden cardiac death experiences. *Nurs Health Sci*. 2011;13(2):149-155. https://doi.org/10.1111/j.1442-2018.2011.00593.x

71. Jang K, Choe K. Bereavement experiences after the unexpected death of an older family member in the emergency department. *Int Emerg Nurs*. 2019;42:7-11. https://doi.org/10.1016/j.ienj.2018.10.006

72. Wallin E, Larsson I-M, Rubertsson S, Kristofferzon M-L. Cardiac arrest and hypothermia treatment-function and life satisfaction among survivors in the first 6 months. *Resuscitation*. 2014;85(4):538-543. https://doi.org/10.1016/j.resuscitation.2013.12.020

73. Haydon G, van der Riet P, Inder K. A systematic review and meta-synthesis of the qualitative literature exploring the experiences and quality of life of survivors of a cardiac arrest. *Eur J Cardiovasc Nurs*. 2017;16(6):475-483. https://doi.org/10.1177/1474515117705486

74. Mion M, Case R, Smith K, et al. Follow-up care after out-of-hospital cardiac arrest: a pilot study of survivors and families' experiences and recommendations. *Resusc Plus*. 2021;7:100154. https://doi.org/10.1016/j.resplu.2021.100154

Profile and Outcomes of Emergency Department Mental Health Patient Presentations Based on Arrival Mode: A State-Wide Retrospective Cohort Study

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Contribution to Emergency Nursing Practice

- People with mental health problems presenting to emergency departments often have complex health care needs compared with the general population, which can intensify ED health care requirements.
- The main findings of this study identify that there exists an association between how people with mental health problems arrive to the emergency department and their subsequent outcomes. This indicates an opportunity to inform current processes within and outside of the emergency department.
- Mental health-focused nursing roles may be used across contexts to provide a targeted and integrated approach to mental health care. Positioning mental health nurses as critical drivers in the development of procedures and collaborative initiatives may be beneficial to creating consistency in approaches to mental health care across systems and jurisdictions.

Abstract

Introduction: People arriving to the emergency department with mental health problems experience varying and sometimes inferior outcomes compared with people without mental health problems, yet little is known about whether or how their arrival mode is associated with these outcomes. This study describes and compares demographics, clinical characteristics, and

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patient and health service outcomes of adult mental health emergency department patient presentations, based on arrival mode: brought in by ambulance, privately arranged transport, and brought in by police.

Methods: Using a retrospective observational study design with state-wide administrative data from Queensland, Australia, mental health presentations from January 1, 2012, to December 31, 2017, were analyzed using descriptive and inferential analyses.

Results: Of the 446,815 presentations, 51.8% were brought in by ambulance, 37.2% arrived via privately arranged transport, and 11.0% were brought in by police. Compared with other arrival modes, presentations brought in by ambulance were more likely to be older and female and have more urgent triage categories and a longer length of stay. Presentations arriving by privately arranged transport were more likely than other arrival modes to present during the day, be assigned a less urgent triage category, be seen within their recommended triage time, have a shorter length of stay in the emergency department, have higher rates of discharge, and have waited longer to be seen by a clinician. Presentations brought in by police were more likely than other arrival modes to be younger and male and experience a shorter time to be seen by a clinician.

Discussion: Discrepancies between arrival modes indicates a need for further investigation to support inter- and intra-agency mental health care interventions.

Key words: Nursing; Ambulance; Emergency department; Mental illness

Introduction

Globally, more than 80% of people are unable to access affordable, quality mental health care,[1] and poor mental health accounts for 1 trillion United States dollars per year of economic losses.[1] The disparities in mental health care service accessibility represent an unmet need and therefore an opportunity to enhance health equity. This is particularly relevant for services that interface with the emergency department. The emergency department, often the first point of contact for people experiencing a mental health crisis, plays a critical role in the initial assessment and management of mental health problems.[2] In the United Kingdom (UK), ED presentations for mental health reasons increased by >200% between 2010 and 2020 and accounted for 1.3% of all presentations in 2019 to 2020.[3,4] In the United States, ED presentations for mental health reasons increased by 40.8% from 2009 to 2015,[5] accounting for 3.8% of all diagnoses made in the emergency department in 2018.[6] In Australia, ED presentations for mental health reasons accounted for 3.8% ($n = 310{,}471$) of all public hospital ED presentations in 2019 to 2020, an increase of 57.4% since 2008 to 2009.[7] People with mental health problems presenting to emergency departments often have complex needs, including physical health comorbidities, co-occurring substance use problems, and broader social challenges such as homelessness.[8]

One characteristic that can provide important service delivery insights into patient care is mode of arrival to the emergency department. Examining how people arrive to the emergency department can provide important insight into care delivery and coordination requirements, fundamental to patient and health service outcomes.[9] However, surprisingly few studies have compared the clinical presentation of patients according to mode of arrival, including for mental health-related problems. Australian government reports indicate that most people with a mental health problem generally arrive to the emergency department in 1 of 3 main ways: by ambulance (52%), by some other means (eg, walked into the emergency department/arrived by community transport/taxi) (42%), or by police (6%).[7] These figures are noteworthy when considered in the context of all ED presentations where 26% arrive by ambulance, 73% arrive by other means, and 0.6% arrive by police.[7]

Adding to the complexity of arrival mode for people with mental health problems is the voluntary or involuntary status of the patient. In Queensland, Australia, involuntary presentations occur through the use of an Emergency Examination Authority, a legal order that enables the detainment and transfer of an individual whose behavior indicates that they may be at risk of imminent harm due to a major disturbance in their mental capacity,[10] usually by police or ambulance. Between 2002 and 2010, the use of involuntary assessment orders increased by 262%,[11] likely indicating an increase in the prevalence of mental health problems.

Examining other characteristics (such as age, triage category, and length of stay [LOS]) of people presenting to an emergency department with a mental health problem, based on arrival mode, can provide further insights into challenges for police and ambulance services. Mental health care represents a sizable caseload for ambulance and police services, representing approximately 10% of ambulance callouts[12,13] and around 15% of police callouts.[14] In a study that examined 219,164 suicide-related calls to Queensland police or

paramedics from 2014 to 2017, 209 calls were made on average per day—that is, 1 call every 7 minutes.[15] For paramedics, mental health care forms part of routine practice, yet education and training for the wide range of mental health problems paramedics encounter are reported to be insufficient.[16] Similarly, the key role of police is protecting and supporting the community and upholding the law. In general, they are not clinically trained, yet acute mental health care is a frequent challenge in their role.[17,18]

For people experiencing a mental health crisis, the provision of a supportive, stable, and safe environment is critical to facilitate appropriate treatment outcomes,[8] yet ED environments are usually designed to treat people who present with physical injury and illness, with a focus on rapid care delivery. This means that the complex physical and social needs of people with mental health problems are often overlooked.[8] Furthermore, the complex care requirements for this cohort mean that they often have a longer LOS in the emergency department than people presenting for other reasons[2] and can wait up to 3 times longer for an inpatient bed or facility transfer.[5] Considering the increasing prevalence and complexity of mental illness among people presenting to the emergency department with mental health problems and gaps in care continuity, understanding mode of arrival characteristics may enable a more focused, effective approach to health care delivery. Therefore, the aim of this study was to describe and compare demographics, clinical characteristics, and patient and health service outcomes of people who present to Queensland emergency departments for mental health problems, based on arrival mode (police/ambulance/privately arranged transport [PAT]).

Methods

DESIGN

This was a retrospective cohort study using state-wide ED data from public hospitals in Queensland, Australia. We report this study according to the Strengthening the Reporting of Observational Studies in Epidemiology Statement guidelines.[19]

STUDY SETTING

The study was set in Queensland, Australia, using a data set reported from 97 public emergency departments.[20] Queensland has a population of approximately 5.2 million.[21]

SAMPLE

The sample included all adult (≥18 years old) mental health presentations made to emergency departments in Queensland public hospitals from January 1, 2012, to December 31, 2017. We defined a mental health-related presentation as any mental health-related presenting complaint (eg, anxiety, unsettled) or mental health-related International Classification of Diseases (ICD-10-AM) primary diagnosis code (F00-F99, X60-X84, T38.3-T51.8). The ICD-10-AM code of T50.8 (reaction to intravenous contrast) was excluded. Diagnosis codes F00 to F99 comprise mental and behavioral disorders. Codes X60 to X84 comprise intentional self-harm diagnoses. Codes T38.3 to T51.8 (excluding T50.8) comprise overdose diagnoses, which were included because self-harm and substance use disorder diagnoses are common in people with mental illnesses[8] and often indicate emerging poor mental health or unmet underlying mental health needs.

DATA COLLECTION

Data used for this study were from the Emergency Department Collection (EDC), a data set of demographic, clinical, and administrative characteristics for ED presentations made to all Queensland public hospitals.[20] Data were deidentified and included patient demographics (date of birth, sex, postcode) and clinical characteristics (hospital, arrival transport mode, Australasian Triage Scale [ATS], presenting complaint, presentation date and time, triage date and time, service start date and time, physical departure date and time, episode end status, ICD-10-AM code, and ICD-10-AM description). The ATS is an Australasian-based clinical tool used to guide maximum expected waiting times for patients in the emergency department, in consideration of their clinical urgency.[22] The ATS categories include ATS 1 (immediate assessment and treatment required), ATS 2 (assessment and treatment within 10 minutes), ATS 3 (assessment and treatment within 30 minutes), ATS 4 (assessment and treatment within 60 minutes), and ATS 5 (assessment and treatment within 120 minutes).[22]

DATA ANALYSIS

Data were checked and cleaned and some variables recoded based on government reports or previous literature to facilitate analysis (Supplemental Table). This included checking for duplicate data or date/time entry inconsistencies. During data cleaning, out-of-range values (eg, ED LOS >72 hours/negative values) were recoded as "missing" (n = 2245,

0.5%). Continuous variables (eg, age, time to see clinician, ED LOS) were analyzed using medians and interquartile ranges (IQRs). Frequencies and percentages were used for categorical variables (eg, sex, ATS category, day of arrival). Chi-square tests were used to test for statistical significance for categorical variables across arrival modes (brought in by ambulance [BIBA]/PAT/brought in by police [BIBP]). After distribution testing, to explore whether there was a significant difference in non-normally distributed continuous variables, the Kruskal–Wallis test was used to test for group differences in continuous and ordinal variables. Data were analyzed at the individual patient presentation level using Stata version 16 (StataCorp LLC, College Station, TX, USA, 2019).

