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STAY POSITIVE AND KEEP THE STRENGTH

Ron Kraus, MSN, RN, EMT, CEN, ACNS-BC, TCRN

In my first President's Message, I introduced my theme for the year: ELEVATE. I challenged all of us to elevate some aspect of our lives, our careers, our profession, our colleagues, and our community. As we read this message and reflect on the past year, have we met that challenge? A quote from Jim Rohn, "Commit yourself to something bigger than yourself," helps me to stay focused to elevate. We all experienced the major challenges of 2021, many unexpected, just as in 2020 at the start of the pandemic. The pandemic is certainly still in full swing as I write this message in early September. As we continue to navigate these uncertain times and are hopefully moving to a postpandemic state, we continue to experience both professional and personal disappointments and losses. However difficult it may be to see at times, I believe we have been made stronger. Our strength is demonstrated in being comfortable with being uncomfortable, expecting the unexpected, and being in a constant state of readiness to pivot and adjust plans on a moment's notice. This is exhausting mentally and physically—it is hard. We need to take the time to recognize the exhaustion, loss, and disappointments and know that circumstances will improve. For me, it is like seeing the light at the end of the tunnel as we move along, and as we get closer to it, the tunnel seems to take a turn, rendering the light dimmer and more distant. So maddening. However, we must recognize that the light is still there.

We all need to continue to support one another in this global pandemic and for years to come. Our specialty of emergency nursing is unique and has trained us to be prepared for the unexpected. We will persevere, we will elevate one another, and we must reach out for help when we need it and provide help to others when they need it. We must make that promise to ourselves and each other. We all must be a transformational leader, keeping ourselves and our communities moving forward during this global crisis. A positive attitude is essential to be successful. Another quote I find inspirational is from General Colin Powell: "Perpetual optimism is a force multiplier." So stay positive; it will encourage others to be optimistic.

This has not been the presidential year that I had envisioned years ago, but it has been a year that has challenged me in ways I could not have foreseen. I have accepted the challenge and must remain agile. We may not know why things happen to us at the moment they occur, but I believe that there is a reason and that we must have faith, hope, and trust in the journey of life. We cannot live freely and thrive by living in the past. We must move forward—pull up the anchor and turn our sails to catch the wind.

It has been an honor and true pleasure to serve as the president of an association full of amazing professionals whom I truly respect, admire, and call friends. Thank you for the opportunity to serve, and let's keep challenging one another to ELEVATE!

Stay safe, stay focused, and be the good!

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AN UNPLANNED AND FATE-FILLED PROFESSIONAL JOURNEY

Susan Budassi Sheehy, PhD, RN, FAEN, FAAN

My dad and 2 of my uncles served in World War II. My dad was a Ranger medic, my Uncle Fred was an 18-year-old infantryman, and my Uncle Ray was a top gunner in a B-17 bomber aircraft. I grew up hearing stories about this war and I was so very proud of my family, so when my time came, I joined the United States Army Student Nurse Program because it felt like the right thing to do. My first active-duty assignment was in the thoracic surgery intensive care unit (ICU) at Walter Reed National Military Medical Center in Washington, DC. I thought I would always be an ICU nurse.

After 9 months, I received orders for Germany—first as the head nurse on a medical floor at the Second General Hospital in Landstuhl and then as the head nurse in the 225th Station Hospital emergency department (at that time called emergency room) in Munich. In Landstuhl, I received a call one day from the chief nurse telling me to report immediately to the helipad with an E-cylinder and a blood pressure cuff—that I would be accompanying a critically burned patient who was being evacuated to a larger military hospital about an hour away. I had never been in an ambulance, let alone a helicopter. The patient was on a nonrebreather mask and had 2 intravenous (IV) lines in place, connected to 2 glass IV bottles that we hung from the helicopter ceiling with strips of roller gauze. Every time we hit a bit of turbulent air, the drips came faster. No one

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told me that it would be impossible to take a blood pressure reading in a Huey—a name for a very noisy, bumpy ride but historically safe helicopter. We and the patient arrived safely at our destination. After a huge sigh of relief, I could palpably feel the adrenaline rush and knew for certain that I wanted to be an emergency nurse.

In Munich, not only was I the head nurse of the emergency department (literally 2 rooms), but I was the only nurse—with a staff of 10 medics and 3 foreign national physicians from Egypt, Turkey, and Iran. Emergency medicine and nursing were not yet specialties. We had no textbooks or protocols to guide us. This made me very uncomfortable, having come from an ICU where we had many resources, textbooks, standard order sets, protocols, and policies, and patient rounds 3 times a day. Hence, my team of medics and I created protocols for a set of frequently seen ED chief complaints and for the not-so-frequent multitrauma patients and cardiopulmonary arrest patients. I loved the pace of the emergency department, the various ages and diagnoses of patients, the uncertainty of who would be coming through the doors next, the need for critical thinking, and the teamwork that had to take place. I loved being a nurse in the emergency department! This is where I was meant to be.

After my discharge from the Army, I went to graduate school. The closest I could come to learning more about emergency nursing was a master's degree in cardiovascular nursing. I really missed being in the military, so I joined the US Air Force Reserves and became a flight nurse after a 6-week training program at the School of Aerospace Medicine in San Antonio. During my 2-week summer duty and an occasional 1-weekend-a-month duty each year, I went on some really busy and challenging missions.

After graduate school, I accepted a clinical nurse specialist (CNS) position in a Cardiac Care Unit. I knew it was not what I really wanted. I longed for an ED position. I decided to move from the East Coast to the West Coast where emergency medicine and paramedic-level emergency medical services (EMS) care programs were being started. What happened next would change my life forever. I interviewed for and was offered a CNS position in the newly created University of California, Los Angeles, Emergency Medicine Center. I am fairly certain that it was because of my military background that the co-chiefs, Dr Marshall Morgan (a cardiologist) and Dr Chuck McElroy (internal medicine) offered me the position. They welcomed me as a

colleague on the emergency care team. They, along with first-year resident Paul Auerbach, encouraged me to learn, to teach, to write, to present at conferences, to attend grand rounds and daily rounds, and to get involved with the EMS community. I attended all the emergency medicine (EM) Residency classes, rounds, and Morbidity and Mortality conferences because I wanted to learn and understand so that I could create educational opportunities for the nurses and techs that would parallel the residents and physicians so that we could work as a finely tuned team. And so it began.

During that time, I also heard about a relatively new organization, the Emergency Department Nurses Association. I joined and got involved right away. I was contacted by the editor of the *Journal of Emergency Nursing* and asked if I would be interested in writing a bimonthly clinical column for the journal. My very first published article was "An Emergency Nurses' Guide to Drawing Arterial Blood Gases."[1] Meanwhile, I was preparing weekly classes and skills sessions for the Emergency Medical Center nursing and tech staff. I wrote to 3 major medical textbook publishers, looking for a textbook that I could use as a reference for my classes. I was contacted by a publisher from C.V. Mosby asking if he could meet with me. We met the following week and he asked if he could see some of my lesson plans. It was then that, much to my astonishment, I was asked if I would be willing to co-author/edit a book for nurses who wanted to learn about emergency nursing. They had already contracted with one co-author who wrote a medical-surgical textbook but had no experience in emergency care. It took a while and several consultation meetings with my colleagues and medical directors before I was convinced that I was capable of that enormous and very important task.

Two years later, *Mosby's Manual of Emergency Care* was published[2] and was very well received. Two years after that, *Emergency Nursing: Principles and Practice*[3] was published and also very well received. They became the go-to books to study for the Certified Emergency Nurse (CEN) examination.

After 20 years of writing and co-editing 9 combined editions of these 2 books, I asked the Mosby Publishing Company's permission turn the books over to the Emergency Nurses Association (ENA). They said yes and the ENA Board said yes. It was the perfect place for these books to endure and to remain current and for opportunities for members to edit, write, or rewrite chapters ad infinitum.[4,5]

After 15 years on the West Coast as a CNS in the ED and EMS communities and concurrently 6 years as clinical faculty at the University of Washington teaching in the Emergency Burn Trauma master's program and co-creating a rural trauma nurse program in Southeast Alaska, I decided to move back to the East Coast—first to Maine at the urging of former ENA President Lynne (Gagnon) Smith. I subsequently accepted a position at Dartmouth Hitchcock Medical Center in New Hampshire as the Trauma Program Director and the Director of the soon-to-be-created Dartmouth Hitchcock Air Response Team. I was heavily involved in the Level One Trauma designation and the creation of statewide Trauma Systems in New Hampshire and Vermont. This was during my ENA presidency in 1995, so it was a very busy time. I could not have done it without the support of the Medical Center administration, staff, and physicians who encouraged me to run for that position and who supported me throughout my presidency.

I was recruited for a position as the Director of Emergency Services at one of the major Harvard teaching hospitals in Boston. The opportunity to try ED administration and to be back home in Boston was something I wanted to do. I was there only 2 years when my world was turned upside down by a devastating personal trauma. My then 13-year-old son sustained a C4 Brown-Sequard spinal cord injury when he dove off of a dock into shallow water at our emergency department summer picnic. Bill Briggs, who later became ENA president, jumped in the water and saved my son's life. I did not go home for the next 10 weeks except to pack one afternoon, staying by my son's bedside 24-7 at 3 different hospitals, as he began his very long life-threatening and then rehabilitation journey. My ENA sisters and brothers were unrelentingly caring and supportive of my son and me, offering prayers and love in abundance, cards, letters, flowers, phone calls, hospital visits, and meals.

I returned to work after 10 weeks away and found that I could not concentrate on work. I was exhausted and distracted and needed to find a job that was not as time consuming and demanding as ED management. Meanwhile, the hospital was going through a major downsizing of middle management, including my management position. As difficult as that was, it was a relief when I learned that my position was being eliminated. Instead of being distraught, I saw it as an opportunity to find something where I could apply my background in emergency care while also allowing me more time with my son.

Several of the attending physicians and emergency medicine residents I had worked with in the past became the new EM physician group at another large Boston academic center. I approached them to see if I could create a research position in their department. I was able to get some grant money and they welcomed me as a member of that wonderful ED team. For the next 3 years, my research focused on identifying predictors of deep vein thrombosis

and pulmonary emboli in patients admitted through the emergency department to the inpatient units.[6-8]

One day, I received a call from a member of the administration of the spinal cord and head injury acute care and rehabilitation center in Atlanta where my son had been a patient. I was asked if I would consider joining their staff as the Northeast regional admissions nurse coordinator. It was a big salary cut and it meant giving up my position in the emergency department, but I felt it was something I had to do to give back to the place that had done so much for my son and his recovery. For the next 3 years, I assessed patients with new spinal cord and brain injuries, met with staff and physicians and insurance companies, and began working on my PhD, researching the motor, self-efficacy, and quality-of-life effects of a nurse-coached exercise program for tetraplegic spinal cord injured patients in a community setting.[9] I was later asked to write a chapter for the seventh edition of Auerbach's Wilderness Medicine book on *Persons with Disabilities in the Wilderness.*[10]

I believe that, as nurses, the universe may lead us down a different path than we may have imagined, if we just pay attention, keep our minds open to new opportunities, and be willing to take some risks. Out of the blue, I received a call from a former colleague with whom I had done rural trauma nurse training in Southeast Alaska. She started a new health care process improvement company and invited me to join her team. She said that much of the work would be process improvement projects and teaching and consulting on new construction or renovations of emergency departments across the US and outside of the US. It was an intriguing offer that interested me very much. My son was in college and I was an empty nester. It was a good time in my life and career to take on this new challenge. I became a co-owner of the business and was responsible for the eastern region of the US and international projects. My projects took me all over the US, to 5 Canadian provinces, Europe, the Middle East, and Australia. I learned much during my 5 years with the company and was grateful for that opportunity.

However, there was a restlessness in my professional soul. I missed the military and I missed teaching. Quite by accident, I came across the website for the Uniformed Services University of the Health Sciences (USUHS) in Bethesda, MD. As far as I knew, it was a Department of Defense Medical School, educating active-duty personnel to become physicians for the Military Healthcare System. I thought that maybe they would have a place for a nurse researcher with a background in emergency, trauma, flight, and spinal cord injury nursing. I did not know that they also had a Graduate School of Nursing —PhD and DNP programs. All the students were active-duty military nurses. As I was reading through the Graduate School of Nursing information, I was pleasantly surprised and excited to see that Marguerite Kearney Littleton was the Associate Dean for Research. Marguerite and I were 2 of the co-authors of ENA's original *Standards of Emergency Nursing Practice.*[11] I called her and she immediately asked me if I was interested in a faculty position. I surprised myself when I said that I was.[12] Yet another ENA colleague who made a difference in my life.

I was hired to teach the core courses in the DNP program. I also had a joint appointment in the School of Medicine where I taught emergency trauma skills (IVs, cricothyrotomies, spinal immobilization, hemorrhage control, Glasgow Coma scoring, and primary and secondary surveys) to first-year medical students. I was (and still am) a faculty member and evaluator for the annual combat medical field exercise Operation Bushmaster for fourth-year medical students and second-year DNP students. Besides trauma skills, the students demonstrate their understanding of tactical operations, care under fire, battlefield evacuations, communicable diseases, cultural awareness, triage and care during mass casualties, dealing with the media, teamwork and accountability, and countless other scenarios one may encounter in a combat theater. I was back in my element![13]

As part of my responsibilities at USUHS, I was asked to be the nurse lead on a project associated with a multimillion-dollar US State Department Grant, "The African Peacekeeping Rapid Response Partnership." The mission was to prepare selected African nation military forces to respond to combat or infectious disease outbreaks in partner African nations. My role was to recruit nursing faculty for the project, develop a trauma nursing course specific to military combat nursing, and implement the course and instructor training in the partner nations. The course and instructor training were completed in Uganda and Rwanda. Owing to the coronavirus disease epidemic, courses to be taught in Ghana, Senegal, and other African nations were delayed. This was one of the most rewarding things I have ever done in my career. I was so honored to be chosen to lead this mission.

During my time at USUHS, I became very familiar with the Wounded Warrior community on base, many of whom had been severely wounded and in the Walter Reed National Military Medical Center's Military Advanced Training Center Rehabilitation Program for 2 or more years. They had burns, amputations, vision loss, hearing loss, polytrauma, traumatic brain injuries, and post-traumatic stress disorder. I worried about what would happen

to them when they left the familiarity, camaraderie, and the bonds they had formed with their like-minded battle buddies at the Medical Center, who understood what it was like to lose comrades and learn to deal with extreme disabilities and the physical and psychological challenges of war.

With the advice of a close friend who is a Wounded Warrior with bilateral lower limb amputations, we brainstormed what could be available all around the country where Wounded Warriors could go to continue to heal physically and mentally. We came up with the idea of matching Wounded Warriors with college athletes as workout buddies on college campuses. Student athletes are like-minded, understand teamwork, work hard, eat healthy food, hold each other accountable, encourage each other, and have each other's backs—just like the veterans when they were on active duty. Veterans and College Athletes Together (VCAT) was born. Because USUHS did not have athletic teams, I searched for a university where we could implement VCAT. I first did a pilot project for a year at a university in Boston. I then applied for a full-time faculty position at the University of Delaware with the caveat that I would teach there as long as I was allowed to start a VCAT program. I not only received their approval but also received a very generous grant from the Dean of the College of Health Sciences. We are currently hosting our third cohort of veterans and have received external grant funding for another year.[14] VCAT veterans lost weight, body fat, body mass index, and waist circumference. They gained muscle mass and improved flexibility. Psychological surveys demonstrated improvements in such areas as resilience, overall wellness, and quality of life. Perhaps the most important outcomes were evidenced in qualitative descriptive group sessions. Comments were made and reiterated about how much better they felt, how their communications have improved, how they sleep better, how much they enjoyed coming to the sessions, and how they are eating healthier food. One veteran said that VCAT saved his life.

In addition to the VCAT program, I received approval to create a new undergraduate elective course, "Care of Military Members, Veterans and Their Family Members in Civilian Healthcare." The first offering was in the spring of 2021 and it received outstanding reviews from the students. It is being offered again this fall. The foundation of the course is the "Have You Ever Served?" initiative from the American Academy of Nursing (SB Sheehy and LS Schwartz, unpublished data, 2021).[15,16]

My professional journey has taken me down many unplanned paths. I have learned so much at every stop along the way. Throughout my nursing career, ENA has been my personal and professional foundation for so many reasons—the friendships, opportunities, encouragement, knowledge, skills, leadership opportunities, and trust in each other. I have come full circle in my career, starting with the military and now coming close to the end of my career, again with the military, always with emergency nursing keeping me grounded and focused on learning new things and making a difference, regardless of the work I was doing.

My advice to those of you new to emergency nursing is to be brave, take risks, keep learning, ask questions, share your knowledge, be kind to your patients and to one another, take care of yourself, and enjoy your journey in the greatest profession in the world. You will have so many options from which to choose.

I gratefully acknowledge my ENA colleagues and friends, my many fellow staff members and students, and most especially 3 caring and brilliant physicians, Dr Marshall Morgan and Dr Chuck McElroy, former co-directors of the University of California, Los Angeles, Emergency Medical Center, who believed in me and who allowed me to tag along so that I could learn and create a parallel knowledge base specifically for emergency nurses, and Dr Paul Auerbach, whom I met when he was a first-year EM resident. His encouragement has helped me in so many ways over our 42-year friendship. Rest in Peace, Marshall, Chuck, and Paul.

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MILITARY, VETERAN, AND PUBLIC HEALTH SERVICE COMMUNITIES

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Commit...Learn...Launch

According to author Shannon Huffman Polson, who is among the first women to fly an Apache helicopter in combat in the United States Army, (1) commit, (2) learn, and (3) launch are the foundational steps to her process of cultivating internal grit and resilience.[1] Given the importance of continuing to ensure that nurses are well represented in international, national, and state high-level decision-making and leadership roles to achieve population health equity,[2] this process is poignantly relevant to our specialty. Polson[1] recommends drawing a circle of trustworthy relationship connections as part of the second step, learning. This circle includes mentors, your dream team, colleagues, friends, and acquaintances. At the edges of this solar system of connections are role models, some of whom may be people you have never met or whom you emulate from history or from afar. As members of our discipline and emergency specialty make ongoing contributions to valuable knowledge by continuing to assume high-level leadership and policymaking roles, we are creating a brilliant and inspiring constellation of emergency nursing pioneers, vanguards, and leaders as role models to elevate one another and the next generation of emergency nursing professionals.

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Pioneers, Vanguards, and Leaders

Dr. Faye Glenn Abdellah, EdD, LLD, ScD, RN, FAAN, is one of those distant lights that is a shining example for me.[3] In a time when our specialty is pulling together and cohesively supporting one another in the face of pandemic-related burnout and professional crises, I'm reminded of the wisdom and deep resilience of my earliest professional mentors who navigated nursing during international war and conflict during their own early careers. They show us that together we can and will overcome the challenges of today, no matter how impossible it may seem.

Abdellah was the pioneer of many firsts: first nurse to serve as Deputy Surgeon General of the US (1981-1989), first nurse to earn the rank of Rear Admiral, Upper Half, and founding Dean for the Uniformed Services University Graduate School of Nursing. Lauded among early nursing theorists, her 21 Nursing Problems theory offers a unique and solid pragmatism that resonated for me with the unscheduled and immediate problem-solving nature of our emergency nursing specialty.[4] Over the last century, the military and nursing evolved together from one of the few and initial professional systems by which women could formally achieve senior leadership promotion and rank in substantial numbers, serve in formally recognized and deployed roles in the military,[5] and generate long-lasting scientific innovations and advances in disaster and trauma nursing interventions, prehospital trauma, and women's health.[6] We have a tradition in the *Journal of Emergency Nursing* (*JEN*) of honoring our military and veteran nurses annually in our November issue. The purpose of this editorial is to introduce this November 2021 issue that carries on the tradition of honoring military and veteran nurses while seeking to expand to include their families, communities, and our public health service nurses moving forward.

We currently have a call for military community and veteran health manuscripts at *JEN*. We are actively recruiting emergency care relevant manuscripts that focus on military members, military families and caregivers, veterans, or veteran families and caregivers as the population or sample; include military or veterans as a measured characteristic to test hypotheses or predictive models; include military treatment facility, veteran hospital, or military environment as the setting; or advance interventions, clinical techniques, theories, concepts, leadership, or evidence-based practices rooted in or derived from military/veterans affairs

innovation or science. Readers can visit the *JEN* website[7] for a collection of recently published military community and veteran health original research, literature review, and evidence-based papers on topics that include infection control,[8] emergency nursing education and professional development,[9-11] mental health,[12,13] specimen-collection devices in the unit supply chain,[14] emergency department point-of-care blood biomarker testing,[15] and more.

Tribute and Farewell

Each November, we've included a tribute and farewell to members of the editorial team who have served for a decade or more. This November, we honor Carrie A. McCoy, PhD, MSPH RN, CEN. Dr. McCoy became coeditor of the Emergency Nursing Review Questions section of *JEN* in 1995, after serving as a CEN item writer, member of the Board of Certification for Emergency Nursing (BCEN) Board of Directors, and BCEN Research Committee. Dr. McCoy also served as a member of the Editorial Board of *JEN* and chaired the search committee for a new editor for *JEN* in 2006. She received a doctoral scholarship from the Emergency Nursing Association as well as a National Institute for Nursing Research predoctoral fellowship to study risk for agricultural injuries in women. Dr. McCoy has also been active in her local Emergency Nursing Association chapter, having served as a Trauma Nursing Core Course instructor since the inception of Trauma Nursing Core Course. In addition, she was member of the Greater Cincinnati Area Red Cross Disaster Team and the Kentucky Medical Reserve Team. She also served as member of the Community Advisory Committee for the Foundation for a Healthy Kentucky. She served in the US Army as a nurse during the Vietnam era and in 2011 was awarded the Greater Cincinnati Woman Veteran of the Year in the area of education. Dr Mccoy is retired from the University of Cincinnati Medical Center, where she spent many years working as a staff nurse in the emergency department, and she is Professor Emerita, Northern Kentucky University, where she taught nursing. On a personal note, I found our conversations about Dr. McCoy's adventures in organic farming to be endlessly delightful. To discuss public health, program planning and evaluation, and clinical emergency nursing with Dr. McCoy was to feel immersed in the presence of profound and inspiring wisdom. The editorial team wishes Dr. McCoy much happiness, health, and joy in her retirement.

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The Accuracy of Medication Administration Data in the Emergency Department: Why Does It Matter?

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In the past decade, emergency departments, like most clinical settings, have seen an explosion in electronic health records (EHRs),[1] which has fueled growth in the use of EHR data for research and operational analysis. In this issue of the *Journal of Emergency Nursing*, de Hond et al[2] publish the results of their study investigating the outcomes of the timely administration of medications in the emergency department. One of their findings is that actual medication times differ from those recorded in the EHR.

As a clinical informatician, my work focuses on the rich supply of EHR usage data to improve the quality of care patient safety and to support clinical decision making. The de Hond et al[2] findings highlight important issues with EHR data. First, the medication time discrepancy points to an opportunity for improvement in EHR usability and design. Second, unaddressed EHR-related systems issues with medication administration in the emergency department still exist. Finally, along with the increasing use of artificial intelligence (AI) in the emergency department, expert clinical involvement in all development and implementation phases of AI is essential and often missing.

The national outcry related to documentation burden and the EHR[3,4] speaks to the need for improved usability of the EHR and the fact that the EHR's design continues to be driven by regulatory and billing forces. The Office of the National Coordinator for Health Information Technology,[5] the Center for Medicare and Medicaid services,[6] and several other federal agencies address documentation burden and EHR usability issues. In addition, working groups,

such as from the Nursing Knowledge Big Data Science conference, have generated a framework for documentation burden.[7] My colleagues and I are leading[8] an initiative funded by the National Library of Medicine that brought relevant stakeholders together in a symposium to reduce documentation burden by 75% in the next 5 years.[8] Finally, clinical documentation reduction efforts commonly recommend that EHR companies create more user-friendly documentation structures.

The de Hond et al[2] article accurately points out that early appropriate medication administration is essential to improving patient outcomes in the emergency department. Many systems-level safety implementations (like barcode medication administration) have recently been implemented, partially in response to the National Academy of Medicine's *To Err is Human*[9] report. However, in the fast-paced, high-stakes environment of the emergency department, the continued use of workarounds exposes systems-level obstacles to the regular use of these safety implementations. For example, in a code situation, emergency nurses often must administer medication before a provider can enter the prescription order into the EHR. However, the success of current medication administration safety tools like barcode medication administration[10] relies on physicians quickly entering medication prescription orders, which is not well aligned with emergency department–specific workflow. Systems-level improvements are still needed for the documentation of medication administration.

Along with the revolutionary benefits of AI interventions using EHR data in the emergency department come several pitfalls, including bias in the underlying AI algorithms.[11] If these biases are not addressed, the AI tools will not be trustworthy. We recently reviewed the current state of the science of AI-driven clinical decision support in the inpatient setting.[12] We found that few studies involved clinicians in developing and implementing AI decision support projects. The de Hond et al[2] findings highlight an area in which this lack of clinician involvement would be detrimental for documented versus actual medication administration time. The fact that actual medication

administration may be different from the documented medication administration would be evident to clinicians, but not likely anticipated or understood by nonclinicians. AI algorithms built without clinician input and experiential wisdom would unlikely to account for expected versus actual clinical workflow discrepancies.

In summary, de Hond et al[2] highlight several ED EHR usability issues, data quality, and systems issues in tracking medication administration. These findings also have implications about the need for future clinician involvement in AI solutions. More research is needed to solve these issues to ensure that clinicians continue providing safe and effective care in the emergency department.

Author Disclosures

Conflicts of interest: none to report.

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OPTIMIZING DISCHARGE KNOWLEDGE AND BEHAVIORS

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Instructions given to the patient at discharge are a crucial component of the ED visit. Effective instructions provide patients the ability to manage their home care, including obtaining and taking medication, arranging follow-up, and understanding the circumstances under which they should return to the emergency department.[1,2] Inadequate or poorly understood instructions are associated with poor adherence to prescribed therapy regimens and related negative outcomes including unscheduled returns and higher rates of hospital admission.[3-6] Individual and environmental factors have been implicated in the poor comprehension of and compliance with discharge instructions,[1,4-7] including limited health literacy.[1,6]

Although some research has examined the association between ED discharge instructions and patient satisfaction, limited research examines teach-back's effect on patient satisfaction.[8,9] In this issue of the *Journal of Emergency Nursing*, Hodges et al evaluated teach-back as a method of increasing patient satisfaction with the discharge process. The authors used teach-back to address inadequate health literacy and ensure understanding of instructions. Although some initial improvement in satisfaction was realized, the authors did not achieve their goal. Despite sharing a flow process demonstrating an excellent teach-back method, the authors did not report or measure patient comprehension. The authors identified patient comprehension outcomes as a subject for future research.[10]

Optimizing ED discharge instructions requires a thorough consideration of both process and outcome measures.[1,11] The Agency for Healthcare Research and Quality's 2014 *Improving the Emergency Department*

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Discharge Process: Environmental Scan Report identifies components for a high-quality ED discharge and factors that contribute to a discharge failure. Among the high-quality discharge categories are communicating with/educating patients, postdischarge support care, and coordination of services and follow-up care.[1] The Agency for Healthcare Research and Quality's report identifies risk factors for discharge failure, outlines the barriers to effective instructions associated with each component, and provides a framework for emergency departments to analyze their discharge process.

Comprehension of and adherence to discharge instructions are important primary outcome measures for ongoing quality improvement, research, and nurse-led scholarship. Individuals with low health literacy are among those considered to be at risk for discharge failure.[1] However, the emergency department's chaotic environment, lack of familiarity with providers, limited time for education, and the patient's physical condition among other conditions can make understanding of and ultimately adhering to discharge instructions challenging for many patients.[4,5] Research has demonstrated that verbal instructions and a combination of verbal and written instructions provide less than optimal comprehension of discharge instructions, with many patients having <50% recall.[5] In addition, many studies of ED discharge do not evaluate postdischarge adherence to instructions.[1,5]

Optimizing the understanding of instructions and compliance with follow-up care begins with unhurried, unambiguous instructions delivered in lay terms to the patient; as appropriate, a translator should explain in the patient's preferred language.[12] When the patient is open to the technique, teach-back is a fundamental part of this process. The literature is replete with examples of the benefits of teach-back in health care settings and recognizes it as an effective method of validating the patient's understanding of instructions. In the emergency department, time for effective teach-back is cited as a barrier.[13] Few ED studies have examined the effectiveness of teach-back in recalling information at a later time or adherence to instructions.[14]

Adjunctive methods that reinforce verbal and written methods show promise in improving patient initial

comprehension and the recall of information after discharge as well as adhering to discharge instructions. Video instructions have improved comprehension in multiple adult and pediatric settings[15−17] with greater benefit seen with more complex diagnoses.[17] When measured, video instructions can increase satisfaction with the discharge process.[15] Financial and time constraints must be considered when producing and using video instructions.

Pictorial discharge instructions, also referred to as pictographs or pictograms, have been used as an adjunctive teaching method with success in the emergency setting.[6,11] Pictorial instructions when supplemented by simple, limited text effectively address inadequate health literacy across populations (Figure 1). Although few randomized control trials are available, a recent meta-analysis indicated that pictorial instruction improved comprehension, compliance, and satisfaction with discharge instructions.[11] Time to

develop pictographs, including creating relevant artwork, is a potential barrierto their use.

Postdischarge telehealth interventions, such as phone calls after an ED visit are associated with improved adherence, reduction in unscheduled returns, and when measured, increased patient satisfaction.[18−20] In studies where follow-up phone calls were used, most patients initially reported an incomplete or inaccurate understanding of instructions, and many had not adhered to follow-up care.[19,20] Telehealth calls provide an opportunity to teach, provide assistance, and evaluate patient satisfaction with emergency care, allowing for service recovery as needed (G. H. Raup, PhD, RN, CEN and E. J. Winokur, PhD, RN, CEN, unpublished data) (Figure 2).

Optimizing discharge knowledge and behaviors for emergency visit aftercare may not be achieved through a singular activity. Although time-intensive, a
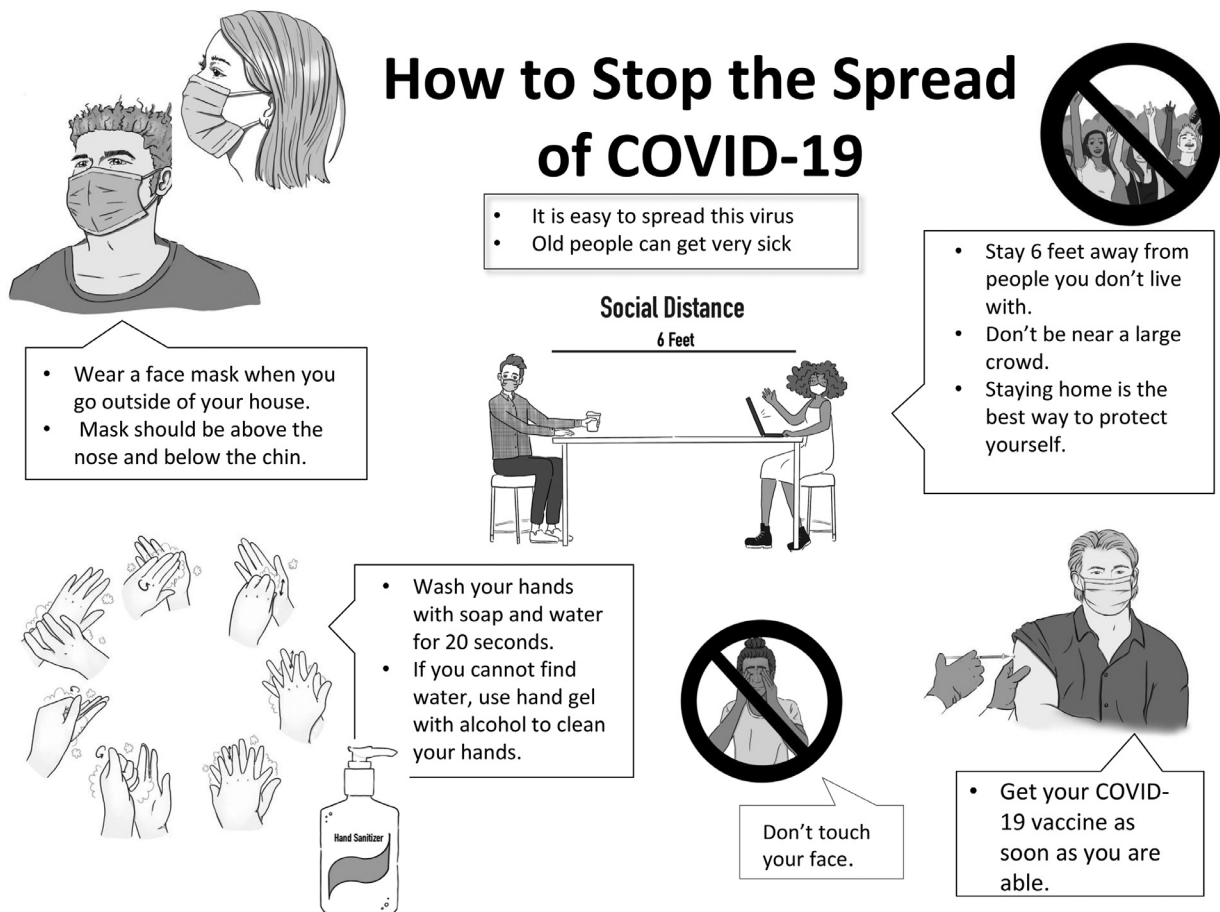

FIGURE 1

Pictograph stopping the spread of COVID-19. COVID-19, coronavirus disease.

Emergency Care Center Callback Script

1. How are you feeling since you left the emergency department with _____ (diagnosis)?

2. Have you looked at your written discharge instructions since you got home? Yes   No

3. Do you think the instructions we gave you verbally or the written ones we sent home are helpful in understanding how to care for yourself?

4. *If medication was prescribed*. . .did you pick up your medicine? If not, why not?

5. *If the patient had a prescription and it was picked up*. . .how often are you taking your medicine? [Check this against the prescription and if the patient is not taking the medication correctly, discuss this with the patient.]

6. How much water or liquid are you drinking every day?

7. Ask if the patient has understood any other instructions, eg, diet change or wound care?

8. Have you developed any new symptoms? If yes _____

9. Have you seen a doctor (gone to urgent care or an emergency department) since leaving the emergency department?   Yes   No   If yes_____

10. *If the patient is supposed to follow up with a physician*. . .have you made an appointment with your provider for follow-up care?   Yes No   If no why not _____

11. How satisfied are you with your emergency department visit?

Very satisfied   Satisfied   Neither satisfied nor Unsatisfied Unsatisfied   Very unsatisfied

12. How satisfied are you with your discharge instructions?

Very satisfied   Satisfied   Neither satisfied nor Unsatisfied Unsatisfied   Very unsatisfied

13. *If the patient reports that they are anything but Very satisfied or Satisfied with the last 2 questions, then ask. . .Is there anything I can do that may help address this?*

14. Do you have any other questions?

FIGURE 2

Emergency care center callback script.

multifaceted process involving written and verbal instructions, teach-back, adjunctive methods such as pictographs, and follow-up telehealth interventions demonstrates the greatest likelihood of achieving patient understanding, compliance with aftercare, and overall satisfaction including with the discharge process (G. H. Raup, PhD, RN, CEN and E. J. Winokur, PhD, RN, CEN, unpublished data).[1,12]

Satisfaction with discharge instructions should be thought of as a bidirectional process, potentially increasing the occupational satisfaction of nurses as well as patient satisfaction with care. A multipronged approach facilitates nurses' enablement to practice at the top of their license, ensuring a holistic method for delivery of efficacious aftercare instructions. Patients receiving these instructions have the opportunity to increase the knowledge and skills that may subsequently empower them to make optimal decisions about the next phase of their care and potentially improve their satisfaction with the health care journey.

Author Disclosures

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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.

Catheter Length In-Vein Impacts Ultrasound-Guided Peripheral Intravenous Catheter Survival

Dear Editor:

The 2021 Infusion Nursing Standards of Practice was updated to highlight the importance of choosing a longer peripheral intravenous (PIV) catheter when ultrasound (US) guidance is needed.[1] A longer PIV increases the likelihood of more catheter length in-vein, which is a key predictor of PIV catheter survival.[2-5] Recently, the article "The Effect of Catheter Length Placed Into the Vein on Peripheral Ultrasound-Guided Catheter Survival Time: A Prospective Observational Study" was published in the *Journal of Emergency Nursing*.[6] The results demonstrated that US PIV survival was not related to in-vein length of catheter. The authors noted a general improvement in US PIV survival at the institution during the study period compared with previous years and concluded that this improvement was due to enhanced clinician experience and proficiency rather than longer catheter length in the vein. This conclusion is in contrast to the existing evidence on this important topic and has significant clinical practice implications. Our intent behind this critical appraisal of the manuscript is to provide clinicians with a deeper understanding of the methodological weaknesses of this publication that may limit the conclusions. Furthermore, we aim to provide a balanced perspective of the current evidence on this important topic.

Dissecting the Study

We used a published critical appraisal tool to assess the quality of the Miles et al[6] manuscript and determined that there were several pertinent methodological weaknesses worthy of additional discussion.[7] See Supplementary Appendix for a complete list of categories and evaluation scores. The main outcome of the study was catheter survival, and data on this outcome were gathered through chart review. The validity of results is highly dependent on the quality of the input data to be meaningful. The authors cited that PIV removal data were not even charted in 9% of cases (26 cases) raising some concern regarding the remaining data set. Given the inherent limitations of chart review data, the conclusions

and recommendations should be tempered particularly in the setting of a small sample size.

US PIV longevity is dependent on multiple factors including patient-, vein-, and catheter-related variables. The patient population in this study of 98 patients was highly diverse with roughly equal proportions recruited in the emergency department and the intensive care unit. Although the authors provide some baseline data on demographics and medical history, severity of illness is notably missing from the data collection. This element could have significantly affected PIV survival, and inclusion may have helped reconcile some concerns over the likely heterogeneous study population. Other highly relevant catheter- and vein-related variables such as vein depth and angle of insertion were also missing. Choosing the right catheter length requires accounting for a complex mathematical relationship among the PIV catheter length, angle of insertion, and depth of the vein. Omitting data on these key variables substantially limits our ability to assess if the most appropriate catheter was chosen for each insertion. Furthermore, as the authors used 3 different catheter lengths and 2 gauges in various combinations without providing data on these distributions, the numerous confounders and small sample size made it difficult to interpret the results. Finally, it is unclear if the most appropriate statistical approach was used for this analysis. Given the large volume of censored data, a better approach to understanding the influence of catheter length in-vein on survival may have been to identify a cutoff threshold of catheter length in-vein with subsequent assessment of the impact on survival in a formal survival analysis.

Current Evidence

There is no longer a paucity of evidence on the concept of increasing catheter length in-vein to improve catheter survival. There is a growing body of evidence of high scientific rigor that supports this practice. Several publications over the last few years have shown that catheter length in-vein is a significant predictor of enhanced survival in US-guided insertions.[2-5] In 2018, Pandurangadu et al[3] prospectively investigated the relationship of catheter length in-vein and US PIV survival in a 4.78-cm PIV. The authors found that when < 30% of the catheter was in the vein, 100% of the catheters failed (median time to failure of 15.6 hours) compared with no IV failures when ≥ 65% of the catheter was in the vein. Depth of the

TABLE

2.75-cm rule[5]

Length of catheter (cm)	Maximum vein depth according to angle		
	15° angle of insertion cm	30° angle of insertion cm	45° angle of insertion cm
4.78	.53	1.01	1.44
6.35	.93	1.8	2.55

vein was a key factor limiting the broader value of this conclusion as the commonly stocked lengths were inadequate to achieve appropriate vein purchase. Fortunately, technology evolved and in a randomized controlled trial targeting these high-risk deeper insertions, Bahl et al[4] found that a longer catheter (6-cm) improved median survival from 1.25 days to 4.04 days. All IVs in this trial were placed in veins at a > 1.20-cm depth magnifying the limitations of the shorter, 4.78-cm catheter. Although the longer 6-cm catheter had increased length, it also had a built-in guidewire. It is possible that the guidewire may have influenced catheter survival, but this confounder was not specifically assessed in this trial. To build on the concept, when a longer 6.35-cm PIV without a guidewire came to market, the authors conducted another larger randomized controlled trial of US PIV survival in 257 patients comparing a 4.78-cm and 6.35-cm PIV catheter for upper arm insertions. Bahl et al[5] published the 2.75-cm rule providing proceduralists with a concrete and actionable evidence-based recommendation on how to choose the appropriate catheter length for US PIV insertions to optimize IV survival. The authors demonstrated that 2.75 cm of catheter in the vein was the ideal cutoff for best IV survival. The 2.75-cm rule is not biased toward any specific catheter type but rather accounts for the depth of the vein and the anticipated angle of insertion to guide the choice of optimal catheter length for the insertion (Table).