ETHICAL APPROVAL

The study was approved by the Health Service (HREC/17/QGC/243) and Griffith University (2017/868) Human Research Ethics Committee. State Public Health Act approval (PHA RD007833) was also received as this study required a waiver of consent and used de-identified, retrospective patient health information.

Results

There were 446,815 presentations made by people with a mental health problem aged 18 years or older to Queensland emergency departments over the 6-year study period. Of these, 231,502 (51.8%) were BIBA, 165,988 (37.2%) arrived via PAT, and 49,325 (11.0%) were BIBP. Demographic and clinical characteristics for mental health-related ED presentations, according to mode of arrival (BIBA, PAT, and BIBP), are detailed in Table 1.

Across all modes of arrival, nearly one-quarter of presentations were aged between 25 and 34 years, with a median age of 36 (IQR, 26-49). More than half of the sample (51.8%) was male and resided in major cities (51.1%), and a Socio-Economic Indexes for Areas quintile of 3 (ie, moderate socioeconomic disadvantage) was the most common across all modes of arrival (24.1%). Presentations were more common on a Sunday (15%) and during the evening (15.00-22.59 hours) (44%). When modes of arrival were compared, presentations BIBA were of the oldest age (median, 38; IQR, 26-52; $P < .001$) and had the highest proportion of assigned ATS category 1 (3%). For presentations arriving by PAT, nearly half arrived during the day (07.00-14.59 hours), and >40% had ATS 4 or 5 categories. Presentations BIBP were the youngest (median, 33 years old; IQR, 25-43) with nearly two-thirds being male; the proportion of presentations assigned an ATS category of 2 or 3 (cumulatively, 83%) was higher among those BIBP than among other groups.

The timing of mental health presentations to the emergency department by arrival mode is detailed in Table 2. Nearly one-third were not seen within the recommended time and more than half were discharged from the ED. A longer ED LOS was encountered among those admitted to the hospital (median, 237 minutes; IQR, 149-420) compared with those not admitted to hospital (median, 167 minutes; IQR, 95-264). Compared with other modes of arrival, presentations BIBA had the longest ED LOS (median, 217 minutes; IQR, 133-361), highest admission rates (44%), and highest proportion of presentations staying longer than 4 hours (43%). Presentations arriving by PAT encountered the longest time to be seen by a clinician (median, 20 minutes; IQR, 8-48) and the shortest ED LOS (median, 164 minutes; IQR, 91-262) with more than two-thirds being discharged. Presentations BIBP had the shortest time to be seen by a clinician (median, 15 minutes; IQR, 6-37) and second longest ED LOS (after BIBA), but shortest LOS if admission was required.

Discussion

The current study described and compared demographics, clinical characteristics, and patient and health service outcomes for adults with mental health-related problems by mode of arrival to the emergency department. Our analysis revealed an association between how people with mental health problems arrive to the emergency department and their subsequent outcomes in the emergency department. Presentations BIBP were seen and discharged from the emergency department most rapidly, whereas those BIBA and then those arriving by PAT took longer to be seen and discharged.

Regardless of the mode of arrival to the emergency department, we identified that most adults (68%) presenting with mental health problems were aged 18 to 44 years. Although the reasons for a younger age are likely complex, it may in part reflect the earlier onset of mental health pathology relative to other physical health conditions.[23,24] Our findings support the need for enhancing community care that acknowledges person-centered mental health needs of people across the lifespan.[25] Within emergency departments, mental health professionals with age-appropriate mental health skills could be used to provide a targeted, age-specific response to mental health presentations.[26] Age-based mental health initiatives, both in the community and in ED settings, could be further strengthened by

TABLE 1
Demographic and clinical characteristics of presentations to Queensland EDs with a mental health problem 2012-2017, according to arrival mode

Demographic characteristic	Total, n (%) *n* = 446,815	BIBA, n (%) *n* = 231,502 (51.8)	PAT, n (%) *n* = 165,988 (37.2)	BIBP, n (%) *n* = 49,325 (11.0)	*P* value
Age, median (IQR) (y)	36 (26-49)	38 (26-52)	34 (25-46)	33 (25-43)	< .001
Age group					
18-24 y	98,663 (22.1)	48,988 (21.2)	37,889 (22.8)	11,786 (23.9)	
25-34 y	109,029 (24.4)	49,346 (21.3)	45,239 (27.3)	14,444 (29.3)	
35-44 y	95,564 (21.4)	46,508 (20.1)	36,692 (22.1)	12,394 (25.1)	
45-54 y	68,067 (15.2)	37,058 (16.0)	23,808 (14.3)	7201 (14.6)	
55-64 y	35,548 (8.0)	21,089 (9.1)	11,950 (7.2)	2509 (5.1)	
65-74 y	18,679 (4.2)	11,979 (5.2)	5927 (3.6)	773 (1.6)	
75-84 y	12,877 (2.9)	9481 (4.1)	3231 (2.0)	165 (0.3)	
85 y and older	8160 (1.8)	6886 (3.0)	1233 (0.7)	41 (0.1)	
Sex					< .001
Male	231,358 (51.8)	113,332 (49.0)	86,649 (52.2)	31,377 (63.6)	
Female	215,457 (48.2)	118,170 (51.0)	79,339 (47.8)	17,948 (36.4)	
Area of remoteness					< .001
Major cities	218,811 (51.1)	115,602 (52.0)	79,273 (49.7)	23,936 (51.5)	
Inner regional	83,067 (19.4)	43,003 (19.3)	30,836 (19.4)	9228 (19.9)	
Outer regional	83,896 (19.6)	42,933 (19.3)	32,000 (20.1)	8963 (19.3)	
Remote	19,528 (4.6)	9955 (4.5)	7504 (4.7)	2069 (4.5)	
Very remote	22,818 (5.3)	10,809 (4.9)	9755 (6.1)	2254 (4.9)	
SEIFA quintile, Queensland					< .001
1	91,317 (21.6)	46,613 (21.2)	34,735 (22.1)	9969 (21.8)	
2	84,671 (20.1)	44,040 (20.1)	31,489 (20.1)	9142 (20.0)	
3	101,603 (24.1)	52,616 (24.0)	37,519 (23.9)	11,468 (25.0)	
4	88,494 (21.0)	46,533 (21.2)	32,415 (20.7)	9546 (20.8)	
5	56,003 (13.3)	29,608 (13.5)	20,710 (13.2)	5685 (12.4)	
Day of arrival					< .001
Monday	65,327 (14.6)	31,935 (13.8)	26,339 (15.9)	7053 (14.3)	
Tuesday	65,523 (14.0)	30,897 (13.4)	24,775 (14.9)	6851 (13.9)	
Wednesday	61,986 (13.9)	31,168 (13.5)	23,783 (14.3)	7035 (14.3)	
Thursday	62,218 (13.9)	31,558 (13.6)	23,665 (14.3)	6995 (14.2)	
Friday	63,621 (14.2)	33,062 (14.3)	23,321 (14.1)	7238 (14.7)	
Saturday	64,353 (14.4)	35,871 (15.5)	21,396 (12.9)	7086 (14.4)	
Sunday	66,787 (15.0)	37,011 (16.0)	22,709 (13.7)	7067 (14.3)	
Time (shift) of arrival					< .001
Day (07.00-14.59 h)	159,662 (35.7)	68,453 (29.6)	76,163 (45.9)	15,046 (30.5)	
Evening (15.00-22.59 h)	194,763 (43.6)	104,857 (45.3)	67,524 (40.7)	22,382 (45.4)	
Night (23.00-06.59 h)	92,390 (20.7)	58,192 (25.1)	22,301 (13.4)	11,897 (24.1)	

continued

TABLE 1
Continued

Demographic characteristic	Total, n (%) $n = 446,815$	BIBA, n (%) $n = 231,502$ (51.8)	PAT, n (%) $n = 165,988$ (37.2)	BIBP, n (%) $n = 49,325$ (11.0)	*P* value
Triage category					< .001
ATS 1 (immediate assessment/treatment)	7491 (1.7)	6230 (2.7)	809 (0.5)	452 (0.9)	
ATS 2 (assessment/ treatment within 10 min)	76,861 (17.2)	46,374 (20.0)	17,940 (10.8)	12,547 (25.4)	
ATS 3 (assessment/ treatment within 30 min)	233,484 (52.3)	124,377 (53.7)	80,581 (48.6)	28,526 (57.8)	
ATS 4 (assessment/ treatment within 60 min)	107,221 (24.0)	50,253 (21.7)	49,940 (30.1)	7028 (14.3)	
ATS 5 (assessment/ treatment within 120 min)	21,758 (4.9)	4268 (1.8)	16,718 (10.1)	772 (1.6)	

P value derived through chi-square test. Age analysis based on 446,617 presentations; area of remoteness analysis based on 428,120 presentations; SEIFA analysis based on 422,088 presentations. ATS, Australasian Triage Scale; BIBA, brought in by ambulance; BIBP, brought in by police; CI, confidence interval; ED, emergency department; IQR, interquartile range; PAT, privately arranged transport; SEIFA, Socio-Economic Indexes for Areas.

including consumers (people who currently have or have had a mental health issue) in design and implementation, thus creating more relevant, transparent, and effective interventions.[27] In this context, using age-specific mental health initiatives within and outside of the emergency department may reduce ED attendances for mental health problems, simultaneously improving mental health outcomes and reducing the burden on scarce hospital resources. This is particularly the case for frequent attenders to the emergency department, many of whom have complex mental health-related problems.[28]

People with a mental health problem comprise a considerable workload for paramedics. More than 50% of mental health presentations in this study arrived by ambulance. An Australian-based retrospective study that examined mental health presentations to emergency departments identified that emergency services (ambulance and police) were primarily used as a transportation service to the emergency department, with only 1 in 8 patients receiving medical treatment by paramedics.[13] Role constraints when caring for people with mental health and/or alcohol and other drug problems have been noted by paramedics.[29] In a qualitative study of paramedics in the UK, feeling frustrated, unsupported, and unprepared when required to respond to cases with mental health symptoms was a common theme.[16] One model with promising effects is the deployment of mental health nurses within ambulance call centers, with initial findings from the UK identifying reduced ambulance response rates.[30] Although these findings are promising, they will require empirical and economic evaluation in diverse country contexts. Another strategy could involve paramedics having the ability to manage lower acuity cases in the community (via paramedic medical assessment with targeted mental health interventions and utilization of individuals in situ support networks). Further conjointly developed initiatives between ambulance and mental health care outside of the emergency department are warranted to alleviate ambulance burden and reduce mental health-related ED demand, while facilitating positive patient outcomes by means of specialist support.