Bahl et al[5] observed that most clinicians preferentially choose a shallower approach to the vein with > 50% of placements having an angle of insertion < 30°. With a shallower approach, the added distance to the vein further substantiates the use of a longer catheter to obtain 2.75 cm into the vein. In addition, the average vein depth in this study was 1 cm, highlighting that most veins are not superficial and require a longer catheter. In cases with superficial veins, a shorter catheter can still be used safely for similar survival outcomes.

Summary

The value of longer peripheral catheters cannot be overstated, and the increased length in-vein has been a key variable in helping transform catheter survival outcomes.[2-5] US-guided venous access is no longer a form of bridge or temporary access lasting a mere 24 hours or less but now is a reliable vascular access strategy with most catheters surviving for several days to completion of therapy. The evidence now strongly supports consideration of catheter length in US PIV insertions, and the 2021 Infusion Nursing Standards was also updated to include this recommendation.[1] Clinicians should strongly consider the evidence and current guidelines when making decisions for patients.

Author Disclosures

Supplementary materials

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SUPPLEMENTARY APPENDIX

The Critical Appraisal Skills Programme (CASP) checklist for cohort study (last amended in 2018)[7]			
Major components	Response options		
Section A: Are the results of the study valid?			
1. Did the study address a clearly focused issue?	Yes		
Comment: Impact of in-vein catheter length on US IV survival is clear			
2. Was the cohort recruited in an acceptable way?		No	
Comment: Small heterogeneous sample size (ICU/ED); DIVA population not defined; Numerous exclusions			
Is it worth continuing?			
3. Was the exposure accurately measured to minimize bias?			Can't Tell
Comment: Limited description of measurement and unclear if missing data			
4. Was the outcome accurately measured to minimize bias?		No	
Comment: Outcome based solely on EMR data; No follow-up or research staff assessments			
5. (a) Have the authors identified all important confounding factors?		No	
Comment: Numerous confounders missing: i.e. vein depth, angle of insertion, vesicant use, catheter to vein ratio			
(b) Have they taken account of the confounding factors in the design and/or analysis?		No	
Comment: Cox regression accounts for some confounders but many relevant confounders not included in the analysis			
6. (a) Was the follow-up of subjects complete enough?		No	
Comment: Exclusive reliance on EMR data is a major weakness			
(b) Was the follow-up of subjects long enough?			Can't Tell
Section B: What are the results?			
7. What are the results of this study?	The model with length of catheter length in-vein as the sole predictor was insignificant ($X^2 = 0.03$, $P = .86$), and the full model was as poor ($X^2 = 2.79$, $P = .95$)		
	(continued)		

8. How precise are the results?	Unknown precision based on reporting of results. Likely poor precision given limited sample size.
9. Do you believe the results? Comment: The results are only as useful as the robustness of the model. A model not accounting for differences in depth, diameter, angle, among other covariates is very, very limited. The design and methods are sufficiently flawed to make results unreliable.	No
Section C: Will the results help locally?	
10. Can the results be applied to the local population? Comment: No, the study population was inadequately defined and highly variable.	No
11. Do the results of this study fit with other available evidence? Comment: No, a body of high quality evidence concludes the opposite	No
12. What are the implications of this study for practice? Comment: No other studies support the results in this study; clinicians should carefully weigh why that is the case.	Can't Tell

CASE REVIEW

SUICIDE SCREENING AND RISK ASSESSMENT IN THE EMERGENCY DEPARTMENT: CASE REVIEW OF A SUICIDE ATTEMPT SURVIVOR

Authors: Avery Z. Laliberte, BA, Brandon Roth, BA, Beau Edwards, BS, and Jason I. Chen, PhD, Portland, OR

Contribution to Emergency Nursing Practice

- Universal suicide screening in emergency departments can double the detection of those at risk. Owing to their routine contact with suicidal patients, emergency nurses play a key role in suicide screening implementation.
- This case review highlights missed opportunities to screen a patient for suicidal ideation, assess risk, and provide appropriate follow-up care during several ED visits.
- Emergency nurses are encouraged to familiarize themselves with the risk factors for suicide and clinical tools for suicide prevention. Hospital systems should continue to train emergency nurses in these suicide prevention areas to improve adherence to guidelines and improve care for suicidal patients.

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Abstract

One in 10 of those who die by suicide are seen in an emergency department within the 2 months before their death. Despite national guidelines and resources (including from the Joint Commission and Emergency Nurses Association) for suicide screening, risk assessment, and follow-up care, suicidal ideation and behavior continue to go undetected in emergency departments, leading to gaps in care. This case review was conducted as part of a larger electronic medical record review of emergency department practices and aims to highlight potential gaps in care and identify missed opportunities for suicide screening and risk assessment. In addition to highlighting these missed opportunities, this case review provides recommendations for suicide screening and risk assessment resources with options for evidence-based follow-up care for suicidal patients.

Key words: Suicide; Emergency nursing; Case reports; Risk assessment

Introduction

In the United States, 127 adults die by suicide every day.[1] One in 10 of those are seen in an emergency department within the 2 months before their death.[2] Researchers have identified the emergency department as a promising setting for suicide prevention and have recommended universal screening, risk assessment, and follow-up care standards.[3,4] Recent national guidelines also advocate for increased suicide screening and improved follow-up care for those at risk of suicide presenting to the emergency department.[5,6] Emergency nurses have an important role to play in suicide prevention because of their routine contact with patients who are experiencing suicidal ideation (SI).[7] Consequently, the Emergency Nurses Association provides a Clinical Practice Guideline for suicide risk assessment, which outlines evidence-based practices for screening all patients for SI and suggests resources for emergency nurses at any stage of an ED stay.[8]

Despite these guidelines, SI and behaviors continue to go undetected in the emergency department, leading to gaps in care.[9,10] Studies on ED care have identified several barriers to screening and risk assessment among providers. These include a lack of self-efficacy related to suicide care and ED workflow challenges.[11-13] Given these barriers, recommendations specific to the emergency nursing community for increasing screening and risk assessment include improved training, interdisciplinary guidelines, and mechanisms for monitoring implementation.[14]

Although emergency nurses are not the only providers responsible for the care of suicidal patients, they have an important role. Screening at ED triage alone can often help support the receipt of appropriate treatment and prevent gaps in care.[15,16] Research suggests that universal screening in the emergency department may double the detection of recent SI or behavior[15] and that brief, ED-based interventions after risk detection are effective at reducing suicide attempts.[17] Here, we review a case where there were multiple missed opportunities to provide suicide screening, risk assessment, and follow-up care. We seek to highlight where screening, assessment, and support could have been provided and investigate the conditions under which this care was not received.

Case Review

The patient is a white, non-Latino man in his early 40s. A review of his electronic health record (EHR) over 1 year revealed that he experienced chronic homelessness, endorsed being a Navy veteran, and did not have access to Veterans Health Administration benefits. He also reported that he had no family or friends and had a history of anxiety and post-traumatic stress disorder. To investigate the care received by this patient, we conducted a chart review using an integrated EHR.[18]

This case review was identified as part of a larger study on current ED practices (larger study's institution ID: IRB00000471 and IRB00001976, projects IRB #18923). We first identified an Index ED visit during a prespecified period (January 1, 2017-January 1, 2018), where it was documented that the patient had a suicide attempt and subsequently presented to a large community hospital for his resulting injuries. We then reviewed all visits in his EHR for 6 months before and 6 months after this visit. Over the course of a year, this patient presented to the emergency department 9 times. This patient utilized 4 different emergency departments, named chronologically in the case review (eg, 'Hospital A,' 'Hospital B'). Details for each ED encounter including the chief complaint, documented providers, and presence of a documented screening are outlined below (see Figure for a timeline of encounters).

ENCOUNTER 1

In the first visit of the study period, the patient reported to the emergency department at Hospital A for an abscess. Here, a case manager documented that he was a veteran, was chronically homeless, recently moved from out of state, had a previous inpatient psychiatric unit stay, and had a history of SI, 2 suicide attempts, and polysubstance abuse.
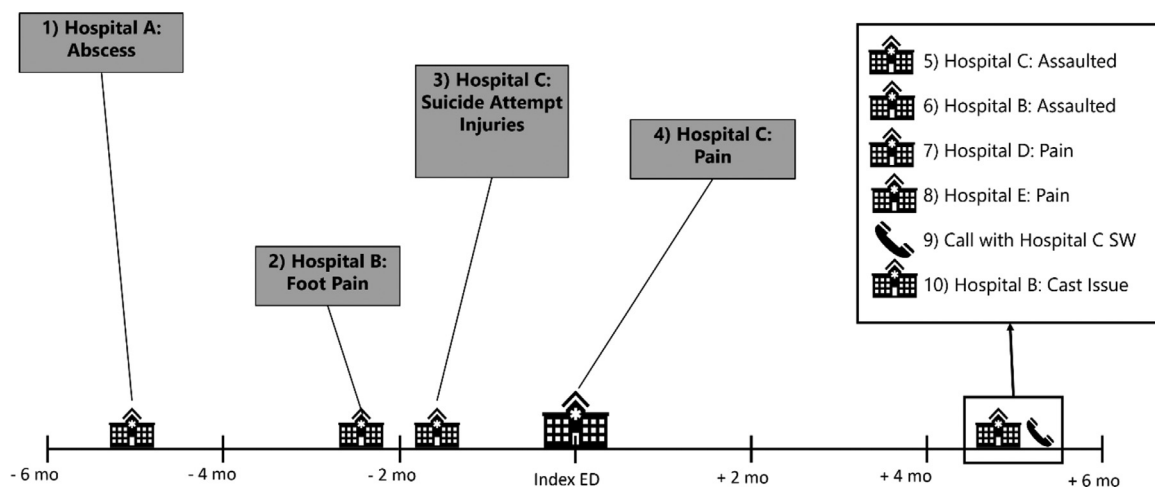
FIGURE
One year of encounters identified via chart review. Nine ED visits (hospital symbols) at 4 different hospitals (A, B, C, D) and 1 telephone contact (phone symbol); encounter number, type, and chief complaint are indicated in text boxes.

The patient was discharged to urgent care, where a physician assistant examined and treated his abscess and encouraged the patient to establish care with a primary care provider. The patient was not screened for SI.

ENCOUNTER 2

The patient presented to Hospital B for acute bronchitis and cellulitis and was seen by 2 registered nurses (RNs) and a family nurse practitioner. He was not screened for SI.

ENCOUNTER 3

In this encounter, the patient was brought into Hospital C by emergency medical services (EMS) for injuries after being hit by a slow-moving train in a suicide attempt. He was admitted to the trauma intensive care unit and treated for his injuries and hospital-acquired pneumonia. During his week-long stay, he was seen by various doctors, physician assistants, social workers, RNs, and a pharmacist. In addition to care provided for his injuries, he was offered assistance with finding a shelter and was screened for substance use. The patient declined assistance identifying a shelter, reporting that he did not want to be kicked out during the day. The patient was not screened for SI.

ENCOUNTER 4

The patient again presented via EMS to Hospital C for pain resulting from previous injuries. He stayed in the hospital for 4 days and was seen by various doctors, RNs, and social workers. Social workers attempted to transfer the patient to an inpatient psychiatric unit at another hospital, but his transfer was denied because of recent methamphetamine use and lack of current SI. The patient met with 3 social workers during his stay. He reported having SI to 2 of them, one of whom documented asking him directly about his SI and suicide planning. The National Suicide Prevention Lifeline was provided in his discharge summary. No screenings for SI were conducted using validated or reliable assessments at any point during this stay.

ENCOUNTER 5

In this encounter, the patient reported to Hospital C after being assaulted. He met with various doctors, RNs, and social workers, was treated for his pain, and was offered housing assistance. The patient was not screened for SI.

ENCOUNTER 6

The patient presented to Hospital B and was treated by doctors for his leg fracture and other assault-related injuries. The doctors recorded working with a social worker to secure a motel for the patient while his leg healed. He was not screened for SI.

ENCOUNTER 7

The patient was brought to Hospital D by EMS after reporting pain and shortness of breath. Providers treated his pain and discussed shelter options with a social worker. The social worker documented that the patient did not bring up SI but did not indicate formally or informally screening him.

ENCOUNTER 8

The patient reported to Hospital E shortly after for pain resulting from his previous injuries. He saw a doctor who documented that the patient "complains of suicidal ideation" in the context of poor pain management. He was not formally screened for SI, and the doctor documented that the patient was not at "serious suicide risk."

ENCOUNTER 9

In this encounter, the patient had a phone call with a social worker from Hospital C. They discussed housing resources and how to access Veterans Health Administration benefits. He was not screened for SI.

ENCOUNTER 10

Finally, the patient came to Hospital B reporting cast difficulties. He was seen by doctors, social workers, and RNs and was not screened for SI.

Discussion

This case review depicts the ED care received by a patient experiencing chronic homelessness over the course of a year and highlights instances where he was not screened for SI. There was no documentation of a formal suicide screening using valid and reliable screening instruments at any of the encounters during the study period. Given the documented characteristics of this patient (veteran, chronic homelessness, history of suicidal behavior, etc), there were also many missed opportunities to assess suicide risk and provide follow-up care. These gaps in care may be

preventable and suggest a lack of guidance and resources for ED staff.

As previously mentioned, providers may have faced barriers that impeded their ability to implement screening and follow-up care.[11-13] Important to note is that emergency nurses are often tasked with implementing numerous screenings because of their routine contact with patients. Consequently, the Emergency Nurses Association General Assembly delegates passed a resolution GA20-04, which guides future work. The resolution only recommends screenings in the emergency department that are evidence-based, demonstrate reliability and validity in the ED setting, and specifies the conditions under which screenings should be mandatory.[19] The Joint Commission has provided a variety of options for screening,[20] risk assessment,[21] and safety planning in National Patient Safety Goal (NPSG) 15.01.01,[22] all of which have been validated and studied in the emergency department. This NPSG also highlights trainings associated with the screening tools and provides guidance for when follow-up care is mandatory.[5] Although NPSG 15.01.01 requires ED providers to screen all patients for suicide who are being evaluated for behavioral health conditions,[5] none of the hospitals in this case review provided formal guidance or training for how to adhere to this requirement.[5,17,23,24] Hospitals should provide this training to improve emergency nurses' self-efficacy with respect to suicide prevention.[25-27]

In addition to the ED-validated resources recommended in NPSG 15.01.01, various clinical practice guidelines and resources are available to emergency nurses who are seeking more information.[5,28,29] Nurses could use the Columbia-Suicide Severity Rating Scale to screen patients for SI.[30,31] To assess risk, they might utilize the P4 Suicidality Screener.[32] After identifying risk, providers may offer a variety of follow-up resources such as the National Suicide Prevention Lifeline, outpatient mental health appointments, post-ED telephone calls, a suicide safety plan, or an inpatient psychiatric hospitalization, depending on the identified risk level. All of these interventions, when implemented, are associated with improved outcomes for suicidal patients.[4,33-35]

Research has shown that universal screening in the emergency department can improve the receipt of appropriate follow-up care for suicidal patients without placing an overwhelming screening burden on providers,[36] and future research should continue to improve screening implementation without disrupting ED workflow. In addition, most studies have included adolescent participants, and research has demonstrated success using alternate screening modalities (eg, via tablet or telephone) for screening patients for suicide.[37-42] Future research should continue to explore implementation of these modalities with adult patients, particularly for those with overlapping medical and social complexities, which may not be feasible to address in the emergency department.

Limitations

There are several limitations. As this is a case review for 1 patient, findings may not generalize to other settings. This report was also limited to what was documented in the EHR. In addition, although the chart reviews were conducted in an integrated EHR, it is possible that there were other visits during the study period that were not captured. Finally, as we were also limited to a specific range of documented visits given the study timeline, we were not able to identify whether the patient attempted or died by suicide beyond the study period.

Conclusion and Implications for Emergency Clinical Practice

Universal suicide screening in emergency departments is feasible and can double the detection of those at risk.[16] Consequently, guidelines at the national and state levels encourage emergency departments to enhance risk assessment and follow-up care. As this case review highlights, implementation of these guidelines and formal training in how to care for suicidal patients in the emergency department is limited. Not screening for SI and assessing risk can lead to missed opportunities to provide follow-up care, as shown in this case review. Screening for SI and assessing suicide risk is especially important in emergency departments, where prevalence of those at risk of suicide is high and where emergency nurses play an important role because of their routine contact with suicidal patients.[2,7] Hospital systems should continue to train in these areas to aid emergency nurses in identifying available clinical tools for screening and risk assessment, embedding these processes into their workflow, and ultimately improving care for suicidal patients.

Author Disclosures

Conflicts of interest: none to report.

The views expressed in this article are those of the authors and do not necessarily reflect the position or policy of the Department of Veterans Affairs, the National Institutes of Health, or the United States government.

This case review conforms to Elsevier's patient consent policy.

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Emergency Nurses' Experiences in Treating Patients With Mental Illness: A Qualitative, Interpretive Metasynthesis

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NCPD Earn Up to 11.5 Hours. See page 955.

Contribution to Emergency Nursing Practice

- What is already known on emergency nurses' care for patients with mental illness is that they often do not feel equipped with the knowledge or skills for this population.
- The main finding of this paper is that emergency nurses feel unprepared or unqualified, anxious and hesitant, yet they feel the need to keep the patient environment safe.
- Recommendations for translating the findings of this paper into emergency clinical practice includes further administrative and colleague support as well as further training and education.

Abstract

Introduction: Each year, emergency departments are seeing an increase in the number of patients with mental illness. Nurses often do not feel equipped with the knowledge or skills for this patient population while caring for them. Although there is published literature about nurses caring for patients with mental illness, there is a gap in knowledge about the lived experiences of these frontline workers.

Methods: To gain a better understanding of the experiences of emergency nurses in treating patients presenting with psychiatric issues, a qualitative interpretive metasynthesis of 5 qualitative articles was conducted.

Results: Three themes emerged from the synthesis: (1) feeling unprepared and unqualified, (2) feeling anxious and hesitant, and (3) the need to keep the patient environment safe.

Discussion: The overarching finding in our QIMS was the prevalent feeling of general concern regarding treating patients with mental illness despite the nurses' own preconceptions and apprehensions. It is important to understand the lived experiences of nurses treating patients with mental illness to learn be better prepared for future encounters.

Keywords: Emergency department; Mental health; Nurses; Interpretive metasynthesis; Qualitative

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Introduction

There are an estimated 43.4 million adults in the United States with a mental illness.[1] For many people, the emergency department is the first stop when they need urgent health care attention.[2] This brings up multiple concerns, including that emergency departments are serving more patients with mental health issues.[1] ED visits for mental disorders increased by 55.5% for depression, anxiety, or stress and 52% for psychoses and bipolar disorders between 2006 and 2013.[1] Emergency departments have become inundated with these types of cases, and it has indubitably affected the nurses on the front line who are at risk for challenges in caring for this patient population.

Nurses are central to the working of health care organizations.[3] Emergency nurses seemingly face a plethora of challenges because they typically make the first contact with patients, and they provide the most hands-on care compared with other hospital staff. During the initial phase of acute illness and trauma, emergency nurses are educated to assess and collaboratively treat patients.[4] Emergency nurses work

in an environment replete with chaos, violence, unrealistic patient expectations, and death while experiencing stress and witnessing tragedies.[4-6] Because emergency departments continue to see increasing numbers of patients with mental illness,[7,8] this presents management and diagnostic challenges for frontline ED workers.[9] Despite these challenges, emergency nurses are faced with the responsibility of providing high-quality care.[10]

Although nursing experiences in caring for patients are diverse, the perspectives and attitudes that emerge are comparable. To understand the commitments of a nurse to their patient, 1 study reports that caring in nursing has traditionally been perceived as a moral way of being, centering on the connection with patients, concern for self and others, and goodness.[11] Although caring and compassion have become synonymous with the nursing profession,[11] there are nurses who lack empathy for some patients and feel a sense of antipathy toward them.[7] Antipathy is defined as "a strong feeling of dislike,"[12] which nurses have felt toward patients, particularly those with untreated mental illness.[7] However, it is also imperative to understand that researchers have found that there is a stigma by association for many nurses owing to public perceptions and negative stereotypes.[13]

Patients who self-harm can be viewed as manipulative and attention seeking, as well as "beyond the reach of help."[7,14] While trying to build rapport with patients, nurses experience negative perceptions of those with mental illness owing to particular behaviors, including agitation and yelling.[15] In a study comparing specialty nursing areas, emergency nurses reported lower rates of compassion satisfaction (24.5%) as well as moderate to high levels of burnout (82%).[11] This is due to their work environment and the stressors related to lack of support services.[11] Working conditions in emergency departments are unique. Nurses are sometimes overloaded and have little time to attend to their other patients because the patients with acute and severe mental illness sometimes require more time. Moreover, nurses need to develop positive attitudes, knowledge, and skills that they often do not have.

Many nurses experience violence in the emergency department and begin to develop symptoms of posttraumatic stress disorder (PTSD). In a study with members of the Emergency Nurses Association, 94% of the nurses experienced at least 1 PTSD symptom, with 17% probable for PTSD.[16] Other researchers have reported that up to 33% of the emergency nurses have symptoms of PTSD.[17,18] In some respects, many emergency nurses are not prepared for patients with mental illness and this, coupled with violent experiences and grappling with their own emotional and mental health issues, can inevitably create everyday challenges during their workday. Potential serious health problems such as PTSD are due to emergency nurses' exposure to high levels of stress, work overload, lack of support, and situational trauma.[19]

In 1 study, nursing participants who had cared for patients with behavioral health (BH) issues had moderate average perceived competency related to their care in the emergency department.[15] The findings from this particular study validate nurses' perceptions that more education related specifically to patients with BH issues is essential.[15] Furthermore, it was concluded that emergency nurses lack knowledge and skills in caring for patients with mental illness.[20] Providing more directed or specific education to emergency nurses could be key in their treating patients with mental illness as well as in their attitudes and perceptions while caring for these patients.

Researchers have been able to capture statistics about the population classified as mentally ill through surveys and secondary data, as well as through focus groups and interviews. Researchers have also been able to capture how to effectively treat patients with mental illness at psychiatric facilities and hospitals. Quantitative studies provide us with data that are expressed in measurement units, but there is very little qualitative work comprising emergency nurses' experiences. The purpose of our study was to conduct a qualitative, interpretive metasynthesis (QIMS) to provide an understanding of emergency nurses' lived experiences in treating patients with mental illness and add to the scant literature pertaining to this particular topic.

Methods

QIMS was used for our study. This method is used for "synthesizing the findings of a group of qualitative studies into an enhanced understanding of the phenomenon of inquiry."[21-23] The authors synthesized "a group of studies on a related topic into an enhanced understanding of the topic of study wherein the position of each individual study is changed from an individual pocket of knowledge of a phenomenon into part of a web of knowledge about the topic where a synergy among the studies creates a new, deeper and broader understanding."[24] This is an intentional process that enriches researchers' analysis of combined qualitative evidence and increases efficacy in integrating qualitative research into evidence-based practice.[24]

We were able to gain accounts of lived experiences using this approach. A 4-step description of the synthesis process was applied: (1) gather the sample, (2) identify the key findings, (3) relate themes across the studies, and (4) describe the phenomenon.[25] QIMS has not been used for our topic of study before, and through this process the authors have provided an enhanced understanding of the phenomenon from the perspective of emergency nurses caring for patients with mental illness.

ARTICLE SEARCH NARRATIVE

A comprehensive article search was completed in March 2020 by the first and second authors. The search terms included psychiatric care, mental health, mental services, emergency department/room nursing, perspectives, views, perceptions, attitudes, and opinion. The EBSCOhost search engine (EBSCO Information Services) was used, and Academic Search Complete was 1 of the databases searched. Other databases used in the search included American Psychological Association PsycArticles, American Psychological Association PsycInfo, CINAHL Complete, Health Source: Consumer Edition, Health Source: Nursing/Academic Edition, MEDLINE, and Psychology & Behavioral Sciences Collection. A total of 96 articles were found, with article results from Academic Search Complete (45 articles), CINAHL Complete (34 articles), and MEDLINE (17 articles).

The inclusion criteria were English language and emergency nurses from any country. For this search, we limited the articles to peer-reviewed journals, with date ranges from 2010 to 2020. A total of 17 duplicates were removed from the 96 articles, leaving 79 articles; of these, the abstracts were reviewed, and 16 articles seemed to meet the inclusion criteria. On further review of the 16 articles, a full-text screen was completed, and 11 articles were removed. Five of them met the inclusion criteria as studies
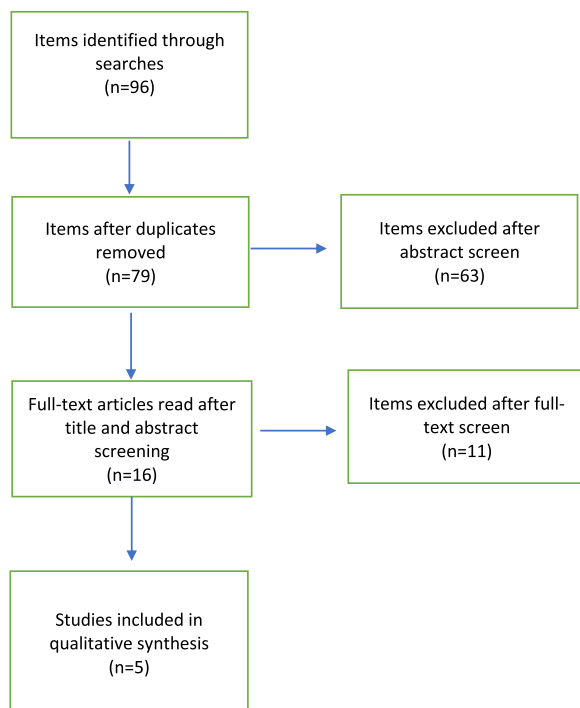
that were published in peer-reviewed journals, published in English, sampled emergency nurses, and were conducted using qualitative methods only (Figure).

RIGOROUS AND ACCELERATED DATA REDUCTION

The Rigorous and Accelerated Data Reduction (RADaR) technique was used to code and analyze the data in this study. This technique provides a way of organizing, reducing, coding, and analyzing qualitative data in a rigorous and accelerated way.[26] The RADaR technique was used in tandem with Microsoft Word (Microsoft Corporation) to create tables, which encourages focusing on the content of the data from the articles. There are 5 steps involved in the RADaR process that were used for this study: (1) ensure that all data transcripts are formatted similarly, (2) place formatted data into an all-inclusive phase I data table, (3) reduce data in the all-inclusive data table to produce a phase II data table, (4) reduce data in the phase II data table to produce more data tables, and (5) draft the project deliverables using the final phase of the data table.[26]

DATA ANALYSIS

Theme Extraction and Theme Synthesis

The 5 articles (Table 1) were separated and formatted similarly to include the title of the article, name(s) of the author(s), setting, qualitative method data, and all quotations extracted from the articles.

Article titles, names of authors, quotations, notes, and themes from each of the articles were then placed in 1 data table in Microsoft Word. The original themes were extracted from the articles to maintain the veracity of the interpretations by the original authors (Table 2). This process included the 5 articles listed, and each was read to determine the themes identified by the authors. Quotations were then extracted from the original themes and analyzed to determine the synthesized themes (Table 3). A synthesis of the studies materialized into a new, synergistic understanding of emergency nurses' experiences in caring for patients with mental illness.

TRIANGULATION

The 2 types of triangulation methods used to reduce systematic bias in this QIMS were sources and analysts.[27,28] A retrospective triangulation of the sources was used in this study to include a variety of settings throughout different countries. During the development of this project, triangulation of the analysts was accomplished through multiple meetings with the second and third authors. This significantly reinforced rigor and maintained consistency in evaluation of the articles and the theme choices.

FIGURE

Quorum chart.

TABLE 1
Demographics of studies included in the QIMS (n = 5)

Study	Tradition/data collection method	N	Demographics of respondents	Setting
Chapman et al[10]	Semistructured interviews	15	12 women, 3 men (aged 24-46 y)	Three emergency departments across metropolitan area in Australia
Clarke et al[30]	Interviews using a digital voice recorder	11	All women with an average of 2.2 years of experience	Regional emergency departments in moderately sized Canadian city
Hjelmeland et al[31]	Semistructured interviews	8	4 women, 4 men	Accra, Ghana
Plant and White[20]	Focus group	10	All women with 4 to 32 years of experience	Northeast United States
Gerdtz et al[29]	Semistructured interviews	16	Two-thirds from metropolitan locations; one-third from rural/regional locations	Emergency departments in 6 different regions of Australia

QIMS, qualitative, interpretive metasynthesis.

Results

The analysis of the 5 articles generated 3 themes. The themes presented included (1) feeling unprepared and unqualified, (2) feeling anxious and hesitant, and (3) the need to keep the patient and environment safe (Table 3).

THEME 1: FEELING UNPREPARED AND UNQUALIFIED

Many of the nurses stated that they either felt unqualified to deal with a patient presenting with psychiatric issues or were unsure how to treat them from check-in to discharge. The nurses explained from personal experience and talked about a sense of discouragement regarding ongoing education opportunities, lack of knowledge about how to work with certain patients presenting with psychiatric issues as well as psychiatric medication, paperwork issues, and support from doctors and BH services. One nurse from a group in the northeastern US had this to say:

"It is horribly disorganized and there is no one person to go to for help with any class or seminar. I think there should be a clear plan of action regarding ongoing education, patient care planning. Trying to find the course and sign up, go through the paperwork for approval, where to start on the paper trail, to submit it is very difficult."[20]

Another nurse from the same area of the US corroborated the need for more education:

I think we should add some education on treating patients with mental illness or understanding the

disease, and this could happen each year when we have ED skills lab for example. I try to gain as much understanding and knowledge as I can from the behavioral health consult team who are really very effective in their care and are always willing to share with us what interventions might work best in each case.[20]

Although nurses are able to use their own clinical judgment many times, the frustration regarding not having the same number of support staff members during the day was reiterated by 1 nurse in Australia:

"…they've employed an [extra] mental health nurse overnight to try and de-escalate [patients] before they become a problem…why can't we do it during the day? We've got no problems overnight…some nights we'll have 12 people in short stay that are all mental health…"[10]

A nurse in Australia reiterated thack of knowledge about mental health problems:

"The biggest thing is lack of knowledge. More and more we're moving our staff through triage competencies a lot quicker, so they don't even have the background knowledge."[29]

Feeling unprepared and unqualified can have a significant adverse impact not only for the nurse in terms of their own thoughts and decision-making, but also on providing quality therapeutic care to a patient with psychiatric concerns. This may trigger an undesirable reaction for the nurse and cause further distress and anxiety during their workday.

TABLE 2

Theme extraction

Study	Original themes
Chapman et al[10]	1. Part of the job
	2. Reasons for manual restraint
	3. Restraint techniques
Clarke et al[30]	1. Managing the scores
	2. Managing the environment
	3. Managing uncertainty: "What's Actually Going on Here?"
	4. Managing their own distress
Hjelmeland et al[31]	1. The law has a deterrent effect
	2. People have no right to take life
	3. Suicide scares people
Plant and White[20]	1. Facing the challenge
	2. Struggling with the challenge
	3. Unmovable barriers
	4. Sinking in hopelessness and seeking resolutions
Gerdtz et al[29]	1. Physical structure of the environment
	2. Time pressures imposed on triage assessment
	3. Activity level and triage workload
	4. Australasian triage scale guidelines
	5. Staff education in mental health and triage training
	6. Resources to support triage decision-making for mental health problems
	7. Triage nurses' knowledge of mental health problems
	8. Triage nurses' levels of experience in assessment of mental health conditions
	9. Triage nurses' attitudes toward mental illness
	10. Police presence
	11. Patient's behavior
	12. Patient's clinical condition (mood)

TABLE 3

Theme synthesis

Synthesized themes	Original themes extracted
Feeling unprepared and unqualified	1. Facing the challenge.[20]
	2. Managing the scores.[30]
	3. Struggling with the challenge.[20]
	4. Managing uncertainty: "What's Actually Going on Here?"[30]
	5. Part of the job.[10]
	6. Triage nurses' knowledge of mental health problems.[29]
Feeling anxious and hesitant	1. Managing their own distress.[30]
	2. Suicide scares people.[31]
	3. Sinking in hopelessness and seeking resolutions.[20]
	4. Part of the job.[10]
	5. Triage nurses' attitudes toward mental illness.[3]
The need to keep the patient and environment safe	1. Reasons for manual restraint.[10]
	2. Managing the environment.[30]
	3. The law has deterrent effect.[31]
	4. Struggling with the challenge.[20]

THEME 2: FEELING ANXIOUS AND HESITANT

Each article mentioned the emotional process that nurses go through when treating patients with mental illness. Some nurses stated that they felt the need to help because it is what they are required to do as nurses, but they also wanted to treat the patient because it is what is right. There are nurses, however, who do not want to treat or do not

care to treat patients presenting to the emergency department with a mental illness. The reasons include lack of trust in the patient, feeling fearful of the patient, and their own countertransference. One nurse from Australia stated:

> "I don't feel like I am being an advocate. I feel like I'm meant to be there to help...and look after the patients and then I'm being told that I have to be the prison guard at the same time to hold them [patients] down and force them [patient] to have medications..."[10]

For a nurse in Canada, 1 interaction with a patient presenting with psychiatric issues made her anxious, and she stated:

> "She's screaming at me, okay, so unfortunately screaming patients make my heart pound, so probably my throat is in my chest at the moment and my hands are starting to shake."[30]

Nurses from the aforementioned area in the northeast US stated that they felt a sense of deception when receiving a patient presenting with psychiatric issues:

> "Many of these patients are attention-seeking and they come back in, time and time again. I do suppose their attention-seeking behaviors is part of their illness, but I often feel we are being taken advantage of."[20]

One nurse in Australia spoke about wanting to avoid judging patients:

"I do want to avoid judging someone when they are presenting, and although it may sound like a mental health presentation, you need to be conscious that you are not missing something that is organic."[29]

Although emergency nurses deal with feelings of anxiousness and hesitancy, they remain focused on their job to not only keep the patient safe, but also to keep the environment safe for staff and other patients and family members.

THEME 3: THE NEED TO KEEP THE PATIENT AND THE ENVIRONMENT SAFE

The safety of both ED staff and, especially, patients was of great importance to many nurses. Many of the nurses also felt a sense of duty to protect not only other staff, but, especially, the patients when a patient with psychiatric issues presented to the emergency department. The safety of a patient presenting with psychiatric issues, however, was of utmost importance to the nurses as well. Reiterating the need to protect staff and patients was a nurse from Australia:

"...We had a police officer escort a section 10 [person apprehended by police whom they believe is mentally ill and may harm themselves or others] in [emergency department] under the influence of some substance who was very aggressive...He kept spitting at everyone so...he was held down....."[10]

Other nurses recounted keeping patients classified as aggressive safe from harming themselves by using manual restraint:

"...Sometimes it just takes too long...if someone's really getting aggro [aggressive] we need to be a little bit quicker...[and] at least stop this behavior and get them [patient] into a position that is safe but that's not going to be harmful to...the people around them or to us...."[10]

In Canada, a nurse recalled a patient who needed immediate care for their own safety:

"...I wouldn't want him sitting in the waiting room because maybe other people staring at him that might agitate him further...I'd want him in treatment room as soon as I could."[30]

In Ghana, 1 nurse agreed with the law making suicide a crime, which ultimately could deter patients with psychiatric issues from going to the emergency department and keep them from harming themselves, stating:

"It will in a way help to reduce the rate of suicide."[31]

These accounts of safety issues are a profound reminder that managing all these variables at the same time is a major task., Additionally, supporting emergency nurses in their continuing education and providing encouragement during moments of turmoil with patients presenting with psychiatric issues may enrich their nursing experiences.

Discussion

The purposeful development of the synergy in this QIMS created a more concentrated collection of themes that provided us with a better understanding of nurses' experiences and perspectives in treating patients presenting with psychiatric issues in the emergency department.[32] Triangulation was especially crucial for this QIMS during the synthesis process to achieve validity and strengthen our study.[32] This study adds to the current scarce qualitative literature available about emergency nurses' lived experiences while treating patients with mental illness.

There were similarities in the nurses' experiences concerning feeling unprepared and unqualified when treating patients presenting with psychiatric issues. These experiences are similar to those in a previous study concerning the need for more education in working with patients with mental illness.[15] Owing to the specific nature of patients with mental illness, the training and education needed should include de-escalation, communicating with these specific patients, and assessment.[33] True to past studies, there were also similarities when the nurses spoke about feeling anxious and hesitant, including concern regarding the unknowns of treating a patient presenting with psychiatric issues, as well as with feelings of anxiousness, feelings of deception by patients, and their own personal beliefs about mental health and suicide.[7,11,14]

In addition, there is a perceived lack of safety and vulnerability felt by the nurses, which was found in a previous study.[34] There was an emphasis that patient and staff safety were of utmost importance. Furthermore, mental illness may still be stigmatized even at places that are intended to treat mental illness, and nurses may feel unsupported by their hospitals, leaving them to manage their bias, anxiety, and burnout on their own.[11,35] Researchers have stated that the stigmatization process has marginalized, disenfranchised, excluded, and denied the human rights of people with mental illness.[35]

The overarching finding in our QIMS was the prevalent feeling of general concern regarding treating patients with mental illness despite the nurses' own preconceptions and apprehensions. It is of utmost importance to

understand the lived experiences of nurses asked to perform their jobs under scrutiny, in dangerous situations, and without the full support and education needed to keep both patients presenting with psychiatric issues and the staff safe. Of note, there is a scarcity of this literature.

Limitations

It is important to discuss first that this QIMS is not generalizable to all nursing experiences in emergency departments across the world. We must take into account different cultures, values, and the diverse health care systems. It is also imperative to keep in mind that the 5 articles analyzed come from different parts of the world that all have different cultures, laws, and health care systems. To put this into perspective, Ghanaian culture has not yet touted the benefits of a counseling relationship.[36] Compare this with US culture, which relies heavily on the therapeutic relationship; however, there is also a stigma attached to that in Ghana purely on the basis of repeated visits by patients presenting with psychiatric issues to the emergency department.[7]

Furthermore, our QIMS had a limited amount of qualitative studies specifically related to emergency nurses treating patients with mental illness. The small sample sizes for each study need to be taken into consideration because this affects the generalizability. Finally, as seen with the 5 chosen studies, the settings vary, making it difficult to assure reliability regarding data collection and data analysis. Providing more directed or specific education to emergency nurses could be key in treating patients with mental illness as well as in improving nurses' attitudes and perceptions while caring for these patients.

Implications for Emergency Clinical Care

Although many implications can be noted for emergency nurses and the need for ongoing training and education, it is important to understand the need to provide support to them and to other staff who do not have much training with patients presenting with psychiatric issues. These needs could be attended to and reinforced by other ED colleagues, hospital administration, and senior managers. Those in administration or in senior-level positions may provide more support by visiting with, or directly observing, the frontline emergency nurses several times a month. For social workers working with emergency nurses, it is important to provide guidance and affirmation to the nurses. It is vital as well that social workers provide resources and advocate for the nurses who spend more time with their patients presenting with psychiatric issues than do physicians and other staff.

The treatment and care provided by emergency nurses may improve with education. Vital skills and confidence to care for patients with mental illness can be improved with developed continuing education.[7,15] There is a need for an increase in support or for the provision of more staff to aid nurses. This support could be in the form of having more back-up provided by nurse aides or nurse technicians. Furthermore, there is a need to solidify safety precautions for the staff, which could be in the form of more security officers or additional safety protocols and collaboration between social workers and administration that incorporates helping nurses with de-escalation techniques.

Conclusion

Although this study offers readers insight into emergency nurses' experiences while treating patients presenting with psychiatric issues, other questions have emerged from this for further research: (1) After receiving more training and education, do nurses feel more prepared or feel better about treating patients with mental illness? (2) Are negative attitudes toward patients presenting with psychiatric issues indicative of negative outcomes for them? (3) What are nurses' experiences regarding protecting themselves or safety protocols that they have used while treating patients with mental illness?

To establish a greater evidence base, further research is needed related to emergency nurses' experiences while treating patients with mental illness. Further research should involve before-and-after educational intervention designs. Finally, more qualitative research is needed to grasp the impact of emergency nurses' lived experiences.

Author Disclosures

Conflicts of interest: none to report.