We found higher discharge rates for PAT mental health presentations than all other modes of arrival. Reasons for this may be a reduced clinical need for ongoing ED care, attributed to barriers in community mental health care, leading people to seek ED health care for less urgent reasons, yet people arriving to the emergency department by PAT for mental health problems are not well defined or explored in the literature. In the context of mental health problems, patients with chronic clinical conditions and mental health care requirements are reported to have a high likelihood of hospital admission.[31] In line with the current study, this suggests that the higher proportions of discharges seen in presentations made by people who arrive by PAT for a mental health problem could be attributed to non-urgent, effectively managed conditions in the emergency department. Therefore, for people arriving by PAT for mental health problems, clinical roles that combine physical and

TABLE 2
Outcomes of presentations to Queensland EDs with a mental health problem 2012-2017, according to mode of arrival.

Outcomes	Total *n* = 446,815	BIBA, n (%) *n* = 231,502 (51.8)	PAT, n (%) *n* = 165,988 (37.2)	BIBP, n (%) *n* = 49,325 (11.0)	*P* value
Seen within ATS (yes), n (%)	306,652 (69.4)	157,702 (68.9)	115,587 (70.5)	33,363 (68.2)	< .001
Time to be seen by clinician, median (IQR)	18 (7-44)	16 (6-42)	20 (8-48)	15 (6-37)	< .001
ED LOS (all), median (IQR) (min)	194 (111-320)	217 (133-361)	164 (91-262)	181 (92-326)	< .001
ED LOS (not admitted), median (IQR) (min)	167 (95-264)	192 (116-306)	143 (82-225)	158 (82-272)	< .001
ED LOS (admitted), median (IQR) (min)	237 (149-420)	245 (162-436)	229 (135-388)	222 (113-416)	< .001
Episode end status, n (%)					< .001
Discharged/referred	256,712 (57.5)	119,285 (51.5)	110,014 (66.3)	27,413 (55.6)	
Admitted (to hospital)	172,557 (38.6)	102,605 (44.3)	49,270 (29.7)	20,682 (41.9)	
Left at own risk (after treatment commenced)	12,704 (2.8)	7303 (3.2)	4438 (2.7)	963 (2.0)	
Did not wait	4794 (1.1)	2262 (1.0)	2265 (1.4)	267 (0.5)	
Died in ED	48 (0.0)	47 (0.0)	1 (0.0)	-	
ED LOS ≥4 hours	163,379 (36.6)	98,267 (42.5)	47,350 (28.5)	17,762 (36.0)	< .001

P value derived through chi-square test. ATS analysis based on 441,753 presentations; time to be seen by clinician analysis based on 443,474 presentations; ED LOS (all) analysis based on 446,615 presentations; ED LOS (not admitted) based on 274,247 presentations; ED LOS (admitted) analysis based on 172,368 presentations; ED LOS ≥4 hours based on 446,615 presentations.
ATS, Australasian Triage Scale; BIBA, brought in by ambulance; BIBP, brought in by police; CI, confidence interval; ED, emergency department; LOS, length of stay; IQR, interquartile range; PAT, privately arranged transport.

mental health assessment could serve to fast-track ED discharge.

In response to increasing ED demand and case mix, extended clinical roles have developed[32] and tailored to patient needs. Further opportunity exists to prepare additional advanced practice/extended scope roles across various clinical professional groups (eg, nurses, pharmacists) to optimize emergency care for people with mental health problems presenting to the emergency department. This may include the addition of advanced practice nurses with mental health expertise (eg, mental health nurse practitioners [MHNPs])[33-35] and extended/expanded scope pharmacists[36] to be integrated within the emergency department, either physically or virtually (especially in rural/remote areas). The MHNP role is well recognized in the United States and beneficial in addressing physical and mental aspects of patient care, thus addressing workforce shortages in mental health care specialists.[33] There are variations in operational characteristics of the MHNP role that make it difficult to implement in a consistent manner across settings, especially in Australia where the nurse practitioner role may be considered relatively new compared with other countries such as the United States, UK, and Canada.[34] There have been limited evaluations of MHNP roles in Australia, with 1 recent community-based proof-of-concept study identifying enhanced overall service delivery and improved patient outcomes.[35] However, further multicenter rollout across different contexts is needed. Increasing the availability of the MHNP role would enable further evaluation, which could be addressed by providing an opportunity for advanced practice nurses to undertake MHNP training. A feasibility assessment of the MHNP role in the emergency department could provide early insight into operational practicalities in the emergency department, while simultaneously reducing workload burden for clinicians and facilitating patient discharge.

For mental health-related presentations BIBP, 26% had an ATS category of 1 or 2, indicating a need for urgent care. There is a paucity of literature on people BIBP to emergency departments,[37] which makes it difficult to develop targeted, evidence-based clinical pathways to optimize patient outcomes. However, high rates of physical and mental health problems among people in police custody[38] and in prisons, including chronic illness, communicable disease, and disability,[39] indicate considerable often unmet health needs for people BIBP to the emergency department.

Mental ill health is the most common reason for police to transport people to the emergency department, followed by physical health conditions. In a United States study that examined presentations brought into emergency departments by law enforcement officers, mental illness accounted for 43.1% of disease prevalence, followed by injury and poisoning (12.4%).[40] The situation is similar in Queensland, where mental illness accounts for 40.7% of presentations BIBP and injury/poisoning accounts for 15.4% of presentations BIBP.[9] This suggests that enhanced mental and physical health support mechanisms for people while in police detainment may both reduce the number of presentations BIBP and reduce clinical urgency among those brought into the emergency department with police. A UK-based initiative, psychiatric decision units (PDUs) are ambulant areas offering assessment and management for those who would have otherwise accessed the emergency department.[41] Although the optimal structure for PDUs has not yet been determined,[42] in the context of those BIBP to emergency departments, adoption of PDUs into areas of police detainment could serve to address mental health exacerbations, treat acute states of disease/disability, reduce the likelihood of further harm, and alleviate the need for emergency care in the emergency department.

Limitations

Our study had 3 limitations. First, we relied on administrative ED data that, although carefully compiled and cleaned, are imperfect and have limited granularity. For example, people who arrive by ambulance may also have a police escort, but the EDC can only capture 1 type of arrival mode. The EDC captures only principal diagnosis, such that additional diagnoses that contributed to ED mental health presentations or other comorbid conditions were not included. For example, a presentation for self-harm may have been given a trauma-/injury-related principal diagnosis, rather than mental health-related principal diagnosis. Thus, we may have under-represented the true extent of mental health-related presentations to the emergency department. Although the use of an Emergency Examination Authority is likely to differ between modes of arrival to the emergency department,[9] we were also unable to ascertain this from the data obtained. Second, this study was designed to focus on mental health-related presentations to the emergency department. Further research examining similarities and differences in the profile and outcomes of mental health and non-mental health-related presentations, by mode of arrival to the emergency department, is warranted. Our findings will require replication in other settings to support generalizability. Our data also reflect patterns of ED presentation up to a decade ago, although we have no reason to suspect that our findings are not applicable in the contemporary context. Mental health care concerns in the emergency department continue to be unresolved, with current initiatives limited in number, application,[8] and empirical evaluation. Third, our study excluded people younger than the age of 18 years, who may require age-specific responses to both prevent mental health-related ED presentation and optimize outcomes for those who do present.

Implications for Emergency Nurses

The prevalence of people with mental health problems and their subsequent impact on ED functioning and resources is of clinical and administrative importance to the health care sector. Initiatives to provide mental health care outside of the ED context are growing[8] but are insufficient in the Australian context.[25] At present, interventions such as tri-response mental health models (including police, mental health clinicians, and ambulance officers) are used in parts of Australia, UK, the United States, and Europe, but they require further empirical evaluation.[43] The unique skill set of the community mental health nurse could extend beyond patient management and crisis response frequently used in tri-response models.[44] Extension of the mental health nurse role to include education delivery across police, ambulance, and ED contexts may also address the current training deficits reported in these areas,[2,16,44,45] thus improving health care delivery and continuity of care and facilitating interagency collaboration.

In addition to our current recommendations, our findings indicate a need to facilitate integrated mental health care, incorporating mental, physical, and social needs.[8] Recognizing that the individual is more than their mental health diagnosis with many factors contributing to the poorer levels of physical health experienced by people with mental health illness is essential.[46] International perspectives support the need for integrated approaches, with United States-based validated predictive models identifying other factors beyond mental health (eg, low income, lower self-rated health) that determine ED presentation.[47] Facilitating a framework-based approach such as the "Equally Well" framework[46] in police, ambulance, and ED contexts may help to understand the broader associations between social inequalities and mental health illness in Australia.

Conclusion

This study contributes to the wider body of evidence on mental health presentations to emergency departments, by profiling the characteristics and outcomes of mental health-related ED presentations according to mode of arrival. It provides a baseline understanding of how people with mental health problems arrive to the emergency department, indicating that duration of ED management and care for people with mental health problems relates to mode of arrival. This information could be used to develop care processes by informing care requirements and sheds light on the need for enhancements in the community mental health sector. Age-based community interventions, PDUs, conjointly developed external ED initiatives, and the addition of advanced practice clinicians with mental health expertise (eg, MHNPs) to the emergency department, are promising interventions worthy of further consideration.

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Author Disclosures

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We are unable to share or make publicly available data used for the present study owing to ethical and data privacy requirements.

Supplementary Data

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REFERENCES

1. World Health Organization. The WHO special initiative for mental health (2019-2023): universal health coverage for mental health. Published 2019. Accessed July 2, 2022. https://apps.who.int/iris/handle/10665/310981
2. Coates D, David M, Roberts B, Duerden D. An examination of the profile and journey of patients with mental illness in the emergency department. *Int Emerg Nurs*. 2019;43:15-22. https://doi.org/10.1016/j.ienj.2018.06.003
3. National Health Service (NHS). Hospital accident & emergency activity 2019-20. Accessed July 10, 2022. https://digital.nhs.uk/data-and-information/publications/statistical/hospital-accident–emergency-activity/2019-20
4. National Health Service (NHS). Accident and emergency attendances in England-2010-11, experimental statistics. Published December 26, 2012. Accessed July 10, 2022. https://digital.nhs.uk/data-and-information/publications/statistical/hospital-accident–emergency-activity/2010-11
5. Santillanes G, Axeen S, Lam CN, Menchine M. National trends in mental health-related emergency department visits by children and adults, 2009-2015. *Am J Emerg Med*. 2020;38(12):2536-2544. https://doi.org/10.1016/j.ajem.2019.12.035
6. Centers for Disease Control and Prevention. National Hospital ambulatory medical care survey: emergency department visits. Published 2018. Accessed July 10, 2022. https://www.cdc.gov/nchs/fastats/emergency-department.htm
7. Australian Institute of Health and Welfare. Mental health services provided in emergency departments. Published 2021. Accessed July 10, 2022. https://www.aihw.gov.au/reports/mental-health-services/mental-health-services-in-australia/report-contents/hospital-emergency-services
8. Duggan M, Harris B, Chislett WK, Calder R. Nowhere else to go: why Australia's health system results in people with mental illness getting 'stuck'. Accessed July 22, 2022. https://acem.org.au/nowhere-else-to-go

9. Wardrop R, Ranse J, Chaboyer W, Crilly J. Profile and outcomes of emergency department presentations based on mode of arrival: a state-wide retrospective cohort study. *Emerg Med Australas*. 2022;34(4):519-527. https://doi.org/10.1111/1742-6723.13914
10. Queensland Health. Emergency examination authorities. Published 2021. Accessed July 22, 2022. www.health.qld.gov.au/clinical-practice/guidelinesprocedures/emergencyexamination-authorities-eeas
11. Meehan T, Stedman T. Trends in the use of Emergency Examination Orders in Queensland since the implementation of the Mental Health Intervention Project. *Aust N Z J Psychiatry*. 2012;20(4):287-290. https://doi.org/10.1177/1039856212450082
12. Duncan EAS, Best C, Dougall N, et al. Epidemiology of emergency ambulance service calls related to mental health problems and self harm: a national record linkage study. *Scand J Trauma Resusc Emerg Med*. 2019;27(1):34-34. https://doi.org/10.1186/s13049-019-0611-9
13. Roggenkamp R, Andrew E, Nehme Z, Cox S, Smith K. Descriptive analysis of mental health-related presentations to emergency medical services. *Prehosp Emerg Care*. 2018;22(4):399-405. https://doi.org/10.1080/10903127.2017.1399181
14. Lane R. "I'm a police officer not a social worker or mental health nurse": online discourses of exclusion and resistance regarding mental health-related police work. *J Community Appl Soc Psychol*. 2019;29(5):429-442. https://doi.org/10.1002/casp.2410
15. Meurk C, Wittenhagen L, Bosley E, et al. Suicide crisis calls to emergency services: cohort profile and findings from a data linkage study in Queensland, Australia. *Aust N Z J Psychiatry*. 2022;56(2):144-153. https://doi.org/10.1177/00048674211009604
16. Rolfe U, Pope C, Crouch R. Paramedic performance when managing patients experiencing mental health issues – exploring paramedics' Presentation of Self. *Int Emerg Nurs*. 2020;49:1-5. https://doi.org/10.1016/j.ienj.2019.100828
17. Livingston JD. Contact between police and people with mental disorders: a review of rates. *Psychiatr Serv*. 2016;67(8):850-857. https://doi.org/10.1176/appi.ps.201500312
18. O'Brien A, Sethi F, Smith M, Bartlett A. Public mental health crisis management and Section 136 of the Mental Health Act. *J Med Ethics*. 2018;44(5):349-353. https://doi.org/10.1136/medethics-2016-103994
19. von Elm E, Altman DG, Egger M, Pocock SJ, Gøtzsche PC, Vandenbroucke JP, STROBE initiative. The Strengthening the reporting of Observational Studies in Epidemiology (STROBE) statement: guidelines for reporting observational studies. *J Clin Epidemiol*. 2007;61(4):344-349. https://doi.org/10.1016/j.jclinepi.2007.11.008
20. Queensland Health. Emergency departments. Published 2021. Accessed August 22, 2022. https://www.data.qld.gov.au/dataset/emergency-departments
21. Australian Bureau of Statistics. National, state and territory population. Published 2021. Accessed July 22, 2022. https://www.abs.gov.au/statistics/people/population/national-state-and-territory-population/latest-release#data-downloads-data-cubes
22. Australasian College of Emergency Medicine. Triage. Published 2021. Accessed July 20, 2022. https://acem.org.au/Content-Sources/Advancing-Emergency-Medicine/Better-Outcomes-for-Patients/Triage
23. de Girolamo G, Dagani J, Purcell R, Cocchi A, McGorry PD. Age of onset of mental disorders and use of mental health services: needs, opportunities and obstacles. *Epidemiol Psychiatr Sci*. 2012;21(1):47-57. https://doi.org/10.1017/S2045796011000746
24. Yap M, Tuson M, Whyatt D, Vickery A. Anxiety and alcohol in the working-age population are driving a rise in mental health-related emergency department presentations: 15 year trends in emergency department presentations in Western Australia. *Emerg Med Australas*. 2019;32(1):80-87. https://doi.org/10.1111/1742-6723.13342
25. Australian Government Productivity Commission. Mental Health, report no. 95. Published June 30, 2020. Accessed August 15, 2022. https://www.pc.gov.au/inquiries/completed/mental-health/report/mental-health-volume1.pdf
26. Tran QN, Lambeth LG, Sanderson K, et al. Trends of emergency department presentations with a mental health diagnosis by age, Australia, 2004-05 to 2016-17: a secondary data analysis. *Emerg Med Australas*. 2019;31(6):1064-1072. https://doi.org/10.1111/1742-6723.13323
27. National Health and Medical Research Council. Consumer involvement. Published November 23, 2018. Accessed August 17, 2022. https://www.nhmrc.gov.au/guidelinesforguidelines/plan/consumer-involvement
28. Lago L, Westley-Wise V, Mullan J, et al. Here one year, gone the next? Investigating persistence of frequent emergency department attendance: a retrospective study in Australia. *BMJ Open*. 2019;9(6):e027700. https://doi.org/10.1136/bmjopen-2018-027700
29. McCann TV, Savic M, Ferguson N, et al. Paramedics' perceptions of their scope of practice in caring for patients with non-medical emergency-related mental health and/or alcohol and other drug problems: a qualitative study. *PLoS One*. 2018;13(12):e0208391. https://doi.org/10.1371/journal.pone.0208391
30. Irving A, O'Hara R, Johnson M, Harris A, Baker K. Pilot evaluation of utilising mental health nurses in the management of ambulance service patients with mental health problems. *Emerg Med J*. 2016;33(9):677 https://doi.org/10.1136/emermed-2016-206139.2
31. Gentil L, Grenier G, Meng X, Fleury MJ. Impact of co-occurring mental disorders and chronic physical illnesses on frequency of emergency department use and hospitalization for mental health reasons. *Front Psychiatry*. 2021;12:1-13. https://doi.org/10.3389/fpsyt.2021.735005
32. Crouch R, Brown R. Advanced clinical practitioners in emergency care: past, present and future. *Br J Hosp Med*. 2018;79(9):511-515. https://doi.org/10.12968/hmed.2018.79.9.511
33. Chapman SA, Phoenix BJ, Hahn TE, Strod DC. Utilization and economic contribution of psychiatric mental health nurse practitioners in public behavioral health services. *Am J Prev Med*. 2018;54(6 suppl 3):S243-S249. https://doi.org/10.1016/j.amepre.2018.01.045
34. Wand T, White K. Building a model of mental health nurse practitioner–led service provision in Australia. *J Nurse Pract*. 2015;11(4):462-465. https://doi.org/10.1016/j.nurpra.2015.01.008
35. Furness T, Giandinoto J-A, Wordie-Thompson E, Woolley S, Dempster V, Foster K. Improving physical health outcomes for people with severe mental illness: a proof-of-concept study of nurse practitioner candidate practice. *Int J Ment Health Nurs*. 2020;29(2):266-277. https://doi.org/10.1111/inm.12680

36. Alsabbagh MW, Houle SKD. The proportion, conditions, and predictors of emergency department visits that can be potentially managed by pharmacists with expanded scope of practice. *Res Soc Admin Pharm*. 2019;15(11):1289-1297. https://doi.org/10.1016/j.sapharm.2018.12.003
37. Crilly J, Johnston ANB, Wallis M, et al. Review article: clinical characteristics and outcomes of patient presentations to the emergency department via police: A scoping review. *Emerg Med Australas*. 2019;31(4):506-515. https://doi.org/10.1111/1742-6723.13300
38. Samele C, McKinnon I, Brown P, et al. The prevalence of mental illness and unmet needs of police custody detainees. *Crim Behav Ment Health*. 2021;31(2):80-95. https://doi.org/10.1002/cbm.2193
39. Australian Institute of Health and Welfare. *The health of Australia's prisoners*. Accessed June 15, 2022. https://www.aihw.gov.au/reports/prisoners/health-australia-prisoners-2018/summary
40. Rosen DL, Travers D. Emergency department visits among patients transported by law enforcement officers. *PLoS One*. 2021;16(1):1-13. https://doi.org/10.1371/journal.pone.0244679
41. Trethewey SP, Deepak S, Saad S, Hughes E, Tadros G. Evaluation of the Psychiatric Decisions Unit (PDU): effect on emergency department presentations and psychiatric inpatient admissions. *Postgrad Med J*. 2019;95(1119):6-11. https://doi.org/10.1136/postgradmedj-2018-135788
42. Goldsmith LP, Anderson K, Clarke G, et al. The psychiatric decision unit as an emerging model in mental health crisis care: a national survey in England. *Int J Ment Health Nurs*. 2021;30(4):955-962. https://doi.org/10.1111/inm.12849
43. Heffernan J, McDonald E, Hughes E, Gray R. Tri-response police, ambulance, mental health crisis models in reducing involuntary detentions of mentally ill people: protocol for a systematic review. *Int J Environ Res Public Health*. 2021;18(15):8230-8230. https://doi.org/10.3390/ijerph18158230
44. Heslop B, Wynaden D, Tohotoa J, Heslop K. Mental health nurses' contributions to community mental health care: an Australian study. *Int J Ment Health Nurs*. 2016;25(5):426-433. https://doi.org/10.1111/inm.12225
45. Richmond M, Gibbs JC. Police perceptions of training on interactions with persons with mental illness. *J Police Crim Psychol*. 2020;36(2):268-275. https://doi.org/10.1007/s11896-020-09409-8
46. Department of Health and Human Services. Physical health framework for specialist mental health services (Equally well in Victoria). Published March 2019. Accessed August 22, 2022. https://www.health.vic.gov.au/publications/equally-well-in-victoria-physical-health-framework-for-specialist-mental-health
47. Bobashev G, Warren L, Wu LT. Predictive model of multiple emergency department visits among adults: analysis of the data from the National Survey of Drug Use and Health (NSDUH). *BMC Health Serv Res*. 2021;21(1):280 https://doi.org/10.1186/s12913-021-06221-w