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Differences in Documented and Actual Medication Administration Time in the Emergency Department: A Prospective, Observational, Time-Motion Study

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Contribution to Emergency Nursing Practice

- Early treatment improves outcomes for many patients of the emergency department. This knowledge is mainly based on retrospective time-to-treatment analyses, using the medication documentation time from the electronic health record.
- The observed medication administration time differed from the documented time in the electronic health record. This time difference was more pronounced for sicker patients. Our findings suggest that retrospective time-to-treatment studies may be prone to measurement bias.
- Our findings should be kept in mind when evaluating retrospective studies concerning time-to-treatment analyses, especially with sicker patients. In addition, future time-to-treatment studies should aim to measure actual medication administration time, instead of using retrospective data from the electronic health record.

Abstract

Introduction: Retrospective studies suggest that a rapid initiation of treatment results in a better prognosis for patients in the emergency department. There could be a difference between the actual medication administration time and the documented time in the electronic health record. In this study, the difference between the observed medication administration time and documentation time was investigated. Patient and nurse characteristics were also tested for associations with observed time differences.

Methods: In this prospective study, emergency nurses were followed by observers for a total of 3 months. Patient inclusion was divided over 2 time periods. The difference in the observed medication administration time and the corresponding electronic health record documentation time was measured. The association between patient/nurse characteristics and the difference in medication administration and documentation time was tested with a Spearman correlation or biserial correlation test.

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Results: In 34 observed patients, the median difference in administration and documentation time was 6.0 minutes (interquartile range 2.0-16.0). In 9 (26.5%) patients, the actual time of medication administration differed more than 15 minutes with the electronic health record documentation time. High temperature, lower saturation, oxygen-dependency, and high Modified Early Warning Score were all correlated with an increasing difference between administration and documentation times.

Discussion: A difference between administration and documentation times of medication in the emergency department may be common, especially for more acute patients. This could bias, in part, previously reported time-to-treatment measurements from retrospective research designs, which should be kept in mind when outcomes of retrospective time-to-treatment studies are evaluated.

Key words: Time and motion studies; Time-to-treatment; Emergency department; Electronic health records; Emergency nurses

Introduction

Early administration of medication in the emergency department is essential when treating life-threatening diseases such as myocardial infarction or sepsis. A delay in administration of medication could have an impact on survival.[1-4] Hence, in the case of sepsis, the Surviving Sepsis Campaign recommends administering broad-spectrum antibiotics immediately when sepsis is recognized or otherwise at least within 1 hour.[5] Nevertheless, studies in this field report door-to-antibiotics or time-to-antibiotics times ranging from 70 minutes to 166 minutes.[1,6-8] Moreover, in 2 systematic reviews, two-thirds of all patients received antibiotics in excess of 1 hour.[9,10] Treatment-focused literature on thrombolysis, asthma, analgesics, and other diseases frequently report time-to-treatment times and observe that delays in treatment are associated with worse prognosis.[11-13] There are different time intervals that can be used for evaluating time-to-treatment times, as shown in Figure 1. Studies differ in the interval used to describe time-to-treatment.[9,10,14-16] Reported medication administration delays in previous studies may not be solely explained by actual delayed administration alone (eg, owing to ED crowding). Alternative causes are likely to influence the delays in time-to-treatment as well.[14-16] Inconsistent time point measurements could be a significant factor in time-to-treatment estimates and the recommendations based on these estimates. First, most studies have retrospective designs, in which, consequently, the reported administration time of the medication is based on the time that is documented in the electronic health record (EHR). This method introduces measurement error as a risk of bias.[17,18] Approximately 53% of the research articles in emergency medicine are chart review studies.[19] Particularly for emergency departments where automatic barcode scanning or other technology for automatic EHR documentation time are not in use, there could be a difference in actual medication administration time and documentation time in the EHR by nurses. Because some studies may assume that medication documentation time is equal to medication administration time, the implications when interpreting the literature are variable. Second, different studies use different time starting points for documentation of these time periods (eg, arrival time, prescription time, or triage time), resulting in differences in reported time-to-treatment times.[9,10,20-22] By using different starting points, the studies are difficult to compare. To clarify these issues, there is a need for direct observational studies evaluating the factors contributing to a delay in the time to administering antibiotics.[15] In the currently published research literature, only 2 observational studies have reported prospective time-to-treatment measurement.[23,24] However, both studies did not actually compare medication documentation time with medication administration time. Roman et al[23] described the effects of a hospital-wide reform to improve timely delivery of antibiotics, while Miner et al[24] only investigated the effects of oral vs intravenous opioids on medication times. Furthermore, nurses in both previous studies were not blinded for the study objective. Therefore, the nurses in these studies could have behaved differently than they normally would (eg, more accurate documentation of medication), a source of bias commonly known as the Hawthorne effect.[25] Thus, a gap in the existing literature exists to determine if a difference in administration and documentation times results in biased time-to-treatment analyses. To address this gap in the published literature, the purpose of the present study was to explore differences between observed medication administration time and medication documentation time and test associations in the observed time differences with patient and nurse characteristics. As an initial and exploratory study, we hypothesized that there would be a difference between administration and documentation times and that this difference would be influenced by patient and nurse characteristics.

Methods

STUDY DESIGN AND SETTING

A prospective observational, time-motion study in the emergency department of the University Medical Center Utrecht was conducted using 6 observers as data collectors. The University Medical Center Utrecht is a 1042-bed tertiary care
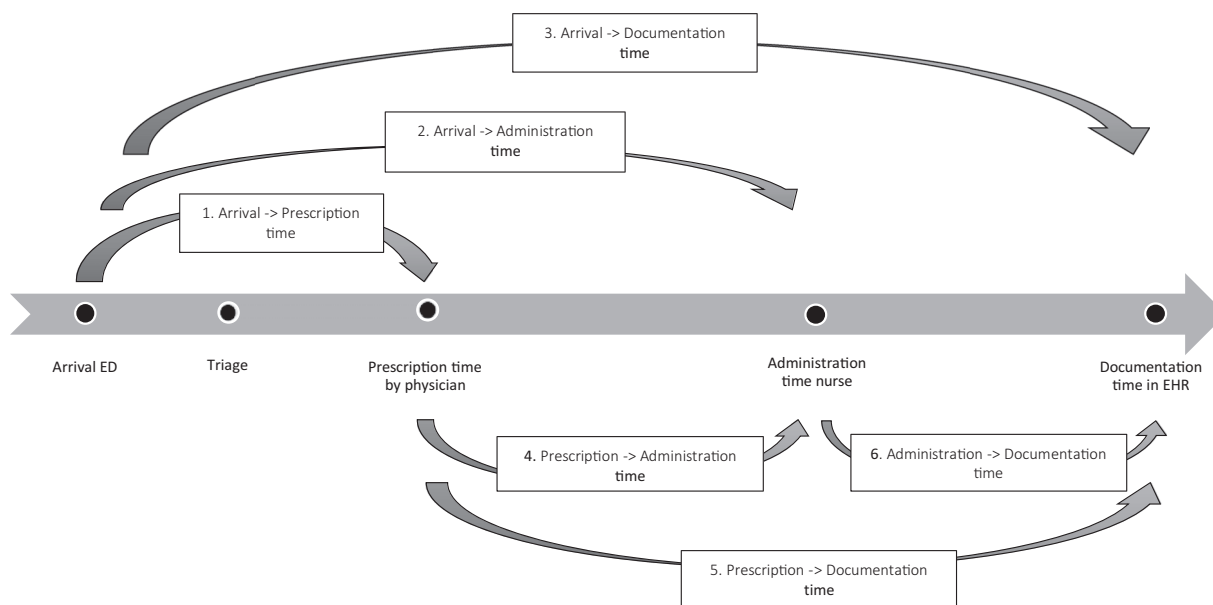
FIGURE 1

Time-to-treatment time intervals in the emergency department. Documentation time was defined as the time that was charted as given. ED, emergency department; EHR, electronic health record.

center in the Netherlands, with more than 23 000 ED attendances per year. This emergency department was open 24 hours, seven days a week. The study protocol was reviewed and approved by the Medical Ethics Review Committee Utrecht (reference number WAG/mb/19/038516).

POPULATION

The study population consisted of patients in the emergency department and emergency nurses. All patients in the emergency department were eligible to participate in this study if informed consent was obtained. All patients who did not agree to participate in this study were excluded. For nurses to be eligible to participate in this study, a participant must have met all of the following criteria: be a trained emergency nurse, work in the emergency department at the study site and have agreed to participate in this study. Emergency nurses who did not meet the inclusion criteria were excluded from participation in this study.

PROCEDURE

As an initial, exploratory study without intervention, no specific effect was expected. No sample size was calculated beforehand. We aimed for 100 patients for initial

data and to ascertain sample sizes for future work. The initial study to ensure protocol feasibility was performed from February 2019 until March 2019. Patient case record forms were completed during this time to collect data on patient characteristics. No data were collected on nurse characteristics during this initial period. Subsequently, the full study was planned from February 2020 until April 2020, but had to be terminated prematurely in March owing to the coronavirus disease 2019 (COVID-19) pandemic.

Data collectors, trained in Good Clinical Practice,[26] shadowed and observed 1 emergency nurse during a working shift to register the several time periods. Working shifts lasted from 2 PM until 10:30 PM or 3 PM until 11:30 PM. The observed shifts in this study were all evening shifts on weekdays.Selecting evening shifts were methodologically justified as the busiest time in the emergency department.[27] Emergency nurses were instructed to continue working as they would normally do, when not being followed. To mimic real-life situations and avoid a Hawthorne effect, nurses were blinded for the study purpose. All participating nurses gave written informed consent for being shadowed without knowing the exact reason for this. In addition, all patients were asked for written informed consent to be observed by 1 of the observers.

Case record forms were used to collect the following data of all new patients who entered the emergency department: age, sex, medical specialty, referring physician, triage color (as described in the Emergency Severity Index),[28] first vital signs, low or high care needs, arrival time, hospital admission (ward, medium care or intensive care) or discharge to home, and time of ED discharge. Furthermore, when medication was prescribed by the treating physician, the following data were documented: type of medication, route of medication administration, prescription time by the treating physician, time of actual administration of medication to the patient, and documentation time in the EHR. From the collected vital signs, the first Modified Early Warning Score (MEWS) at the emergency department was calculated. According to literature, the best cut-off value for the MEWS score to predict morbidity and mortality is 3.[29] Except for observed medication administration, if portions of the required data were not available at the moment of collection, the case record form data were supplemented within 24 hours using the EHR of the patient.

Nurse characteristics were collected through the case record forms. By means of a nurse survey, the following data were collected: number of years working experience in the emergency department, busyness of the working shift as experienced by the nurse, and number of patients during the shift. By lack of an official measurement for working shift busyness, a scale (1-10) was used. On this scale, 1 represented no busyness at all, whereas 10 was the busiest shift a nurse could imagine.

PRIMARY OUTCOME

The main study end point was the difference in observed medication administration and documentation times. Documentation time was defined as the time that was charted as given. For patients who received multiple medications, the cumulative difference between administration and documentation times was calculated and divided by the total amount of prescriptions. To clarify, the mean difference for each patient was used for our analyses. Thus, the unit of analysis was per patient. An additional per medication analysis (without taking the mean) was also performed and is summarized in Supplementary Table 1. Furthermore, for all medications administered to the patients observed, the following time intervals were calculated: the ED arrival time to prescription time, ED arrival time to actual administration time, ED arrival time to documentation time, prescription time to actual administration time, prescription time to documentation time, and actual administration time to documentation time (Figure 1).

TABLE 1

Baseline characteristics of all patients in the emergency department that received medication (N = 34)

Patient characteristics	Median or n	IQR or (%)
Demographics		
Age, y, median, IQR	63.5	54.3-74.3
Female (%)	18	(52.9)
Referring physician		
General practitioner (%)	12	(35.3)
General practice center (%)	2	(5.9)
Medical specialist (%)	7	(20.5)
Own initiative (incl. ambulance) (%)	13	(38.2)
Other (%)	0	(0)
Triage color		
Blue (%)	0	(0)
Green (%)	4	(11.8)
Yellow (%)	18	(52.9)
Orange (%)	11	(32.4)
Red (%)	1	(2.9)
ED department		
Low care (%)	17	(50.0)
High care (%)	17	(50.0)
Vital signs		
Temperature,°C, median, IQR	37.2	36.8 -37.6
Heartrate/min, median, IQR	89	72-99
Systolic blood pressure, mm Hg, median, IQR	133	116-149
Diastolic blood pressure, mm Hg, median, IQR	71	65-82
Respiratory rate/min, median, IQR	18	16-24
O_2 saturation, % SpO_2, median, IQR	97	95-98
O_2 treatment (%)	7	(20.6)
Discharge to		
Home (%)	9	(26.5)
Ward (%)	18	(52.9)
Medium care (%)	2	(5.9)
Intensive care (%)	2	(5.9)
Other hospital (%)	3	(8.8)
MEWS ≥3 (%)	7	(20.6)
Admission form		
Intravenous (%)	16	(47.1)
Oral (%)	11	(32.4)
Inhalation (%)	2	(5.9)
Rectal (%)	1	(2.9)
Subcutaneous (%)	1	(2.9)
Sublingual (%)	1	(2.9)
Other (%)	2	(5.9)

IQR, interquartile range; MEWS, Modified Early Warning Score; O_2, oxygen.

OTHER VARIABLES

Secondary outcome parameters were patient characteristics and emergency nurse characteristics associated with the aforementioned difference in actual administration and documentation time. In addition, we investigated whether this time difference was influenced by route of medication administration.

TABLE 2
Time intervals observed for all medications administered (N = 34)

Time interval	Duration in min-median	IQR	Minimum and maximum time in min
1. Arrival to prescription time	99	38-153	Min: −45 Max: 323
2. Arrival to administration time	121	44-162	Min: 5 Max: 335
3. Arrival to documentation time	130	68-174	Min: 14 Max: 345
4. Prescription to administration time	12	6-19	Min: 2 Max: 230
5. Prescription to documentation time	16	9-32	Min: −4 Max: 230
6. Administration to documentation time	6	2-16	Min: −18 Max: 138

Min indicates minimum observed time interval and Max indicates maximum observed time interval.
IQR, interquartile range.

STATISTICAL ANALYSIS

Data were analyzed using SPSS version 25.0 (IBM Corp, Armonk, NY).[30] Medians and interquartile ranges (IQRs) were expressed for continuous variables if non-normally distributed. Otherwise means and standard-deviations were used. For categorical variables, proportions were used. To compare groups, a chi-square test was used for categorical variables, whereas a Mann-Whitney U test was used for continuous variables.

A Spearman's correlation test was used to investigate a correlation between several continuous/ordinal variables and the administration-documentation time. A correlation between dichotomous variables and the administration-documentation time was analyzed using a biserial correlation test. Data were analyzed with and without outliers.

Results

In total, 20 nurses were approached for informed consent, of whom 18 nurses (90%) were willing to participate. This resulted in the observation of 18 evening working shifts of 18 emergency nurses. During these shifts, 82 patients were treated of whom 34 patients (41.5%) received medication during their stay in the emergency department. Patients who received medication were more often admitted in the hospital (73.5% vs 45.8%, χ^2 = 6.24 P = .01) and had lower oxygen saturation levels than patients who did not receive medication (median 97% vs 98% SpO_2, U = 484.50, P = .03). Baseline characteristics of patients who received medication are shown in Table 1. Additional

patient descriptions about the medical specialty referred to and the number of medications administered per patient are summarized in Supplementary Table 2.

In Table 2, the medians of the different time intervals observed in this study are shown (see Figure 1 for the conceptualization of time intervals). The median difference in administration and documentation times was 6.0 minutes (IQR 2.0-16.0). A difference between administration and documentation times of more than 15 minutes was observed for 9 (26.5%) patients. The maximum difference between administration and documentation times was 138 minutes. In 27 (79.4%), the documentation time was later than the actual administration time (median difference 5.0 minutes IQR 2.0-16.0) and in 7 (20.6%), it was earlier (median difference 2.0 minutes IQR 2.0-10.0). In 3 patients (8.8%), the door-to-treatment time based on the EHR was at least 1 hour, whereas the actual door-to-treatment time was less than 1 hour.

Figures 2 and 3 show several patient characteristics and their association with difference in actual medication administration and documentation times. High MEWS, receiving oxygen therapy, low blood oxygen saturation levels, and high body temperature were significantly associated with increasing differences in the documentation time compared with the observed administration time. For all other collected patient characteristics (sex, heart rate, respiratory rate, blood pressure, referring physician, triage color and high care needs), no association was found. In addition, the median difference between actual administration and documentation times for patients with MEWS at least 3 was significantly higher than for patients with MEWS less than 3 (median 5.0 minutes [IQR
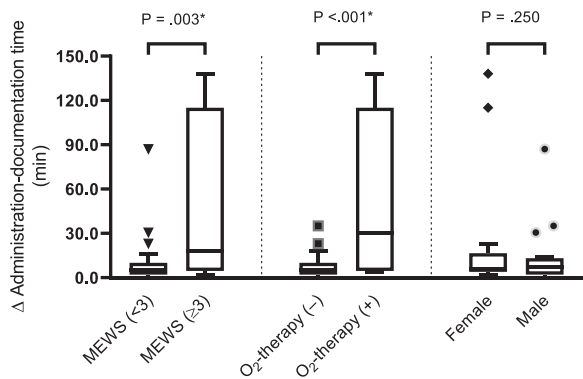
FIGURE 2

Patient characteristics and the correlation with the difference between actual administration and documentation times. Boxplots (median + IQR) are shown for MEWS, need for oxygen therapy, and sex. A MEWS ≥3 (18.0 minutes [4.5-115.0] vs 5.0 minutes [2.0-10.0]) and need for oxygen therapy (30.6 minutes [4.5-115.0] vs 5.0 minutes [2.0-10.0]) were significantly associated with an increased difference in actual medication administration and documentation times. Sex (male = 7.1 minutes [2.0-13.19] vs female = 5.5 minutes [3.88-16.5]) did not influence the difference between those times (point-biserial correlation test). IQR, interquartile range; MEWS, Modified Early Warning Score; O₂, oxygen.
*P < .05.

2.0-10.0] vs median 18.0 minutes [4.5-115.0]). No relationships were observed in the sensitivity analysis with outliers removed from the data (Supplementary Table 3 and Supplementary Figures 1 and 2).

Table 3 shows the different nurse characteristics of the nurses who participated. In 18 nurses, the median years of working experience in the emergency department was 6.0 years (IQR 3.0-15.0). Shift busyness was rated with a median of 4 (scale 1-10). The median number of patients cared for per shift was 5. There was no association between any of the nurse characteristics and differences in the administration and documentation times. This result was replicated when the outliers were removed (Supplementary Table 4).

Finally, the median difference between actual administration and documentation times was not influenced by route of medication administration (Supplementary Figure 3).

Discussion

This is the first study, to our knowledge, to prospectively investigate whether there is a difference in the actual administration and documentation times of medication given in the emergency department. In half of the patients, the observed administration time of medication was more than 6 minutes discrepant with the
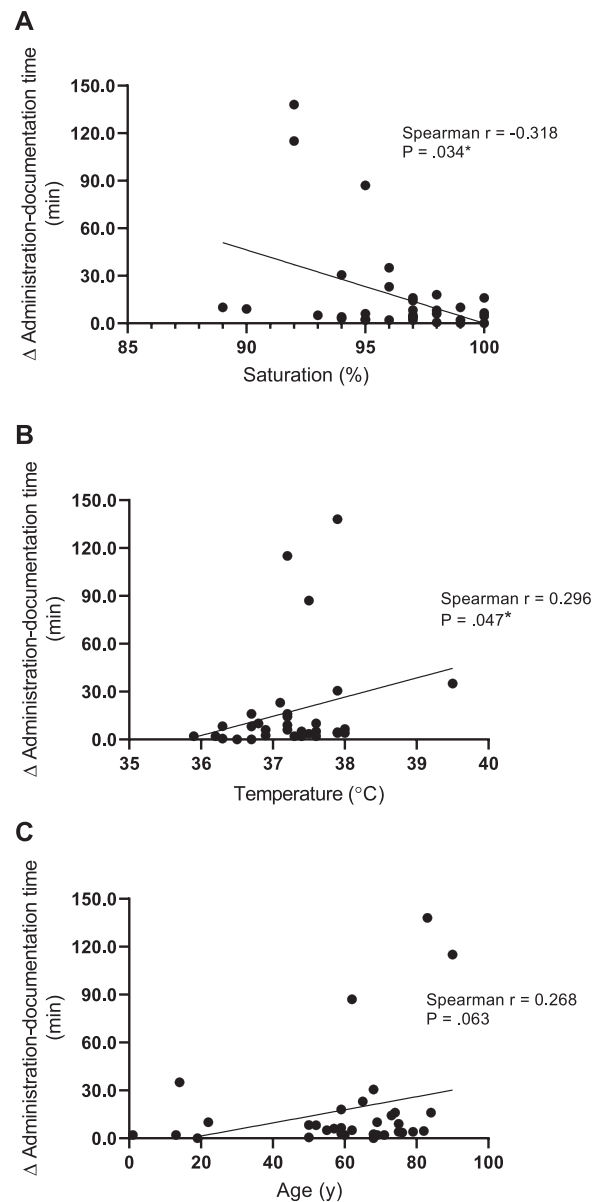

FIGURE 3

Spearman r rank correlation plots of (A) blood oxygen saturation, (B) temperature, and (C) age correlated to the difference in actual medication administration and documentation times. Saturation is significantly negatively correlated, whereas temperature is positively correlated to the difference between administration and documentation times. It shows an insignificant correlation between age and inconsistency in the administration and documentation times.
*P < .05.

documentation time of the medication in the EHR. Although a median difference of 6 minutes in half of the patients might not seem very high, this difference is still more than 15 minutes for 25% of the patients.

TABLE 3
Nurse characteristics and correlation with difference in administration and documentation time (n = 18)

Nurse characteristics	Median	IQR	Spearman R-coefficient	P value
Working experience (y)	6.0	3.0-15.0	0.05	.42
Shift busyness	4.0	3.0-8.0	0.03	.45
No. patients per shift	5.0	3.0-6.0	−0.10	.34

IQR, interquartile range.

Furthermore, there was a correlation between receiving oxygen therapy, low blood oxygen saturation levels, high body temperature, and a high MEWS (≥3) and an increasing difference between the administration and documentation times. These results may be interpreted that the care for sicker patients makes accurate documentation of the medication times more challenging. On several occasions, medication was documented in the EHR before it was administrated to the patient, indicating bias in both delayed timing and potential for the actual event not truly occurring as documented when working with retrospective collected data. Altogether, these results show a clear discrepancy between the actual medication administration and documentation times in the emergency department. Therefore, we infer that this difference introduces a risk of bias in retrospective time-to-treatment research, most pronounced in severely ill patients.[1,6-13] To further clarify the associations of the variables we tested, a multivariate model is recommended in future studies. Owing to the initial and exploratory nature of the current study with a small sample size, the multivariate model was considered beyond the scope of this article.

Our results were not replicated when outliers were removed. However, outliers are a part of clinical practice and cannot be removed from clinical operations. In a larger cohort, we anticipate outliers would still influence the results. In our cohort, most of the outliers were acutely ill (Figures 2 and 3). Since these critically ill patients have a large impact on daily practice, we intentionally included outliers in the main report of our analyses.

The currently published time-to-treatment studies focused on medications needed to treat the most acute conditions.[1,11,12] The medication prescribed to patients in our present study included a broader range of prescribed medical treatments than previously measured. For instance, we considered the administration of sodium chloride intravenously as administration of medication. Sodium chloride is used in the timely treatment of conditions, such as dehydration, in the emergency department, and its administration is documented in the EHR. The inclusion of fluids and other nonacute medications in this study could explain why the arrival to documentation time was longer in our present study than in some other studies (57.0-71.9 minutes).[1,7]

There are several ways to improve the accuracy of the documentation time in the EHR, including education for staff on existing guidelines, weekly e-mail reminders of the existing guidelines, EHR interface design changes, and standards of care for certain medical conditions or medications.[12-14,31-33] In addition to these improvements, the observed differences in this study could also be decreased by implementing better ways of monitoring the actual moment of administration of medication. For example, it is unknown if using barcoded medication administration or smart, EHR communicating intravenous systems for intravenous treatment would produce different results.[34,35] These automated methods are susceptible to nurse workarounds, such as not scanning the barcodes at all or scanning multiple medications for multiple patients at once.[36,37] These workarounds may defeat the purpose of implementing the technology, namely to reduce medication errors and adverse drug events. To counter these workarounds, these technologies should be as user friendly as possible, and further observational study as we designed is warranted to fully understand the problem and needed improvements.[38]

Methods of future time-to-treatment studies would be improved by observing actual medication administration time, instead of using retrospective data from the EHR. Studies that focus on the differences in treatment times could also focus solely on acutely ill patients, given our findings indicated that differences in the medication times of these patients were more pronounced. We recommend future studies could also combine the data on ED crowding with the observed time differences to give a more complete analysis of factors influencing medication administration and documentation differences.

Limitations

The present study, being exploratory and the first of its kind, has several limitations related to the dataset, variables, procedures, and setting. A small patient sample size of 82 patients was further decreased with only 40% of patients who received medication. The planned second study period was terminated early owing to the start of the COVID-19 pandemic. Since this termination was implemented for priority infection control preventative reasons and the hospital did not see patients with COVID-19 already at the time of termination, we do not expect that the treatment of patients with COVID-19 otherwise influenced our analysis. We did not collect data on the nurse characteristics during the initial study period. Although we acknowledge our study could lack statistical power to identify nurse characteristics influencing the administration-documentation time, the correlation coefficients were close to 0 on the data we did have available to test. Although this missing data was a limitation, prioritizing collecting and testing nurse characteristics in future study was not indicated by our results.

Our results should be interpreted with study procedure limitations in mind. Because the analysis was a combination of 2 different study time periods, it is possible that there were unmeasured differences between the first data collection period and the second. However, we were unaware of any major changes in workflow or personnel at the study site. Our results have limited generalizability as we only observed shifts in the evening and on weekdays.[27] Our results need to be interpreted in this context as compliance with guidelines may shift during the day.[39] Furthermore, owing to our study design of observing the nurses instead of the patients, actual patient medication administration could be missed if a colleague and not the observed nurse administered the medication, such as when the observed nurse was on a break. We attempted to minimize the influence of the Hawthorne effect by blinding the nurses for the actual study purpose. Nevertheless, it is possible that the nurses modified their behavior when observed by the data collectors.[25] Despite this limitation, direct observation was, to our opinion, the most optimal option to achieve the most reliable and robust results.[40]

Finally, the study setting may limit generalizability. ED crowding is a factor that influences time-to-treatment times in the emergency department.[16] In this study, we only measured nurse perception of business and did not collect objective measures of workload or crowding in the study context. No automatic devices such as barcode scanners were used by the emergency nurses in our study. Therefore, our findings are only generalizable for hospitals that work in a similar setting with manual medication documentation.

Implications for Emergency Clinical Care

The observed differences in administration and documentation times of medication in the emergency department may have several implications when evaluating the existing literature in this field and determining quality metrics of emergency care. Our results indicated that there may be substantial bias in retrospective time-to-treatment research designs using EHR data instead of observing the actual administration time. Therefore, the results of this study could explain that measurement bias is at least 1 factor in delays or longer time-to-treatment times reported in the published literature.[1,6–16] Our data show an association between the severity of the patient condition and the difference in the administration and documentation times.[9,10,14] Thus, in sepsis research and quality benchmarks, if a patient in a retrospective EHR study appears to have received medication in excess of 1 hour from arrival, our results indicated that the patient could have actually received the medication earlier.

Therefore, several recommendations can be made. Emergency nurses should consider not pre-documenting medications before they are actually given. Automated technology at the practice site is likely to increase reliability of the documented medication times but is vulnerable to workarounds. Finally, a note could be created in the EHR when documentation is delayed after administration to improve accuracy.

Conclusions

In this first of its kind, prospective, observational study, the actual administration time of medication and the documentation time in the EHR did not correspond in a significant part of the observed patients. This discrepancy should be kept in mind when evaluating retrospective studies concerning time-to-treatment analyses. Owing to the small sample size and generalizability limitations of this current study, future studies are required to advance and strengthen our findings.

Author Disclosures

Supplementary materials

Supplementary material associated with this article can be found in the online version at doi:10.1016/j.jen.2021.07.002.

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Quality Improvement: Using Teach-Back to Improve Patient Satisfaction during Discharge in the Emergency Department

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RESEARCH
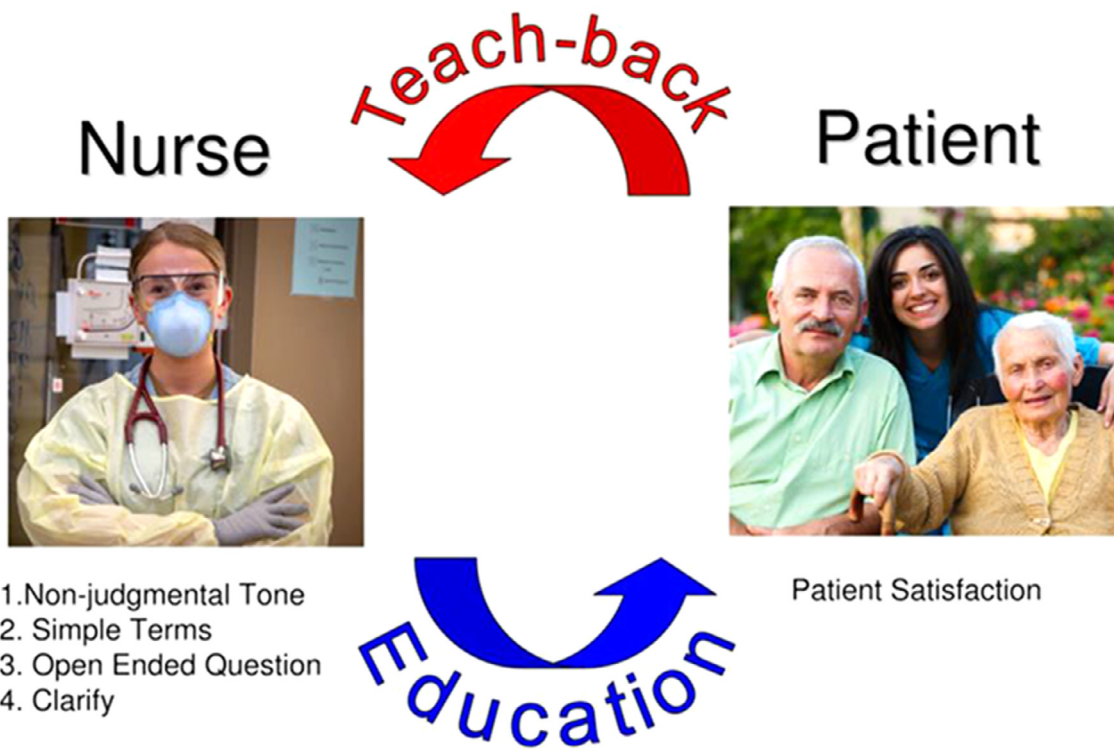
Quality Improvement: Using Teach-Back to Improve Patient Satisfaction during Discharge in the Emergency Department

Authors: Ryan Hodges, MSN, RN, CEN, CPEN, Sarah Stepien, MPH, MSN, RN, CMSRN, NPD-BC, and Linda Y. Kim, PhD, MSN, RN, PHN, CPHQ, Los Angeles, CA

NCPD **Earn Up to 11.5 Hours. See page 955.**

Contribution to Emergency Nursing Practice

- Teach-back is an intervention in the emergency department setting that may improve patient understanding, but limited data are available on teach-back's influence on patient satisfaction.
- Teach-back may improve patient satisfaction but only with sustained efforts by clinical staff.
- Emergency nurses can consider using teach-back when explaining discharge information to improve patient comprehension, but effect on patient satisfaction is still unknown.

Abstract

Introduction: Patients discharged in the emergency department often have poor understanding of their discharge instructions. Teach-back is a communication method that involves asking patients to explain in their own words what a health care provider just told them. The purpose of this project was to determine whether nurse-led teach-back at discharge could improve patient satisfaction with discharge information.

Methods: A teach-back method was used to educate patients on what to do if they do not feel better after leaving, using a single site quality improvement design. Patient satisfaction was measured using a standardized benchmark question on whether providers explained what to do if they did not feel better after leaving. The department goal for this question was established as achieving a response of "Yes, definitely" for 64.4% or more of the satisfaction surveys. Patient satisfaction data were collected before and after intervention through a survey given to patients within 24 hours after their visit. A statistical process chart was used to analyze whether the observed improvements coincided with implementation of the teach-back intervention.

Results: Although there was an overall increase in post-intervention scores (61%) from baseline scores (59%), there were no special cause variations signaling that the intervention had a significant impact.

Discussion: Teach-back may improve patient satisfaction with discharge information. Future implementation with measures of intervention adoption, fidelity, accountability, and sustainability are needed.

Key words: Teach-back communication; Patient discharge; Patient satisfaction

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Introduction

In the emergency department, patient education at discharge is an essential part of the patient's visit to teach about disease processes, improve treatment compliance, provide follow-up guidance, and prevent unnecessary return visits. The Agency for Healthcare Research and Quality (AHRQ), a federal agency in charge of improving health care system quality and safety, lists teach-back as a suggested communication tool to increase patient understanding of health information.[1] Other

BOX

Twenty-one AHRQ-recommended tools to improve patient health literacy[1]

Tool 1: Form a Team
Tool 2: Create a Health Literacy Improvement Plan
Tool 3: Raise Awareness
Tool 4: Communicate Clearly
Tool 5: Use the Teach-Back
Tool 6: Follow Up with Patients
Tool 7: Improve Telephone Access
Tool 8: Conduct Brown Bag Medicine Reviews
Tool 9: Address Language Differences
Tool 10: Consider Culture, Customs, and Beliefs
Tool 11: Assess, Select, and Materials
Tool 12: Use Health Education Material Effectively
Tool 13: Welcome Patients: Helpful Attitude, Signs, and More
Tool 14: Encourage Questions
Tool 15: Make Action Plans
Tool 16: Help Patients Remember How and When to Take Their Medicine
Tool 17: Get Patient Feedback
Tool 18: Link Patients to Non-Medical Support
Tool 19: Direct Patients to Medicine
Tool 20: Connect Patients with Literacy and Math Resources
Tool 21: Make Referrals Easy

communication tools suggested by the AHRQ include addressing language differences, considering cultural beliefs, and providing patient follow-up (Box).[1] In a recent systematic review on teach-back, it was found to be effective in a wide range of settings, populations, and comprehension outcomes.[2] Although the AHRQ and health care research both support the use of teach-back as a strategy to improve patient comprehension,[1,2] research is conflicting on whether teach-back can improve patient satisfaction with provider communication.

LOCAL PROBLEM

In the emergency department at a large urban level 1 trauma center, only 59.1% of the patients responded "Yes, definitely" to the question on whether the providers explained what to do if they do not feel better after leaving. This was below the department's goal of 64.4% (65% national ED benchmark).

COMMUNICATION GAP AND TEACH-BACK

Health literacy is the ability of individuals to obtain, process, and understand basic health information in order to make appropriate health care decisions.[1] Patients commonly receive health information verbally by providers, yet patients are only able to recall approximately half of the medical instructions provided to them.[3] Even when medical instructions are recalled, almost half of what patients recall is incorrect.[4] Unfortunately, recall of information may be even lower in the emergency department than in other health settings.[5] Even with both written and oral instructions, patients discharged from the emergency department have poor comprehension of the various aspects of discharge information including reasons to return.[6,7] When called a day after discharge, nearly one-third of ED patients have substantive questions or areas of confusion, with some patients reporting no recollection of receiving any discharge information.[8] Traditional written health information also has the additional problem of being poorly understood by people with different primary languages and lower literacy levels. Tools such as audio and video media, the changing of font sizes, and pictorial education have been hypothesized to improve patient comprehension of discharge information,[9] but research has found these interventions to have limited success.[7]

Teach-back, which targets validation of patient comprehension, can be both a practical and cost-effective intervention to communicate with patients, particularly those with low health literacy.[2,10] Teach-back is a method that can enhance patients' understanding by allowing them the opportunity to verbalize in their own words information previously given by a provider. If the patient is unable to "teach-back" the information to the provider, the provider can re-explain it in a way the patient can understand.[11] The teach-back technique not only tests whether the patient is listening and understanding but also provides insight to the provider's communication skills and word clarity, and patient application of given information.[12] In a recent systematic review of the implementation and impact of teach-back, 19 out of 20 studies showed teach-back to be effective in learning as well as improving other health-related outcomes, such as quality of life.[2] The few published studies that have looked at the impact of teach-back in the emergency department have also shown promising results. Teach-back in the emergency department has improved the recall of information regarding diagnosis, treatment, follow-up care, and return instructions.[10,13,14]

TEACH-BACK AND PATIENT SATISFACTION

Although teach-back has shown to increase health literacy, very little is known about its effect on patient satisfaction. One study on teach-back found that it improved the satisfaction of hospitalized neurology patients receiving medication information.[15] When nursing students implemented teach-back with medication education as part of a quality improvement (QI) project, the intervention improved the patients' knowledge of medications but did not improve patient satisfaction.[16] Other studies conducted in a hospital medical unit, emergency department, and pregnancy/parenting telemedicine found no improvement in patient satisfaction with teach-back.[10,17,18]

PURPOSE

The purpose of this QI project was to determine whether nurse-led teach-back intervention could improve patients' satisfaction with discharge information to the department's goal of 64.4% or greater.

Methods

DATA COLLECTION

This QI project used a longitudinal design that compared weekly baseline data with data collected after intervention. The project was conducted from February to October 2019 in the emergency department at a large urban level 1 trauma center located in Southern California that services about 260 patients per day. Patients discharged from the emergency department received a survey via email and an interactive voice recording (phone call) within 24 hours after their visit. The survey, which was produced by National Research Corporation (NRC) Health, contained 16 questions about their experience. It was used by this hospital before the QI project for collecting patient satisfaction data. The survey was chosen because of its quick patient outreach, previous integration into the department system, timeliness of results, and large data sample size. Surveys were sent in English, Spanish, Russian, or Mandarin, on the basis of patients' listed preferred language in the electronic medical records. NRC was responsible in translating the survey to the 4 different language options.

The question chosen to reflect patients' satisfaction of the provider explaining the discharge information was, "Did the care providers explain what to do if you did not get better after leaving?" There were 4 Likert-type answer choices, which were scored for data analysis: "No" (1), "Yes, somewhat" (2), "Yes, mostly" (3), and "Yes,

definitely" (4). For the purposes of this project, the data include percentages of respondents who answered "Yes, definitely." Pre-intervention data were collected for 13 weeks during February to April (N = 2570) to establish as a baseline. The QI project intervention was taught to staff in late April and May. The post-intervention data were collected for 18 weeks during June to October (N = 4694).

INTERVENTION IMPLEMENTATION

When implementing teach-back, the provider needs to be aware of their approach when asking patients to "teach-back" the information. During the teach-back process, some patients can feel as if their time is being wasted or that they are being judged or even insulted.[19] Medical terminology should be avoided.[20] If medical terminology must be used, such as a medical diagnosis (diabetes, congestive heart failure), those terms must be explained so that patients can later define the medical terminology in their own words. To optimize patient dialog and avoid patient judgment, a 4-step method was created (Figure 1) on the basis of recommendations from the AHRQ[1] and by incorporating methods supported by research on patient/provider communication.[11,12,14,19,21] When using teach-back at discharge, nurses were taught to (1) set a nonjudgmental tone; (2) explain the discharge information, including telling the patient what to do if they do not feel better after leaving, using simple terms and avoiding medical
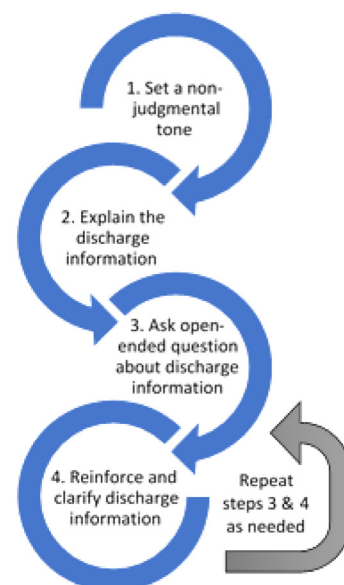

FIGURE 1
Four-step teach-back method.

jargon; and (3) ask the patient an open-ended question about what to do if they do not feel better after leaving. Possible example questions provided during staff training were as follows: What is your plan if you are feeling worse in 3 days; Tell me 2 things that would happen, which would require you to return to the emergency department before following up with your doctor? The final step, (4) is to address any misunderstandings through reinforcement and clarification. Steps 3 and 4 may need to be repeated until satisfactory understanding by the patient is achieved.