Patients Air Medical Transport During the COVID-19 Pandemic: A Retrospective Cohort Study

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Contribution to Emergency Nursing Practice

- The current literature on air medical transport indicates it is an advanced care practice for transferring patients from distant geographic areas and was essential during the coronavirus disease 2019 pandemic.
- This article contributes to the research on air transport, providing evidence regarding clinical conditions and occurrence of complications during transport by fixed-wing aircrafts of 741 patients in Amazonas, Brazil.
- Key implications for emergency nursing practice found in this article are that knowledge of the clinical conditions of air-transported patients, especially those with coronavirus disease 2019, makes nurses aware of the need to develop care strategies before, during, and after the flight to prevent physical and psychological damage and reduce avoidable patient deaths.

Abstract

Introduction: Air medical transport during the coronavirus disease 2019 pandemic was essential for transferring critically ill patients. This study aimed to comparatively analyze air-transported patients with and without coronavirus disease 2019 according to their clinical condition and complications that occurred during the flight.

Methods: This was a retrospective cohort study that analyzed the digital records of adult patients transported by fixed-wing aircraft from the interior of the state of Amazonas to the state capital Manaus, Brazil, from June 2019 to May 2021. Pearson's chi-squared, Fisher exact, and Wilcoxon-Mann-Whitney tests were applied (significance level of $P < .05$).

Results: The sample consisted of 741 patients (60.59% men, median age 54 years). The incidence of complications during the flight was 7.28%, with emphasis on dyspnea, psychomotor agitation, and pain. There was a significant difference between patients with ($n = 466$) and without coronavirus disease 2019 ($n = 275$) regarding the variables age ($P < .001$), comorbidities ($P < .001$), body mass index ($P < .001$), impact ($P < .001$) and priority ($P = .002$) of the transfer, physiological severity ($P < .001$), use of vasoactive drugs when boarding the aircraft ($P = .033$), and occurrence of respiratory complications during air medical transport ($P = .003$).

Discussion: Patients with coronavirus disease 2019 were older, had more comorbidities and were severely ill, and had higher body mass index, frequency of vasoactive drug use, and respiratory complications. Although there are minimal differences among these patients, the role that interhospital transfer plays in reducing burden on local, less well-equipped

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hospitals is a primary role of medical transport, particularly during pandemics.

Key words: Air rescue; Transport of patients; Coronavirus disease 2019; Clinical evolution; Nursing care

Introduction

The coronavirus disease 2019 (COVID-19), an infection caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), originated in China in 2019 and was defined as a pandemic by the World Health Organization in March 2020. COVID-19 has spread rapidly worldwide, with high illness and mortality rates.[1,2]

Due to the high number of people infected in a short period of time with different symptoms and severity, the pandemic overloaded the health care systems of several countries.[3] The health budget and the geographic distribution of the population in Brazil are different among the 5 regions of the country. Therefore, the incidence of COVID-19 was not homogeneous, and was mainly impacted by the local health resources available for providing care.[4,5]

In this context, the state of Amazonas, located in the northern region of the country, had the highest incidence rate of the disease in Brazil (4474.6/1,000,000), which overloaded the local health care system, being characterized by the concentration of specialized hospitals in the capital Manaus and services with low resources in interior regions of the state.[5] In addition, the state of Amazonas has some peculiar geographic characteristics such as the largest hydrographic basin on the planet, a high number of remote areas, and limited roads, configuring a logistics problem regarding user access to the health care system, especially from riverside communities.

In this sense, the transport of patients by fixed-wing aircraft is performed in the Amazon region and was intensified during the COVID-19 pandemic to transfer infected patients from remote areas and with scarce resources for hospitals in Manaus. It was essential to provide adequate care to treat these patients,[6] especially for severe acute respiratory syndrome given the susceptibility of many of them, such as older adults with comorbidities and/or immunologic fragility.[7-10]

However, it is worth noting that air medical transport is not risk free. When the patient is exposed to the aerospace environment, there is a probability of presenting clinical complications during the flight, especially hypoxia,[11-13] hypotension,[11-13] and tachycardia.[12] Such conditions result from some flight stressors, including accelerative and gravitational forces, turbulence, air humidity, vibrations, flight duration, and musculoskeletal overload and fatigue.

It is highlighted that these conditions can interfere with the patient's clinical conditions. Therefore, it is fundamental to structure team care with flight conditions aimed at reducing the effects of altitude on the body, gravitational effects, and those generated by the aircraft operation.[14-16]

Considering the aspects described earlier and the scarcity of studies in the world and in Brazil that have investigated patients infected with SARS-CoV-2 who were transported by fixed-wing aircraft compared with patients with other diseases, it is relevant to conduct studies on this topic. Thus, this study aimed to comparatively analyze air-transported patients with and without COVID-19 according to clinical condition and complications that occurred during the flight.

Methods

STUDY DESIGN, LOCATION, AND SAMPLE

This is a retrospective cohort study with a quantitative approach using the records of patients airlifted from the interior of the state of Amazonas to the state capital Manaus, Brazil, from June 2019 to May 2021. The study was conducted at the Regulatory Complex of the State Department of Health (Secretaria de Estado de Saúde) of Amazonas, where the digital files related to the transfer process of patients undergoing state air medical transport in the Regulated Emergency Transfer System (Sistema de Transferência de Emergência Regulada [SISTER]) are stored. SISTER is an online system that works around the clock and is composed of 41 regulatory physicians and 13 supervisory nurses who coordinate the transfer of critically ill patients to the hospital network for urgent and emergency care in the state of Amazonas.

The sample was composed by convenience and consisted of patients undergoing state air medical transport from June 1, 2019 to May 31, 2021 who met the following inclusion criteria: age ≥18 years and having been transported by fixed-wing aircraft tendered by Secretaria de Estado de Saúde and regulated by SISTER from the interior of the state of Amazonas to the state capital Manaus. Air-transported patients who did not have clinical data recorded when boarding the aircraft and during the flight were excluded from the study.

OUTCOME MEASURES

The independent variable of the study was the presence or absence of COVID-19 as identified through rapid testing, reverse transcription polymerase chain reaction, or serology for SARS-CoV-2. The dependent variables included demographic characteristics (age and gender), presence of comorbidities (including type), severity according to the Rapid Emergency Medicine Score (REMS)[17] upon boarding the aircraft, and the criteria urgency, impact, and transfer priority adopted by SISTER. In addition to these variables, we also analyzed the use of oxygen therapy, invasive mechanical ventilation, vasoactive drugs and/or sedation at the time of boarding, clinical complications (categorized into respiratory, neurologic, cardiologic, and gastrointestinal, as well as pain), and death during flight.

The REMS was created in 2004 and is an index that enables identifying the physiological severity of the patient based on the sum of the scores assigned to the components of mean arterial pressure, respiratory rate, heart rate, peripheral oxygen saturation, Glasgow coma scale score, and age. REMS can vary from 0 to 26 points, and the higher the value, the worse the patient's prognosis.[17] As evidenced in a literature review, the REMS is a simple and feasible index, being quickly calculated by the health professional after evaluating the patient. In addition, it performs similarly to or better than other severity indices in predicting mortality.[18] These characteristics supported the choice of REMS to assess the severity of patients in the sample of this study.

The urgency criterion refers to the patient's clinical situation informed at the time of requesting the transfer in SISTER, and the impact criterion highlights the need for specialized patient support and the access time to this support. Priority is defined by SISTER's regulatory physician based on the assessment of the urgency and impact criteria. All criteria are classified as very high, high, medium, low, or very low in SISTER.

DATA COLLECTION

Data collection was performed by applying an instrument developed by the researchers. The first part of the instrument contained patient data provided by the requesting municipality in SISTER, including demographic and clinical characteristics; operational information on the transport; reason for requesting the transfer, including urgency, impact, and priority; and the exchange of information between the requesting municipality and the regulation center. The second part deals with the aeromedical mission report used during and at the end of the transport, such as clinical data of the patient when boarding the aircraft and during the flight.

Calculating the severity index is not a routine practice for health professionals (doctors and nurses) in Brazil who compose the health team. However, considering the importance of identifying the severity of patients with and without COVID-19 in the sample, the REMS was calculated by the study researchers based on data on vital signs and Glasgow coma scale score measured when the patient boarded the aircraft and recorded by the team in the flight record.

STATISTICAL ANALYSIS

Data were entered into a Microsoft Excel Office (Microsoft Corp, Redmond, WA) 2016 spreadsheet and analyzed by a statistician using the Microsoft statistical computing package R version 4.2.2. Pearson's chi-squared, Fisher exact, and Wilcoxon-Mann-Whitney tests were applied for comparative analysis of groups (patients with and without COVID-19). A P value of $<.05$ was considered statistically significant.

ETHICAL CONSIDERATIONS

This study was approved by the Research Ethics Committee of the Federal University of Amazonas, Brazil, on May 24, 2020 (CAAE no. 31868620.8.0000.5020).