Emergency nurses (N = 93, 65% of total department) were trained on how to use teach-back after reviewing the written discharge summary with the patient at time of discharge. Training was provided by an emergency clinical nurse in 3 department meetings in late April and by the charge nurse during staff huddles for 3 weeks in May. During the same weeks of May, a clinical reminder adhesive note stating "Teach-Back, If you are not feeling better after leaving" was placed on the discharge paperwork at the time of discharge to remind nurses of the teach-back QI intervention. An email was also sent to the nursing staff in May, encouraging them to incorporate teach-back into their practice. No follow-up training was given after the month of May. No intervention fidelity or adoption at the individual nurse level was measured.

ETHICAL CONSIDERATIONS

This QI project was reviewed by both the hospital's Nursing Quality Improvement Committee and the Nursing Research Council, who determined this to be a quality improvement project. Hence, the project was deemed exempt from requiring the organizational Institutional Review Board review.

DATA ANALYSIS

Descriptive statistics were used to analyze participant demographic data. Changes in pre-intervention and post-intervention data were assessed using a statistical process control chart available through the QI Macros Software, version 2021 (KnowWare International Inc). More specifically, a p-chart was used to assess changes in the weekly data on percentage of respondents who answered "Yes, definitely." Data collected during the intervention time frame (weeks 14-17) were excluded. We followed methods well established in the literature for identifying special cause variation[22] to determine whether significant improvements were made after the intervention: (1) a single point outside the control limits, (2) a run of 8 or more points in a row above (or below) the centerline, (3) 6 consecutive points increasing (trending up) or decreasing (trending down), (4)

2 out of 3 consecutive points near (outer one-third) a control limit, and (5) 15 consecutive points close (inner one-third of the chart) to the centerline.-

Results

PATIENT DEMOGRAPHICS

Response rate of patients varied per month, with 27.4% being the lowest and 32.2% being the highest. Table shows the age, sex, language, race, and ethnicity demographics of the pre- and postintervention populations. A majority of respondents were 45 to 74 years old (44%), female (56%), white (67%), Non-Hispanic (79%), and reported English as their primary language (93%-94%).

TABLE
Patient demographics

Response	Pre-intervention		Post-intervention	
	n	%	n	%
Age (y)				
0-17	252	9.8	442	9.4
18-44	907	35.3	1634	34.8
45-74	1124	43.7	2054	43.8
≥75	287	11.2	564	12.0
Total	2570	100.0	4694	100.0
Sex				
Female	1450	56.4	2644	56.3
Male	1120	43.6	2050	43.7
Total	2570	100.0	4694	100.0
Language				
English	2406	93.6	4344	92.5
Spanish	143	5.6	313	6.7
Other	21	0.8	37	0.8
Total	2570	100.0	4694	100.0
Race				
Asian	148	5.8	262	5.6
Black	543	21.1	927	19.7
Hawaiian/Pacific	5	0.2	13	0.3
Native American	3	0.1	8	0.2
White	1716	66.8	3123	66.5
Unknown/ Declined	155	6.0	361	7.7
Total	2570	100.0	4694	100.0
Ethnicity				
Hispanic	489	19.0	919	19.6
Non-Hispanic	2045	79.6	3718	79.2
Declined/ Unknown	36	1.4	57	1.2
Total	2570	100.0	4694	100.0

PATIENT SATISFACTION WITH DISCHARGE INFORMATION

Figure 2 shows the p-chart of the percentage of respondents who answered "Yes, definitely" to the question, "Did the care providers explain what to do if you did not get better after leaving?" Overall, the average percent of the respondents responding "Yes, definitely" increased from a baseline of 59% to 61% at the end of the post-intervention period. Nonetheless, there were no special cause variations that indicated significant improvements after implementation of the teach-back intervention. The department goal was not met.

Discussion

At the end of the QI project, we did not meet the department goal of reaching 64.4% or greater on the patient satisfaction score. Furthermore, this QI project did not show sustained improvement of patient satisfaction through nursing-led teach-back. This finding is similar to previous studies on patient satisfaction and teach-back in and outside of the emergency department.[10,16,17,18] Patient satisfaction measurements did improve after the first month of intervention, and improvements trended down for most months afterwards. It can be hypothesized that this trend may be due to frontline nurses utilizing the teach-back intervention less often over time, but no data were collected to support this claim. This project only measured patient satisfaction and did not measure patient comprehension. The feasibility of the present study required design simplicity for implementation at the site and future study that incorporates measures of knowledge attainment, knowledge retention, and satisfaction together would improve the understanding of possible correlation between multiple variables. Only satisfaction with one aspect of the discharge information was measured in this project of, "what to do if you did not get better after leaving?" Future QI projects studying patient satisfaction on different education aspects (diagnosis, treatment, follow-up care, or medications) may have different results.

Before this QI project, the feasibility of measuring the effects of teach-back in the emergency department had been understudied.[13] Teach-back implementation can be challenging, particularly in the emergency department, because of the fast pace and frequent changes in patient acuity. A previous study measured teach-back as adding 1 minute and 39 seconds to the discharge conversation.[13] In a crowded emergency department, nurses are pressured to expedite discharges to improve patient throughput, which may prevent the required time for properly reviewing discharge information and test for patient comprehension.

Only 65% of emergency nursing staff attended the meetings when the teach-back education was provided. To reach the nurses that were not in attendance, the use of teach-back was discussed during staff huddles and via department email. Clinical reminders in the form of adhesive notes were also used. Having frontline teach-back champions educating remaining staff may have improved the overall department's intervention utilization and increased frontline staff support, adoption, and sustainability of the intervention.

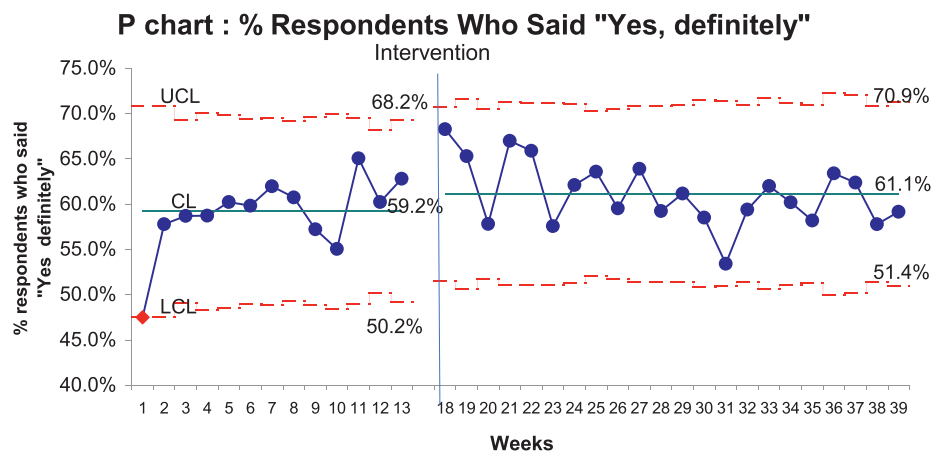This QI project only targeted nurses utilizing the teach-back method because the current practice pattern at

P chart : % Respondents Who Said "Yes, definitely"

FIGURE 2

p-chart: Percentage of respondents who answered "Yes, Definitely" to the question "Did the care providers explain what to do if you did not get better after leaving?" Note no single point outside the control limits nor sustained consecutive points trending up or down. UCL, upper control limit; CL, centerline; LCL, lower control limit.

this project location was that the nurses provided the discharge education. Although not included in this project, ED physicians and respiratory therapists also provide patient education. Published literature in interdisciplinary medical and respiratory care journals recommend incorporating teach-back for patient education such as discharge plan review, and medical device instructions.[20,23] Teach-back by clinicians in the home health field is also recommended and may reduce rehospitalizations.[24] Teach-back, particularly on the subject of "what to do if you don't get better after leaving," may be hypothesized to reduce ED return visits, although past research has not shown teach-back to affect inpatient 30-day readmission rates.[25] Patient satisfaction with teach-back should be further examined with different health care providers and in various clinical settings.

Language barriers often exist at time of discharge. When teach-back was performed properly, nurses could easily identify language issues when patients were asked to answer an open-ended question. Nurses were encouraged to use in-person, audio, or video interpreters when language barriers were identified. Even with available resources, health care providers may habitually provide simple commands and instructions without use of interpreters, which can impact the quality of communication exchange. Another language barrier is that the NRC survey sent to patients was available only in English, Spanish, Russian, and Mandarin. The limited languages of this survey did not seem to decrease survey participation, because response rate of non-English speaking patients was higher than that of English speaking ones (34.3% vs 29.8%).

Patient engagement with teach-back is always a factor to consider when measuring patient satisfaction. Patient engagement may decrease because of long wait times, feeling tired or ill, and fear of making mistakes.[13] Some patients, particularly those with limited health literacy, have vocalized concerns about teach-back being condescending, judgmental, and insulting.[19] As 1 patient remarked, "What you mean do I understand? Of course I understand what you are saying. I am not dumb."[19] Setting a nonjudgmental tone, as taught in this QI project, is an important step to mitigate perceived patient judgment.

A strength of this project is the large number of total surveys collected (N = 7264). Instead of increasing the workload of creating and training staff on a new survey, data were pooled from an existing facility operation and routine benchmarking measure. Although a formal cost analysis was not performed for the QI project, the costs to the organization were limited to several thousand adhesive notes, a stamp, and three 15-minute staff meetings with frontline nursing staff. Potential revenue could occur with

improved hospital reimbursement with elevated patient satisfaction scores and reduced costs associated with unnecessary return ED visits.

Limitations

We were unable to determine the fidelity of this QI project (the implementation of an intervention as intended) because we did not measure whether nurses were utilizing the teach-back method and whether they continued to use the method over time. This may impact the project's internal validity. Teach-back studies in the past have tried different implementation strategies to improve fidelity and sustainability. Observers have been used to monitor communication methods used during the discharge process to ensure that teach-back had occurred.[6,14,17] The Institute for Healthcare Improvement recommends using a clinical leader such as a charge nurse as an observer to assess whether frontline staff are executing the desired interventions from QI projects.[26] Bedside nursing stakeholders, such as teach-back champions, could have been assigned to listen in on a number of discharges per day and provide re-education as needed. For any staff that is involved with monitoring or re-educating nurses performing the QI task, allocated time should be given to participate in these activities.[27] Unless supported by department management, finding protected time for QI projects may be difficult, especially when departments have high census and low staffing.

Other teach-back studies have made infrastructure changes, such as adding prompts to the electronic medical record.[2] A pop-up banner could have been added to the patient's chart requiring nurses to document whether they used teach-back at discharge. It is our recommendation that further teach-back projects should include intervention tracking and routine staff reinforcement to optimize utilization and help hardwire the teach-back method into practice.

Additionally, the project was conducted in only 1 emergency department within 1 health care organization, which may limit external validity of findings across other settings and organizations. Nonetheless, lessons learned from this project can serve as a guide, which can be adapted to meet the specific needs of the implementing organization.

Implications for Emergency Clinical Care

This QI project showed that when frontline nurses were introduced to the teach-back method for use at discharge,

the intervention may have slightly and initially improved patient satisfaction, although this improvement was not sustained in the long term. This project not only looked at the relationship of teach-back and patient satisfaction but also exposed opportunities to enhance QI projects' fidelity and to prevent drift to baseline practice. Without a strong effort by the staff to carry out the QI tasks and deliberate monitoring, it is impossible to know whether nurses are performing the intended intervention.

Even if teach-back does not improve patient satisfaction, the benefit to patient comprehension is well documented in the literature.[2] Teach-back can be used to improve learning throughout the ED visit and not just at time of discharge. Teach-back can also include other skills in addition to communication, such as psychomotor skills redemonstration. AHRQ also refers to patient redemonstration of psychomotor skills as the "show-back" method.[1] For example, a patient can demonstrate to the nurse a newly taught skill, such as breathing in an incentive spirometer or self-administering insulin. We encourage all health care providers to add teach-back to their practice, especially at time of discharge.

Conclusions

Findings from this QI project did not show that teach-back improved patient satisfaction with the provider's communication of the discharge information over time. However, lessons learned from this project shed light on the critical importance of incorporating a plan for changes in practice and sustainment of efforts. How to create a culture receptive to change is often the most difficult part of QI projects. Further implementation research should be performed on how to implement and integrate teach-back in the emergency department with measures of intervention adoption, fidelity, accountability, and sustainability.

Acknowledgments

Author Disclosures

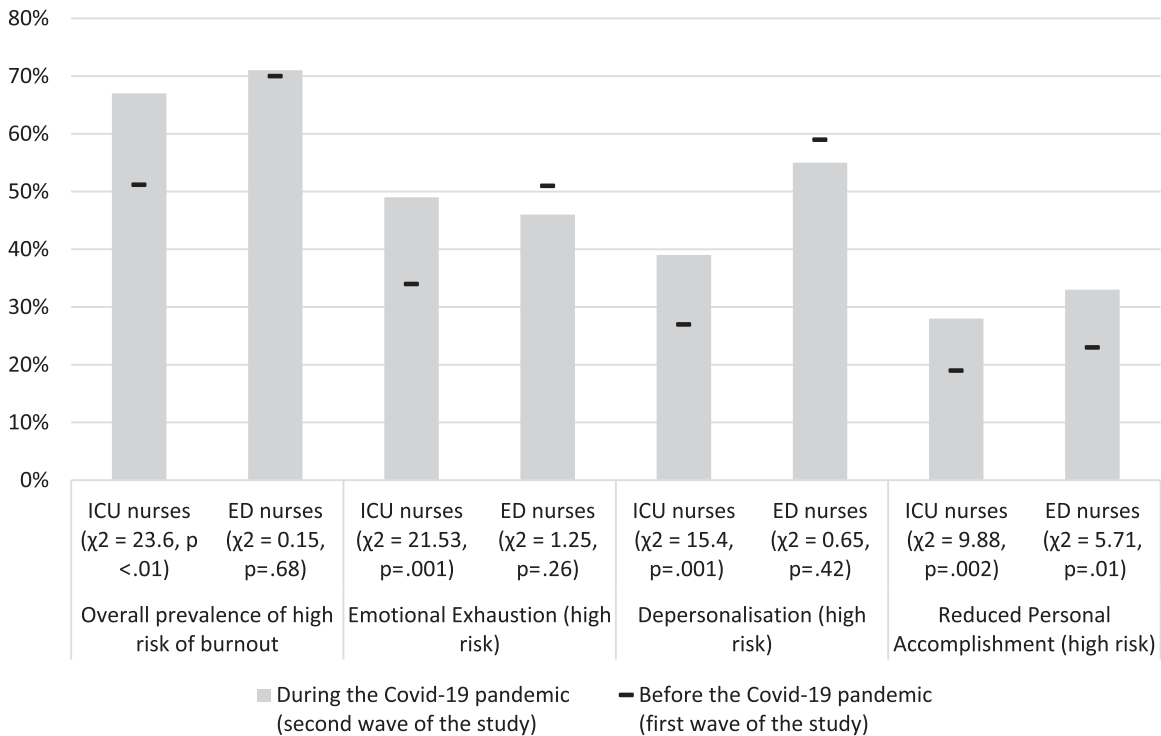Conflicts of interest: none to report.

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PREVALENCE AND ASSOCIATED FACTORS OF BURNOUT RISK AMONG INTENSIVE CARE AND EMERGENCY NURSES BEFORE AND DURING THE CORONAVIRUS DISEASE 2019 PANDEMIC: A CROSS-SECTIONAL STUDY IN BELGIUM

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Prevalence and Associated Factors of Burnout Risk Among Intensive Care and Emergency Nurses Before and During the Coronavirus Disease 2019 Pandemic: A Cross-Sectional Study in Belgium

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Contribution to Emergency Nursing Practice

- Nurses in many countries face high prevalence of burnout, particularly those working in intensive care units (ICUs) and emergency departments. The impact of the coronavirus disease 2019 (COVID-19) pandemic on their risk of burnout remains underdocumented.
- The COVID-19 pandemic had a greater impact on the burnout risk of ICU nurses than emergency nurses, although the latter had a higher prevalence of burnout risk. Several determinants of burnout risk were different between ICU and emergency nurses.
- It is important to implement interventions to prevent and manage burnout among ICU and emergency nurses. However, different individual and organizational determinants must be targeted for emergency nurses than for ICU nurses.

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Abstract

Introduction: This study aimed to assess (1) the prevalence of burnout risk among nurses working in intensive care units and emergency department before and during the coronavirus disease 2019 pandemic and (2) the individual and work-related associated factors.

Methods: Data were collected as part of a cross-sectional study on intensive care unit and emergency nurses in Belgium using 2 self-administered online questionnaires distributed just before the pandemic (January 2020, N = 422) and during the first peak of the pandemic (April 2020, N = 1616). Burnout was assessed with the Maslach Burnout Inventory scale.

Results: The overall prevalence of burnout risk was higher among emergency nurses than intensive care unit nurses but was not significantly different after the coronavirus disease 2019 pandemic (from 69.8% to 70.7%, $\chi^2 = 0.15$, $P = .68$), whereas it increased significantly among intensive care unit nurses (from 51.2% to 66.7%, $\chi^2 = 23.64$, $P < .003$). During the pandemic, changes in workload and the lack of personal protective equipment were significantly associated with a higher likelihood of

burnout risk, whereas social support from colleagues and from superiors and management were associated with a lower likelihood of burnout risk. Several determinants of burnout risk were different between intensive care unit and emergency nurses.

Conclusion: Our findings indicate that nurses in intensive care unit and emergency department were at risk of burnout but their experience during the coronavirus disease 2019 pandemic was quite different. Therefore, it is important to implement specific measures for these 2 groups of nurses to prevent and manage their risk of burnout.

Key words: COVID-19; Burnout; Nurses; Intensive care unit; Emergency department

Introduction

Burnout is a psychological syndrome resulting from chronic exposure to emotional or psychological stressors at work and can be illustrated by a 3-dimensional model that involves emotional exhaustion (EE), depersonalization (DP), and reduced personal accomplishment (RPA).[1] EE is characterized by an extreme lack of energy, DP is associated with the development of negative feelings and attitudes and a certain withdrawal from work, and RPA is characterized by a sense of loss of skills and professional effectiveness.[2] A global consensus has identified EE as the central dimension of burnout.[3,4]

Nurses in many countries face a high prevalence of burnout, which may be related to the very nature of this profession that is considered to be physically and psychologically demanding. A meta-analysis on 61 studies in 49 countries worldwide showed that the pooled prevalence of burnout symptoms among nurses was 11.23%, with significant differences between countries and specialties.[5] Burnout among nurses has multiple consequences. First, it has negative consequences on their professional practices, with a deleterious impact on the quality of care provided to patients and therefore on their safety, health, and recovery.[4,6-8] Second, it has consequences for nurses themselves with a significant risk of developing physical and mental health problems[4,6] such as fatigue, anxiety, sleep disorders,[5] mental health disorders, heart disease, and metabolic syndromes.[8] Third, it has a negative impact on the health care systems with a decrease in work performance,[7] an increase in absenteeism at work and a phenomenon of staff turnover,[7,8] and an increase in expenses related to recruitment and human resources.[5]

Some nurses are at a greater risk of burnout than others, and many studies have found several risk factors for burnout. On the one hand, individual risk factors include young age, sex, having an emotionally unstable or uncooperative personality, and having a low level of self-control and self-determination.[7,9,10] On the other hand, risk factors related to the professional environment include the type of service in which the nurse works (ie, intensive care unit [ICU], emergency department, pediatric, and oncology), working in a technical environment, excessive workload, overtime worked, shift work, understaffing,[7,10] performing acts for which one is underqualified or overqualified,[11] having low decision-making autonomy,[12] and a lack of social and organizational support from colleagues and from superiors and management.[10,12,13]

Profiles of nurses identified as at risk of burnout in the scientific literature are nurses working in the ICU and emergency departments. A meta-analysis published in 2020 highlighted that the prevalence of burnout was 14.36% among ICU nurses and 10.18% among emergency nurses.[5] Some studies explained this higher prevalence by the fact that these nurses work in a very technical and stressful environment, with patients in critical health situations (ie, repeated exposure to suffering and death) and with a high physical and psychological demand.[11,14]

The working conditions of nurses, like other care professionals, fluctuate over time and are sensitive to external events such as natural disasters, conflicts, or epidemics. At the end of December 2019, China reported a pneumonia epidemic in Wuhan linked to a new coronavirus, the severe acute respiratory syndrome coronavirus 2, a virus responsible for the global coronavirus disease 2019 (COVID-19) pandemic announced on March 11, 2020, by the World Health Organization. In one year from December 2019 to January 4, 2021, there were 83 715 617 confirmed cases and 1 835 901 deaths worldwide.[15] Frontline health care workers, such as ICU and emergency nurses, were particularly exposed to the consequences of this pandemic. They were heavily involved in the detection and treatment of patients with COVID-19.[16] This exposure involved, among other things, working in a high-risk environment[8,10] with a considerable increase in their workload,[16,17] treating patients with COVID-19 with limited clinical knowledge[14,18] and without any specific treatment available at the start of the pandemic,[19] repeated exposure to suffering and death,[20] working in a context of shortage of personal protective equipment (PPE),[16,18] and being afraid of contracting and transmitting the virus.[17]

Some studies have shown that the COVID-19 pandemic had negative consequences on the well-being and mental health of nurses.[13,19,20] However, few studies have analyzed the impact of the COVID-19 pandemic on the risk of burnout of nurses. A study in China found that between 43.5% and 62.0% of nurses had a moderate to high risk of burnout in the dimensions of DP, EE, and RPA during the COVID-19 pandemic.[19] In addition, few studies have compared the situation during the COVID-19 pandemic with the situation before it. Finally, although ICU and emergency nurses were particularly exposed during the COVID-19 pandemic, very few studies specifically addressed the risk of burnout among them.

OBJECTIVES

The objectives of this cross-sectional study in the French-speaking part of Belgium were to assess (1) the prevalence of burnout risk among ICU and emergency nurses before and during the COVID-19 pandemic and (2) the individual and work-related associated factors during the pandemic.

Methods

STUDY DESIGN AND SETTING

A cross-sectional study was conducted on the risk of burnout among ICU and emergency nurses in the French-speaking part of Belgium. Two waves of open online survey were conducted. The first wave of the survey took place over a period of 4 weeks in January 2020, before the COVID-19 pandemic, the first case of COVID-19 in Belgium being identified on February 4, 2020. The second wave of the survey took place between April 21 and May 04, 2020. This period corresponded to the peak of the first wave of COVID-19 in Belgium. The Hospital Emergency Plan was launched on March 13, 2020, and the first peak of the pandemic took place in April with between 400 and 500 new hospitalizations per day.[21] Data were collected online via a platform compliant with the General Data Protection Regulation and using a convenience sampling method. Limitations of the following sampling method will be further developed in the discussion. The self-administered online questionnaires were disseminated through different channels. First, the heads of nursing departments of the 50 French-speaking hospitals were contacted and invited to share the study with the emergency and ICU nurses of their staff. In addition, 2 French-speaking associations of critical care nurses (ie, working in the ICU and emergency department) sent the study to their members.

Finally, the study was shared on social networks, mainly in online communities of Belgian critical care nurses. Cookies were used to assign a unique user identifier to each respondent and prevent multiple entries from the same individual. The usability and technical functionality of the online questionnaire were tested by 5 independent people before the survey was released. The number of items per page was limited to have the highest completion rate. The questionnaire consisted of 36 questions distributed over 9 pages.

PARTICIPANTS

A total of 442 ICU and emergency nurses completed the questionnaire in the first wave of the study and 1616 in the second. Because the questionnaire dissemination methods were the same in both waves, the larger sample size in the second wave of the study may be explained by the greater interest of nurses in the topic of the study in the context of the COVID-19 pandemic. The participation rate (ratio of unique visitors who agreed to participate to unique first survey page visitors) was 46% in the first wave of the study and 68% in the second wave. The completion rate (ratio of users who finished the survey to users who agreed to participate) was 82% in the first wave and 91% in the second.

VARIABLES AND MEASURES

The primary outcome of interest was the risk of burnout and was assessed with the Maslach Burnout Inventory (MBI) questionnaire. The MBI has a high reliability (Cronbach alpha > 0.70) and convergent validity to assess the different aspects of burnout among health care workers.[2,22] The convergent validity was established by correlating individual MBI scores with outcomes such as job dissatisfaction and poor working conditions.[2,23] The MBI is free to use and assesses the following dimensions of burnout: EE, DP, and RPA. We used the validated French version of the MBI, which is a 22-item questionnaire (9 items on EE, 5 items on DP, and 8 items on RPA). Each item is measured on a 7-point frequency scale from "never" (scored at 0) to "every day" (scored at 6) with the EE score ranging from 0 to 54, the DP score ranging from 0 to 30, and the RPA score ranging from 0 to 48. For the 2 dimensions EE and DP, the higher the scores, the higher the risk of burnout, whereas it is the contrary for the dimension of RPA. As suggested in the user manual, predetermined cutoff points were used to identify in each dimension individuals at high risk of burnout.[1] The cutoff point for a high risk was ≥27 for EE, ≥10 for DP, and ≤33 for RPA. To estimate the overall prevalence of risk of burnout, we chose

as in other studies that a person at high risk in at least one of the 3 dimensions can be considered at risk of burnout.[24]

Additional data were collected in the second wave of the study to assess the impact of the COVID-19 pandemic on the working conditions and risk of burnout of nurses. The objective was to collect variables to identify the explanatory factors of the risk of burnout and the groups at risk: age, sex, the seniority in the health care sector, the perceived workload during the COVID-19 pandemic, the availability of PPE for COVID-19, and the social support from colleagues and from superiors and management. To assess social support at work, we used the 2 subscales on social support from colleagues and from superiors and management of the French version of the Job Content Questionnaire.[25] This questionnaire is considered to be the main validated instrument to assess job strain,[12] and it is composed of 3 dimensions assessed separately: psychological demand, decision latitude, and social support at work. The 2 subscales on social support from colleagues and from superiors and management are respectively composed of 6 and 5 items. Each item is scored on a 4-point Likert-type scale with scores ranging from 1 (strongly disagree) to 4 (strongly agree). Therefore, the score for social support from colleagues ranges from 6 (low social support) to 24 (high social support) and from superiors and management from 5 (low social support) to 20 (high social support).

DATA ANALYSIS

Data were analyzed using IBM SPSS (IBM Corp, Armonk, NY). First, descriptive analyses were performed on the samples from the 2 waves. This study being cross-sectional and not longitudinal, it seemed important to compare the samples between the 2 waves. Second, descriptive analyses were performed on the prevalence of high risk of burnout in the 3 dimensions of the MBI (ie, EE, DP, and RPA) before the COVID-19 pandemic, then during the first peak of the pandemic, and separately for nurses working in the ICU and those working in the emergency department. Additional descriptive analyses were performed on data from the second wave of the study to describe the working conditions of nurses during the COVID-19 pandemic. The final objective was to assess the factors associated with the high risk of burnout during the pandemic, among ICU and emergency nurses separately, to identify common and different factors between the 2 groups. Therefore, multivariate logistic regression models were performed on the 3 dimensions of the risk of burnout separately for ICU and emergency nurses.

ETHICAL APPROVAL AND INFORMED CONSENT

Participation was voluntary and anonymous and did not involve any compensation. Informed consent was obtained from all participants. The Belgian Law does not require an approval from an Ethical Board for an online survey with the general population. However, the study is covered for privacy regulations. Participants were provided with the legal information relating to consent. All information related to respondents' consent and the General Data Protection Regulation is available on request. This is in accordance with the Declaration of Helsinki and the law that is applicable, including the regulation 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC—General Data Protection Regulation. All methods were performed in accordance with the relevant Belgian guidelines and regulations.

Results

SAMPLE CHARACTERISTICS

The comparison of the sample in the 2 waves of the study is presented in Table 1. The samples in the 2 waves were not statistically different for the mean age (t = 3.89, $P = .05$) and for sex distribution ($\chi^2 = 0.461$, $P = .5$). The mean age was approximately 35 years, and three-quarters of the sample were women. However, there was a significant difference between the 2 waves regarding the proportion of ICU and emergency nurses ($\chi^2 = 8.207$, $P = .004$), with a higher proportion of ICU nurses in the second wave of the study. This difference was taken into account by analyzing these 2 groups separately.

PREVALENCE OF HIGH RISK OF BURNOUT BEFORE AND DURING THE COVID-19 PANDEMIC AMONG NURSES WORKING IN THE ICU AND EMERGENCY DEPARTMENT

The prevalence of high risk of burnout before and during the COVID-19 pandemic among nurses working in the ICU and the emergency department is presented in the Figure. The overall prevalence of burnout risk was higher among emergency nurses than among ICU nurses before and also during the COVID-19 pandemic. Among emergency nurses, the prevalence remained stable over time (from 69.8% to 70.7%) and was not significantly different between the first and second waves of the study ($\chi^2 = 0.15$,

TABLE 1
Comparison of the sample in the 2 waves of the study

Variables	First wave of the study: before the COVID-19 pandemic (N = 442)		Second wave of the study: During the COVID-19 pandemic (N = 1616)		t test/chi-square (P value)
	Mean or n	SD or %	Mean or n	SD or %	
Age, year, mean (SD)	34.70	0.459	36.91	0.25	3.89 (.05)
Sex, female, n (%)	345	78.1	1225	76.5	0.46 (.5)
Type of service, n (%)					
• ICU	283	64	1149	71.1	8.21 (.004)
• Emergency nurse	159	36	467	28.9	

COVID-19, coronavirus disease 2019; ICU, intensive care unit.

P = .68). Conversely, among ICU nurses, the prevalence has significantly increased after the COVID-19 pandemic (from 51.2% to 66.7%, χ^2 = 23.64, P < .003).

Regarding the different dimensions of burnout among ICU nurses, the most significant difference after the pandemic was observed on the high risk of EE, increasing from 33.6% to 48.9% (χ^2 = 21.53, P = .001). There was also a significant increase on the dimension of DP (high risk of DP, from 26.9% to 39.4%, χ^2 = 15.4, P = .001) and on the dimension of RPA (high risk of RPA, from 19.1% to 28.3%, χ^2 = 9.88, P = .002) after the COVID-19 pandemic.

Among emergency nurses, there was a significant difference after the COVID-19 pandemic on the high risk of RPA (5.71, P = .017) with an increase from 23.3% before to 33.4%, but not on the high risk of EE (χ^2 = 1.25, P = .26) and DP (χ^2 = 0.65, P = .42). For these last 2 dimensions, there was a slight decrease after the pandemic (high risk of EE from 50.9% to 45.8%; high risk of DP from 59.1% to 55.5%).

WORKING CONDITIONS OF NURSES WORKING IN THE ICU AND THE EMERGENCY DEPARTMENT DURING THE COVID-19 PANDEMIC

The working conditions of ICU and emergency nurses during the COVID-19 pandemic are presented in Table 2. During the COVID-19 pandemic, the only significant difference between ICU and emergency nurses was on the perceived workload (χ^2 = 390.6, P < .001). Among ICU nurses, 89.1% reported an increased workload after the COVID-19 pandemic and 2.3% a decreased workload. In contrast, among emergency nurses, less than half (45.1%) reported an increase and 37% reported a decrease. The average seniority in the health care sector was not significantly different (t = 0.42, P = .06) between ICU nurses (13.96 years,

SD = 0.32) and emergency nurses (13.57 years, SD = 0.47). In addition, approximately half of ICU (48.9%) and emergency nurses (51.4%) said they did not have sufficient PPE for COVID-19. Finally, ICU and emergency nurses reported fairly high social support from both their colleagues (18.5 of 24) and their superiors (14.8 of 20) during the COVID-19 pandemic.

FACTORS ASSOCIATED WITH THE 3 DIMENSIONS OF THE RISK OF BURNOUT AMONG ICU AND EMERGENCY NURSES DURING THE COVID-19 PANDEMIC

The factors associated with the 3 dimensions of the risk of burnout among ICU and emergency nurses during the COVID-19 pandemic are presented in Table 3.

Regarding the high risk of EE, the associated factors among ICU nurses were the perceived workload, whether or not they had PPE for COVID-19, and the social support from colleagues and from superiors and management. Among emergency nurses, the associated factors were whether or not they had PPE for COVID-19 and social support from colleagues. Among ICU nurses, having a higher workload during the COVID-19 pandemic significantly increased the odds (OR = 4.03, P < .001) of being at high risk of EE compared with having a stable workload. In addition, ICU nurses who reported not having enough PPE for COVID-19 were more likely (OR = 1.81, P < .001) to be at high risk of EE compared with those who reported having enough. Finally, high social support from colleagues (OR = 0.93, P < .05) and from superiors and management (OR = 0.91, P < .01) were significantly associated with lower odds of being at high risk of EE. Among emergency nurses, not having enough PPE for COVID-19 was also associated with an increased likelihood of high risk
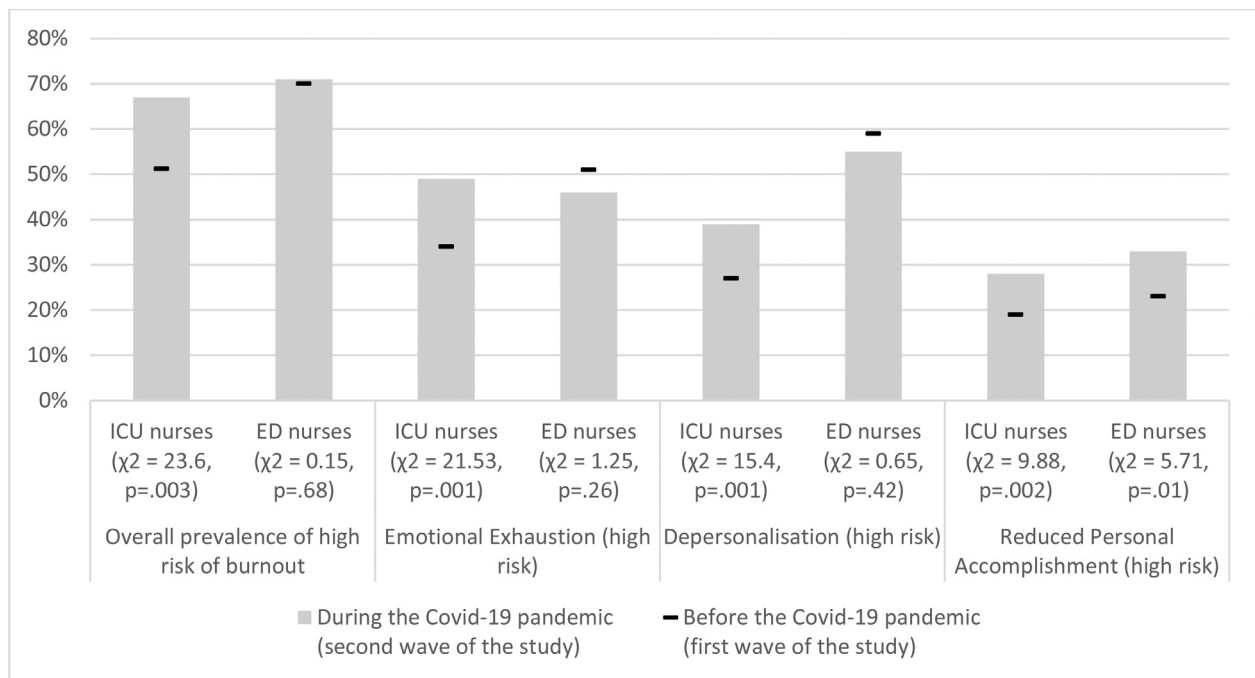
FIGURE

Prevalence of high risk of burnout before and during the COVID-19 pandemic among nurses working in ICU and ED. COVID-19, coronavirus disease 2019; ICU, intensive care unit; ED, emergency department.

of EE (OR = 1.75, $P < .01$). Finally, emergency nurses reporting high social support from colleagues had lower odds of being at high risk of EE (OR = 0.83, $P < .01$).

Regarding the high risk of DP, the associated factors among ICU nurses were age, sex, perceived workload, and social support from colleagues. For emergency nurses, the associated factors were sex, perceived workload, and social support from colleagues. In both groups, men (ICU, OR = 2.81, $P < .001$; ED, OR = 3.87, $P < .001$) and those reporting a higher workload since the COVID-19 pandemic (ICU, OR = 2.44, $P < .01$; ED, OR = 1.70; $P < .05$) were more likely to be at high risk of DP than women and those reporting a stable workload. In addition, ICU and emergency nurses with higher social support from colleagues had a lower likelihood (ICU, OR = 0.91, $P < .01$; ED, OR = 0.85, $P < .01$) of being at high risk of DP. Finally, among ICU nurses, older nurses had a lower likelihood (OR = 0.94, $P < .05$) of being at high risk of DP than younger nurses.

Regarding the high risk of RPA, the associated factors among ICU nurses were the social support from colleagues and from superiors and management. For emergency nurses, the associated factors were seniority in the health care sector and perceived workload. For ICU nurses, high social support from colleagues (OR = 0.89, $P < .01$) and

from superiors and management (OR = 0.92, $P < .01$) were significantly associated with lower odds of being at high risk of RPA. Among emergency nurses, those with more seniority in the health care sector (OR = 1.17, $P < .01$) and those reporting a lower workload (OR = 1.80, $P < .01$) during the COVID-19 pandemic had higher odds of being at risk of RPA than emergency nurses with less seniority and reporting a stable workload.

Discussion

KEY RESULTS

The objectives of this study were to assess in Belgium (1) the prevalence of burnout risk among ICU and emergency nurses before and during the COVID-19 pandemic and (2) the individual and work-related associated factors during the pandemic. This study highlighted that the prevalence of burnout risk was high in both groups but overall higher in emergency nurses than in ICU nurses, before and during the COVID-19 pandemic. Half of ICU nurses were at risk of burnout before the pandemic, and this proportion significantly increased to 67% after the pandemic. Conversely among emergency nurses, 70% were at risk of burnout before the pandemic and this proportion did not

TABLE 2
Working conditions of ICU and emergency nurses during the COVID-19 pandemic (second wave of the study)

Variables	ICU nurses (N = 1149)		Emergency nurses (N = 467)		t test/chi-square (P value)
	Mean or n	SD or %	Mean or n	SD or %	
Seniority in the health care sector, year, mean (SD)	13.96	0.32	13.57	0.47	3.42 (.07)
The perceived workload during the COVID-19 epidemic was n (%)					390.62 (<.001)
• Lower	24	2.3	155	37.6	
• The same	88	8.5	71	17.2	
• Greater	920	89.1	186	45.1	
Having sufficient protective equipment for COVID-19, n (%)					0.75 (.39)
• Yes	550	51.1	209	48.6	
• No	527	48.9	221	51.4	
Social support from colleagues, from 6 (low) to 24 (high), mean (SD)	18.59	0.09	18.59	0.14	0.06 (.81)
Social support from superiors, from 5 (low) to 20 (high), mean (SD)	14.85	0.1	14.81	0.17	0.67 (.42)

Descriptive statistics were performed after the exclusion of missing data.
ICU, intensive care unit; COVID-19, coronavirus disease 2019.

change significantly after the pandemic. Therefore, we can note that the COVID-19 pandemic had a greater impact on the burnout risk of ICU nurses than emergency nurses, although the latter had a higher prevalence of burnout risk.

Regarding the determinants of the risk of burnout during the COVID-19 pandemic, several risk and protective factors were highlighted in this study. A change in workload was a significant risk factor but experienced differently by nurses in the ICU than in the emergency department. Among ICU nurses, 89.1% reported having an increase in their workload after the COVID-19 pandemic and this was a significant risk factor for EE and DP. However, among emergency nurses, 37% reported having a decrease in their workload after the pandemic and this was a significant risk factor for RPA. The lack of PPE for COVID-19 was reported by half of ICU and emergency nurses and was a significant risk factor for burnout. Having high social support from colleagues was a protective factor of burnout in both ICU and emergency nurses. In contrast, having high support from superiors and management was a protective factor only in ICU nurses.