Results

The study sample consisted of 741 patients airlifted from the interior of the state of Amazonas to the state capital Manaus. Most were males (60.59%) with a mean and median age of 53.12 (SD 17.06) and 54 (ranging from 18 to 94) years, respectively. A total of 351 patients (47.37%) had some type of comorbidity, with metabolic (23.89%) and cardiovascular (15.65%) diseases being the most prevalent (Table 1). Patients with COVID-19 ($n = 466$) represented 62.89% of the sample and were mainly diagnosed by the rapid test (93.71%) followed by reverse transcription polymerase chain reaction (6.07%), especially between the 8th and 14th day of the onset of symptoms (66.15%).

Table 1 presents the demographic characteristics and comorbidities of the patients in the sample, in which a higher median age; frequency of comorbidities, especially cardiovascular, metabolic, and/or pulmonary disease; and a higher body mass index (BMI) value in patients infected with SARS-CoV-2 can be observed.

TABLE 1
Patients with and without COVID-19 undergoing air medical transport according to demographic characteristics and comorbidities ($n = 741$)

Variables	COVID-19		Total	*P* value
	With	Without		
Age, med (min-max)	58 (18-94)	49 (18-87)	54 (18-94)	< .001*
Gender, n (%)				
Female	187 (40.13)	105 (38.18)	292 (39.41)	.601
Male	279 (59.87)	170 (61.82)	449 (60.59)	
Comorbidities, n (%)	281 (60.30)	70 (25.45)	351 (47.37)	< .001*
Main comorbidities, n (%)				
Cardiovascular disease	99 (21.24)	17 (6.18)	116 (15.65)	< .001*
Metabolic disease	146 (31.33)	31 (11.27)	177 (23.89)	< .001*
Pulmonary disease	19 (4.08)	2 (0.73)	21 (2.83)	.008*
BMI, med (min-max)	27.68 (14.57-60.24)	25.68 (14.84-52.05)	26.86 (14.57-60.24)	< .001*

Wilcoxon-Mann-Whitney; Pearson's chi-squared test.
BMI, body mass index; COVID-19, coronavirus disease 2019; med, median; min-max, minimum-maximum.
* $P < .05$.

Regarding the urgency, impact, and priority of the transfer adopted by SISTER, the data in Table 2 show that most patients (>50%) were classified as very high risk in all SISTER criteria and the median of REMS evidenced low physiological severity in the sample. There is evidence of a significant difference in terms of impact ($P < .001$) and priority ($P = .002$) in comparing the groups (with and without COVID-19), and patients with COVID-19 were more severely ill when boarding the aircraft according to REMS ($P < .001$).

A significant frequency of patients (85.96%) using oxygen therapy was identified, of whom 291 (39.27%) were on invasive mechanical ventilation and 231 (31.17%) were sedated before the flight. Vasoactive drug use was observed in approximately 10% of the sample. Regarding these variables, there was a difference ($P = .033$) between patients regarding the use of vasoactive drugs when boarding the aircraft, with a higher frequency of cases among those with COVID-19 (12.66% vs 7.64%) (Table 3).

The incidence of clinical complications in patients during the flight was 7.28%, with emphasis on dyspnea ($n = 17$), psychomotor agitation ($n = 13$), and pain ($n = 11$). There were 4 cases of cardiac arrest during the air medical transport, with no return to spontaneous circulation after cardiopulmonary resuscitation maneuvers. The comparative analysis of the groups regarding the variables complications and death on the flight showed that there was a statistically significant difference ($P = .008$) regarding the occurrence of respiratory complications, with a higher frequency of cases (4.08%) among patients with COVID-19 (Table 3).

Discussion

The analysis of the characteristics of patients airlifted from the interior of the state of Amazonas to the state capital Manaus in Brazil showed aspects that reinforce that air medical transport is an essential, common, and recurrent care practice in the Amazonian context and of significant relevance during the COVID-19 pandemic.

The higher frequency of males and an approximate mean age of 53 years identified among the 741 patients in the sample corroborate findings from other investigations that analyzed patients with COVID-19 or air-transported patients.[13,19-22] It is noteworthy that the greater involvement of men by SARS-CoV-2 has been explained by sexual hormonal issues in relation to the X gene regarding immune responses to the disease.[23]

Similar to that identified in this study, the presence of comorbidities, including cardiovascular and metabolic diseases, is frequently identified in patients with COVID-19.[7-9,24] In addition to comorbidities, BMI differed significantly between the 2 study groups. It is known that patients who are positive for SARS-CoV-2 and with a history of obesity, diabetes, and cardiovascular diseases are more severe, with the need for hospitalization and intensive care unit admission and a high risk of death.[25-27]

TABLE 2
Patients with and without COVID-19 undergoing air medical transport according to severity ($n = 741$)

Variables	COVID-19		Total	*P* value
	With	Without		
Urgency, n (%)				.294
Very low	-	-	-	
Low	1 (0.22)	1 (0.36)	2 (0.27)	
Medium	53 (11.37)	34 (12.36)	87 (11.74)	
High	181 (38.84)	89 (32.37)	270 (36.44)	
Very high	231 (49.57)	151 (54.91)	382 (51.55)	
Impact, n (%)				
Very low	-	2 (0.73)	2 (0.27)	
Low	1 (0.22)	-	1 (0.13)	
Medium	44 (9.44)	24 (8.73)	68 (9.18)	< .001*
High	201 (43.13)	80 (29.09)	281 (37.92)	
Very high	220 (47.21)	169 (61.45)	389 (52.50)	
Priority, n (%)				
Very low	2 (0.43)	-	2 (0.28)	.002*
Low	1 (0.21)	2 (0.73)	3 (0.40)	
Medium	36 (7.73)	19 (6.91)	55 (7.42)	
High	180 (38.63)	72 (26.18)	252 (34.01)	
Very high	247 (53.00)	182 (66.18)	429 (57.89)	
REMS upon boarding, med (min-max)	5 (0-16)	3 (0-13)	5 (0-16)	< .001*

Fisher exact test; Wilcoxon-Mann-Whitney test.
COVID-19, coronavirus disease 2019; med, median; min-max, minimum-maximum; REMS, Rapid Emergency Medicine Score.
* $P < .05$.

Advanced age associated with the presence of comorbidities increases the severity of infected patients,[28] and such severity was evidenced by the higher REMS value calculated in patients with COVID-19 than those without the disease. A study conducted in Turkey identified low severity among air-removed patients (median REMS of 3.5); however, in-hospital mortality after transportation was 100% among patients with REMS scores between 24 and 26,[29] highlighting the importance of evaluating the REMS score of each patient undergoing air medical transport.

In this context of severity and possible clinical worsening, and with the aim of establishing a better prognosis for patients with and without COVID-19 who require interhospital transfer, it was identified herein that the impact and priority criteria differed between the groups. As previously mentioned, the impact reflects the need for specialized support and the time of access to this support for the patient at the time of the transfer request, and the priority is established by the regulating physician based on the urgency (patient's clinical variables) and the impact informed in SISTER. As an example, urgency and impact considered very high in SISTER automatically refer to very high transfer priority. If 1 of them (urgency or impact) is classified as very high and the other high, the transfer priority is also classified as very high by the regulating physician. In this sense, the importance of applying disease severity classification systems is reinforced for greater quality control and effectiveness in the air transport of patients, favoring previous planning of the flight and greater safety for the professionals involved in the transport and for the patients themselves,[30,31] especially during a pandemic.

In addition, a high frequency (>80%) regarding the use of some type of oxygen support at the time of departure was observed in both groups, as well as the need for invasive mechanical ventilation (close to 40%). Although no significant difference was identified between patients with and without COVID-19 in relation to these variables, it is noteworthy that tracheal intubation is an important resource for patients who, owing to physiological conditions determined by the pathological process, require assisted ventilation, often times with 100% oxygenation.[32] In addition, it is essential to offer

TABLE 3
Patients with and without COVID-19 undergoing air medical transport according to ventilatory support, use of sedatives and/or vasoactive drugs, complications, and death during the flight ($n = 741$)

Variables	COVID-19		Total	*P* value
	With	Without		
Oxygen therapy, n (%)	395 (84.76)	242 (88.00)	637 (85.96)	.221
Invasive mechanical ventilation, n (%)	186 (39.91)	105 (38.18)	291 (39.27)	.641
Vasoactive drug, n (%)	59 (12.66)	21 (7.64)	80 (10.80)	.033*
Sedation, n (%)	145 (31.12)	86 (31.27)	231 (31.17)	.965
Occurrence of complication, n (%)	35 (7.51)	19 (6.91)	54 (7.28)	.761
Type of complication, n (%)				
Respiratory	19 (4.08)	2 (0.73)	21 (2.83)	.008*
Neurologic	8 (1.72)	5 (1.82)	13 (1.75)	.919
Pain	4 (0.86)	7 (2.55)	11 (1.48)	.066
Gastrointestinal	3 (0.64)	4 (0.15)	7 (0.94)	.270
Death, n (%)	2 (0.43)	2 (0.73)	4 (0.54)	.593

Pearson's chi-squared test.
COVID-19, coronavirus disease 2019.
* $P < .05$.

oxygen to many patients during air transport owing to hypoxia resulting from altitude.[14,33] Nevertheless, high-flow oxygen therapy was frequent in patients with COVID-19 to reverse respiratory distress resulting from pulmonary impairment, which is a criterion used to assess the disease severity and patient prognosis.[19,34] The group of patients with COVID-19 stood out in terms of frequency and use of vasoactive drugs when boarding the aircraft. One study shows that vasoactive drugs was 1 of the main drug therapies administered in critically ill patients with COVID-19 to reverse the cardiopulmonary effect promoted by the disease.[35]

Furthermore, it was identified that patients with COVID-19 had a higher frequency of respiratory complications during the flight. Clinical manifestations arising from the altitude of the flight can result in complications such as dyspnea, respiratory distress with hypoxia as a result, paroxysmal involuntary dry cough, and cyanosis, which are certainly aggravated in patients with COVID-19 due to significant previous pulmonary involvement. It is worth mentioning that the effects of the aerospace environment on the cardiovascular system can also result in signs and symptoms of hypoxia, known as hypoxic myocardium, which starts to respond with a decrease in heart rate and hypotension.[14]

Therefore, flight-related conditions, clinical aspects of the underlying disease, and the signs and symptoms inherent to SARS-CoV-2 infection compromise the stability of the patient who, depending on their criticality, require mechanical ventilation and vasopressor drugs,[34] especially during air medical transport. Therefore, performing laboratory tests at the point of care before prehospital transport is essential for quick critical decision making with the aim of promoting assertive and early interventions to mitigate risks to the patient[36] during air transport.