INTERPRETATION

A recent meta-analysis on studies conducted before the COVID-19 pandemic showed that the prevalence of EE varied from 2% to 27% among ICU nurses and from 3% to 17% among emergency nurses.[5] These figures are significantly lower than those of our study and different hypotheses can explain it. First, this difference can be explained by the Belgian context. In 2019 in Belgium, the average number of patients per nurse was 9.4, which is above international standards.[26] In addition, a study conducted in Belgian hospitals highlighted that although the nurse-to-patient ratio in the ICU is set by national regulations at 1:3, the optimal ratio would rather be 1:1.5.[27] This indicates, on the one hand, that there was a shortage of nurses in Belgium and, on the other hand, that they were facing a heavy workload that could increase their risk of burnout. Our results are consistent with a 2019 Belgian study on nurses working in general hospitals, which found that 36% had a high risk of EE, 32% a high risk of DP, and 31% a high risk of RPA.[26] In addition, Belgium was strongly affected by the first wave of COVID-19 compared with other European countries. For example, in the first months of the pandemic, Belgium's hospitalization rate was nearly 12 times higher than that of France and its crude death rate from COVID-19 was almost twice as high.[21,28] Second, although the MBI is

TABLE 3
Factors associated with the 3 dimensions of the risk of burnout during the COVID-19 pandemic among ICU and emergency nurses using multivariate logistic regression models (second wave of the study)

Variables	High risk of EE, OR (95% CI)		High risk of DP, OR (95% CI)		High risk of RPA, OR (95% CI)	
	ICU nurses	Emergency nurses	ICU nurses	Emergency nurses	ICU nurses	Emergency nurses
Age, year	1.04 (0.98-1.09)	0.96 (0.89-1.05)	0.94 (0.88-0.98)*	0.95 (0.88-1.04)	0.97 (0.91-1.04)	0.96 (0.87-1.05)
Sex (REF = women)						
• Men	0.86 (0.61-1.24)	0.69 (0.41-1.18)	2.81 (1.96-4.02)†	3.87 (2.23-6.74)†	0.84 (0.54-1.32)	0.91 (0.50-1.64)
Seniority in the health care sector, year	0.97 (0.92-1.02)	1.02 (0.94-1.11)	1.01 (0.95-1.08)	0.99 (0.92-1.08)	1.01 (0.95-1.08)	1.17 (1.08-1.28)‡
The perceived workload during the COVID-19 epidemic was						
• Lower	0.98 (0.27-3.54)	1.01 (0.51-1.97)	0.88 (0.21-3.63)	1.41 (0.71-2.79)	0.93 (0.17-4.93)	1.80 (1.53-2.08)‡
• The same	REF	REF	REF	REF	REF	REF
• Greater	4.03 (2.10-7.72)†	1.73 (0.89-3.36)	2.44 (1.27-4.68)‡	1.70 (1.16-2.22)*	2.02 (0.90-4.55)	1.56 (0.69-3.50)
Having sufficient protective equipment for COVID-19 (reference = yes)						
• No	1.81 (1.36-2.42)†	1.75 (1.25-2.21)‡	1.28 (0.94-1.74)	0.85 (0.52-1.38)	1.14 (0.79-1.63)	1.30 (0.75-2.23)
Social support from colleagues, from 6 (low) to 24 (high)	0.93 (0.88-0.98)*	0.83 (0.75-0.92)‡	0.91 (0.86-0.97)‡	0.85 (0.77-0.95)‡	0.89 (0.83-0.96)‡	0.91 (0.82-1.02)
Social support from superiors, from 5 (low) to 20 (high)	0.91 (0.87-0.97)‡	0.92 (0.85-1.01)	0.96 (0.91-1.01)	0.92 (0.84-1.01)	0.92 (0.86-0.97)‡	0.94 (0.86-1.02)

EE, emotional exhaustion; DP, depersonalization; RPA, reduced personal accomplishment; OR, odds ratio; CI, confidence interval.
* P < .05.
† P < .001.
‡ P < .01.

a widely used instrument, there may be variations in the cutoff points used and these are not systematically reported, making comparisons of prevalence between studies complicated.[5]

So far, few studies have assessed the impact of the COVID-19 pandemic on the risk of burnout among nurses by comparing the situation during the pandemic with the situation before it. Our study highlighted a significant increase in the risk of burnout after the pandemic, in 3 dimensions of burnout among ICU nurses, and in the dimension of RPA among emergency nurses. In addition, our study found a higher risk of burnout among emergency nurses than among ICU nurses before and during the COVID-19 pandemic. This could be explained by the working conditions of emergency nurses because they work in an unpredictable environment in which they have to move from one emergency to another in a short time.[4] In addition, emergency nurses are continually faced with acute illnesses and traumatic events and are often exposed to assault from patients.[7] However, our study found that the COVID-19 pandemic had more impact on the burnout risk of ICU nurses than emergency nurses. Several elements can explain this difference between the 2 groups. Between March and June 2020, 1696 patients with COVID-19 were admitted to ICUs in Belgium.[29] Therefore, the number of intensive care beds has been increased to 2000 with the opening of 800 new intensive care beds in this short period.[30] These additional beds have led to major structural and organizational changes within the ICUs. For example, many nurses from other care units, such as the operating room, consultations, or even some hospitalization units, have been deployed in ICUs to supplement the workforce. However, these nurses had little or no experience working in ICUs, which resulted in an increase in the workload of ICU nurses. In addition to taking care of the most severe patients requiring the most technical care, ICU nurses also had to train their new colleagues and supervise them. In addition, patients with COVID-19 in ICUs considerably increase the workload of nurses because they are often critical, with many devices, requiring a lot of nursing care and high and long-term monitoring. A study in Belgium found that patients hospitalized in the ICU owing to COVID-19 require much more nursing time than patients without COVID-19 and that they needed a nurse-to-patient ratio of 1:1.[31] Finally, ICU nurses were highly exposed to death because the mortality rate of patients with COVID-19 in the ICU at the end of the first wave of the pandemic in Belgium was 36%.[30]

Regarding the factors associated with the risk of burnout, many studies have found an association between the

high workload in intensive care and emergency services and the increased risk of burnout of nurses working there.[6,7] Studies conducted during the COVID-19 pandemic also reported that the increased workload during the pandemic led to an increase in burnout among nurses,[14,16] which is consistent with the results of our study. However, our study also found an outcome that had rarely been documented so far; during the COVID-19 pandemic, a decrease in the workload among emergency nurses significantly increased the risk of RPA. Nearly half of the emergency nurses in our sample declared that they had a decreased workload during the pandemic, which could have led to the feeling that they were not very involved in the fight against the pandemic and the care of patients with COVID-19. This feeling can then lead to an increased risk of RPA.

Conversely among ICU nurses, nearly 90% reported an increase in their workload after the pandemic and this increase was a major risk factor for burnout. Several actions can be implemented to manage the workload in the ICU. First, there is a need to increase the number of trained ICU nurses to increase the nurse-to-patient ratio. Currently, in Belgium, this ratio is legally set at 1:3 in the ICU but as previously explained the ratio for patients with COVID-19 should be close to 1:1.[31,32] Unfortunately, Belgium faces, like many countries, a shortage of nurses. Some stakeholders even speak of a vicious circle, because this shortage exhausts the nurses who are at the bedside, leading to an escape from the profession and therefore a decrease in the number of active nurses. Therefore, it is essential to promote the nursing training and profession, to make it more attractive to students, and also to retain nurses already at the bedside.

Regarding the availability of PPE, approximately half of the sample of ICU and emergency nurses said they did not have enough during the first wave of COVID-19 in Belgium. At the start of the pandemic in Belgium, as in other countries, there was a shortage of PPE. This shortage has probably caused a feeling of insecurity among nurses and the fear of being infected but also of infecting patients and relatives. This could explain why the lack of PPE was associated with a higher risk of EE in ICU and emergency nurses. Similar results were found in a recent study in China.[8]

Our study also found that, during the COVID-19 pandemic, having a high social support from colleagues reduced the risk of burnout among ICU and emergency nurses. Having a high social support from superiors and management also reduced the risk of burnout, but only among ICU nurses. Previous studies have also shown that, during a pandemic, social support from colleagues and from superiors was a protective factor for burnout among health care workers.[33,34] Other studies have found that greater social support from colleagues and superiors reduced the anxiety associated with COVID-19 among frontline nurses.[18,19]

LIMITATIONS

The main strength of this study is the use of data collected before and during the COVID-19 pandemic to assess the impact of the pandemic on the risk of burnout among emergency and ICU nurses. In addition, different potential determinants of the risk of burnout were assessed, some of which have been less studied in the context of the COVID-19 pandemic, such as social support from colleagues and from superiors and management. Finally, another strength of this study was the use of the MBI, which is a validated and widely used tool to assess the risk of burnout among health care workers. This study also has limitations. The first limitation is that it was a cross-sectional study; the 2 waves of surveys were conducted on similar populations, but we did not follow the same individuals over time. Therefore, we cannot study the impact of the pandemic on the risk of burnout at the individual level. Although the 2 samples were not statistically different in terms of age and sex (see Table 1), other unmeasured characteristics may be different between the 2 samples and may modify the association with the risk of burnout. The second limitation is that it was a convenience sample via an online survey with voluntary participation, which leads to possible selection bias. The nurses who responded were people who potentially wanted to share their difficulties and be heard, which could result in an overestimation of the risk of burnout. Information was sought in the Belgian national and regional registers on the characteristics of ICU and emergency nurses (eg, age and sex distribution) to assess the representativeness of the samples of the current study. However, this information is only partially available for nurses in Belgium, and the type of service (eg, emergency department and ICU) is not systematically recorded. Consequently, the representativeness of the samples could not be assessed or adjusted using weighting methods.

IMPLICATIONS FOR EMERGENCY CLINICAL CARE

This study highlighted that the COVID-19 pandemic had a greater impact on the burnout risk of ICU nurses than emergency nurses, although the latter had a higher prevalence of burnout risk. As explained previously, there are several elements that may explain the greater impact of the pandemic on ICU nurses. Between March and June 2020, 800 additional intensive care beds have been opened in

Belgium, and these additional beds have led to major structural and organizational changes within the ICUs (eg, temporary deployment of the nurses from other departments). In addition, patients with COVID-19 in ICUs considerably increase the workload of nurses because they are often critical, with many devices, requiring a lot of nursing care and intensive and long-term monitoring. Finally, ICU nurses were highly exposed to death because the mortality rate of patients with COVID-19 in the ICU at the end of the first wave of the pandemic in Belgium was 36%.[30]

Regarding the determinants of the risk of burnout during the COVID-19 pandemic, several risk and protective factors for burnout were highlighted in this study. A change in workload after the COVID-19 pandemic was a significant risk factor but experienced differently by nurses in the ICU than in the emergency department. Most intensive care nurses reported having an increase in their workload as a result of the COVID-19 pandemic, and this increase was a significant risk factor for EE and DP. Conversely, among emergency nurses, almost 40% reported having a decrease in their workload after the pandemic, and it was a significant risk factor for RPA. The lack of PPE for COVID-19 was also a significant risk factor for burnout. Almost 50% of ICU and emergency nurses reported a lack of PPE, and it was a significant risk factor for EE in both groups. Having high social support from colleagues was a protective factor of burnout in both ICU and emergency nurses. In contrast, having high social support from superiors and management was a protective factor only in ICU nurses.

In addition to the negative impact on workers' health, health care worker burnout has a negative impact on the entire health care system and patient care outcomes. Therefore, policy makers and health managers should provide adequate evidence-based interventions. Several studies have highlighted the importance of implementing interventions at the organizational (eg, appropriate staffing and provision of protective equipment) and individual level (eg, debriefing sessions and social support).[35,36] In terms of staffing, some countries have guidelines for nurse-to-patient ratios, depending on the type of service or patient profile. In the context of a pandemic, one possibility would be to adapt these guidelines and increase the nurse-to-patient ratio. At the individual level, debriefing techniques are probably the most documented interventions to manage the risk of burnout. Individual or group debriefing is an information-sharing and event-handling session that is considered good practice after a disaster or adverse event.[37,38] After a stressful and traumatic event such as the death of patients with COVID-19, a debriefing session within 24 hours could be beneficial for nurses to prevent burnout and other stress-related disorders.[39] Finally, our study showed that strengthening the social support from colleagues and from superiors and management could reduce the risk of burnout among ICU and emergency nurses. For the social support of colleagues, it is possible to strengthen team spirit with interventions such as the granting of breaks to promote informal exchanges between colleagues, the provision of a relaxation room, or the organization of team building. Regarding support from superiors and management, it is possible to set up daily team meetings and systematic debriefing exchanges between the team manager and the nurses. However, for these strategies to be effective, it is essential to target nurses at risk of burnout. This study showed that nurses who experienced a decrease in their workload after the COVID-19 pandemic were also at high risk of burnout; therefore, they should not be overlooked when it comes to interventions.

Conclusions

This study found that ICU and emergency nurses had high burnout risk prevalence before and during the COVID-19 pandemic. Although emergency nurses had a higher prevalence before and during the COVID-19 pandemic, this study found that ICU nurses were more affected by the pandemic. Indeed, the prevalence of burnout risk was stable among emergency nurses whereas it increased among ICU nurses after the pandemic. This result suggests the need for routine, nonpandemic-specific interventions for emergency nurses and more pandemic-specific interventions for ICU nurses.

In the context of the COVID-19 pandemic, different risk factors for burnout have been highlighted such as changes in workload or lack of PPE and protective factors such as social support from colleagues and from superiors and management. However, these factors may have a different influence on the 2 groups of nurses, so it is important to assess them to better target the interventions to be implemented at the individual and organizational levels. For example, most ICU nurses reported an increased workload after the pandemic, and this was a risk factor for burnout. Conversely, nearly half of emergency nurses reported a decreased workload, and it was a risk factor for RPA.

Given that the COVID-19 pandemic continues to rage worldwide, it would be relevant to conduct additional studies to analyze the evolution after more than a year of the risk of burnout among nurses and long-term associated factors. In addition, further studies should

include open-ended questions so that participants can voice their concerns. Finally, we suggest collecting data related to any deployment during the pandemic, to investigate the stress arising from a new work environment.

Author Disclosures

Conflicts of interest: none to report.

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The Impact of Burnout on Emergency Nurses' Intent to Leave: A Cross-Sectional Survey

Authors: Michele M.D. Lee, DNP, RN, CEN, NPD-BC, Mandy M. Gensimore, DNP, RN, NE-BC, Ralitsa S. Maduro, PhD, Merri K. Morgan, DNP, RN, CCRN, and Kathie S. Zimbro, PhD, RN, Woodbridge, VA

BURNOUT IN EMERGENCY NURSES: INTENT TO LEAVE

This study examined the relationship between orientation, burnout (emotional exhaustion, depersonalization, & personal accomplishment) & intent to leave for emergency nurses.

TURNOVER ESTIMATE: $56,000 PER NURSE

48% EMERGENCY NURSES REPORTED NO FORMAL ORIENTATION

Participating in a formal ED orientation program was positively associated with feelings of personal accomplishment and negatively associated with turnover intentions.

Emotional Exhaustion = Emergency Nurse Turnover: Feelings of Personal Accomplishment as a Protective Factor

Nurse managers must actively engage with staff & implement interventions that target areas of concern

Creating work environments to help emergency nurses find meaning or enjoyment in their work is critical to work-life balance and staff retention.

The Impact of Burnout on Emergency Nurses' Intent to Leave: A Cross-Sectional Survey

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CE Earn Up to 11.5 Hours. See page 955.

Contribution to Emergency Nursing Practice

- The current literature indicates that emergency nurses continue to be at high risk for burnout and subsequent turnover.
- This article contributes evidence of the relationships among emotional exhaustion, depersonalization, and sense of personal accomplishment and explains how these psychological mechanisms are associated with emergency nurses' intent to leave.
- Key implications for emergency nursing practice include recognizing the factors that contribute to burnout and providing strategies for nurse leaders, such as a formal professional growth pathway, to decrease emergency nurse burnout in their organizations.

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Abstract

Introduction: Emergency nurses work in one of the busiest and most stressful departments in a hospital and, as such, may experience burnout more often than nurses working in other nursing units. This study examined the relationship among orientation, burnout (emotional exhaustion, depersonalization, and low sense of personal accomplishment), and intent to leave.

Methods: A cross-sectional survey design was used. Emergency nurses who were members of the Emergency Nurses Association were invited to participate in an anonymous survey. The Maslach Burnout Inventory tool was used to explore emotional exhaustion, depersonalization, and sense of personal accomplishment. Emergency nurses' intent to leave was assessed with the Turnover Intention Scale. A logistic regression analysis was used to investigate the odds of intent to leave for those who scored at or above versus below the median on each burnout subscale.

Results: The findings revealed that a formal orientation enhanced emergency nurses' sense of personal accomplishment and was associated with lower intent to leave. The odds of intent to leave were almost 9 times greater for participants with 5 or more years of experience, approximately 13 times greater for those with above-median emotional exhaustion, and more than 6 times lower for those with above-median sense of personal accomplishment.

Discussion: Emotional exhaustion and low sense of personal accomplishment were key factors influencing emergency nurses' intent to leave. Emergency nurse leaders may find that a formal orientation program enhances sense of personal accomplishment and decreases intent to leave. Creating work environments to help emergency nurses find joy in their work may be critical to work—life balance and staff retention.

Key words: Emergency nurse; Burnout; Maslach Burnout Inventory; Intent to leave

Introduction

Emergency nurse leaders are concerned with the high prevalence of burnout among nurses and the subsequent negative impacts on quality of care, lower patient satisfaction scores, and increased job turnover.[1-3] Burnout, described as a high degree of emotional exhaustion and depersonalization and a low sense of personal accomplishment,[4] can affect staff morale, lead to absenteeism, and result in intent to leave employment.[5-8] The prevalence of burnout in nursing has increased considerably over the past 10 years, making burnout a significant workforce issue,[9] especially in the emergency department.[10,11] Organizational change, lack of autonomy, and lack of management support create significant occupational stressors and increase burnout.[10]

Emergency nurses work in one of the busiest and most stressful departments in a hospital and, as such, may experience burnout more often than nurses working in other nursing units.[12] This environment is emotionally and physically demanding[13,14] because nurses routinely experience patients classified as high acuity, increased nurse-to-patient ratios, life-and-death situations, and the ever-present threat of violence.[15] Consequently, emergency nurses may no longer find meaning or enjoyment at work,[16] causing them to leave the emergency department in search of positions that are less physically demanding and less stressful.[17]

Burnout occurs gradually over time, often making the symptoms more difficult to identify.[14] Chronic high levels of burnout are harmful to nurses as well as their patients[18] and lead to increased turnover.[19] Across the United States, ED staff turns over every 5 years,[20] which contributes to a lack of experienced nurses and can be linked to decreased quality of care.[21-25] In 2019, the annual turnover rate for emergency nurses was 18.5%, which was significantly higher than the national average (15.9%).[26] In 2020, emergency nurses' turnover rate had increased to 20.0%, still exceeding the national average (18.7%).[20] New graduate nurses make up approximately 10% of the staff in acute care settings,[27] with 23.9% leaving within the first year.[20]

Continually educating new emergency nurses[28] at a higher rate than other nurses may result in the consumption of a higher proportion of the organization's recruitment and retention budget,[17] negatively affecting the financial viability of the organization.[29] The turnover cost associated with replacing a newly vacated position may total more than $56 000,[26] including advertisement, recruitment, hiring, and general orientation.[30] The Emergency Nurses Association (ENA) Executive Synopsis on Emergency Nurse Retention noted that specialized education for critical competencies, specialty certifications, and advanced training for patients classified as high acuity may further increase costs.[31] Beyond these costs are those related to hospital-acquired infections attributed to hospitals with increased burnout rates.[32] With the average hospital losing between $3.6 million and $6.1 million each year related to turnover, an increase of 1% in the retention rate could lead to a savings of $306 400 per year.[26]

Burnout may manifest in insidious ways, ultimately resulting in nurses' intent to leave their job.[33] Other contributing factors include the lack of (1) education, (2) professional growth, (3) qualified nurses, (4) visible leadership, (5) encouragement, and (6) recognition.[34] Exploring the relationship among nurse orientation, burnout, and intent to leave employment is critical to maintaining an experienced, engaged workforce in the emergency department.[5,8,35] Providing an ED-specific orientation program may help emergency nurses manage and overcome stress in their work environment.[36] This specialty-specific orientation is especially important for new graduate nurses as they transition into practice, as well as for those changing their specialty, because it may improve their professional development and increase retention rates.[37] A gap exists in the literature regarding easily implemented, cost-effective interventions that address burnout and intent to leave.[38] Therefore, the current study aimed to explore the relationship among orientation, burnout, and intent to leave for nurses working in the emergency department.

Methods

STUDY DESIGN, SETTING, AND PARTICIPANTS

A cross-sectional, exploratory survey was conducted from May 2019 to August 2019, using convenience sampling. The anonymous self-administered questionnaire was accessible on the ENA website.

INCLUSION/EXCLUSION CRITERIA

Registered nurses working in the emergency department and members of the ENA were invited to participate. Licensed practical nurses, advanced practice nurses, and participants who could not read and understand the English-language survey were excluded.

VARIABLES AND INSTRUMENTS

The sociodemographic variables included personal (age, sex, race, and education) and professional (work setting, time worked in direct care, shift worked, and years of

experience) attributes. Self-reported completion of an ED orientation program was also measured. The survey did not describe the components of a formal ED orientation program, thus leaving interpretation to the participants.

OUTCOME

Turnover Intention Scale

The Turnover Intention Scale−6 is a validated tool that uses a 6-item 5-point Likert scale with anchor points of 1, never; and 5, always.[39] The score ranges from 6 to 30, with higher scores indicating a higher intention to leave employment. An example survey item includes "How often have you considered leaving your job?" The internal consistency reliability of the Turnover Intention Scale−6 scale in this present study was good (Cronbach α = 0.79).

INDEPENDENT VARIABLES

The Maslach Burnout Inventory−Human Services Survey for Medical Personnel is a validated tool that has 3 subscales (emotional exhaustion, depersonalization, and personal accomplishment) measured on a 7-point Likert scale with anchor points of 1, never; and 7, every day.[4,8,40]

Emotional Exhaustion

Emotional exhaustion, which describes feelings of being emotionally overextended and exhausted by one's work,[4] is a 9-item subscale with a total score that ranges from 9 to 63, with higher scores indicating higher emotional exhaustion.[5,41] An example survey item includes "I feel emotionally drained from work." The internal consistency reliability of the emotional exhaustion scale in this study was excellent (Cronbach α = 0.90).

Depersonalization

Depersonalization, which describes an unfeeling and impersonal response toward the recipients of one's care or service,[4] is a 5-item subscale with a total score that ranges from 5 to 37, with higher scores indicating higher depersonalization. An example survey item includes "I worry that this job is hardening me emotionally." The internal consistency reliability of the depersonalization scale in this study was good (Cronbach α = 0.73).

Personal Accomplishment

Personal accomplishment, which describes feelings of competence and successful achievement in one's work with people,[4] is an 8-item subscale with a total score that ranges from 8 to 56, with higher scores indicating more personal accomplishment. An example survey item includes "I can deal effectively with the patients' problems." The internal consistency reliability of the personal accomplishment scale in this study was good (Cronbach α = 0.73).

ETHICAL STATEMENT

This study was approved by the American Sentinel University Institutional Review Board. The online questionnaire contained a cover letter with a waiver of informed consent. To maintain participant anonymity, internet protocol addresses were not collected.

POWER AND DATA ANALYSES

The calculated total sample size required for the bivariate correlations in this research project was 29, whereas for the logistic regression analysis, it was 70. This was determined a priori by using a correlational, 2-tailed estimate, along with α = 0.05, power of 0.80, and an effect size of 0.50 (moderate effect size), through G*Power power analysis software (Heinrich Heine University).[42]

SPSS version 24 (IBM Corp, Armonk, NY) was used for data analyses. Surveys with missing data were excluded. Descriptive statistics were used to characterize the study sample. Pearson and Spearman rank correlation coefficients were used to explore bivariate relationships. We ran an unadjusted and bootstrapped multiple binary logistic regression analysis to explore the odds of the participants indicating intent to leave employment. The effects for each association were examined while controlling for the effects of other variables in the model. Bootstrapping (iterations = 5000), a method for deriving robust estimates of SEs and CIs for estimates such as the odds ratios or regression coefficients, is used to assure stability of the estimates derived from a relatively small sample size. Significance testing was performed using 95% bias-corrected CIs.

For interpretability, we categorized participant answers on the burnout and turnover scales as 0, median or below; 1, above median, given that the scale results were discrete. We derived the median values by using frequency distributions for this sample (intent to leave median = 18, emotional exhaustion median = 36, depersonalization median = 16, and personal accomplishment median = 45). The total burnout score was not included in the multivariate regression model because the individual subscales were included instead.

TABLE 1

Descriptive statistics for demographic variables and work characteristics (N = 77)

Variables	n	%
Work setting		
Acute care hospital	63	81.8
Freestanding emergency department	4	5.2
Education/academia	4	5.2
Other	6	7.8
Direct care, %		
≤50	21	27.3
>50	56	76.7
Experience, y		
<5	29	37.7
5-10	18	23.4
11-15	7	9.1
16-20	11	14.3
21-25	4	5.2
>25	8	10.4
Shift		
Day: 7 AM to 7 PM	36	46.8
Night: 7 PM to 7 AM	16	20.8
Midshift: 9 AM to 9 PM	3	3.9
Midshift: 11 AM to 11 PM	11	14.3
Midshift: 3 PM to 3 AM	2	2.6
Day: 7 AM to 3 PM	6	7.8
Night: 11 PM to 7 AM	3	3.9
Age group, y		
20-30	15	19.5
31-40	25	32.5
41-50	19	24.7
51-60	14	18.2
61-70	4	5.2
Sex		
Male	11	14.3
Female	65	85.7
Race		
American Indian or Alaska Native	2	2.6
Asian	3	3.9
Black or African American	3	3.9
White	65	84.4
Other	4	5.2
Nursing education		
Associate Degree	15	15
Bachelor of Science	51	51
Master of Science	10	10
Doctorate in Nursing Practice	1	1
Orientation		
Yes	40	51.9
No	37	48.1

Results

A total of 104 potential participants began the survey, with 77 (74%) included in the final analyses. A total of 27 participants were excluded: 15 did not meet the inclusion criteria, and 12 did not complete the questionnaire. The participants in our sample varied with regard to demographic characteristics (Table 1). Descriptive statistics for the burnout and turnover intention variables are listed in Table 2.

Increase in participant age was significantly associated with lower depersonalization ($r = -0.32$, $P = .01$), whereas having less than 5 years of experience was associated significantly with lower turnover intentions ($r = 0.23$, $P = .046$). Furthermore, participating in a formal ED orientation program was positively associated with feelings of personal accomplishment ($r = 0.26$, $P = .02$) and negatively associated with turnover intentions ($r = -0.25$, $P = .03$; Table 3). Significant correlations were noted between total burnout ($r = 0.43$, $P < .001$) and intent to leave employment and between the burnout subscales emotional exhaustion ($r = 0.71$, $P < .001$), depersonalization ($r = 0.36$. $P = .002$), and personal accomplishment ($r = -0.46$, $P < .001$) and intent to leave employment. See Table 3 for correlations between the 3 burnout subscales and the total burnout score.

To test the associations of our study variables, we ran unadjusted and adjusted bootstrapped, simple, and multivariate binary logistic regression analyses examining the odds of the participants indicating intent to leave (Table 4). We used the results of the univariate regression analyses to inform the multivariate model. The participants who reported having experience of 5 years or more had a 2.85 times increase in the odds of intent to leave in the univariate regression analysis and an 8.89 times increase in the odds of intent to leave in the multivariate regression analysis. The participants who reported above-median emotional exhaustion had an 8.33 times increase in the odds of intent to leave in the univariate regression analysis and a 13.29 times increase in the odds of intent to leave in the multivariate regression analysis. The participants who reported above-median depersonalization had a 6.13 times increase in the odds of intent to leave in the univariate regression analysis; however, these odds were not statistically significant in the multivariate regression analysis. The participants who reported above-median sense of personal accomplishment had a 5.26 times decrease in the odds of intent to leave in the univariate regression analysis and a 6.67 times decrease in the odds of intent to leave in the multivariate regression analysis. Finally, on the univariate level, the participants who reported above-median total

TABLE 2
Descriptive statistics for burnout and turnover intent (N = 77)

Measures	Median	Interquartile range	Mean	SD	Minimum	Maximum	Skewness/Kurtosis
Emotional exhaustion	36.00	15	36.77	11.01	12	59	−0.04/−0.47
Depersonalization	16.00	26	16.99	6.17	5	31	0.33/−0.52
Personal accomplishment	45.00	11	44.56	7.45	26	56	−0.57/−0.42
Burnout	98.00	23	98.25	15.20	59	132	0.09/−0.25
Turnover intent	18.00	6	17.91	3.82	10	26	−0.11/−0.56

burnout had a 3.50 times increase in the odds of intent to leave.

Discussion

This study explored the associations of orientation and burnout with emergency nurses' intent to leave employment. Lack of appropriate education has been linked to nurses feeling incompetent and subsequently having a low sense of personal accomplishment.[43] Health care–setting leaders should focus on strategies to reduce depersonalization and improve sense of personal accomplishment to improve quality of care and job satisfaction.[44] Our results were in concordance with those reported in the literature in that emotional exhaustion and sense of personal accomplishment were key factors influencing emergency nurses' intent to leave.[5,17,44] In our study, emergency nurses who reported a higher-than-median perception of emotional exhaustion had significantly higher odds of reporting intent to leave their employment. Conversely, emergency nurses who reported higher-than-median perceptions of a sense of personal accomplishment had significantly lower odds of intent to leave their employment.

Consistent educational and transitional programs better prepare new graduate nurses for the intense patient care environment and are critical to nurse retention.[45] In concordance with the findings of previous studies, we found that receiving a formal orientation enhanced emergency nurses' sense of personal accomplishment, and a high sense of personal accomplishment was associated with lower intent to leave.[37] However, we noted that only 52% of the emergency nurses in our sample had participated in what they considered a formal orientation. In contrast with the Nursing Solutions, Inc, 2020 study,[26] our findings revealed that most emergency nurses practicing for less than 5 years had lower intent to leave. Finally, our results (Table 3) supported the findings of previous work that showed no relationship between level of academic education and burnout.[46]

Limitations

This study was exploratory and aimed at generating hypotheses that inform future research. Several limitations should be considered. First, there was a small convenience sample of emergency nurses who participated, limiting the number of model parameters that could be investigated. Second, the sample consisted of participants who were members of the ENA, which may have resulted in selection bias. Repeating the study with a larger, more diverse sample may produce different results. In addition, a description of a formal ED orientation was not provided. Finally, there may be other confounding variables that influenced an emergency nurse's decision to leave employment, such as workload and culture,[5] that were not explored in this study. Future studies should include these variables.

Implications for Emergency Clinical Care

Our work adds to the body of evidence that suggests that increasing emergency nurses' sense of personal accomplishment may reduce nurse burnout and decrease intent to leave.[8] Moreover, nurse leaders can have a significant impact on nurse turnover and the quality of patient care delivered.[8] The shortage of nurses has resulted in increased workload and burnout, which can affect the quality of care as well as their intent to leave.[45] Emergency nurse managers are frequently confronted with urgent priorities, making filling vacancies an overwhelming task.[47] Despite nursing shortages and productivity issues, our results support nurse managers encouraging, and budgeting for, professional development opportunities for their staff.[34]

On the basis of our results and the work of previous researchers, we recommend that emergency nurse managers actively engage with their staff, explore their concerns, and subsequently implement interventions or strategies that target the areas of concern.[48] Staff retention is critical to workforce management, and, as such, a nurse manager's responsibility is to create and maintain an environment that supports retention.[49] Research results in the published

TABLE 3
Bivariate correlations (N = 77)

Variable	Age	Sex	Race	Education	Experience	Direct care	Orientation	EE	DP	PA	Burnout	Turnover intent
Age*	—											
Sex*	0.10	—										
Race*	0.13	0.23†	—									
Education*	0.13	−0.05	0.07	—								
Experience*	0.37‡	0.14	0.26†	0.24†	—							
Direct care*	−0.23†	−0.08	−0.10	−0.17	−0.36‡	—						
Orientation*	−0.12	0.13	0.09	−0.13	−0.32‡	0.29†	—					
EE	−0.10	0.06	−0.10	0.10	−0.07	0.04	−0.07	—				
DP	−0.32‡	0.02	−0.10	0.03	−0.12	0.10	−0.17	0.59‡	—			
PA	0.04	−0.08	0.09	0.16	−0.15	−0.11	0.26†	−0.26†	0.23†	—		
Burnout	−0.21	0.02	−0.03	0.12	−0.18	0.06	−0.01	0.84‡	0.72‡	0.21	—	
Turnover intent	0.03	0.02	−0.15	0.16	0.23†	0.09	−0.25†	0.71‡	0.36‡	−0.46‡	0.43‡	—

Personal accomplishment age coded 0 = <40 years, 1 = ≥40 years; sex coded 0 = male, 1 = female; race coded 0 = nonwhite (Black, Asian, American Indian, and Other), 1 = white; education coded 0 = bachelor's degree or less, 1 = graduate degree; experience coded 0 = less than 5 years, 1 = 5 years or more; direct care coded 0 = ≤50%, 1 = >50%; orientation coded 0 = no ED orientation, 1 = ED orientation, EE = Emotional exhaustion; DP = Depersonalization; and PA = Personal accomplishment.

* Spearman rho correlations (nonparametric).
† P < .05.
‡ P < .01

TABLE 4
Unadjusted and adjusted logistic regression analyses for dependent variable turnover intent

Measures	Unadjusted					Adjusted				
Variables	B	Bias*	Effect (OR)	95% CI	P/P*	B	Bias*	Effect (OR)	95% CI	P/P*
Orientation	−.67	−.04	0.51 (1.96)	0.02−1.27	.15/.14	—	—	—	—	—
Experience	1.05	0.51/0.54	2.85	1.06−7.69	.04/.03	2.19	0.89	8.89	1.98−40.04	.004/.001
Emotional exhaustion	2.12	0.09	8.33	1.19−23.49	<.001/<.001	2.59	0.91	13.29	2.74−64.44	.001/<.001
Depersonalization	1.81	0.06	6.13	2.27−16.60	<.001/<.001	.64	0.10	1.89	0.49−7.27	.35/.38
Personal accomplishment	−1.64	−0.06	0.19 (5.26)	0.07−0.52	.001/<.001	−1.88	−0.54	0.15 (6.67)	0.04−0.56	.006/.002
Burnout (total score)	1.25	0.04	3.50	1.36−9.04	.01/.005	—	—	—	—	—

Simple regression analysis: predictors were analyzed individually without controlling for other variables in the model. Multivariate regression analysis: predictors were entered in the model simultaneously. Odds ratios and CIs are based on unstandardized estimates. Significance was inferred on the basis of the 95% CIs. P values were kept at 3 decimals to allow for differentiation in adjustment. Orientation and total burnout were not included in the multivariate regression model for parsimony and to avoid collinearity, respectively. Inverse odds ratios are presented in parentheses for ease of interpretation when the effects were negative.
OR, odds ratio.
* Bootstrapped (bias-corrected) estimates.

literature indicate that one way to significantly improve nurse practice environments and directly affect nurse outcomes is by increasing nurse leaders' support of nurses.[8] Nursing leaders who are visible, accessible, and supportive of the staff can have a positive impact on their staff's intent to stay.[8] These nurse leaders' behaviors align with the ENA Position Statement on Nurse Leaders in Emergency Care Settings, which promotes emergency nurse leaders' creation of a learning environment geared toward professional growth and ongoing mentoring.[50]

Our results suggest that intent to leave may be indirectly influenced by inadequate ED orientation and work-related burnout. The ENA Emergency Nurse Orientation Position Statement notes that successful retention strategies in the emergency department should target orientation and training.[51] Orientation includes traditional classroom lectures, realistic simulations, group discussions, and clinical hands-on competency education and mentoring,[51] along with changing the culture and improving the nurse practice environment.[52-54] Residency (orientation) programs, taught over 18 weeks, that contain didactic instruction, clinical immersion, case studies, and structured mentoring enhance nurse competencies comparable to the competencies of nurses with 17 months of work experience.[55]

On the basis of the results of our study, along with the literature regarding the importance of improving personal accomplishment, we recommended to our emergency nurse leaders that they consider designing a professional growth pathway that would focus on reducing the emotional exhaustion and increasing the sense of personal accomplishment of emergency nurses. Such pathway process models may decrease our emergency nurses' intent to leave by decreasing their sense of burnout and, ultimately, may lead to improved patient care.

Helping emergency nurses, especially new graduates, develop coping strategies may minimize their emotional exhaustion and enhance their sense of personal accomplishment, which may ultimately reduce burnout and improve staff retention.[56,57] Attending a formal ED orientation program is just the beginning of their professional growth. Having ongoing professional development is critical to increasing their sense of personal accomplishment and subsequently decreasing burnout. We recommend developing a formal orientation for new graduate nurses as an important investment, not an expense.[30] The return on investment owing to increased retention rates and improved quality of patient care can provide a financial benefit for the entire organization.[30]

Conclusions

This study examined the relationship among emergency nurse orientation, burnout (emotional exhaustion, depersonalization, and low sense of personal accomplishment), and intent to leave. We found that nurses who reported having a formal orientation had an enhanced sense of personal accomplishment, and a sense of personal accomplishment was associated with lower intent to leave. Creating work environments to help emergency nurses find meaning or enjoyment in their work is critical to staff retention.[16] Emergency departments are challenging and complex environments that impose high levels of stress and significant demands on emergency nurses.[56,58,59] We recommend that emergency nurse leaders design professional growth pathways, invest in nurse professional development with professional accomplishments, and ensure adequate emergency nursing orientation that fosters a workplace learning environment geared toward professional accomplishments, growth, and ongoing mentoring.

Author Disclosures

Conflicts of interest: none to disclose.

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Emergency Response: A Cross-sectional Study of Core Competencies for Nurses Regarding Major Infectious Disease Outbreaks

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Contribution to Emergency Nursing Practice

- The core competencies of nursing personnel regarding disaster preparedness have been identified as a main factor affecting nursing effectiveness.
- This research aids in the understanding of nurses' perceptions of their preparation and comfort level in caring for patients with infectious diseases during a pandemic.
- Recommendations for translating the findings of this article into emergency clinical practice include that it is necessary to develop an education program to improve core competencies of nurses regarding major infectious disease outbreaks. Consideration should be given to the development and utilization strategies to support nursing pandemic response, such as triaging of patients, early warning systems, reporting of mass patients, or the emergence of clustering diseases.

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Abstract

Introduction: The core competencies of nursing personnel have been identified as a main factor affecting nursing effectiveness. This study examined core emergency response competencies of Chinese nursing personnel related to the outbreak of major infectious diseases.

Methods: A survey was conducted among 960 nurses working in a tertiary hospital in Shanghai, China. Data were collected on core emergency response competencies of nursing personnel caring for patients with major infectious diseases, measuring overall competency as well as by dimensions of prevention ability, rescue ability, and preparation ability. A t-test and one-way analysis of variance were first analyzed for differences between groups, followed by multiple linear regression to analyze main influencing factors for core emergency response competencies.

Results: The average score for core emergency response competencies of nursing personnel delivering care to patients with major infectious diseases was 128.05 (SD 22.23) (range 36−180 points); or 71%, which is equivalent to moderate performance. Multiple linear regression analysis demonstrated that the main influencing factors for these nursing personnel were before participation in emergency drills for infectious diseases, current educational background, and working experience in the realm of infectious disease nursing. The final model explained 8.4% of the variance in core emergency response competencies.

Discussion: These findings indicate that it is necessary to strengthen the training of nursing staff with educational background deficits or no prior work or drill experience related to infectious diseases to effectively improve the core emergency response competencies of nursing personnel relative to infectious diseases.

Key words: SARS-CoV-2; Outbreak; Infectious diseases; Nurse; Emergencies; Surveys and questionnaires; Capacity building; Pandemics

Introduction

Over the past 2 decades, a series of major infectious disease events have challenged the core emergency response competencies of the nursing profession. Each emergency response results in learning opportunities, experience, and data, which can contribute to the design and improvement of disaster nursing competencies. Here, we consider those relevant to pandemic response.[1-6]

China is an economically, geographically, and climatologically diverse country with a huge population, which makes it potentially vulnerable to emerging diseases and strains.[7] In recent years, severe acute respiratory syndrome, avian human influenza, influenza, coronavirus disease 2019 (COVID-19) and other major infectious diseases have occurred successively in China, and these outbreaks have had a serious impact on Chinese society and its economy. COVID-19 is an emerging respiratory infectious disease caused by the severe acute respiratory symdrome coronavirus-2 which was first detected in early December 2019 in Wuhan, China. Evidence-based measures taken to control the disease in Wuhan included Wuhan's lockdown, the operation of temporary hospitals (known in China as Fangcang shelter hospitals), the extension of the lunar new year holiday, and active case finding and contact tracing.[8-10] The temporary hospitals, transformed from large public facilities (such as gymnasiums, etc.) for the purpose of treating a large number of mild-to-moderate COVID-19 patients, played a distinctive part in breaking the vicious cycle of transmission of the virus. These hospitals were built for triage, the provision of basic medical care for mild-to-moderate cases, isolation, monitoring, rapid referral, and essential living and social engagement.[10] This is a new type of temporary hospital model, which also presents different challenges to the working style of nursing personal. Nurses needed to adapt to new positions quickly.

During the COVID-19 epidemic, in addition to the local medical staff in Hubei Province, 42,000 medical workers across the country participated in frontline epidemic response work in key areas of the outbreak (Hubei Province); among them were 28,600 nurses which accounted for 68% of the total number of medical workers.[11] Given the increasing number of cases worldwide, epidemic prevention and control in China changed into normalized management, which will be a long-term effort.

Evidence from previous studies indicates that nurses reported inconsistent experiences of readiness for disasters.[12,13] In addition to a shortage of nursing personnel, the core competencies of nursing personnel regarding disaster preparedness have been identified as a main factor affecting nursing effectiveness in disaster response.[14,15]

During an infectious disease outbreak or other disaster, nurses are on the front lines, potentially putting their health and safety at risk. However, experience in addressing infectious disease outbreaks and professional knowledge in addressing emergencies has been associated with reduced frequency of burnout,[16] while a lack of knowledge has been associated with reports of anxiety and higher stress levels.[17] While disaster nursing competencies are focused on all-hazards preparedness, the COVID-19 pandemic has presented an opportunity to address nurses' readiness for pandemics and to apply key recommendations from other major public health emergencies to better protect the world against future disasters.[18,19] The COVID-19 pandemic has shown that an important priority for nursing education moving forward is to ensure that nurses are competent to provide effective care during a pandemic or other disaster. Therefore, investigating the core emergency response competencies of nursing personnel following the COVID-19 pandemic is essential to improving nursing practice. The purpose of this study was to quantify the level of participants' perception of disaster preparedness for infectious disease and ascertain factors associated with perceived preparedness levels in the midst of the ongoing pandemic among nursing personnel in China.

Methods

DESIGN AND PARTICIPANTS

This descriptive study, consisting of a cross-sectional survey, was conducted from March 27 to April 2, 2020 among clinical nursing personnel from an academic, tertiary hospital in Shanghai. This study conformed to STROBE guidelines. Before data collection, ethical approval was obtained from the Institutional Review Board of Shanghai East Hospital affiliated with Tongji University (IRB No.: EC.D (BG. 016. 02.1-2020-149).

MEASURES

Demographics

The demographic section included 11 items on sex, age, education level, department, working years, professional title, clinical position, political outlook, whether they have children, infectious disease-related work experience and training, and previous experience with other major disasters/emergency rescue (such as earthquake, etc).

Core Emergency Response Competency

The core emergency response competency questionnaire for medical staff for major infectious diseases developed by Gan Ting[20] and Liu Lingyu[21] was used. The authors obtained permission from the survey developers to reprint these instrument items (Table 1). The questionnaire is composed of 3 first-level indicators, 11 second-level indicators, and 36 third-level indicators. The first-level indicators included preventive ability (including 3 second-level indicators), preparation ability (including 2 second-level indicators and 4 subordinate 3-level indicators), and rescue ability (including 6 second-level indicators and 29 subordinate third-level indicators). The survey was developed

TABLE 1

The Core Emergency Response Competency Questionnaire

How familiar are you with the content listed in the following table? Please select the corresponding option according to your present situation. There are 3 categories (prevention, preparation and rescue) and 36 items in total)

| 1; Not at all | 2; Not familiar | 3; Generally familiar | 4; Familiar | 5; Very familiar |

1	How familiar are you with the infectious disease spectrum (the concept and significance of incubation period, infectious period, recessive infection, dominant infection, etc.)?
2	I understand the spread of infectious diseases.
3	I feel that I have a mastery of the principles of prevention and control of infectious diseases.
4	I am familiar with the responsibilities of health workers in the National Emergency Plan for Public Health Emergencies.
5	I am familiar with the responsibilities of nursing staff in the National Emergency Plan for Medical and Health Rescue in Public Emergencies.
6	I understand the Regulations on Public Health Emergencies.
7	I understand the Law of the People's Republic of China on the Prevention and Control of Infectious Diseases.
8	I understand the significance of symptom monitoring.
9	I understand the definition of syndrome and target disease.
10	I understand case monitoring in emergency situations, i.e., classify patients according to established case definitions.
11	I understand the time limit for reporting legal infectious diseases.
12	I understand how to fill in the Report Card of Infectious Diseases of the People's Republic of China correctly.
13	I understand the scope of information regarding the reporting of infectious disease emergencies.
14	I understand the reporting process of public health emergencies.
15	I understand the basic knowledge of medical response to infectious disease emergencies.
16	I feel comfortable in correctly implementing patient specimen collection regarding infectious diseases.
17	I understand the precautions for specimen preservation and transportation.
18	I feel I have clear and reliable sources of information regarding infectious diseases.
19	I know how to obtain key information from selected information sources.
20	I understand the methods of psychological self-adjustment after caring for patients with infectious diseases.
21	I understand the meaning of standard precautions.
22	I understand the protection requirements of various transmission routes of infectious diseases.
23	I know how to correctly put on and take off personal protective equipment.
24	I can list the emergency treatment methods for exposure to the patient's blood and body fluids.
25	I understand the principles of setting up infectious disease wards.
26	I can properly implement hand hygiene.
27	I can properly dispose of medical waste related to infectious diseases.
28	I understand how to properly dispose of dead bodies of potential and actual infectious disease patients.
29	I understand the method of environmental disinfection.
30	I understand the isolation principles of various transmission channels.
31	I can correctly implement the isolation of patients with various infectious diseases.
32	I understand the quarantine methods for close contacts of various infectious diseases.
33	I can formulate health education programs to control the spread of infectious diseases.
34	I understand the appropriate response to a bioterrorism attack.
35	I understand the emergency response of infectious diseases after natural disasters.
36	I know the precautions to take when participating in international rescue situation.

based on extensive literature review and with the input of experts in disaster nursing.[12,14,20-22] It was first pilot tested with 102 nurses and refined before the final version was established. In this study, the Cronbach's αlpha of the questionnaire is 0.97. The Cronbach's αlpha of each indicator is 0.91, 0.95, and 0.98. The content validity of the questionnaire was completed by expert scoring method, and the Content Validity Index was 0.87,[21,22] which demonstrates good reliability and validity and has been used in China in previous studies. Using a Likert scale with 5-level scoring, each item ranges from 1 point "totally unknown" to 5 points "very familiar." The total score ranges from 36 to 180 points, where the higher the score, the better the core emergency response competencies. A score of less than 60% (ie, 36−108 points) indicates nonperformance, 60%−79% (ie, 108−144 points) equates to moderate performance, ≥80% (ie, 108−144 points) denotes proficient ranking, and ≥90% (ie 162−180 points) suggests a distinguished level.[21]

PARTICIPANT RECRUITMENT

Participants were recruited from the Shanghai East Hospital. Inclusion criteria were (1) a current nursing practice certificate and registration; and (2) in current active clinical practice at the study site. Nurses not presently practicing clinically at the time of the study, or who held administrative roles, were excluded.

The purpose and response method of the survey was explained by the manager of the nursing department to the head nurses of each clinical department. The questionnaire link was then uniformly distributed to each nursing unit. The head of each nursing unit encouraged, but did not require, nurses who met the inclusion criteria to participate in the research study, and the results of the electronic questionnaire were only visible to the research team with no disclosure to others, reducing the possibility of compulsion.

DATA COLLECTION

Data collection was performed via the WeChat app (the Chinese version of WhatsApp) accessed on a smart phone. The questionnaire was completed by each nurse, individually and anonymously. After entering the electronic questionnaire interface, informed consent was collected, where the home page explained the research purpose to the participants and clarified that the data collected would not be used for any purpose other than the research. They could then choose "agree" to continue to answer questions or "disagree" to exit and withdraw from the survey at any time without providing a reason or being penalized.

Antirepeat settings, which are used to prevent the same person from participating repeatedly, regional settings of IP address, and required-question settings were used to ensure the quality of returned questionnaires. The questionnaires were collected by anonymous electronic forms. Respondents were able to review and change their answers through a back button. After the completion of the questionnaire, participants had the option to enter their email address to be randomly selected for a ¥1−100 shopping voucher. Data taking less than 4 minutes to complete were deleted to avoid potential invalid questionnaire collection. In this survey, 1040 nurses met the eligibility criteria and received a link to the survey, 978 questionnaires were collected, and 960 questionnaires were determined to be valid. The response rate was 92.3%.

DATA ANALYSIS

First, mean and SD were used to describe the continuous measurements if they were normally distributed or the inter quartile range was used if not. Categorical variables were described by frequency and composition ratio. A t-test and one-way analysis of variance (one-way ANOVA) were analyzed for differences between groups, and those with statistical differences were analyzed by multiple linear regression. In the multiple linear regression analysis, the total score was taken as the dependent variable, and the statistically significant factors (such as prior work experience with infectious disease, prior major disaster rescue experience, etc) in the one-way ANOVA were used as independent variables. Variables that entered the regression equation were considered to be the main influencing factors. The significance level was set at $P = 0.05$. SPSS (version 25.0) was used for all analyses.

Results

A total of 960 nurses were included in the study, which encompassed a variety of specialty fields including intensive care, medical-surgical, operating room, cardiac, and others. Among these, 259 nurses (27%) were from the emergency department and 18 nurses (1.9%) were from the WHO emergency medical team. These nurses are deployed to help countries affected by disasters, outbreaks, and emergencies.[23] These identified teams are appropriately trained and equipped to assist those countries seeking international medical assistance. The 18 WHO emergency medical team nurses also participated in the fight against COVID-19 in Wuhan.

In this survey, of the 960 nursing personnel surveyed, there were 39 men (4.1%) and 921 women (95.9%), with

TABLE 2
Rating table for core emergency response competency of major infectious diseases in nursing personnel (n = 960)

Items	Score range	Mean (SD)	Score %
Prevention ability	3−15	10.79 (2.03)	71.93
Preparation ability	4−20	13.54 (2.92)	67.70
Emergency plan	2−10	6.92 (1.50)	69.20
Laws and regulations	2−10	6.62 (1.54)	66.20
Rescue capability	29−145	103.72 (18.35)	71.53
Monitor	3−15	10.32 (2.15)	68.80
Report	4−20	13.33 (3.02)	66.65
Medical response	6−30	21.06 (4.18)	70.20
Public health response	12−60	45.93 (8.13)	76.55
Risk communication	1−5	3.50 (0.83)	70.00
Emergency response to infectious diseases under specific circumstances	3−15	9.57 (2.62)	63.80
Total score	36−180	128.05 (22.23)	71.14

a mean age of 31.6 years (SD 8.1, range 21−55). Nursing experience in years ranged from 10.2 years (SD 8.9, range 0.7−40), and there were 357 nurses (37.2%), 401 nurse practitioners (41.8%), 198 supervisor nurses (20.6%), and 4 nurse specialists (0.4%). Current education levels included 11 study participants (1.1%) who graduated from technical secondary school, 313 (32.6%) who graduated from junior college, 617 undergraduates (64.3%), and 19 postgraduates (2.0%).

Out of a possible 180 points, the average score was 128.05 points (SD 22.23) for core emergency response competencies of nursing personnel delivering care to patients with major infectious diseases (Table 2). At 71%, this score indicates moderate performance.

Figure 1 shows the distribution chart of core emergency response competency score frequencies of nursing personnel for major infectious diseases. 11.3% of nurses scored less than 60%, which lies within the nonperformance level,
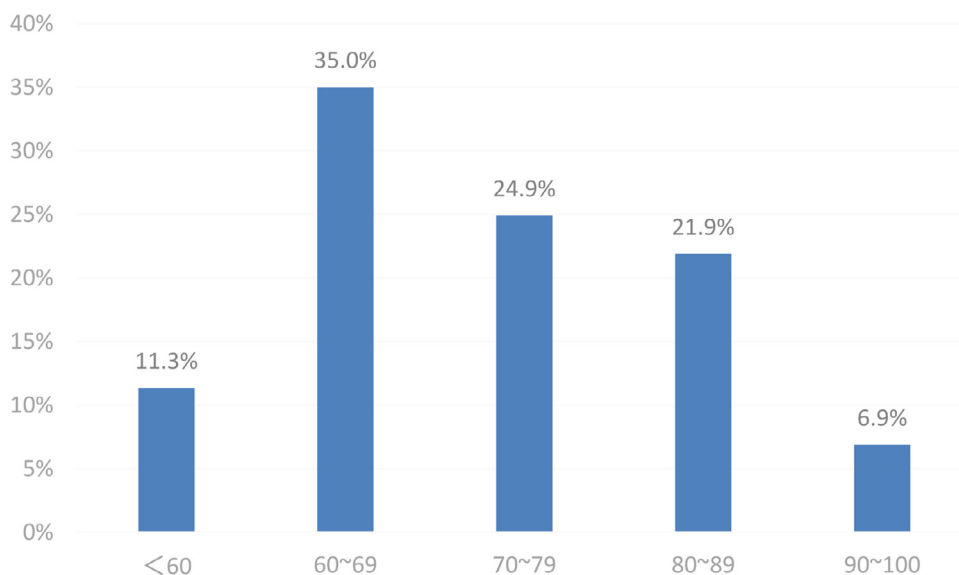
FIGURE 1
Distribution chart of core emergency response competency score frequencies of nursing personnel for major infectious diseases. The x-axis represents different survey scores, ranging from less than 60 to 100, the y-axis represents the proportion of the total number of people whose survey score fell into this segment.

TABLE 3

Items with lower scores in all dimensions of core emergency response competencies of nursing personnel for major infectious diseases

Items*	Mean (SD)
Understand the precautions for participating in international rescue	3.14 (0.94)
Understand the response to bioterrorist attacks	3.17 (0.92)
Correctly fill in The Infectious Disease Report Card of the People's Republic of China	3.21 (0.86)
Understand the emergency response of infectious diseases after natural disasters	3.26 (0.88)
Familiar with the scope of information report related to infectious disease emergencies	3.29 (0.81)

* Scores ranged from 1−5

59.9% of nurses scored between 60% and 79%, which lies within the moderate performance level, 21.9% of nurses scored between 80% and 89%, which lies within the proficient level, 6.9% of nurses scored more than 80%, which lies within the distinguished level.

Table 3 presents the 5 items with the lowest scoring items for core emergency response competencies among nursing personnel for major infectious diseases. These are: precautions for participating in international rescue, the response to bioterrorist attacks, filling in The Infectious Disease Report Card (a requirement for reporting infectious diseases), the emergency response of outbreak of infectious diseases during a natural disaster, the information reporting related to infectious disease emergencies required in different situations.

The results of the one-way ANOVA indicated no statistical significance in the total scores of the core emergency response ability of nursing personnel for major infectious diseases in terms of sex, age, working years, marital status, or parental status. Table 4 describes these details.

Multiple linear regression analysis was used, where the total score was the dependent variable and the statistically significant factors (such as professional title qualification, current education, prior work experience with infectious disease, prior major disaster rescue experience, training on prevention of infectious diseases, etc) in the one-way ANOVA were used as independent variables. To avoid the multicollinearity problem among the predictive variables in the regression analysis, the correlation analysis of all the independent variables was carried out before the regression analysis. The correlation coefficient of the independent variables was not greater than 0.75, so there was no collective significant effect between these influencing factors. Using skill drill, current education background, and working experience of infectious disease nursing as independent variables, the variation explained by the model accounted for 8.4% of the total variation. The regression

equation is: Y=89.03+4.65 (skill drill) +3.82 (current education background) +3.94 (working experience of infectious disease).

Three independent factors were found to influence core emergency response competencies when dealing with infectious diseases among the study sample: (1) whether or not nursing personnel participated in an emergency drill for infectious diseases, (2) their current educational background, and (3) whether they have working experience with infectious diseases (Tables 4 and 5). Table 5 describes these details.

The results also demonstrated that the 18 nurses from the WHO emergency medical team had higher core emergency response competency scores compared to general clinical nurses (*P* = .02), but due to the limited sample size, this was not further analyzed.

Discussion

This study examined core emergency response competencies related to infectious disease outbreaks among a sample of clinical nurses in Shanghai, China. Given that nurses are the largest health workforce in clinical care for infectious disease outbreaks,[24] our findings are critical to inform future pandemic response.

In our sample, the total core emergency response competency score of nursing personnel for major infectious diseases was 71%, which is equivalent to moderate performance. While this is an acceptable level of readiness with room for improvement, the goal is to be in the proficient level. Among the sample, the score for preparation ability was low (67.7%) indicating a need for further improvement in the area of emergency planning, specifically around knowledge of laws and regulations. However, the current score rate is higher than that of the core emergency response competency of nursing personnel surveyed

TABLE 4

One-way ANOVA of the core emergency response competency of nursing personnel for major infectious diseases (n = 960)

Item	N	Total score Mean (SD)	t/F value	P-value
Have you ever worked in infectious disease nursing before?			−2.90	<.01
No	827	114.18 (20.33)		
Yes	133	119.70 (20.62)		
Before the outbreak of COVID-19, have you ever participated in the rescue of major disasters (earthquake, tsunami, typhoon, etc.)?			−1.98	.04
No	950	114.81 (0.34)		
Yes	10	127.70 (28.10)		
Does your hospital have regular knowledge training on the prevention and treatment of infectious diseases?			13.70	<.01
Basically none	150	105.93 (20.63)		
Once every 2 years	143	111.87 (20.06)		
1−2 times per year	479	116.23 (19.33)		
3−5 times per year	115	121.81(21.37)		
More than 6 times per year	73	120.22 (19.85)		
Does your hospital have regular infectious disease-related skills training?			19.34	<.01
Basically none	297	107.12 (20.26)		
Once every 2 years	145	114.90 (19.97)		
1−2 times per year	389	118.51 (18.30)		
3−5 times per year	79	122.92 (22.66)		
More than 6 times per year	50	121.14 (21.38)		
Professional title			4.85	<.01
Junior nurse[a]	357	114.41 (19.75)		
Nurse practitioner	401	113.05 (20.83)		
Supervisor nurse	198	119.68 (20.41)		
Nurse specialist	4	118.00 (16.81)		
Position			8.69	<.01
Nurse	898	114.27 (20.36)		
Head nurse[b]	48	126.69 (18.90)		
Other nursing manager	14	117.93 (20.66)		
Political affiliation			8.36	<.01
No party affiliation	478	114.93 (20.53)		
Member of Chinese Communist Youth League	468	114.16 (19.65)		
Member of Chinese Communist Party	10	139.80 (17.16)		
Other	4	145.75 (32.73)		
Current education background			3.44	.02
Technical secondary school	11	112.00 (18.96)		
Junior college	313	112.02 (21.48)		
Undergraduate	617	116.50 (19.65)		
Master's	19	114.05 (25.39)		

Note:
[a] Junior nurse usually refers to nurses who have been engaged in nursing work for less than 3 years.
[b] Head nurse refers to the manager of each clinical department.

TABLE 5

Multiple linear regression analysis of the core emergency response competencies of nursing personnel for major infectious diseases

Independent variable	B value	β value	t value	P-value
Constant	89.03		22.77	<.01
Skill drill (X_1)	4.65	0.26	8.46	<.01
Current education background (X_2)	3.82	0.10	3.17	<.01
Working experience of infectious disease nursing (X_3)	3.94	0.07	2.13	.03

Note: $R^2 = .08$, $F = 29.1$

All of the variables in Table 4 were tested in the model. The model was adjusted for participation situation in the training of skills related to infectious diseases, current education, and working experience of infectious disease nursing. Assignment situation: Participation situation in the training of skills related to infectious diseases: Basically none = 1, Once every two years = 2, 1-2 times per year =3, 3-5 times per year = 4, More than 6 times per year = 5; Current education: Technical secondary school = 1, Junior college = 2, Undergraduate = 3, Postgraduate = 4; Working experience of infectious disease nursing: No = 1, Yes = 2.

in 2017, which was 64.5%.[21] A possible reason for improvement is that after the outbreak of COVID-19, nursing staff received 'just-in-time' training on infectious disease-related knowledge and skills through educational efforts and "on the job" experiences, which effectively improved their core emergency response competency over a short period of time.

Based on the theory of competency-based education,[25] the construction of a training strategy should focus on the items with lower scores as the key content of the training to effectively improve the core emergency response competencies of nursing personnel for infectious diseases. Expanding the training coverage, ensuring training frequency, regularly organizing comprehensive exercises for addressing the prevention and control of infectious diseases, finding omissions and identifying deficiencies according to the results of the exercises, and summarizing and making improvements are all important aspects of the applied educational efforts.

The findings of this study provide data to support future training of nurses to enhance their knowledge around emergency response to infectious diseases, targeted toward the population of nurses sampled in Shanghai, China. Past research describes a large gap among nurses for core emergency response competencies. Competencies may also depend on the availability of response plans and mechanisms, as well as regular testing for drills and updates to address gaps.[26] Regular education and training to maintain these competencies is necessary, especially given that these skills may not be used frequently.[22]

Figure 1 indicates that most nurses in this study have acceptable foundational knowledge. Improvement efforts should be focused on the 11.3% of nurses who scored less than 60%, which lies within the nonperformance level. Meanwhile, only 28.8% scored more than 80%, which is in the proficient level, leaving 71.2% of nurses scoring less than proficient. These data points also indicate the importance of continuing education. In addition, our research highlights the need for ongoing measurement of disaster nursing competencies.

This study also examined the influencing factors related to emergency response competencies. Political affiliation had little difference in the analysis. The results demonstrated that the higher the educational background, the higher the core emergency response competency score for infectious diseases. The score of those who participated in an emergency drill for infectious diseases and among those who had experience with infectious disease nursing was higher than those who did not participate in the drill or had no experience with infectious disease nursing, which indicates that ability is related to the experience accumulated in real-life situations. In the drill, the simulation of a scenario similar to an actual situation was helpful for all types of personnel to acquire emergency management experience. Through these scenarios, participants can determine their own shortcomings and mistakes, using the experience to improve their clinical practice in the future.

NEXT STEPS AT RESEARCH SITE

To improve the core emergency response competencies of nursing personnel for infectious diseases, our team has implemented a series of quality improvement projects for all departments of a 1500-bed tertiary hospital in Shanghai. Based on the results of this study, the core emergency response competencies of nurses for infectious diseases has room for improvement, particularly in the rescue ability component. Our first goal was to establish an educational program for nurses that increased their knowledge in emergency response as a whole. Secondly, nurses with professional training or experience in infectious diseases then joined a newly developed committee established with the goal of educating noninfectious disease professional

nursing personnel about theoretical knowledge, professional skills, and the ability to actively respond to the challenge of sudden infectious disease outbreaks. Thus, a train-the-trainer type of program was developed. Figures 2−4 illustrate the prevention tactics of the nursing staff of various departments of the hospital (including emergency department, wards, etc.) after infectious disease-related knowledge and skills training that occurred from the end of January through June 2020 during the outbreak of the epidemic and the normalization of prevention and control. Figure 3 depicts the protections in place in February 2020 when the epidemic was at a serious level. Figure 4 was taken in June 2020 after stabilization and control of the epidemic was established.

Picture 1   Picture 2   Picture 3

FIGURE 2

Hospital entrance. (Picture 1 is the outside the outpatient building; Pictures 2 and 3 are the temperature measurement and epidemiological survey points at the entrance of the outpatient and emergency departments respectively).

Picture 4   Picture 5

FIGURE 3

Ward Entrance Registration Management Office. Pictures 4 and 5 are the different protection levels of nurses in February and June 2020, respectively.

FIGURE 4

Our hospital opened the first outdoor nucleic acid sampling cabinet in Shanghai to ensure the health and safety of frontline sampling personnel. All of the individuals appearing in these photos have provided the authors with permission to take photos and publish them. All medical staff members who appear in the photos have received our courses of infectious disease-related knowledge and skills after the outbreak of COVID-19. COVID-19, coronavirus disease 2019.

At the same time, to continue to address the current pandemic, our hospital has also carried out an alternative education program to improve disaster preparedness through computers. To improve the rescue ability of nurses (see Table 2), we further strengthened the development and design of an integrated emergency information system on the basis of our team's past information technology research.[27] As a supplement to address the lack of reporting ability of nurses, a 3-module integrated intelligent emergency triage system was created and implemented in our hospital. It is a software that can transmit disease information through mobile devices before the patients reach the hospital, and carry out preliminary triage to achieve data sharing. The system includes prehospital information sharing, emergency intelligent automatic computer recognition of pre-examination and triage, and early warning and reporting of mass patients or clustering diseases. Perceived disaster preparedness levels were increased through these improvement measures using the existing hospital information system. We have successfully implemented the integrated emergency information system in our hospital emergency department, and the daily operation of the system is stable. The information software system we developed has obtained the patent certificate authorized by the government and will be further promoted and applied.

Limitations

This study surveyed nurses from one tertiary hospital in Shanghai, thereby limiting the generalizability of its results to other countries or even other parts of China. This survey was cross-sectional in nature, so represents the views of the participants at the time of the survey. It is possible their knowledge increased substantially as a result of continuing to address the pandemic in the period after they completed the survey. Further, this survey was voluntary and those who did not complete it might represent groups with different responses than those reported in this paper. Research has found that countries varied widely in terms of their capacity to respond to public health emergencies.[26] Participants might represent the core competence of local nurses in Shanghai, but are not representative of the global nursing workforce. This led to a potential for selection bias, as well as the limited generalizability of the research design. We look forward to further research that addresses these limitations.

Implications for Emergency Clinical Care

Given the critical role emergency nurses have in disaster readiness,[28] this study contributed to informing the improvement of educational programs to strengthen disaster nursing education. Many studies[13,29−32] indicate that nurses believe they were not well prepared before being involved in a disaster response and that they have a need to understand the differences between standard care given in nursing practice and care that is given in disasters.[33] Knowledge on disaster preparedness both in initial nursing education and during in-service education is limited, even time spent on education around pandemic preparedness.[15] A lack of regular training may lead to a decline or insufficiency in disaster response ability, as well as a lack of a sense of security.[34] The increase in the frequency and severity of disasters coupled with the reported need to further improve levels of preparedness in this frontline workforce is an issue worthy of attention.[35] In addition, emergency nurses are critical to successful disaster outcomes because in most countries they are the main health care force providing clinical care.[24]

Conclusion

The increasing frequency of epidemics means that nurses, and nursing education, should place a greater emphasis on core emergency response competencies and participate in refresher training and drills to maintain a basic level of proficiency. When a major infectious disease outbreak occurs, the entire nursing team, across many specialty fields, may find themselves on the front line at any time. The increasingly frequent occurrence of epidemics means that every nurse should take these core emergency response competencies seriously and use refresher training and participation in drills and exercises to maintain at least a basic level of proficiency.

Our findings show that core emergency response competencies of nursing personnel for infectious diseases are at a moderate level, which calls for implementation and development of a response plan and mechanism, and regular testing for drills and updates to improve emergency response competencies. In particular, knowledge around familiarization with the emergency plan and understanding relevant laws and regulations of infectious disease needs to be further strengthened. We advocate for a greater focus on strengthening training for those who have not participated in drills regarding infectious disease outbreaks, and those who have no nursing experience relative to caring for those with infectious diseases. It is necessary to conduct normalized, continuous, and practical training to include noninfectious disease professional personnel. The COVID-19 pandemic has emphasized the critical need for a skilled

nursing workforce, and one that is prepared and ready to address future outbreaks.

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A Predictive Model Development of Hospital Admission during Triage in a Chinese Ear, Nose, and Throat Emergency Department

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Contribution to Emergency Nursing Practice

- In highly specialized ophthalmology and otolaryngology hospitals, where only eye, ear, nose, and throat patients are treated within the emergency department, there is little published evidence on patient triage practice.
- Information such as that gained from this research project could be included in a predictive formula that could then be further tested and placed in a computer software program to be used in the triage area.
- The need for patient education and clear discharge instructions is an important aspect of care when predictive patterns are understood.

Abstract

Introduction: Triaging patients into correct severity categories in an emergency department is an advanced skill that depends on a quick assessment after obtaining very little information. The purpose of this study was to assess specific risk factors associated with hospital admissions in the emergency department environment of the specialized Eye, Ear, Nose, and Throat hospital located in Shanghai, China.

Methods: This study was a retrospective cohort study. Patients visiting the emergency department in a tertiary hospital in eastern China from February 2008 to August 2015 were included. Univariate and multivariate analyses were used to identify the risk factors related to hospital admissions. Combining variables calculated from the regression equation of multivariate analysis (binary logistic regression analysis) enabled the risk factors quantification. The receiver operating characteristic analysis was used to identify the most informative cutoff point of the combining predictors.

Results: A total of 188 715 patients were enrolled in the study. Of them, 8395 patients (4.4%) required hospital admission. Hour of visit, season, age, sex, chief complaint, anatomical location, and locale of patients were independent risk factors of hospital admission by univariate and multivariate analysis. Combining predictors were calculated from the equation of the multivariate logistic model. The area under the curve of the combining predictors was 0.949, and the 95% confidence interval was 0.947 to 0.951 ($P < .001$), with a sensitivity of 95.2% and a specificity of 85.6%. A cutoff score of less than -35.1975 was associated with hospital admission.

Discussion: This study provided a method to build a feasible predictive model of hospital admission during triage. Understanding risk factors is an important part of the triage process in order to correctly assign priorities to the patients served. The outcomes of this study would add additional information for the triage nurse to consider in assessing the patient and assigning acuity ratings. The model developed here requires validation in future research.

Key words: Ear nose and throat; Emergency department; Risk factors; Predictive system

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Introduction

The emergency department of otolaryngology is one of the important branches of emergency care. Sethi et al[1] compiled a systematic summary of patient cases requiring emergency care in otolaryngology worldwide, including stand-alone emergency departments, integrated units in hospital emergency departments similar to the hospitals in China, urgent care clinics, and full-time emergency services in a hospital. The indications for seeking care were diverse, ranging from otologic diseases[1,2] to epistaxis[3] and foreign bodies.[4]

Our hospital is a specialized hospital located on the eastern coastline of China and is mainly composed of ophthalmology and otolaryngology departments. Our otolaryngology emergency department, established on July 2, 1952, provides 24-hour, year-round emergency services 7 days a week for patients with otolaryngologic and ophthalmic complaints. X-ray and computed tomography examinations are available 24 hours. Endoscopy, laryngoscopy, B-scan ultrasound, electrocardiogram, and magnetic resonance imaging examinations, along with audiological and vestibular function evaluations, are available from 8:00 AM to 4:30 PM every day except national holidays.

The emergency department of our hospital stipulated the criteria for injuries, presenting complaints, and diseases that qualify for ENT (ear, nose, throat) emergency services (Supplementary Table 1). In the emergency department, patients requiring hospitalization are often suffering from severe and possibly high-risk situations. Therefore, quick judgment is essential regarding the severity of the presenting complaints accompanied by appropriate clinical responses during triage. Accurate triage relies on the triage nurses' educational background and long-term clinical work experience along with a thorough understanding of the triage program adopted by the institution. With limited information acquired during triage, even an experienced triage nurse might make an inappropriate decision. Consider then a less experienced emergency nurse who might, in all likelihood, have more opportunities to misjudge and under-triage potentially critical patients. This research sought to determine whether there were other factors that could be used in the triage area to assist in proper identifications of acuity for our patients.

In this study, we reviewed 8 years of triage information in the ENT emergency department and established a predictive model[1] to screen for hospitalization risk factors. In a previous study,[1] postoperative complaints, arrival overnight, and laryngeal complaints were considered predictors of inpatient admission. The purpose of our present study was to replicate and advance this methodology to develop a predictive model of hospital admissions in our setting. We advanced the previously published study[1] by calculating the combining predictors and their cutoff values.

Methods

PARTICIPANTS AND SOURCE OF DATA

In this retrospective cohort study, we reviewed the medical records of all patients who registered for otolaryngologic complaints and received a diagnosis in the Eye, Ear, Nose and Throat Hospital, Fudan University, Shanghai (SHEENT) (a tertiary hospital) emergency department between February 2008 and August 2015. Records for follow-up patients (those asked to come back to the emergency department in a specified amount of time by the ED personnel) in the emergency department and patients with no emergent disease were excluded. Patient demographics, admission characteristics, and diagnostic data were extracted. Ethical approval was obtained from the SHEENT Hospital Ethics Committee prior to the study (Ethic code:2015038).

OUTCOME VARIABLE

Patients who had an actual or potential risk of developing life-threatening complications were admitted to the hospital for surgery or observation. Outcome variable of hospital admission was classified dichotomously as either discharge to home or admission to the hospital.

PREDICTOR VARIABLES

The time of arrival was assigned according to clinician shifts, as midnight to 7:00 AM, 7:00 AM to 6:00 PM, or 6:00 PM to midnight. Seasons were defined as follows: spring (March to May), summer (June to August), autumn (September to November), and winter (December to February). Age groups were divided as less than or equal to 5, 6 to 14, 15 to 49, 50 to 69, and 70 or more years. The residence of the patients was classified as inside or outside of Shanghai. Sex was male and female.

With reference to published data[1] and the clinical data in our emergency department, the primary diagnosis was recorded using the International Classification of Diseases, tenth revision, Clinical Modification Codes. For cases with no International Classification of Diseases code, the research team assigned a diagnosis according to a health record review. The affected anatomical locations were grouped into 11 categories: (1) auditory and/or vestibular, (2) nasal and/or paranasal sinus, (3) oropharynx and/or laryngopharynx, (4) nasopharynx, (5) larynx, (6) retropharynx and parapharynx, (7) trachea and bronchus, (8) neck, (9) middle cranial fossa and/or anterior skull base, (10) face, and (11) esophagus. Reasons for visiting the emergency department were categorized as follows: infection, wound,

foreign body, bleeding, complications from surgery, tumor-associated emergency, and others.

STATISTICAL ANALYSIS

Besides diagnoses, missing values for the remaining variables represented less than 1% of the total samples and were therefore deleted case wise. Continuous variables were presented as mean and standard deviation with a normal distribution. Categorical data were compared among groups by the chi-square test. Unadjusted and adjusted multivariate binary logistic regression analyses were performed to ascertain the risk factors of hospital admission. The manner in which the variables enter the regression model is "enter" (all at once). Combining predictors of each patient were calculated with parameters from the regression equation.[5,6] Beforehand, we assigned subvariables of categorical variables as 0 = negative and 1 = positive. Combined predictors were assigned a notation of L.

MODEL DEVELOPMENT: UNADJUSTED ANALYSIS

Sex, age group, chief complaint, time of day, geographical location of patients, season, and anatomical location were significant risk factors for hospital admission, by univariate analysis (Table 3).

MODEL SPECIFICATION: ADJUSTED MULTIVARIATE ANALYSIS

Sex, age group, chief complaint, time of day, geographical location of patients, season, and anatomical location were independent risk factors of hospital admission. The odds of male patients' admission was 1.29 times that of female patients. The odds of hospitalization of patients less than or equal to 5 years old, 50 to 69 years, and 70 or more years, was 1.13 times, 1.43 times, and 1.32 times that of patients 15 to 49 years old, respectively. The hospitalization odds for patients who came

$$
\begin{aligned}
L = {} & \text{constant} + \text{subvariates}_1 + \frac{\text{regression coefficients2}}{\text{regression coefficients1}} \times \text{subvariate}_2 + \frac{\text{regression coefficients3}}{\text{regression coefficients1}} \times \text{subvariate}_3 \\
& + \frac{\text{regression coefficients4}}{\text{regression coefficients1}} \times \text{subvariate}_4 + \ldots\ldots + \frac{\text{regression coefficientsn}}{\text{regression coefficients1}} \times \text{subvariate}_n
\end{aligned}
$$

We then plotted the receiver operating characteristic (ROC) curve and calculated the area under the curve (AUC), sensitivity, and specificity of the combined predictors on hospital admissions. A 2-sided P value $\leq .05$ was considered statistically significant. All statistical analyses were performed using SPSS 22.0.0.0 (IBM Corp, Armonk, NY).

Results

A total of 188 715 patients received a diagnosis at the SHEENT emergency department for an otolaryngologic complaint between February 2008 and August 2015. 80 (0.042%) records with missing data, and 3849 (2%) patients with uncertainty sore throat cannot be diagnosed by ICD encoding.

DEMOGRAPHIC CHARACTERISTICS

The mean age of all the patients was 35.69 (SD = 24.05) years, and the sex ratio was 1:1 (Table 1). A total of 8395 patients (4.4%) required hospitalization for further surgical intervention or observation. The 10 most common diagnoses among all patients visiting the emergency department as well as the admitted patients are summarized in Table 2.

to the hospital because of postoperative complications and tumor complications were 16.67 times and 7.80 times that of patients who came to the hospital because of bleeding, respectively. The hospitalization odds for patients with diagnoses related to the trachea and bronchus, esophagus, and neck were 624.54 times, 422.60 times, and 91.16 times of the patients with oropharynx or/and laryngopharynx diagnoses, respectively. The hospitalization rate of patients with a consultation time of 6:00 PM to midnight was 1.09 times that of a consultation time of midnight to 7:00 AM. The hospitalization rate of patients visiting in winter was 1.24 times that of patients seeking care in spring. The hospitalization rate of patients living outside of the city was 2.30 times that of local patients. (Table 4)

COMBINING PREDICTORS

According to the regression coefficients of the logistic equation from multivariate analysis, the combining predictors were calculated as depicted in the Equation Box.

Equation	Example application: During winter months, at 6:00 AM, a 3-year-old male patient who had choked on a peanut presented to the emergency department, coming from outside of Shanghai.
L=	-78.596=
[INTERCEPT]	**[INTERCEPT]**
-5.551	-5.551
[SEX]	**[SEX]**
-2.876 Male	**-2.876 * Male**
+0 Female	
[AGE]	**[AGE]**
- 1.382 * Age category ≤ 5	**- 1.382 * Age category +≤5**
+ 8.730 * Age category 5 to 14 in years	
+ 0 * Age category 15 to 49 in years	
- 3.989 * Age category 50 to 69 in years	
- 3.101 * Age category ≥70 in years	
[REASON]	**[REASON]**
- 8.820 * Bleeding	**+ 14.753 * Foreign body**
- 5.517 * Infection	
+ 6.573 * Wound	
+ 14.753 * Foreign body	
- 40.438 * Complications of surgery	
- 31.899 * Complications of tumor	
+ 0 * Others	
[TIME]	**[TIME]**
+ 1 * Hour group [midnight to 7:00 am]	**+ 1 * Hour group [midnight to 7:00 am]**
+ 1.146 * Hour group [7:00 am to 6:00 pm]	
+ 0 * Hour group [6:00 pm to midnight]	
[ANATOMICAL LOCATION]	**[ANATOMICAL LOCATION]**
+ 8.596 * Auditory and/or vestibular	**- 72.326 * Trachea and bronchus**
- 23.629 * Nasal paranasal sinus	
+ 4.528 * Nasopharynx	
- 37.551 * Larynx	
- 45.483 * Retropharynx and/or parapharynx	
- 72.326 * Trachea and bronchus	
- 50.708 * Neck	
+ 176.843 * Middle cranial fossa	
- 35.652 * Face	
- 67.944 * Esophagus	
+ 0 * Oropharynx and/or laryngopharynx	
[SEASON]	**[SEASON]**
- 0.090 * Spring	**- 2.483 * Winter**
+ 0.292 * Autumn	
- 2.483 * Winter	
+ 0 * Summer	
[GEOGRAPHIC REGION]	**[GEOGRAPHIC REGION]**
-9.731 * Out of city	**-9.731 * Out of city**
[INTERPRETATION]	**[INTERPRETATION]**
Cutoff: < -35.1975 = High probability of hospital admission	-78.596 is less than cutoff. Thus, high probability of hospital admission

TABLE 1
Demographic characteristics of all patients

Variables	All patients	χ^2	P value
Age in years, mean (SD)	35.69 (24.05)		
Age range	1 mo-108 y		
Age (years)		54 900.95	<.001
≤5, n (%)	32 478 (17.2)		
6-14, n (%)	20 492 (10.9)		
15-49, n (%)	68 917 (36.5)		
50-69, n (%)	52 617 (27.9)		
≥70, n (%)	14 211 (7.5)		
Sex		2.23	.14
Male, n (%)	94 033 (49.8)		
Female, n (%)	94 682 (50.2)		
City of patients		129 772.72	<.001
Inside Shanghai, n (%)	172 604 (91.5)		
Outside of Shanghai, n (%)	16 111 (8.5)		
Disposition		156 628.81	<.001
Discharged from ED	180 320 (95.6)		
Admitted to hospital	8395 (4.4)		
Year of visit		17 466.73	<.001
2008 (February-December)	14 554		
2009	18 506		
2010	19 871		
2011	20 141		
2012	20 250		
2013	29 017		
2014	38 382		
2015 (January-August)	27 994		

P <.05; there was a significant difference between groups.