Finally, cardiac arrest during the flight occurred in 4 patients who died, and this condition was similar between the groups. In a sample of >13,000 patients, American researchers identified that the incidence of cardiorespiratory arrest is rare (<1%) during air medical transport and emphasized that hypotension often precedes this complication.[37] The success rate of return to spontaneous circulation after in-flight cardiopulmonary resuscitation is 42%[37] to 50%,[38] which is higher than that found in this investigation.

In view of the above, continuous monitoring of the patient, maintenance of physical and physiological integrity, and meeting basic and emergency needs during the flight refer to the need to standardize care, especially for patients with COVID-19, to ensure safe care provided by nurses and doctors during air medical transport.

Limitations

As limitations, it should be noted that this study only highlights the reality of air medical transport of patients from the state of Amazonas, 1 of the 5 regions of Brazil. Furthermore,

given that this is an analysis of secondary data, the results depend on the quality of the records made by health professionals because the service does not provide a checklist-type document for registration, nor does it provide a care protocol to be applied for patients during air medical transport. Therefore, prospective studies could help to better complete the digital record and thereby fill in possible information gaps.

Implications for Emergency Nurses

This study addresses the air medical transport of patients with and without COVID-19 and highlights clinical conditions and complications that occurred during the flight. Knowledge of these characteristics will help emergency nurses in planning pre-, intra-, and postflight care according to the type of patient (with and without COVID-19) and direct the team (nurses and doctors) toward standardized care based on advanced practices and the best scientific evidence, without disregarding the possibility of urgent and emergent situations inherent to airlift, which are essential conditions for patient and nursing professional safety in facing the challenges of air medical transport.

Conclusions

Patients with COVID-19 were older and had more comorbidities, and had higher BMI values, frequency of vasoactive drug use, and respiratory complications during the flight, in addition to being more severely ill.

Although there are minimal differences in patients with and without COVID-19 who are transported for higher level care in the Amazon region, the role that interhospital transfer plays in reducing burden on local, less well-equipped hospitals is a primary role of medical transport, particularly during pandemics. Furthermore, due to the increased severity of illness, early identification of patients at risk of poor outcomes (increased age, comorbid load, and/or BMI) should be performed and these patients transferred to higher level care before they become significantly ill, thus reducing burden on local resources earlier, potentially reducing the complexity of transport, and getting the patient to the right level of care earlier.

Author Disclosures

Conflicts of interest: none to report.

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REFERENCES

1. Cucinotta D, Vanelli M. WHO declares COVID-19 a pandemic. *Acta Biol Med.* 2020;91(1):157-160. https://doi.org/10.23750/abm.v91i1.9397
2. Yüce M, Filiztekin E, Özkaya KG. COVID-19 diagnosis-a review of current methods. *Biosens Bioelectron.* 2021;172:112752. https://doi.org/10.1016/j.bios.2020.112752
3. Ochani R, Asad A, Yasmin F, et al. COVID-19 pandemic: from origins to outcomes. A comprehensive review of viral pathogenesis, clinical manifestations, diagnostic evaluation, and management. *Infez Med.* 2021;29(1):20-36.
4. Werneck GL, Carvalho MS. The COVID-19 apndemic in Brazil: chronicle of a health crisis foretold. *Cad Saúde Publ.* 2020;36(5):e00068820. https://doi.org/10.1590/0102-311X00068820
5. Cavalcante JR, Santos ACC, Bremm JM, et al. COVID-19 in Brazil: evolution of the epidemic up until epidemiological week 20 of 2020. *Epidemiol Serv Saúde.* 2020;29(4):e2020376. https://doi.org/10.5123/s1679-49742020000400010
6. Albuquerque MV, Ribeiro LHL. Inequality, geographic situation, and meanings of action in the COVID-19 pandemic in Brazil. *Cad Saúde Publ.* 2020;36(12):e00208720. https://doi.org/10.1590/0102-311X00208720
7. Porcheddu R, Serra C, Kelvin D, Kelvin N, Rubino S. Similarity in case fatality rates (CFR) of COVID-19/SARS-COV-2 in Italy and China. *J Infect Dev Ctries.* 2020;14(2):125-128. https://doi.org/10.3855/jidc.12600
8. Wilson N, Kvalsvig A, Barnard LT, Baker MG. Case-fatality risk estimates for COVID-19 calculated by using a lag time for fatality. *Emerg Infect Dis.* 2020;26(6):1339-1441. https://doi.org/10.3201/eid2606.200320
9. Mehta P, McAuley DF, Brown M, et al. COVID-19: consider cytokine storm syndromes and immunosuppression. *Lancet.* 2020;395(10229):1033-1034. https://doi.org/10.1016/S0140-6736(20)30628-0
10. Karakike E, Giamarellos-Bourboulis EJ. Macrophage activation-like syndrome: a distinct entity leading to early death in sepsis. *Front Immunol.* 2019;10:55. https://doi.org/10.3389/fimmu.2019.00055
11. Berguigua H, Iche L, Roche P, et al. Emergency air evacuation of patients with acute respiratory failure due to SARS-CoV-2 from Mayotte to Reunion Island. *Med (Baltim).* 2021;100(48):e27881. https://doi.org/10.1097/MD.0000000000027881
12. Gao L, Zhang J, Gao K, et al. Air medical transportation for severe acute pancreatitis patients over an extra long distance: is it safe enough? *Gastroenterol Res Pract.* 2018;2018:3826084. https://doi.org/10.1155/2018/3826084
13. Singh JM, MacDonald RD, Bronskill SE, Schull MJ. Incidence and predictors of critical events during urgent air-medical transport. *CMAJ.* 2009;181(9):579-584. https://doi.org/10.1503/cmaj.080886

14. Reis MCF, Vasconcellos DRL, Saiki J, Gentil RC. The effects of air physiology on nursing care for the airborne patient and on the air medical crew. *Acta Paul Enferm*. 2000;13(2):16-25.
15. Hampson NB, Kregenow DA, Mahoney AM, et al. Altitude exposures during commercial flight: a reappraisal. *Aviat Space Environ Med*. 2013;84(1):27-31. https://doi.org/10.3357/asem.3438.2013
16. Hale JJ, Hall DP, Dunn MJG. Physiology of patient transfer by land and air. *Intensive Care Med*. 2019;20(10):595-599. https://doi.org/10.1016/j.mpaic.2019.07.015
17. Olsson T, Terent A, Lind L. Rapid Emergency Medicine score: a new prognostic tool for in-hospital mortality in nonsurgical emergency department patients. *J Intern Med*. 2004;255(5):579-587. https://doi.org/10.1111/j.1365-2796.2004.01321.x
18. Nolan B, Tien H, Haas B, Saskin R, Nathens A. The rapid emergency medicine score: A critical appraisal of its measurement properties and applicability to the air retrieval environment. *Air Med J*. 2019;38(3):154-160. https://doi.org/10.1016/j.amj.2019.02.001
19. Al Maqbali M, Al Badi K, Al Sinani M, Madkhali N, Dickens GL. Clinical features of COVID-19 patients in the first year of pandemic: a systematic review and meta-analysis. *Biol Res Nurs*. 2022;24(2):172-185. https://doi.org/10.1177/10998004211055866
20. Li J, Huang DQ, Zou B, et al. Epidemiology of COVID-19: a systematic review and meta-analysis of clinical characteristics, risk factors, and outcomes. *J Med Virol*. 2021;93(3):1449-1458. https://doi.org/10.1002/jmv.26424
21. Zhu J, Ji P, Pang J, et al. Clinical characteristics of 3062 COVID-19 patients: a meta-analysis. *J Med Virol*. 2020;92(10):1902-1914. https://doi.org/10.1002/jmv.25884
22. Zia A, MacDonald R, Moore S, Ducharme J, Vaillancourt C. Assessment of pain management during interfacility air medical transport of intubated patients. *Air Med J*. 2019;38(6):421-425. https://doi.org/10.1016/j.amj.2019.09.002
23. Agrawal H, Das N, Nathani S, et al. An assessment on impact of COVID-19 infection in agenderspecific manner. *Stem Cell Rev Rep*. 2021;17(1):94-112. https://doi.org/10.1007/s12015-020-10048-z
24. Naimi A, Yashmi I, Jebeleh R, et al. Comorbidities and mortality rate in COVID-19 patients with hematological malignancies: a systematic review and meta-analysis. *J Clin Lab Anal*. 2022;36(5):e24387. https://doi.org/10.1002/jcla.24387
25. Peters SAE, MacMahon S, Woodward M. Obesity as a risk factor for COVID-19 mortality in women and men in the UK Biobank: comparisons within fluenza/pneumonia and coronary heart disease. *Diabetes Obes Metab*. 2021;23(1):258-262. https://doi.org/10.1111/dom.14199
26. Drucker DJ. Diabetes, obesity, metabolism, and SARS-CoV-2 infection: the end of the beginning–review. *Cell Metab*. 2021;33(3):479-498. https://doi.org/10.1016/j.cmet.2021.01.016
27. Russell CD, Lone NI, Baillie JK. Comorbidities, multimorbidity and COVID-19. *Nat Med*. 2023;29(3):334-343. https://doi.org/10.1038/s41591-022-02156-9
28. Docherty AB, Harrison EM, Green CA, et al. Features of 20 133 UK patients in hospital with Covid-19 using the ISARIC WHO clinical characterisation protocol: prospective observational cohort study. *BMJ*. 2020;369:m1985. https://doi.org/10.1136/bmj.m1985
29. Yurt YC, Kati C, Ocak M. Evaluation of the patients brought to the emergency service by helicopter ambulance by REMS and NACA score. *Anatolian J Emerg Med*. 2021;4(1):17-22. https://doi.org/61118/780778.
30. Veldman A, Fischer D, Brand J, Racky S, Klug P, Diefenbach M. Proposal for a new scoring system in international interhospital air transport. *J Travel Med*. 2001;8(3):154-157. https://doi.org/10.2310/7060.2001.24467
31. Tursch M, Kvam AM, Meyer M, Veldman A, Diefenbach M. Stratification of patients in long-distance, international, fixed-wing aircraft. *Air Med J*. 2013;32(3):164-169. https://doi.org/10.1016/j.amj.2012.10.017
32. National Association of Emergency Medical Technicians. *Prehospital Trauma Life Support*. 9th ed. Jones and Bartlett Learning; 2019.
33. Rengasamy S, Nassef B, Bilotta F, Pugliese F, Nozari A, Ortega R. Administration of supplemental oxygen. *N Engl J Med*. 2021;385(3):e9. https://doi.org/10.1056/NEJMvcm2035240
34. Long B, Carius BM, Chavez S, et al. Clinical update on COVID-19 for the emergency clinician: presentation and evaluation. *Am J Emerg Med*. 2022;54:46-57. https://doi.org/10.1016/j.ajem.2022.01.028
35. Kim S. COVID-19 drug development. *J Microbiol Biotechnol*. 2022;32(1):1-5. https://doi.org/10.4014/jmb.2110.10029
36. Collopy KT, Westmoreland A, Powers WF. Patient care alterations after point-of-care laboratory testing during critical care transport. *Air Med J*. 2022;41(4):370-375. https://doi.org/10.1016/j.amj.2022.04.008
37. Danielson KR, Condino A, Latimer AJ, McCoy AM, Utarnachitt RB. Cardiac arrest in flight: a retrospective chart review of 92 patients transported by a critical care air medical service. *Air Med J*. 2021;40(3):159-163. https://doi.org/10.1016/j.amj.2021.02.005
38. Khurana H, Mehta Y, Dubey S. Air medical transportation in India: our experience. *J Anaesthesiol Clin Pharmacol*. 2016;32(3):359-363. https://doi.org/10.4103/0970-9185.173377

Emergency Nursing Review Questions: November 2023

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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 with a history of coronary artery disease presents to the emergency department with chest pain and is found to have significant ST elevation in the lateral leads on the electrocardiogram. Before transferring to the catheterization lab, the patient develops tachycardia with hypotension, and cardiogenic shock is suspected. Which of the following assessment findings would most likely be observed?
   - **A.** A decrease in systemic vascular resistance
   - **B.** A decrease in central venous pressure
   - **C.** A decrease in cardiac index
   - **D.** A decrease in afterload
2. An emergency nurse assumes care of a patient from a motor vehicular crash. The patient experienced a lateral head injury with bruising noted. A sudden loss of consciousness was reported followed by a period of lucidity lasting several minutes before a decrease in consciousness again. The patent's Glasgow coma scale on ED admission demonstrates 3, E-1, M-1, V-1. The nurse would suspect:
   - **A)** Intracerebral hematoma
   - **B)** Epidural hematoma
   - **C)** Subdural hematoma
   - **D)** Concussion
3. A patient presents to the emergency department after football practice with muscle weakness, perspiring, muscle aches, and legs cramping. Vital signs on admission include blood pressure of 80/60 mm Hg, heart rate 132 beats per minute, respirations 24 per minute, and temperature 99.0 °F (37.2 °C). After evaluation, the patient is diagnosed as having severe dehydration and rhabdomyolysis. He states these symptoms have occurred for the past 3 days during practice. Intravenous hydration is initiated immediately. Which of the following assessment findings would be confirmatory of the rhabdomyolysis diagnosis?
   - **A.** Urine specific gravity of 1.003
   - **B.** Creatine kinase of 600 U/L
   - **C.** Potassium level of 4.3 mEq/L
   - **D.** Anion gap of 8 mmol/L
4. A 3-year-old is brought to urgent care by the parents with a temperature of 100.8 °F (38.2 °C). The parents describe a history of cold and congestion for several days, with a pronounced cough this evening. The child has a hoarse voice and a seal-like sounding cough. Mild to moderate stridor is assessed. The child is not drooling and is playing with a toy. Which of the following conditions would you suspect?
   - **A.** Croup
   - **B.** Epiglottitis
   - **C.** Asthma
   - **D.** Bronchiolitis
5. A soccer player is being discharged from the emergency department with a Lisfranc fracture. The provider requests a splint be applied before discharge. Based on the diagnosis, the nurse would obtain and apply which of the following splints?
   - **A.** Short arm splint
   - **B.** Sling and swathe
   - **C.** Knee brace
   - **D.** Foot and ankle splint

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ANSWERS

1. Answer: C

Cardiogenic shock is a potential complication after myocardial infarction and damage to the left ventricle. Defined by systemic hypoperfusion and tissue hypoxia due to cardiac dysfunction, cardiogenic shock is the leading cause of in-hospital death in patients with acute myocardial infarction. Other common causes of cardiogenic shock include dysrhythmias, cardiac contusions, and structural abnormalities. A low cardiac index (<2.2 L/min/m^2) would be observed in cardiogenic shock. The cardiac index or output is low because the heart is not pumping adequately (C). Systemic vascular resistance would be elevated due to the body's attempt to maintain blood pressure (perfusion pressure) by increasing arteriolar tone (A). Central venous pressure would be increased (>10 mm Hg) due to forward failure of the cardiac pump resulting in backup of blood within the venous side of the system. Jugular vein distension may be observed (B). Afterload would be increased due to an increase in systemic vascular resistance (D).[1,2]

2. Answer: B

Epidural hematomas are frequently caused by a laceration of the middle meningeal artery and can occur secondary to trauma involving the temporal or parietal bones. A transient loss of consciousness, followed by a period of lucidity, is the classic presentation of an epidural hematoma (B). Intracerebral hematomas do not typically involve a transient loss of consciousness, although are associated with neurologic deterioration (A). Subdural hematomas do not generally present with a transient loss of consciousness followed by a period of lucidity. A steady loss of consciousness is noted with chronic subdural bleeds (C). Concussions are not associated with a rapidly worsening neurologic status, although they may be associated with an initial loss of consciousness (D).[3]

3. Answer: B

Rhabdomyolysis is a rare muscle condition causing life-threatening muscle breakdown after an injury or excessive perspiration and high-intensity exercise. Myoglobin, a muscle protein, is released into the blood stream. The kidneys are unable to break down the myoglobin, resulting in myoglobin release in urine, with potential kidney damage due to blockage at the vascular and excretion level in the kidney. Creatine kinase is also released into the bloodstream due to muscle damage, demonstrating a high level in the blood system. Normal creatine kinase in males is 55 to 170 U/L and in females 30 to 145 U/L. The classic triad of rhabdomyolysis is severe muscle pain, numbness or altered sensation, muscle weakness, and dark red or brown urine with an elevated creatine kinase level. Rhabdomyolysis can be seen with severe dehydration and compression or crush injury to muscles (B). A urine specific gravity of 1.003 would be considered very dilute urine, possibly due to overhydration (A). A Potassium level of 4.3 mEq/L is considered a normal value. Hyperkalemia, hyperphosphatemia, and hypocalcemia are electrolyte abnormalities commonly seen with rhabdomyolysis (C). An anion gap of 8 mmol/L would be considered a normal value (4-12 mmol/L). Metabolic acidosis can be seen in rhabdomyolysis, demonstrating an elevated anion gap (D).[4]

4. Answer: A

Croup or laryngotracheobronchitis is a viral infection characterized by hoarse voice, seal-like barking cough, inspiratory stridor, and varying degrees of respiratory distress. Most often occurring in males between the ages of 6 to 36 months, croup is most frequently seen in the fall and early winter months. A common cause is the parainfluenza virus. It is frequently preceded by an upper respiratory infection and presents with a low- to medium-grade fever (A). Epiglottis is a bacterial infection with an acutely ill presentation. The child with epiglottitis typically will demonstrate drooling, acute respiratory distress, restlessness, anxiety, and tripod positioning. A cough is typically not present with epiglottitis (B). Asthma is a chronic obstructive respiratory disease demonstrating airway inflammation and bronchospasm (C). Bronchiolitis is a lower respiratory infection. Respiratory syncytial virus is a common causative agent. It most commonly occurs in infants younger than 1 year of age and is a progressive illness with worsening dyspnea and lethargy (D).[5,6]

5. Answer: D

A Lisfranc or midfoot fracture is an injury to the metatarsal and tarsal bones of the foot. Varying degrees of injury are noted, with general ligamentous injury and a long

rehabilitation process. This fracture is seen in hyperextension or crush injury to the foot, such as from football, soccer, or other contact sports. A common finding of a Lisfranc fracture is bruising along the arch of the foot. A foot and ankle splint would be appropriate (D). A short arm splint would not be appropriate, along with a sling and swathe (A, B). Although a knee injury may be concurrent, it would not be the splint for a Lisfranc fracture (C).[7]

REFERENCES

1. Holleran RS. Shock emergencies. In: Sweet V, ed. *Emergency Nursing Core Curriculum*. 7th ed. Elsevier; 2018:473-481.
2. Blissitt P. Cardiovascular system. In: Hartis T, ed. *AACN Core Curriculum for Progressive and Critical Care Nursing*. 8th ed. Elsevier; 2023:344-350.
3. Campbell M. Head trauma. In: Blansfield JS, ed. *Emergency Nurses Association*. 8th ed. Jones and Bartlett Learning; 2020:106-110. Trauma Nursing Core Course (TNCC) Provider Manual.
4. Cline K. Musculoskeletal trauma. In: Blansfield JS, ed. *Emergency Nurses Association*. 8th ed. Jones and Bartlett Learning; 2020:198. Trauma Nursing Core Course (TNCC) Provider Manual.
5. Millici JJ. Respiratory emergencies. In: Sweet V, ed. *Emergency Nursing Core Curriculum*. 7th ed. Elsevier; 2018:457-463.
6. American Heart Association. *Pediatric Advanced Life Support Provider Manual*. American Heart Association; 2020.
7. American Academy of Orthopaedic Surgeons. Lisfranc (Midfoot) injury. OrthoInfo. Published 2022. Accessed July 4, 2023. https://orthoinfo.aaos.org/en/diseases–conditions/lisfranc-midfoot-injury. www.AAOS.com

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