MODEL PERFORMANCE: PREDICTIVE VALUE OF COMBINING PREDICTORS

The ROC analysis demonstrated that the AUC of the combining predictors was 0.949, and the 95% confidence interval was 0.947 to 0.951 (P <.001), with a sensitivity of 95.2% and a specificity of 85.6% (Figure). According to ROC analysis, the maximum absolute value of the Youden index (sensitivity + specificity − 1) was 0.808381, and the corresponding combining pre-

TABLE 2
Ten most common diagnoses among all patients and admitted patients

Diagnosis of all patients (n = 188715)	n (%)	Diagnosis of admitted patients (n = 8395)	n (%)
Foreign body in pharynx or larynx	104 039 (55.1)	Foreign body in the esophagus	2347 (28.0)
Acute otitis media, mastoiditis, or bullous myringitis	22 116 (11.7)	Foreign body in trachea/bronchus	2219 (26.4)
Epistaxis	18 404 (9.8)	Epistaxis	1782 (21.2)
Trauma to the head and neck	6345 (3.4)	Acute epiglottitis	748 (8.9)
Foreign body in the esophagus	6301 (3.3)	Laryngeal papilloma	362 (4.3)
Foreign body in nasal sinus and/or nostril	5965 (3.2)	Laryngeal obstruction	224 (2.7)
Foreign body in the ear	5055 (2.7)	Trauma to the head and neck	124 (1.5)
Foreign body in trachea/bronchus	4369 (2.3)	Bleeding after tonsillectomy	110 (1.3)
Nonspecific sore throat	3849 (2.0)	Foreign body in nasal sinus and/or nostril	109 (1.3)
Acute tonsillitis	3071 (1.6)	Cellulitis of head and neck	61 (0.7)

TABLE 3

Unadjusted logistic regression analysis of risk factors of hospital admission

Variables		Discharged home, n	Hospitalized, n	Odds ratio	95% confidence interval	*P* value
Sex	Male	88 851	5182	1.66	1.59-1.74	<.001
	Female	91 469	3213	reference		
Age group, y	≤5	29 647	2831	3.09	2.92-3.28	<.001
	5-14	20 060	432	0.70	0.63-0.77	
	50-69	50 335	2282	1.47	1.38-1.56	
	≥70	13 426	785	1.89	1.74-2.06	
	15-49	66 852	2065	reference		
Reason	Infection	32 704	981	0.29	0.27-0.32	<.001
	Wound	6386	119	0.18	0.15-0.22	
	Foreign body	120 956	4756	0.38	0.36-0.41	
	Complications of surgery	281	134	4.66	3.77-5.76	
	Complications of tumor	142	372	25.59	20.97-31.24	
	Others	2374	244	1.004	0.87-1.16	
	Bleeding	17 477	1789	reference		
Time of day	7:00 AM-6:00 PM	71 063	4097	1.01	0.94-1.08	<.001
	6:00 PM-midnight	88 508	3112	0.61	0.57-0.66	
	Midnight-7:00 AM	20 729	1186	reference		
City	Outside of Shanghai city	14 163	1948	3.55	3.36-3.74	<.001
	Within Shanghai city	166 157	6447	reference		
Season	Summer	43 363	1826	.96	0.90-1.02	<.001
	Fall	39 699	1708	.98	0.92-1.05	
	Winter	43 818	2518	1.31	1.24-1.39	
	Spring	53 440	2343	reference		
Anatomical location	Auditory and/or vestibular	31 117	110	1.52	1.21-1.90	<.001
	Nasal and/or paranasal sinus	261 83	1919	31.47	27.64-35.84	
	Nasopharynx	210	7	14.31	6.68-30.69	
	Larynx	4473	1437	137.95	120.50-157.92	
	Retropharynx and parapharynx	98	55	240.99	169.51-342.61	
	Trachea and bronchus	2166	2222	440.50	384.83-504.22	
	Neck	31	33	457.10	275.85-757.44	
	Middle cranial fossa and/or anterior skull base	2	0	<0.001	NA	
	Face	8	3	161.02	42.48-610.33	
	Esophagus	3960	2348	254.60	223.17-290.46	
	Oropharynx and/or laryngopharynx	112 072	261	reference		

NA, not available.

dictors were −35.1975. Combining predictors less than −35.1975 were diagnosed to be hospital admission. A clinical example is provided in the box.

Example

An example of how this model works in triage is illustrated in the following scenario. During the winter months, at 6:00 AM, a 3 year-old male patient who had choked on a peanut presented to the emergency department, coming from outside of Shanghai. We assigned subvariates of categorical variables as 0 = negative and 1 = positive (Supplementary Figure 1). Combining predictors were L`.

Furthermore, we put these variables into the following equation (equation in the results):

TABLE 4
Multivariate logistic regression analysis predicting inpatient admission for all patients

Variable	Odds ratio	95% confidence interval	*P* value
Male (vs female)	1.29	1.22-1.37	<.001
Age (vs 15-49), years			<.001
≤5	1.13	1.04-1.23	.003
6-14	0.46	0.41-0.52	<.001
50-69	1.43	1.33-1.53	<.001
≥70	1.32	1.19-1.45	<.001
Reason (vs bleeding)			<.001
Infection	0.75	0.59-0.94	.01
Wound	0.25	0.21-0.31	<.001
Foreign body	0.12	0.10-0.15	<.001
Complications from surgery	16.67	11.86-23.44	<.001
Tumor-associated emergency	7.80	5.70-10.68	<.001
Others	0.46	0.35-0.60	<.001
Time (vs midnight-7:00 AM)			.002
7:00 AM-6:00 PM	0.99	0.91-1.07	.75
6:00 PM-midnight	1.09	1.01-1.19	.04
Location (oropharynx and/ or laryngopharynx)			<.001
Auditory and/or vestibular	0.47	0.36-0.61	<.001
Nasal and/or sinus	8.19	6.56-10.22	<.001
Nasal pharynx	0.67	0.30-1.51	.33
Larynx	28.29	23.20-34.49	<.001
Retropharynx and parapharynx	57.25	38.97-84.12	<.001
Trachea and bronchus	624.54	528.17-738.51	<.001
Neck	91.16	48.92-169.86	<.001
Middle cranial fossa and/ or anterior skull base	0.000	0.000	1.000
Face	23.87	4.17-136.71	<.001
Esophagus	422.60	360.69-495.14	<.001
Season (vs spring)			<.001
Summer	0.99	0.92-1.07	.84
Autumn	0.97	0.90-1.04	.39
Winter	1.24	1.15-1.33	<.001
Outside of Shanghai (vs inside Shanghai)	2.30	2.14-2.48	<.001

$$L = -5.551 + 1 + 1.146 \times 0 + 0 \times 0 - 8.820 \times 0 - 5.517 \times 0 + 6.573 \times 0 + 14.753 \times 1 - 40.438 \times 0$$
$$-31.899 \times 0 + 0 \times 0 - 0.090 \times 0 + 0.292 \times 0 - 2.483 \times 1 + 0 \times 0 + 8.596 \times 0 - 23.629 \times 0$$
$$+4.528 \times 0 - 37.551 \times 0 - 45.483 \times 0 - 72.326 \times 1 - 50.708 \times 0 + 176.843 \times 0 - 35.652 \times 0$$
$$-67.944 \times 0 + 0 \times 0 + 8.730 \times 0 - 1.382 \times 1 - 3.989 \times 0 - 3.101 \times 0 + 0 \times 0 - 9.731 \times 1 + 0 \times 0 - 2.876 \times 1 + 0 \times 0$$

$L = -78.596$ (See Equation Box with example for details.)

The L was less than −35.1975 (the critical value); therefore, this patient would have a high probability of hospitalization and should be given priority to see the physician during the triage process.
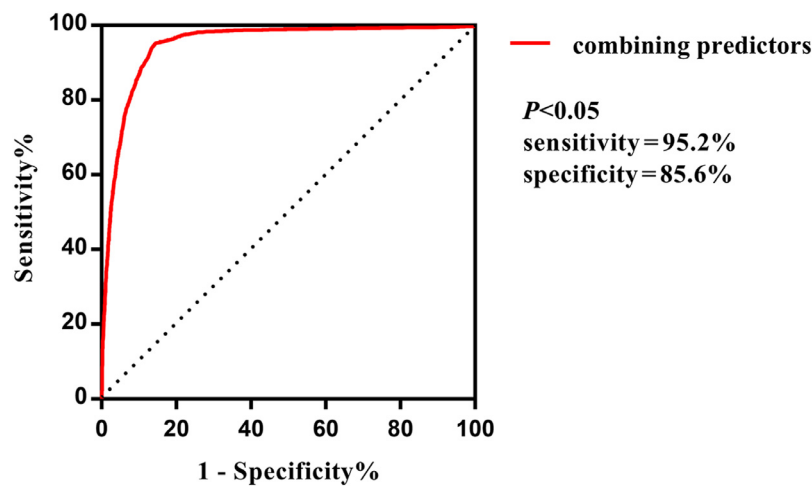
FIGURE

ROC curve of combining predictors. ROC, receiver operating characteristic.

Discussion

This study adds a unique perspective to the published literature[1] by developing a predictive model of hospital admissions regarding patients seen in an ENT emergency department. The AUC demonstrated an excellent model. This study's findings showed that sex, age group, chief complaint, time of day, geographical location of patients, season, and anatomical location were independent risk factors associated with hospital admission in an ENT emergency department. Furthermore, the combining predictors were calculated utilizing the model. More importantly, identifying the critical value of combining predictors improved the reliability and efficiency of triage severity judgment. Assessment in the triage area includes multiple aspects affecting outcome, including the objective measurement of vital signs coupled with an understanding of high-risk factors impacting the final decision.

This study's strengths rely on its large sample size, broad disease spectrum, and multivariate analysis. More importantly, the calculation of the combining predictors and their critical values may be used by other emergency departments. Moreover, combining predictors may supply a more scientific manner in which to triage and train new nurses' judgment calls regarding patient severity. This model could be formulated into an app within the triage program. Risk factors included in the model would be randomly assigned and combined in the app, which could then simulate a real triage situation. The trainees could receive simulation training utilizing this app.

Only 4.4% of patients were hospitalized through our emergency department, as most of the patients' prognoses were good.[1,7] Triage nurses should be able to identify patients who had or have the potential to develop a life-threatening status from a large number of visiting patients in the emergency department and arrange medical treatment as soon as possible. Experienced triage nurses can often judge the severity of the patient's condition based on triage information such as the patient's age, sex, the season and time period of visit, patient's address, location of the disease, and reason for the visit. For example, a foreign-body-related emergency was the most common presentation needing surgical intervention both in our and another study.[8] The severity of this process is often related to the type and location of the foreign body.[9] At age 60 years or more, impaction of a foreign body in the esophagus was identified as an increased risk factor for complications.[10] Older patients in general are believed to be at an increased risk of a return ED visit, hospitalization, or death.[11] Therefore, we include these basic triage information pieces as risk factors in the logistic model for hospitalization.

The risk factors of hospitalization found in this study are consistent with many nurses' clinical experiences in triage. First, the anatomy of the disease carries a high risk. Diseases such as foreign bodies, inflammation, hemorrhage, and tumors occurring in the larynx, airway, laryngopharynx, parapharyngeal, and neck area increased the risk for laryngeal or tracheal obstruction, leading to potential hypoxia or even death. For example, an aspirated foreign body is the leading cause of death among infants and the

fourth leading cause among preschool children under the age of 3 years.[12,13] Death occurs in 5% to 7% of these cases.[14] Therefore, if the insult is found within these particular anatomical parts during triage, the nurse should be vigilant for severe and urgent decompensation. Second, winter gives rise to a high risk of hospitalization. From Table 1 we determined that foreign bodies in the trachea/bronchus areas, epistaxis, and acute epiglottitis accounted for 56.5% of the total number of hospitalizations, and these diseases occur more commonly during the winter months. These risk factors may interact with each other. For example, regarding airway foreign bodies, young children may have seasonal access to food items such as melon seeds, peanuts, and walnuts from their homes in the winter due to cultural patterns of food preferences and celebrations during this time of year.[15] Therefore, airway foreign bodies are more common during this period.

In addition, epistaxis above age 40 is often related to vascular factors and these tend to occur more often in winter.[16] The bleeding points are usually located in the olfactory cleft and the posterior region of the inferior meatus. These often require surgical intervention when nasal packing is not effective. Another aspect to consider is that the interval of time between 6:00 PM and midnight is also a risk factor for hospitalization. Social and dietary patterns factor into this portion of the triage decision-making. First of all, cultural and regional dietary patterns may offer plausible explanations that we did not measure in our study. River fish are a common dietary staple at dinnertime in this region of China. Most of these river fish have spines. Patients with esophageal foreign bodies often arrive to seek care during dinnertime hours. Finally, patients entering the system from outside of Shanghai had a higher risk of admission because of the severe nature of their disease processes and the availability of advanced medical technologies for diagnosis and treatment in our tertiary hospital, which did not exist in the referring hospitals.

Other important risk factors for hospital admission were also brought to our attention during this research study, which revolved around the need for patient education. For example, most foreign bodies in the pharynx, esophagus, and airway can be avoided. Talking, laughing, and frolicking during eating contribute significantly to the risk of foreign body aspirations. Some patients visited the emergency department for recurrent pharyngeal and airway foreign bodies. Therefore, providing these individuals with proper and complete discharge information relating to the mitigation of these processes is necessary to promote healthy lifestyles.

Limitations

As a model development study, our methods should be validated in other patient samples. The major limitation of the present study is its retrospective design and the fact that its data came from 1 hospital and could, therefore, have limited generalizability. Furthermore, the hospital admission criterion was not standardized. To clarify, parapharyngeal abscess without dyspnea is a hospital admission disease in this study because it can develop as a laryngeal obstruction but may not qualify for admission in other hospitals. Finally, some factors, such as vital signs, economic status, and the education level of those caring for infants and young children, which may be essential factors to epistaxis and airway foreign bodies, were not included in the study.

Implications for Emergency Clinical Care

The identification of patients at risk of deterioration or hospital admission at the point of triage is challenging. A prediction model can be used in concert with a reliable and valid triage tool to identify and intervene appropriately for patients quickly. An astute emergency nurse functioning in the role of triage will prioritize these patients and determine the order of their care by using the institution's accepted triage tool and known risk factors that affect patient care as determined by research and a strong knowledge base. Understanding the comprehensive relationship of factors such as the patient's age, sex, chief complaint, geographical location, seasons of the year, and anatomical location of the problem can affect the triage nurse's decisions. These are added factors in appropriate identification, the proper institution of emergency measures, and hospital admission's predictive ability.

The authors encourage the utilization of proper triage tools and the adoption of factors as described in this study to be included in a computer software program that will assist in the proper and expedient care of patients presenting to the emergency department. In order to triage appropriately, no matter which tool is used, the triage nurse must utilize other important factors such as those presented in this study, which assists in the determination of risk dynamics and improves the ability to answer important questions such as "Is this patient at high risk for present or potential deterioration?"

Understanding these important risk factors along with a strong background in disease processes may speed appropriate emergent interventions and aid in positive outcomes for these patients. For example, the emergency nurse will be aware that the potential for a nonpatent airway is one of the most common admission diagnoses. For example, a

patient with a chief complaint of dyspnea after laryngeal cancer surgery should be provided with adequate airway humidification and suction as soon as possible. Because the airway is directly exposed to the air after this type of surgical procedure, fluid from the airway is lost during respiration, and sputum can easily form a crust blocking the airway. For dyspnea caused by acute epiglottitis, supplemental oxygen should be given promptly, and methylPREDNISolone and emergent airway equipment should be at hand. For children with airway foreign bodies, especially those with severe laryngeal obstruction, immediate access to definitive care should be provided depending on the institution's policies and practices. In our hospital, a "quick rescue channel" was opened, and the emergency physician will send the patient directly to the operating room where the surgeon, nurse, and anesthetist meet the patient.

Having knowledge of risk factors can also play a role in the provision of proper discharge instructions and mitigation of future similar presentations requiring the utilization of the emergency department as described in the Discussion section of this manuscript. Prevention and mitigation strategies such as proper mealtime activities and identification of patients who tend to repeat behaviors contributing to multiple returns are also important tasks for emergency nurses to inform behavior-change interventions. Identifying these factors at triage can assist in the patient discharge education and coaching process.

In summary, appropriate triage education must include a reliable and valid triage tool coupled with knowledge of salient factors that impact decision-making in the triage area. Triage nurses must have knowledge of common disease processes cared for in their facility and understand factors that can further impact the outcome for the patient, including possible admission status. Triage nurses must be able to identify and initiate emergent care for disease processes that are at high risk, and triage nurses must understand that factors such as age, sex, the patient's geographical location, the time of day and season, and chief complaint all play a role in anticipating the clinical course and are optimized for each patient. Algorithms can support emergency nurse triage clinical decision-making.

Conclusions

Sex, age group, chief complaint, time of day, geographical location of patient, season, and anatomical locations are independently associated with and predictive of hospital admission. Adding the results of these factors to a multivariate model to calculate combining predictors can improve the diagnostic accuracy of screening for possible hospital admission and appropriate triage care. If validated in further research, this model may be a useful tool in clinical triage and new employee training in our otolaryngology emergency department. Understanding how these factors intersect with the chief complaint of the patient increases the ability to more closely determine the risks that these patients may be facing.

Author Disclosures

Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.jen.2021.04.012.

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RESILIENCE AMONG PROFESSIONAL HEALTH WORKERS IN EMERGENCY SERVICES

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Contribution to Emergency Nursing Practice

- The current literature on resilience indicates that several variables affect the development of nursing and health care workers' resilience.
- This article contributes the findings that resilience in nurses is low and is influenced by work-related and personal variables such as shift work, age, and marital status.
- Key implications for emergency nursing practice found in this article are that resilience needs to be strengthened and that organizations should actively participate in implementing strategies to improve working conditions and personal resources.

Abstract

Introduction: Although it seems logical that working in an emergency service implies having a great capacity to face extreme situations, resilience in health care workers has been shown to be related not only to individual personality characteristics but also with external factors. The objective of this study was to understand the resilience of health professionals working in hospital and in-hospital emergency services and to determine the relationships of resilience with sociodemographic and work-related conditions.

Methods: This cross-sectional study included emergency physicians, nurses, and nursing assistants. Sociodemographic variables, work characteristics, and the Resilience Scale–25 were analyzed. Data were not missing at random and models with imputed data were tested.

Results: A total of 321 professionals participated. Their mean age was 43.36 years (SD 8.73), and 81.31% were women. The mean resilience score was 133.38 (SD 17.11), which corresponds to moderately low to moderate levels. Being single (B $= -7.35$; $P < .01$) or divorced (B $= -8.26$; $P = .04$) were associated with decreased resilience in the raw score of the Resilience Scale-25. Working shifts that do not include night shift (OR $= 2.00$, 95% CI 1.04, 3.90, $P = .04$) and being a nurse (OR $= 2.11$, 95% CI 1.07, 4.18; $P = .03$) were associated with higher odds of belonging to categories of lower resilience levels. However, more professional work experience was related to lower odds of belonging to categories of lower resilience levels (OR $= 0.94$, 95% CI 0.89-0.99, $P < .04$). Several variables, including marital status, demonstrated inconsistent associations across different modeling methods.

Conclusions: Resilience in professional health workers was related to personal and working conditions. The scores of emergency staff were low and improvement with specific strategies is needed.

Key words: Psychological resilience; Emergencies; Medical staff; Nursing staff

Introduction

Resilience is defined in general terms as the ability to adapt to change.[1] Some researchers have applied the concept to health care professionals, stating that resilience is the ability to maintain personal and professional well-being to cope with stress and adversity at work.[2] It therefore seems logical to assume that working in an emergency service implies having a great capacity to face extreme situations. However, resilience has been shown to be related not only to individual

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personality characteristics (personal satisfaction, perseverance, self-control, self-confidence, and commitment),[3,4] but also to external factors (working conditions, relationship status, and physical and mental health).[5,6]

In health workers, resilience has been found to be a protective factor against mental health problems,[7] and has been shown to play a beneficial role in reducing burnout and the perceived workload in emergency professionals.[8] In addition, individuals with low resilience are more anxious when faced with adversity, and they experience marked distress by trying to resolve adverse situations before they happen.[9]

Certain sociodemographic and work-related characteristics are also associated with the ability to cope with changes. For example, previous studies show a correlation between having a partner[10] and children[11] and better levels of resilience in nursing professionals, and indicate that age, colleagues' support, and work autonomy increase resilience in physicians.[9,12] However, the working conditions of nurses are also determinants of the development of resilience, which has been shown to be decreased when they suffer stress and workplace bullying.[13,14]

Despite the numerous studies on resilience in health professionals[6,10] and the need to implement strategies to improve the situation of emergency workers,[15,16] many institutions still do not take active measures to strengthen resilience. Therefore, given the international health emergency caused by coronavirus disease (COVID-19), in which it is believed that 1500 health professionals have been affected by the disease and have died,[17] it is pertinent to continue investigating resilience in health care workers, specifically those who work in emergency departments and who may be subjected to high-stress situations.

PURPOSE

The objective of this study was to understand the resilience of health professionals working in hospital and pre-hospital emergency services and to determine the relationships of resilience with sociodemographic and work-related characteristics.

Methods

STUDY DESIGN, SETTING, AND PARTICIPANTS

A cross-sectional descriptive study was conducted between May 2016 and September 2016. The inclusion criteria were as follows: health care personnel working as physicians, nurses, or nursing assistants who performed care functions in hospital and pre-hospital emergency services (emergency mobile units [EMUs]) belonging to the Health Service of the principality of Asturias, Spain, and who agreed to volun-

tarily participate and complete the data collection form in its entirety. According to the data provided by the management of the centers, 628 people from the chosen professional categories worked in emergency departments. To calculate the sample size, we considered a power of 80%, a confidence level (CI) of 95%, and a medium effect size for a general linear model with 13 predictor variables, which yielded a minimum sample size of 131 (WebPower library in R [The R Foundation for Statistical Computing] was used).

VARIABLES AND INSTRUMENT

An anonymous and self-administered questionnaire was used. Sociodemographic variables were age, sex, marital status, having children, having dependents, supporting dependent care, free-time activities (hobbies, social, cultural, or sports), and own salary as the only source of income in their household. Work-related variables collected were professional category (nurse, physician, or nursing assistant), type of employment contract (permanent or temporary), length of professional experience, length of experience in emergency service, work shift (nights vs no nights), and perceptions that work was stressful (yes/no).

To study resilience, we used the Resilience Scale–25 (RS-25),[18] developed by Wagnild and Young,[3] whose purpose was to identify the degree of personal resilience, which is considered a positive personality characteristic that improves adaptation. The scale consists of 25 items that which participants indicate their degree of agreement with on a Likert scale ranging from 1 to 7, on which the lowest number corresponds to "disagree" and the highest number corresponds to "agree." The total score varies from 25 to 175, with higher scores indicating greater resilience. The scale also establishes different levels of resilience as a function of the total score: 115 points or less indicates very low resilience; 116 points to 144 points indicates moderate resilience to moderately low resilience; and 145 points or more indicates moderately high resilience to high resilience. For the remainder of this manuscript, these categories will be respectively referred to as low, moderate, and high. The RS-25 has been validated at the international level and has adequate psychometric properties in the Spanish population (Cronbach alpha for the total scale =.93),[18] and it is protected under license.

PROCEDURE AND ETHICAL STATEMENT

Authorization was obtained from the Research Ethics Committee of the principality of Asturias (Regional Clinical Research Ethics Committee of the principality of Asturias #83/15), management of the health care areas, and the

coordinator of the EMUs. It conformed to the principles embodies in the Declaration of Helsinki.

The supervisors of each unit were informed about the main characteristics of the study and the dates when data collection would begin. Each unit was visited during different work shifts to deliver the questionnaires to reach the entire accessible population. Once consent was obtained, the questionnaire was given to the participant along with an explanation of how to correctly fill it out and the instruction to return it personally to the researcher at some point during the work shift or leave it at the unit in a specially designated receptacle. Permission to use the scale was obtained from the original author.

DATA ANALYSIS

The statistical package SPSS version 21.0 (IBM Corp) and the software R version 3.6.0 were used for data analysis. Descriptive analysis were performed, including the absolute frequency for the qualitative variables and mean, SD, percentage, and range for the quantitative variables. Bivariate analysis was subsequently performed and reported in the Supplemental Results and Tables to compare group differences in resilience using the chi-square test, independent samples Student's t test, ANOVA, or Kruskal-Wallis. A linear regression model was used to study the relationship between the independent variables and the total RS-25 score as follows:

RS-25 = Professional Category + Years of Professional Experience + Years of Emergency Experience + Shift + Contract + Finds Work Stressful + Salary as Only Household Income + Sex + Age + Marital Status + Has Children + Has Dependents + Supports Dependents + Activities/Hobbies.

Ordinal logistic regression was used to test the relationship of the independent variables to categories of the RS-25 (low, moderate, high) as the dependent variable as follows:

RS-25 (options: low, moderate, high) = Professional Category + Years of Professional Experience + Years of Emergency Experience + Shift + Contract + Finds Work Stressful + Salary as Only Household Income + Sex + Age + Marital Status + Has Children + Has Dependents + Supports Dependents + Activities/Hobbies.

Given that more than 5% of the data were missing (classified as missing not-at-random), data processing and imputation were carried out first using a multiple imputation method in R software libraries MICE (Multiple Imputation by Chained Equations) and BaylorEdPsych. A

senstivity analysis was performed to compare the results before and after imputation (all analyses are included in the Supplemental Material). The main results reports here are based on the imputed data. Differences between the imputed and raw data are discussed.

Results

PARTICIPANTS

A total of 321 professionals participated, with a greater representation of women (n = 261, 81.31%) than men (n = 60, 18.69%), and a mean age of 43.36 years (SD 8.73). The global response rate was 51.11%, and the response rate of the nurses (60.47%) and nursing assistants (51.28%) was higher than that of the physicians (40.18%).

DESCRIPTIVE DATA

Of the participants, 65.73% (n = 211) reported having a partner, 26.17% (n = 84) were single, 8.10% (n = 26) were divorced. The average number of children was 0.93 (SD = 0.96). With respect to social variables, 63.93% (n = 202) practiced some cultural or sport activity in their free time, and 41.43% (n = 133) has dependents (excluding children), of whom 36.09% (n = 48) had social, familial, or financial support for their care. Regarding work-related variables, the mean length of professional experience (total time working in a professional category) was 16.91 years (SD = 8.36), the mean length of services in the emergency department was 8.85 years (SD = 6.93), 15.26% (n = 49) did not work night shifts, 54.52% (n = 175) were casual or non-permanent workers, 19.94% (n = 64) reports that their salary was the only source of income in their household, and 80.69% (n = 259) considered their work stressful.

MAIN RESULTS

The mean RS-25 score was 133.38 (SD 17.11), and the most prevalent resilience level was moderate (n = 201; 62.62%), followed by high (n = 74; 23.05%), and low (n = 46; 14.33%). Group difference testing results can be found in the Supplemental Material.

The multivariate model in which the dependent variable was the RS-25 total score, being single (β = -7.35, $P < .01$) or divorced (β = -8.26, P = .04) were associated with a decrease the total RS-25 scale score (R^2 0.04; $P < .02$) (Table 1).

Finally, the multivariate ordinal regression model in which the dependent variable was the categories (low, moderate, high) of the RS-25 resilience score indicated that a

TABLE 1

Multivariate model for RS-25 total score (imputed data; n = 321)

Variable	Coefficient	SE	P value
Professional Category (Nursing Assistant=referent)			
Nurse	-4.56	2.76	.10
Physician	-0.44	3.13	.89
Years of Professional Experience	0.15	0.25	.53
Years of Emergency Experience	0.08	0.20	.70
Shift (No Nights)	-5.18	2.70	.06
Contract (Permanent)	-2.96	2.61	.26
Finds Work Stressful	-2.65	2.46	.28
Salary as Only Household Income	4.73	2.82	.09
Sex (Male = referent)			
Female	-0.29	2.78	.92
Age	-0.04	0.21	.83
Marital Status (Married=referent)			
Divorced	-8.26	3.95	.04
Single	-7.35	2.76	<.01
Has Children	0.54	1.28	.68
Dependents	-0.99	2.46	.69
Supports Dependents (Yes)	1.14	3.03	.71
Activities (Yes)	3.26	1.97	.10

Model summary: F = 1.92, P = .02. Adjusted R^2 = .04.

longer duration of professional experience decreased the odds of belonging to a group with lower levels of resilience (odds ratio [OR] = 0.94, 95% CI = 0.89, 0.99; P = .04). In contrast, being a nurse (OR = -2.11, 95% CI = 1.07, 4.19; P = .03) and not working shifts (OR = 2.00, 95% CI = 1.04, 3.90; P = .04) increased the odds of belonging to a group with lower resilience (Table 2). The model did not fulfill the proportional odds assumption.

Differences were found when comparing the models with imputed data and the model results prior to imputation (Table 3). In the model without imputation for missing data, being divorced increased the odds of belonging to a group with low levels of resilience (OR = 2.71, 95% CI = 1.02, 7.26; P = .05), while having children and leisure hobbies or activities decreased the odds of belonging to

groups with lower levels of resilience (OR = 0.66, 95% CI = 0.47, 0.94; P = .02) and (OR = 0.58, 95% CI = 0.34, 0.97; P = .04), respectively.

Discussion

Our study found an intermediate resilience score that corresponded to moderate to moderately low capacity for resilience, a higher degree of resilience than that reported in other publications.[19,20] Few publications have previously analyzed this characteristic of emergency health professionals, which has emerged as even more relevant since the onset of COVID-19 pandemic.[21] Therefore, our research is an interesting starting point for evaluating the evolution of health workers who were on the front lines during the crisis, particularly nurses, who defined the category with highest odds of having lower resilience levels in our study.

Regarding measurement of our outcome, the Connor-Davidson Resilience Scale establishes a total scoring system similar to that of the RS-25; these 2 scales are among the most widely used tools focusing on assessing resilience, although not categorized in the original version.[22] This scale has also been shown to have adequate psychometric properties; thus, its use can be considered appropriate in future research.

Both work and personal factors were shown to influence the resilience of our sample, depending on how we tested resilience as a continuous score, a categorical outcome, or by imputing missing data. Regarding the work-related variables, the work shift was found to be associated with levels of resilience, with greater resilience observed in professionals who worked night shifts. Possible explanations for this finding include better adaptation among individuals who are accustomed to constantly changing their life rhythms for work reasons or the existence of confounding variables that were not considered. In addition, recent research suggests that oncology professionals working on the front lines during the COVID-19 pandemic experienced a lower prevalence of burnout than their colleagues,[23] suggesting an interesting line of future research to test this in the emergency specialty. Nonetheless, work shift and its relationship with resilience have rarely been reviewed in the literature, and no relationship has been established[6]; given the association we observed between work shift and resilience this relationship should be analyzed in future studies.

Our investigation showed that the duration of professional experience was positively related to resilience, but age in our multivariate models was not associated. Future study should test the correlations and interactions among length of work experience overall, length of work experience

TABLE 2
Odds of being in lower categories of resilience, ordinal logistic regression model results (imputed data, n = 321)

Variable	Coefficient	P	OR	95% CI	
				LL	UL
Professional Category (Nursing Assistant=referent)					
Nurse	0.75	.03	2.11	1.07	4.18
Physician	0.23	.55	1.25	0.59	2.65
Years of Professional Experience	−0.06	.04	0.94	0.89	0.99
Years of Emergency Experience	0.01	.73	1.01	0.96	1.06
Shift (No Nights)	0.70	.04	2.00	1.04	3.90
Contract (Permanent)	0.58	.06	1.79	0.97	3.58
Finds Work Stressful	0.30	.31	1.35	0.75	2.42
Salary as Only Household Income	-0.29	.39	0.75	0.38	1.46
Sex (Male = referent)					
Female	-0.32	.33	0.73	0.38	1.39
Age	0.02	.38	1.02	0.97	1.07
Marital Status (Married=referent)					
Divorced	0.92	.06	2.52	0.99	6.41
Single	0.50	.14	1.65	0.85	3.22
Has Children	-0.30	.06	0.74	0.54	1.01
Dependents	0.40	.19	1.49	0.82	2.73
Supports Dependents (Yes)	-0.26	.47	0.77	0.37	1.58
Activities (Yes)	-0.35	.16	0.71	0.44	1.14

Nagelkerke R^2 = 0.11; parallel-lines assumption not verified ($P < 0.01$).
OR, odds ratio; CI, confidence interval; EXP(B), exponentiation of the B coefficient.

in the emergency setting, and age to ascertain if these should each be treated as independent, uncorrelated factors. Investigating each of these variables in future studies is warranted to verify whether they may be related to other psychosocial risks associated with health professionals, such as stress or burnout, or if they are isolated but determinant factors in the development of resilience.[14,24,25] In addition, job satisfaction could be a possible explanation that we did not test. Severe work–private life conflicts, work-life balance incompatibility, and fewer opportunities for development for nurses have demonstrated a negative association with job satisfaction in older nurses in other studies.[26,27]

The existence of a better capacity for adaptation and coping with adversity in medical professionals was investigated in previous studies that confirmed that work commitment, autonomy, and independence at work were related to resilience.[5,28] This is coherent with the results of our present study, in which physicians had higher resilience scores, and being in the nursing profession was a factor associate with lower resilience categories. We currently do not have an explanation for why the nurses in our sample presented the lowest levels of resilience, and this finding has not been reported in previous studies. For this reason, analyses of the situations of different professional groups in future studies are necessary to inform measures to improve the adaptation of nurses.

Although emergency professionals can conduct their work in pre-hospital or transport settings has not been previously reported in other studies and is worth considering in future research. Perhaps the type of care provided, which occurs far from the health center and often in extreme and adverse environments, increases the ability of professionals to adapt, which is reflected in their resilience scores.

From a social standpoint, there are theories about the role of the family and the partner as cumulative protective factors that lead to resilience[10,11,29] These concepts were corroborated by our results, which affirm a greater resilience scores among married health professionals.

TABLE 3

Odds of being in lower categories of resilience, ordinal logistic regression model results (data not imputed, n = 288)

Variable	Coefficient	P	OR	95% CI	
				LL	UL
Professional Category (Nursing Assistant=referent)					
Nurse	0.79	.04	2.21	1.05	4.70
Physician	0.10	.80	1.11	0.49	2.53
Years of Professional Experience	-0.09	<.01	0.91	0.86	0.97
Years of Emergency Experience	0.03	.28	1.03	0.98	1.09
Shift (No Nights)	0.89	.01	2.45	1.20	5.01
Contract (Permanent)	0.55	.09	1.73	0.90	3.35
Finds Work Stressful	0.25	.44	1.28	0.68	2.40
Salary as Only Household Income	-0.29	.42	0.75	0.37	1.51
Sex (Male = referent)					
Female	-0.32	.37	0.73	0.36	1.45
Age	0.04	.18	1.04	0.98	1.09
Marital Status (Married=referent)					
Divorced	0.96	.05	2.71	1.02	7.26
Single	0.42	.26	1.52	0.74	3.14
Has Children	-0.41	.02	0.66	0.47	0.94
Dependents	0.47	.16	1.59	0.84	3.06
Supports Dependents (Yes)	-0.13	.74	0.88	0.41	1.91
Activities (Yes)	-0.55	.04	0.58	0.34	0.97

Nagelkerke R^2 = 0.15; parallel-lines assumption not verified ($P < 0.01$).
OR, odds ratio; CI, confidence interval; LL, lower bound; UL, upper bound.

Limitations

Some limitations in this study should be considered. First, the design does not allow us to determine cause and effect but only to describe the associations. Second, because the participants worked in emergency services, the results may not be generalizable to other settings; therefore, an extensive analysis in other departments is warranted. Third, there may be some confounding variables that we have not studied that could influence resilience, such as salary, commitment to the company, job satisfaction, or how valued a particular health care provider feels in their institution. Fourth, the proposed ordinal regression model has a low explanatory power. Our model did not fulfill the proportional odds assumption. Thus, additional models and studies to test additional or other independent variables for associations with categories of resilience are needed. In addition, participation in the study was voluntary; therefore, selection bias is possible. Finally, the RS-25 has adequate psychometric properties and has been widely used in previous studies in different contexts; however, the instrument copyright and required payment may be a barrier to widespread use in studies of health professionals.

Implications for Emergency Clinical Care

Improving resilience in emergency nurses is necessary for multiple reasons. First, it is necessary to strengthen the resilience of nursing students and current workers to encourage both the recruitment of new nurses and their retention in emergency services.[15] In turn, the positive influence of nurse resilience in terms of work performance, job satisfaction, and commitment to the organization[5,30,31] makes it logical that institutions will benefit if they invest in measures that increase resilience in workers. In fact, the effectiveness of different strategies for improving resilience in nursing personnel, such as formal and informal support from the institution and training in specific skills or mindfulness, has been demonstrated.[14,32,33]

A recent project led by the American Nurses Association, the Emergency Nurses Association, the American Association of Critical-Care Nurses, and the American Psychiatric Nurses Association stands out; this project was designed by and for nurses to help nurses cope with stress arising from the COVID-19 outbreak. This project involves virtual platforms to allow professionals to share thoughts, experiences, and doubts; apps focusing on physical and mental well-being through meditation, breathing exercises, and lifestyle tracking; and support by a team of professionals virtually available 24 hours a day, 7 days a week.[34] It seems appropriate that these types of measures persist over time and are not only specific strategies for extreme cases.

International campaigns to increase awareness of the importance of nurses in society and health are essential; however, such campaigns are insufficient if measures to evaluate and control institutional policies regarding health workers are not taken into consideration.

Conclusions

Resilience in emergency professionals is associated with sociodemographic and work-related factors. The moderate levels of resilience among emergency professionals may be insufficient, and adequate strategies are needed to increase the adaptive capacity and health of these workers.

Author Disclosures

Conflicts of interest: none to report.

The data that support the findings of this study are available from the corresponding author upon reasonable request.

Supplementary Data

Supplementary data related to this article can be found at https://doi.org/10.1016/j.jen.2020.07.007.

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Supplemental Results

We found a significant association between the highest scores on the RS-25 and the professional category of physician ($\chi^2 = 10.05$; $P < .01$), the marital status of married/in a partnership (F=5.65; $P < .01$), and working night shifts (t =2.37; $P = .02$) (Table S1). Tukey's post hoc analyses confirmed the differences between the groups, and the average resilience in the single group was lower than that in the married/in a partnership group ($P \leq .01$). When the different professional groups were compared, a relationship was found between the RS-25 score and nursing assistants who worked night shifts (t =3.58; $P < .01$), and physicians who were married or in a partnership ($x^2 = 8.85$; $P = .01$) (Table S1). Similar to the entire sample, Dunn's post hoc analyses confirmed

the differences between the groups, and the average number of physicians belonging to the single group was lower than those belonging to the married/in a partnership group ($P < .01$).

Resilience capacity was shown to be associated with profession, with moderately low to moderate capacities being more frequent among physicians ($\chi^2 = 19.78$; $P < .01$) and males ($\chi^2 = 7.78$; $P = .02$,) (Table S2). When the different levels of resilience were analyzed as a function of professional category, a significant association was found between nursing professionals who practised free time activities ($\chi^2 = 9.41$; $P < .01$), nursing assistants who worked night shifts ($\chi^2 = 15.62$; $P = .01$), and physicians with longer lengths of service (seniority), who demonstrated moderate resilience category ($x^2 = 8.31$; $P = .01$) (Table S2).

TABLE S1

Relationship between RS25 Resilience Scale– total score and working and sociodemographic variables (imputed data; n = 321).

Variable	Mean	SD	Median	95% CI	Point estimates	P value
Professional category					χ^2 10.05	<.01*
Physicians	136.20	16.10	138	132.79; 139.62,		
Nurses	130.95	14.87	131	128.57;133.34,		
Nursing assistants	134.85	21.21	138	130.16;139.54,		
Marital status					F 5.65	<.01[†]
Single	128.46	18.32	130	124.49;132.44,		
Married/in a partnership	135.61	15.77	137	133.47;137.75,		
Divorced	131.11	20.44	136	122.86;139.47,		
Work shift					t 2.37	.02[‡]
Not night shift	128.08	18.63	132	122.72;133.43,		
Including night shift	134.33	16.68	136	132.34;136.00,		
Nursing assistants						
Work shift						<.01[‡]
Not night shifts	120.11	25.06	118.50	107.65;, 132.57	t 3.58	
Including night shifts	139.06	18.04	140	134.51;144.62,		
Physicians						
Marital status					x^2 8.85	.01[†]
Single	122.79	25.46	130.50	108.09;137.48,		
Married/in a partnership	139.43	12.21	138.50	136.47;142.38,		
Divorced	131	12.23	131.50	118.16;143.84,		

CI, confidence interval.

[*] Kruskal-Wallis

[†] Analysis of variance

[‡] test

TABLE S2

Relationship between resilience categories and working and sociodemographic variables (imputed data; n = 321).

Variable	Resilience category			Point estimates	P value
	Low n (%)	Moderate n (%)	High n (%)		
Professional category				χ^2 19.78	<.01*
Physicians	7 (7.95)	61 (69.32)	20(22.73)		
Nurses	24 (15.79)	104(68.42)	24(115.79)		
Nursing assistants	15 (18.52)	36(44.44)	30(37.04)		
Sex					.02*
Female	41 (15.71)	154(59.00)	66 (25.29)	χ^2 7.78	
Male	5(8.33)	47(78.33)	8 (13.133)		
Nurses					
Free-time activities	10(10.42)	74(77.08)	12(12.50)	χ^2 9.41	.01*
Not free-time activities	14(25.00)	30(53.57)	12(21.42)		
Nursing assistants					
Not night shifts	9 (50)	6 (33.33)	3 (16.67)	χ^2 15.62	<.01*
Including night shifts	6(9.52)	30(47.62)	27(42.86)		
Physicians					
Length of service	2.00[†]; 5.80[‡] 95% -0.87; 9.84CI –,	9.00[†];6.56[‡] 95% CI 8.70;12.07	5.79[†]; 10.14[‡] 95% 4.03; 13.52CI ,	χ^2 8.31	.01[§]

CI, confidence interval.
* Chi square test
[†] Median
[‡] Standard Deviation
[§] Kruskal Wallis

ENA POSITION STATEMENT:
RESUSCITATIVE DECISIONS IN THE EMERGENCY CARE SETTING

NCPD **Earn Up to 11.5 Hours. See page 955.**

ENA
EMERGENCY NURSES ASSOCIATION

Description

In the emergency care setting, resuscitative decisions are encountered frequently. These decisions may be controversial, especially in the absence of advance directives (ADs) delineating the patient's wishes. Ethical issues regarding cardiopulmonary resuscitation (CPR), life-sustaining treatment, futility, self-determination, and ADs may complicate a time-sensitive clinical situation. Legal issues arise with respect to state and country variances in laws regarding ADs, out-of-hospital do not resuscitate (DNR) orders, living wills, power of attorney, minors, and expressed wishes. Family dynamics regarding communication, decision-making, and family presence can be challenging, especially when there is disagreement among family members or with the patient's wishes as stated in an AD. (Family is defined here as a "social unit comprised of people related by ancestry, legal determination, or significant others as identified by the patient."[1])

Clinical barriers to providing care in accordance with the patient's wishes include the absence of an AD, a recent change in health status which may have caused the patient to reconsider their wishes, or an AD that is too vague to provide meaningful information. In addition, it may be difficult for emergency care providers to access an AD, especially if they are not able to access the patient's electronic health record.[2,3] Even when ADs are available in patients' records, emergency care providers may fail to note their existence.[4,5]

Resuscitative decisions are often encountered after clinical deterioration or during end-of-life care.[6] Such timing can make these decisions challenging for patients, their families, and the health care team. United States federal laws require health care facilities to comply with the Patient Self Determination Act (PSDA) regarding ADs, which includes patients who come into the emergency department with an established AD.[7]

The issue of resuscitative decisions is magnified by a growing population that is increasingly older as well as by continual advances in health care that allow for extension of life, even in the face of catastrophic illness or injury. According to the US Census Bureau, between 2012 and 2060, the US population is projected to grow 34%, from 314 million to 420 million.[8] More than 20% of residents will be 65 years or older by 2030, a significant increase from 13% in 2010 and only 9.8% in 1970.[8] Emergency nurses, including advanced practice registered nurses, are in a key position to inform, educate, and advocate for patients and their families regarding advance care planning. Emergency nurses are essential resuscitation team members who not only participate in clinical care but also support family members, whether they are present in the resuscitation room or not. It is important that emergency nurses participate in the shared decision-making process, which enables patients, family members, surrogates, and clinicians to make collaborative health care decisions while considering the patient's values and preferences.[9-11]

Emergency Nurses Association Position

It is the position of the Emergency Nurses Association (ENA) that:

1. Emergency nurses respect the patient's autonomy, dignity, and right to self-determination in resuscitative decisions.
2. Emergency nurses collaborate with other health care professionals and advocate for compliance with the patient's stated wishes regarding resuscitation decisions and interventions.
3. Emergency nurses advocate for advance care planning, educate patients and their families on planning options, and verify documentation of ADs, including code status, in the health care record.
4. Emergency nurses support a patient- and family-centered care approach to health care decisions.
5. Emergency nurses support family presence during resuscitation if the family desires to be present.
6. Emergency nurses participate in the development, implementation, and evaluation of resuscitative decision policies and protocols.

7. Emergency nurses are knowledgeable about specific laws and regulations regarding ADs in the locations where they practice.

Background

The Patient's Bill of Rights was created by the American Hospital Association in 1970, and it detailed the rights a patient could expect, including informed consent, quality care, privacy, and the right to an AD for health care.[12] In what is now known as The Patient Care Partnership, the American Hospital Association continues to advocate for patient involvement in care, including the creation of ADs and the designation of a health care power of attorney.[13]

The federal PSDA was enacted in 1990 and mandates that individuals can accept or opt out of medical treatment in an AD or by appointing someone as their legal surrogate.[14] The PSDA requires hospitals, skilled nursing facilities, home health agencies, hospice programs, and health maintenance organizations to comply with the following requirements[7,14]:

- Inform patients about their medical care options
- Periodically inquire about the existence of ADs
- Not discriminate against a person with an AD
- Ensure an AD is legally valid
- Promote educational programs regarding ADs

Clinicians are encouraged to counsel patients regarding ADs.[15] Advance care planning is reimbursed by Medicare either as a part of a Medicare wellness visit or as a separate medically necessary service.[15] Outside of US, European countries also acknowledge the importance of patient's wishes, ADs, and proxy decision makers in end-of-life care.[10,16,17]

An AD is a binding document that delineates an individual's decision about their medical treatment.[18] Living wills and durable power of attorney for health care, also known as medical power of attorney, are examples of ADs. A living will addresses treatment for a person who is terminally ill and unable to make decisions on their own behalf, whereas a durable power of attorney is a legal document that appoints a designated person (surrogate or proxy) to make medical decisions when a person is incapacitated, whether temporarily or permanently.[19−21]

In some states, Physician Orders for Life-Sustaining Treatment (POLST) documents are used to specify the health care treatment wishes of a seriously ill or frail patient, including resuscitative measures and transport to a hospital.[22] A POLST is a portable document that is valid outside of a health care setting and is therefore especially helpful to prehospital personnel.[22]

There are 4 levels of treatment to be considered during resuscitative care events: no resuscitation be attempted, only provide specified treatments as selected, comfort measures be provided, and all necessary and appropriate interventions be offered. The most widely recognized terminology and abbreviations include Do Not Resuscitate (DNR) or Do Not Attempt Resuscitation (DNAR),[14] or Do Not Attempt CPR DNACPR),[20] Do Not Intubate (DNI),[18] Comfort Measures Only (CMO), and Full Code (FC). More recently, some have suggested the addition of an alternative called Shock-Only Resuscitation (SOR). With this new status, patients would not receive CPR but could receive defibrillation for shockable cardiac rhythms.[23]

DNR, DNAR, and DNACPR are terms used to direct clinicians to withhold resuscitative measures. In the event a patient goes into cardiopulmonary arrest, without a written DNR order in the medical record, resuscitation efforts will be initiated if it is medically appropriate. Once the existence of a valid DNR is established, resuscitative efforts will be stopped.[24] A patient may also choose to have a DNI order to prevent intubation or mechanical ventilation.[18] CMO is a term used to permit the natural dying process while affording maximum comfort, which includes addressing the psychological and spiritual needs of both patient and family.[25] Full code is a term used to indicate that health care providers are to attempt all resuscitative interventions including, but not limited to, CPR, advanced cardiac life support, and airway management, including intubation, mechanical ventilation, and heroic measures. Although each state has its own version of an AD, there is dialogue about a national AD that would be transferable among states.[26]

In most situations, resuscitation attempts are indicated for all patients in cardiac arrest who do not have a valid DNR order. However, in some situations, guidelines may stipulate additional criteria for decision-making as to when resuscitation should not be attempted or should be withdrawn if started. Examples of such criteria include clear danger to the health care providers, obvious fatal injury or signs of irreversible death, strong evidence that resuscitation would be against the patient's wishes or is futile, and asystole of greater than 20 minutes duration despite resuscitative measures when no reversible cause has been identified.[10,24] External events, such as a pandemic or a mass casualty situation that may result in a demand for health care resources that is greater than the supply, require crisis standards of care that influence decision-making in resuscitative situations.[10,24,27]

In addition to decisions regarding the initiation of resuscitation efforts, the issue of ceasing interventions arises whenever such interventions are ineffective. Terminating resuscitative events may be a difficult decision for care providers and family members, especially in the case of young

or previously healthy patients, and can lead to protracted intervention.[10] Unconscious bias based on socioeconomic and demographic factors may adversely affect these decisions, leading to either protracted or prematurely terminated codes.[28] In addition, emergency care providers frequently have little information about the patient's preresuscitation state of health and, thus, do not know if they may be

prolonging suffering even as they consume precious health care resources such as extracorporeal membrane oxygenation.

Structured, advanced care planning initiated early in the patient admission process or immediately following clinical deterioration may lead to greater patient involvement, self-determination, and decision-making.[6] Patient- and family-centered care is an approach to health care that recognizes the role of the family

Resources

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in providing health care; encourages collaboration between the patient, family, surrogate, and health care professionals; and honors individual and family strengths, cultures, and traditions.[29] In 1993, ENA General Assembly passed a resolution supporting family presence during resuscitation. This resulted in the development of a position statement and educational resources.[30,31] Subsequently, ENA developed an evidence-based clinical practice guideline for family presence as an option during resuscitation to help meet the family's psychosocial needs in a time of crisis. In addition, the evidence supports having a designated health care individual stay with the family as well as creating institutional policies and education to support family presence.[32] Other authoritative bodies such as the American College of Emergency Physicians, the American Heart Association, and the European Resuscitation Council also support family presence during resuscitation.[10,33,34]

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INTERVENTION DEVELOPMENT: QUICK RESPONSE CODE IMPLEMENTATION FOR POINT-OF-CARE TRAINING NEEDS IN THE EMERGENCY DEPARTMENT

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Key words: Education; Training; Nursing; Technology; Emergency nursing

Abstract

The rise of a digital native generation of nurses entering the ED workforce prompts a need for targeted training resources to meet their needs and preferences. The purpose of this intervention was to (1) leverage Quick Response code technology to provide point-of-care information as it relates to high-risk, low-volume therapies, (2) improve staff nurse perception toward the ease of access to educational and training materials, and (3) improve staff perception of the adequacy of educational and training resources. Training videos ranging in length from 2 to 3 minutes were created and linked through Quick Response codes for smartphone scanning and affixed to relevant pieces of equipment. Nurses were asked to complete project-specific surveys before implementation (n = 20) and at 4 months postimplementation (n = 26). After the second project-specific survey, nearly all (96.2%) of the surveyed nurses described their ease of access to informational materials as extremely easy or somewhat easy. Approximately 93.7% stated yes to having adequate educational resources to meet their training needs, an increase of 50% in comparison with the first project-specific survey. There is a great opportunity to capitalize on the potential preferences of this younger, technologically savvy generation of nurses through Quick Response code implementation and point-of-care training to improve competency with high-risk, low-volume therapies. This intervention could also be tailored to many other aspects of nurse training and education in various settings.

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Introduction

The nationwide demographics of emergency nurses demonstrate a younger average age than the overall workforce of registered nurses across other specialties. As of 2019, a benchmark survey by the Transport Nursing Workforce revealed the average age of emergency nurses in the United States to be 30 to 39 years.[1] The 2017 National Nursing Workforce Survey revealed the average age of registered nurses across all specialties to be 51 years.[2] When considering the younger average age of emergency nurses, opportunities arise to target educational resources to meet the needs and potential preferences of their demographic.

Digital natives are those who have grown up with advanced technology thoroughly integrated in their daily lives.[3] Given the average age of emergency nurses being 30 to 39 years, it is likely that this group grew up with elements of advanced technology embedded in their daily life, specifically in the areas of communication, leisure, and education. Smartphone access and the proliferation of broadband infrastructure have supported the integration of the use of this technology in health care. The practice of nurses seeking medication and disease-related information through smartphone internet access and applications has been thoroughly documented.[4] Various applications exist on smartphones for knowledge sharing. One application known as BAND allows surgical nurses to share information, photos, and YouTube videos explaining various instruments and procedures.[4] In a 2018 study, Flynn et al [5] noted that greater than 75% of surveyed nurses demonstrated a preference for using smartphones to access information and that the group most commonly represented by these digital natives was nurses aged between 18 and 30 years.

As technology use increases across all domains, including health care, the concept of point-of-care or just-in-time training has risen as well.[3] This paradigm has the potential to lessen the risk of harmful trial and error decision-making by providing information that is immediately available.[5] A study by Jamu et al[6] revealed the importance of educating emergency nurses on high-risk low-volume therapies (HRLVTs); pieces of equipment or procedures that are used infrequently but bear a high level of complexity creating a risk to patient care.[7] This concept was supported by annual learning needs assessments sent out to emergency nurses in our acute-care, community hospital setting. Training and education should be tailored towards nurses who prefer using technology to access point-of-care information.

Quick Response (QR) codes, first developed by the automobile industry in Japan, provide codes that can be scanned by any smartphone with a camera.[3] Once scanned, they connect the user with whatever corresponding content had been linked to that specific code (ie, YouTube videos, a photograph, a website). When implemented effectively, they can help bridge the gap between educational material and learners by providing point-of-care education.

This intervention development project intended to increase staff comfort and perceived ease of access to informational materials pertaining to HRLVTs while capitalizing on the preferences of a digital-native generation. This intervention implementation of QR code technology for just-in-time training aimed to offer brief, easily accessible videos explaining/demonstrating the setup/management of HRLVT devices or procedures.

Methods

CONTEXT

This intervention was implemented in the emergency department of a 371-bed hospital. This community hospital's emergency department sees 56 000 patients per year and features a 4-bed trauma bay. It is an American College of Surgeons level III trauma center, New York State Stroke Center, and American Academy of Pediatrics level II neonatal critical care center.

Staff nurses participate in education during their initial orientation that introduces them to various HRLVTs. This education provides them with a knowledge of the equipment and indications for use. Brief training is also provided during this period during which a staff educator observes the staff nurse performing the skill. This counts as their recorded competency, which is completed annually through a skills fair. The attendance of annual skills fairs (after the initial orientation) are optional per union regulations.

INTERVENTIONS

Results of the annual learning needs assessments were completed and evaluated to assess themes and trends and to extract priority training needs. These anonymous learning needs assessments were collected 4 months before the implementation of QR code technology for point-of-care training. Many HRLVTs were among the primary requests (expressed in the free-text response portion of the survey) for ongoing training owing to the nature of their infrequent use, including the rapid infuser, arterial line setup, water seal chest tube setup, and end-tidal carbon dioxide monitoring. Though each nurse in the department possesses a competency for each of these HRLVTs, many have not used the equipment since their orientation and, as such, can benefit from refresher training.

Instructional video clips pertaining to these themes and requested equipment were created and edited by the author, a clinical nurse educator who is board certified in emergency and trauma nursing. To maintain a point-of-care brief style of refresher training, the videos were recorded with a goal duration of less than 3 minutes. The rapid infuser, however, required a longer explanation and thus exceeded the goal video length (7 minutes).

The videos were reviewed for accuracy and quality by other staff educators. They were then uploaded to YouTube on the department's YouTube channel. This ensured that the videos were accessible not only through QR code links but by searching the channel as well. The videos were then linked through YouTube to unique QR codes performed through a free website.[8] The QR codes were downloaded, enlarged, and printed for ease of access. Figures 1 and 2 are examples of associated QR codes.

FIGURE 1
"How to set up the Rapid Transfuser" QR code. QR, Quick Response.

FIGURE 2

"How to zero an arterial line" QR code. QR, Quick Response.

STUDY OF THE INTERVENTIONS

Anonymous learning needs assessments were performed from July 1 to July 31, 2020, 4 months before QR code implementation. These were distributed on paper to ascertain priority education and training needs. This guided the selection of highly requested HRLVTs by giving nurses the opportunity to name those HRLVTs for which they wished to receive training.

Data from the first project-specific survey were acquired over a 2-month period immediately before implementation, from September 1, 2020 to October 31, 2020. Likert-style surveys were disseminated to nurses in the emergency department to determine nursing perception of resource/training accessibility before and after this intervention. The intervention went live November 1, 2020.

In the first month of the intervention, QR codes were provided in a binder located at the main nursing station within the emergency department. The binder included instructions on how to scan a QR code and an alphabetically organized library of all the codes. The process for scanning was discussed daily at the morning briefs and huddles.

In discussing the intervention with staff during the second month of QR implementation, it was understood that this resource would be most valuable when affixed to specific equipment. This feedback was discussed by leadership and immediately implemented on December 15, 2020. QR codes were laminated for cleaning to comply with infection-control policies and affixed through hospital-grade Velcro to the various pieces of equipment. Staff verbalized that this change not only made access easier but served as a helpful reminder of the codes, thus prompting their increased use.

The video explaining how to set up the rapid infuser was affixed by QR code to the device itself. The QR codes for the videos explaining how to set up an arterial line and how to zero an arterial line were affixed to the storage closet where those supplies were kept. The same process was repeated for chest tubes, ventilators, and the end tidal carbon dioxide monitoring module.

Data from the second project-specific survey were acquired 4 months after implementation, from March 1, 2021 to March 31, 2021. Likert-style surveys were disseminated to nurses in the emergency department to gauge satisfaction specific to the training provided for HRLVTs through QR codes.

The project lasted 10 months, beginning with the learning needs assessments in July 2020 until data analysis and synthesis, followed by manuscript submission in April 2021.

Learning needs assessment	X									
Analysis		X								
Intervention development		X								
Project-specific survey 1			X	X						
Intervention is live					X	X	X	X	X	X	X
Adjustment (codes affixed to equipment)						X 12/15	X	X	X	X	X
Project-specific survey 2										X	
Data collection										X	
Data analysis & synthesis										X	
Data interpretation, manuscript drafting										X	X
Dissemination and manuscript submission										X	X

FIGURE 3

Timeline of intervention

A visual representation of this timeline is demonstrated in Figure 3.

ANALYSIS

The first and second project-specific surveys were sent out to the entire roster of 112 nurses in the department through Microsoft forms (Microsoft Corp). This resulted in unequal adherence to the unmatched surveys; 20 nurses took the first project-specific survey and 26 nurses took the second project-specific survey. This was an unintended result as the goal was to have equal response rates between the first and second project-specific surveys. Descriptive statistics were used to analyze the first and second project-specific survey responses. Percent changes from pre- to postdata were calculated and assessed.

All participants in the department were provided with the same QR codes, however, not all participants received the same acuity of patients over the 7-month live intervention project period and, as such, may not have needed to scan QR codes pertaining to specific equipment in that time. The intervention began with the goal of recording data regarding the number of times each QR code was scanned. The QR code generator used for this intervention was unable to provide that service, and, as such, this metric was unable to be recorded as initially planned.

The linked YouTube videos, since implementation of the QR codes, have received the following numbers of views as of March 31, 2021:

- Rapid infuser - 117 views
- Arterial line setup - 61 views
- Zero an arterial line - 2076 views
- Water seal chest tube setup - 32 views
- End tidal carbon dioxide monitoring - 14 views

Results

Before implementation of the QR codes in the emergency department, 45% of the surveyed nurses (n = 20) described their ease of access to informational videos for specific equipment and procedures through a Likert scale as somewhat difficult or very difficult. Half of those surveyed answered no to feeling that they had adequate resources for information on specific equipment and procedures, demonstrated in Figure 4A.

At the 4-month project-specific survey (n = 26), 96.2% of the surveyed nurses described their ease of access to informational videos for specific equipment and procedures as extremely easy and somewhat easy (demonstrated

in Figure 4B). A small percentage (3.8%) described their ease of access to informational videos as somewhat difficult. Most of the respondents (92.3%) felt like they had adequate resources for information on specific equipment and procedures, with only 7.7% answering no.

Lessons Learned

Emergency nurse perception of the accessibility of informational videos regarding specific high-acuity equipment improved considerably in this study from the first project-specific survey data to the second project-specific survey data. After the implementation of the QR codes, most of the nurses surveyed described their ease of access as extremely or somewhat easy, with 3.8% still describing it as difficult (a decrease of 41.2% from preimplementation survey data). The accumulated data suggested that the implementation of this technology had assisted with the rendering of critical, point-of-care training material for HRLVTs.

Emergency nurse perception of having adequate refresher training resources for specific pieces of equipment and procedures improved across pre- and postsurvey data. Before the implementation, half of the nurses surveyed (n = 20) reported feeling inadequately prepared with resources on these pieces of equipment. After its implementation, a lesser percentage (7.7%) of those surveyed (n = 26) reported feeling inadequately prepared. This implies that the integration of QR code technology and point-of-care training videos are perceived as adequate resources by staff nurses in the department, and the addition of these services filled a training gap.

There is a great opportunity to capitalize on the leadership of this younger, technologically savvy generation of nurses through QR code implementation and point-of-care training to improve competency with HRLVTs as well as other aspects of nurse training and education. The implementation of QR codes affixed to HRLVT pieces of equipment improved surveyed staff nurse perception on the ease of access to informational materials. It also increased the number of surveyed staff nurses who felt adequately prepared with training resources on specific equipment and procedures.

Interdepartmental relationships were created and strengthened through the filming of these videos. Neurology physician assistants at the hospital expressed interest in recording a video for external ventricular drain setup in the emergency department, citing a need for nurses to know exactly how to prepare for this HRLVT. The video was uploaded to YouTube and linked through

(A)

Staff response to: "Do you feel like you have adequate resources for information regarding how to use specific equipment and procedures?" (n=20)

(B)

Staff response to: "Do you feel like you have adequate resources for information regarding how to use specific equipment and procedures via QR codes?" (n=26)

Staff response to: "How easy is it to access informational videos for specific equipment and procedures?" (n=20)

Staff response to: "How easy is it to use the QR codes to access informational videos for specific equipment and procedures?" (n=26)

FIGURE 4

(A) Project-specific survey 1 — preintervention. (B) Project-specific survey 2 — postintervention.

the same QR code process to the storage area containing all the relevant supplies. Owing to the extensive nature of the information, this video exceeded the 3-minute-length goal. However, discussion at staff briefs revealed satisfaction from nurses in its availability despite its longer length.

Limitations

QR code implementation for point-of-care training might be beneficial only to those comfortable rapidly using technology. Although 2019 demographic information from the Transport Nursing Workforce demonstrates the average age of emergency nurses to be 30 to 39 years,[1] a portion of the workforce remains in more advanced age groups. Nurses older than 40 years may or may not affiliate themselves with the same experiences as younger digital natives. Alternatively, digital natives will have varying

levels of comfort and experience with technology. As such, the success of this implementation is ultimately dependent on the individual user's willingness, comfort, and ability to access the videos regardless of their age and technology experience.

Other factors influencing the success of this process include smartphone availability and network access. QR codes are only scannable by smartphone technology, and those without access to this type of device will be unable to participate in this style of point-of-care training. Network access also plays a crucial role as those without a strong enough Wi-Fi signal or data availability might face difficulty in quickly accessing the information. Delayed loading of the videos might render them no longer useful for point-of-care training needs.

Survey data were collected through unmatched samples, with the first project-specific survey data collected from 20 nurses and the second project-specific survey data collected from 26 nurses (17.9% and 23.2% of nurses

within the department, respectively). This resulted in an unmatched analysis of data; low response rates limit the generalizability of these results. As previously mentioned, it was not possible to differentiate which YouTube video views came from the QR code scans and which came from YouTube traffic. We were also unable to determine the number of times each QR code was scanned, which limited our ability to analyze the data as originally planned. Future research in this area should plan for these factors in advance, as there are QR code services that exist with this feature at an added fee.

Implications for Emergency Clinical Care

The field of emergency health care is constantly evolving. This requires clinical staff to be up to date on best practices to render the highest quality of care. Patients present to emergency departments with a wide variety of conditions, making it crucial for nurses to be able to perform a vast set of skills and procedures. Some of these therapies, known as HRLVTs, are not routinely used. Competency for these therapies is achieved during orientation to the department; however, the therapy itself may not be seen by the nurse for a long period of time afterward. This makes ongoing training critically important to provide sufficient care. The implementation of QR code technology, including 2- to 3-minute training videos, provides an effective way to render point-of-care training to this population of nurses. Through the implementation of this technology, we have recognized an increase in staff satisfaction by word-of-mouth feedback as it relates to training provisions as well as an improvement in perceived ease of access to training materials.

Conclusions

Leveraging the use of QR code technology, in conjunction with 2- to 3-minute brief video clips, can improve staff perception of adequacy and the ease of access to point-of-care training specific to HRLVTs. Countless new technologies and procedures enter the field of emergency health care

each year, which signifies a need for ongoing refresher training. Initial competency accomplished during orientation to the department may not depict a true and ongoing ability to perform these HRLVTs. As such, this technology can offer personalized training when convenient for the user or at the exact moment they are using the specific HRLVT. This intervention could be easily tailored to other aspects of nurse training or education in various settings. In addition, future research should include larger, matched samples and examine the cost effectiveness of such training/education strategies.

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EMERGENCY NURSING REVIEW QUESTIONS: NOVEMBER 2021

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Section Editor: Sara Webb, MSN, C-PNP, CFNP, C-NPT

Questions

1. An emergency nurse is caring for a patient involved in an altercation where the discharge of a firearm occurred. What techniques performed by the emergency nurse suggest understanding of proper evidence collection?

A. Placing one sheet on the floor of the room to collect trace evidence from removed clothing
B. Handling bullets with a pair of rubber-tipped forceps and placing them in a gauze-lined, sterile plastic cup
C. Storing clothing, jewelry, and other general wear in a plastic hospital belongings bag
D. Suspending an applicator in a Styrofoam cup in the patient room and leaving the room to retrieve an envelope

2. Which of the following situations suggests traction splint application is contraindicated?

A. Suspected mid-shaft femur fracture
B. Mid-shaft femur deformity with concurrent pelvic injury
C. Injury to the distal femur
D. Suspected proximal tibia fracture

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3. A 37-year-old female patient arrived at your emergency department 90 minutes ago, presenting with altered mental status, evidence of open wounds and redness to the right lower extremity. The patient's initial vital signs included an apical pulse of 126, a blood pressure (BP) of 82/48, a respiration rate of 26, an oral temperature of 39.6°C (103.2°F), and a lactate level of 4.5 mmol/L. The patient weighs 60 kg. She received 2 L of isotonic crystalloids, 1000 mg of intravenous (IV) acetaminophen, and 2 g of cefazolin IV. Altered mental status persists after treatment. Repeat vital signs include an apical pulse of 124, a BP of 84/50, a respiration rate of 24, an oral temperature of 38.9°C (102.1°F), and a lactate level of 4.0 mmol/L. How should the nurse anticipate proceeding?

A. Initiating a norepinephrine drip at a rate of 5 μg/minute
B. Continuing fluid resuscitation with isotonic crystalloid
C. Initiating an EPINEPHrine drip at a rate of 0.6 μg/minute
D. The patient is adequately resuscitated, requiring no intervention

4. A triage nurse is evaluating a 70-year-old male patient who arrived at the emergency department with a steady stream of blood coming from both nares. The nurse has the patient apply direct pressure to the nose and lean forward. The patient also states he is on apixaban (Eliquis). The bleeding has slowed at this time. Which Emergency Severity Index level is most appropriate for this patient?

A. ESI level 2
B. ESI level 3
C. ESI level 4
D. ESI level 5

5. A 47-year-old patient is experiencing signs of a severe traumatic brain injury. Which of the following

interventions is least effective in supporting adequate cerebral blood flow in this patient?

    A. Ventilating the patient to target $PaCO_2$ 35 mm Hg to 45 mm Hg
    B. Elevating the head of the stretcher to 30 degrees
    C. Administering fluid boluses to maintain systolic BP of ≥100 mm Hg
    D. Hyperventilating the patient at a rate of 20 breaths/minute.

Answers

1. Correct answer: B

Preservation of forensic evidence is a critical element of emergency department nursing. Two major objectives of forensic evidence collection are preservation (preventing degradation and contamination) and maintaining the chain of custody. Bullets and other metal fragments should be handled in a manner that prevents chipping or scratching, which includes using padded equipment for handling and storage. When managing a trauma patient, 2 sheets should be placed on the floor of the hospital room instead of 1 sheet. The first layer limits contamination from the floor. The second sheet layer should be preserved for examination of trace evidence that may shed from the patient's clothing during removal. Items stored for evidence preservation should be stored in packaging made of breathable material, such as paper; this includes items that must be dried before being placed in a storage receptacle. Suspending an applicator in a Styrofoam cup can facilitate drying of specimens, but care must be given to ensure that the chain of custody is not broken while facilitating this process, otherwise evidence tampering can occur.[1]

2. Correct answer: C

Certain lower extremity injuries may benefit from traction splinting. Traction splinting provides benefits to the patient, such as relief from pain and swelling, as well as reducing injury to blood vessels and nerves in proximity to the injury. Currently, traction devices are indicated for mid-shaft fractures of the femur as well as fractures of the proximal tibia. Per Trauma Nursing Core Course guidelines, a patient presenting with evidence of both a treatable femur fracture and a pelvic injury can receive femur splinting following the application of a pelvic splinting device. In a distal femur fracture, the traction splint can rotate the distal bone fragment anteriorly, potentially compromising the popliteal artery and nerve.[2,3]

3. Correct answer: A

This patient has not responded to the administration of a 30 mL/kg bolus of intravenous crystalloid fluids. A bolus of crystalloid fluids should be administered within 3 hours of arrival at the hospital, according to 2016 Surviving Sepsis guidelines. Based on repeat assessment data, vital signs, and lab values, the patient continues to be hypoperfused. When a patient does not respond to fluid resuscitation, the addition of a vasopressor is recommended. The preferred vasopressor for patients in septic shock is norepinephrine, with EPINEPHrine or vasopressin being added to norepinephrine if the patient does not reach a target mean arterial pressure (MAP) of 65 mm Hg.[4-6]

4. Correct answer: A

This patient should be placed in ESI level 2, high risk. ESI level 2 is reserved for patients who are high risk, in severe distress, presenting with confusion or concerning vital signs. The patient in this case is suffering from epistaxis and appears to have risk factors that limit the success of simple interventions. The triage nurse recognizes that although the initial intervention of applying direct pressure to the nose slows the bleeding, the ability to control the bleeding fully may be inhibited by the patient's use of a blood thinner. The patient may require additional interventions, such as vasoconstrictive medications (Neo-synephrine or cocaine) or nasal packing to provide further hemostasis. ESI levels 3 through 5 are assigned to patients based on the number of resources needed to treat the patient. These patients, however, do not present with an immediately life-threatening or high-risk situation.[7]

5. Correct answer: D

Cerebral perfusion pressure (CPP) is the difference between the patient's MAP and intracranial pressure (ICP). This is expressed as CPP = MAP−ICP. Therefore, for the brain to be adequately perfused and maintaining a target CPP of 60 mm Hg, the patient must maintain an adequate BP. This may include administering IV crystalloids or vasopressors to maintain the systolic BP at or above 100 mm Hg, which will improve MAP. Other interventions are targeted at reducing ICP, and include elevating the head of the patient's stretcher to 30 degrees and maintaining normal carbon dioxide levels in the bloodstream. Hypercapnia ($PaCO_2$ >45 mm Hg), a sign of inadequate ventilation, has a vasodilatory effect on cerebral arteries, increasing blood flow, but also worsening ICP. This puts the patient at greater risk for herniation. Hypocapnia ($PaCO_2$ <35 mm Hg) does the opposite; it decreases cerebral blood flow which can decrease ICP. Hypocapnia in a critical care environment may be caused by hyperventilation, as the body offloads more carbon dioxide via the respiratory system. In the event of traumatic brain injury, hyperventilation should not be used unless the patient is exhibiting signs of impending brainstem herniation (extension posturing, widening pulse pressure, bradycardia, depressed respirations, and non-reactive pupils). Only then, hyperventilation is used as a temporary bridge to more definitive interventions to reduce ICP.[2]

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Send submissions to Sara Webb, MSN, C-PNP, CFNP, C-NPT, Paramedic at: sara.webb@jhmi.edu or submit five questions with rationale and references directly to JEN.

LOSS STRIKES LIKE AN EMPTY BELL

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Loss strikes like an empty bell,
Or the wind in a vacant home,
Pushing uselessly against absence.

Loss is opening a car door
To the surprise of a silent world
And turning around
To tell no one.

With time, wounds heal
But loss lingers quietly —

Even the word adrift is too loud
And is best written before
Pen scratches paper.

Loss goes unanswered
As mute questioning does,

But the silence makes us remember.

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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A Retrospective Analysis of the Impact of the Coronavirus Disease 2019 Pandemic on Health Care Workers in a Tertiary Hospital in Turkey

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Contribution to Emergency Nursing Practice

- This article contributes to the clinical findings of coronavirus disease 2019—infected health care personnel and the effectiveness of hydroxychloroquine use.
- All health care personnel must be trained on the correct use of personal protective equipment at regular intervals, particularly paraprofessional support personnel, such as secretaries or technical staff.

- Our results showed no evidence that the use of prophylactic hydroxychloroquine was effective against severe acute respiratory syndrome coronavirus 2 transmission. Joint pain, weakness, and anosomia were the most common symptoms among health care personnel infected with severe acute respiratory syncdrome caronavirus 2, or SARS-CoV-2.

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Abstract

Introduction: Several vaccines have been developed and approved for use against severe acute respiratory syndrome coronavirus-2; however, the use of personal protective equipment remains important owing to the lack of effective specific treatment and whole community immunity. Hydroxychloroquine sulfate was a treatment option in the early days of the pandemic; however, it was subsequently removed owing to a lack of evidence as an effective treatment.

We aimed to evaluate the testing and infection characteristics of coronavirus disease 2019 among health care personnel and determine the effectiveness of prophylactic hydroxychloroquine sulfate use to prevent transmission.

Methods: This retrospective observational study was conducted between May 1 and September 30, 2020. The health care personnel included in the study were physicians, nurses, and paraprofessional support personnel. The health records of health care personnel who had been tested for severe acute respiratory syndrome coronavirus-2 using polymerase chain reaction were retrospectively analyzed.

Results: In total, 508 health care personnel were included in the study. A total of 152 (29.9%) health care personnel were diagnosed with coronavirus disease 2019. The positive polymerase chain reaction rate was 80.3% (n = 122). A comparison

of infected and uninfected health care personnel showed a difference in age and occupation and no difference in sex, working area, and prophylactic hydroxychloroquine sulfate use.

Discussion: Protective measures in low-risk areas of our hospital require improvements. All health care personnel should be trained on personal protective equipment use. There was no evidence to support the effectiveness of prophylactic hydroxychloroquine sulfate against severe acute respiratory syndrome coronavirus-2 transmission.

Key words: Coronavirus disease 2019; Health care personnel; Hydroxychloroquine sulfate; Personal protective equipment; Severe acute respiratory syndrome coronavirus 2

Introduction

Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) continues to show worldwide impact. To date, approximately 86 million people have been infected and more than 1.5 million have died.[1,2] In Turkey, 2.3 million people have been infected and the total number of deaths has reached 22 450.[3] The rapidly increasing number of patients in critical condition or dying has caused a significant challenge to public health. Mortality rates are correlated with countries' health care resources. In addition, the invasive ventilator and intensive care unit resources are inadequate.[4]

It is important to protect health care personnel (HCP) from the risk of infection to ensure continuity of effective health care. The World Health Organization (WHO) recommends the use of personal protective equipment (PPE) for HCP at high risk owing to their interaction with patients with coronavirus disease 2019 (COVID-19).[5] Several vaccines have been recently developed for use against SARS-CoV-2; however, the use of PPE and precautions against transmission remain important owing to the lack of effective specific treatments and whole community immunity.[6-9]

The potential efficacy of hydroxychloroquine sulfate (HCQ) against SARS-CoV-2 was demonstrated in vitro after the first severe acute respiratory syndrome epidemic in 2005.[10] It was included in treatment algorithm in the early days of the 2020 pandemic; however, there was no evidence for its efficacy in the treatment of COVID-19 and it was subsequently removed from use.[11-15] Additional studies have investigated the efficacy of HCQ use before exposure to SARS-CoV-2, and during the pandemic, we became aware that some HCP working in our hospital had used HCQ as prophylaxis.[16-18]

This study's primary focus was to evaluate the testing and infection characteristics of COVID-19 among HCP. In addition, we sought to determine the effectiveness of prophylactic HCQ use in the prevention of transmission.

Methods

DESIGN

This retrospective observational study was performed between May 1 and September 30, 2020 in a tertiary academic hospital. The study was conducted in compliance with the Declaration of Helsinki and approved by the regional ethics committee (2020/03-47).

SETTING AND INFECTION PREVENTION MEASURES

The setting was the only hospital in our city within which COVID-19 patients are hospitalized. During the study process, the mean daily admission to the emergency department with COVID-19 symptoms was 352. In total, 1957 patients with COVID-19 pneumonia were hospitalized in 5 months. Our hospital continued to provide routine health care, in addition to COVID-19 care, during the pandemic. The working areas in the hospital were divided into 2 groups according to high and low COVID-19 transmission risk. High-risk areas were defined as the emergency department, COVID-19 suspected emergency department, COVID-19 isolation wards, and COVID-19 intensive care units. The low-risk areas were defined as the outpatient clinics, administrative divisions, information technology clerical, technical clerical, and other areas where routine hospital operations continued. HCP with no chronic disease worked in the high-risk areas of the hospital; working shifts were limited to 4 hours in these areas. A disposable mask (1200 N95/FFP2 NR; ERA, İstanbul, Turkey), goggles (Pulsafe LG20 Goggle; Bacou-Dalloz Company, Paris, France), isolation gowns (Safetouch TP63 5/6 classic disposable protective coverall; Safetouch Ltd, Istanbul, Turkey), and nonsterile gloves were routinely used during the care of patients who were suspected or confirmed to have COVID-19 in high-risk areas. Furthermore, all PPE was used for 1 shift in high-risk areas. After each shift, the goggles were routinely sterilized, and all other PPE was disposed of. Surgical masks and nonsterile gloves were used in low-risk areas.

PARTICIPANTS

Of the 1830 HCP working in our hospital, 523 were tested for SARS-CoV-2 by oropharyngeal/nasal swabs and polymerase chain reaction (PCR) between May 1 and September 30, 2020. Fifteen HCP were excluded because of missing data; therefore, 508 HCP were included in the final analysis. Informed consent was obtained from each HCP.

Age, sex, occupation (physicians, nurses, and paraprofessional support personnel), working area (high/low risk), the reason for PCR testing (suspected contact, screening, presence of COVID-19 symptoms), COVID-19-related symptoms (fever, sore throat, anosmia, shortness of breath, cough, joint pain, fatigue), use of prophylactic HCQ, side effects if HCQ was used, PCR result, chest computed tomography (CT) result, hospitalization, and treatment regime for COVID-19 were retrospectively analyzed. HCP with a positive PCR test were classified as being infected with COVID-19. In addition, HCP with a positive chest CT for COVID-19 or those with COVID-19−related symptoms, even with a negative PCR test, were classified as being infected with COVID-19.

DATA ANALYSIS

The data were analyzed using SPSS version 22.0 (SPSS Inc, Chicago, IL). Visual (histogram and probability graphs) and analytical methods (Kolmogorov-Smirnov test) were used to determine the distribution normality. The descriptive statistics were expressed as mean (SD) for normally distributed variables. The categorical data were expressed as n (%). For the intergroup comparisons, a t test was used to compare the normally distributed data (age), and Pearson's chi-square or Fisher exact test was used to compare the categorical variables. All analyses were 2-tailed. A P value of $< .05$ was considered statistically significant.

Results

A total of 508 HCP were included in the study. The mean age was 35.89, SD = 8.2 years, and most of the HCP (n = 328, 64.6%) were female. Nurses were the largest proportion of HCP (n = 310, 61%), followed by paraprofessional support personnel (n = 102, 20.1%), and physicians (n = 96, 18.9%). In total, 307 (60.4%) HCP were working in high-risk areas, and 152 (29.9%) were diagnosed with COVID-19. The positive PCR rate was 80.3% (n = 122). The number of HCP using HCQ before any suspected contact was 40 (7.9%), and 1 participant reported HCQ-

TABLE 1

Characteristics of health care personnel tested for COVID-19 using PCR

Variables	Number	%
Age, y, (*mean*) (*SD*)	(35.89)	(8.2)
Sex		
Male	180	35.4
Female	328	64.6
Occupation		
Nurses	310	61
Paraprofessional support personnel	102	20.1
Physicians	96	18.9
Working area		
High risk for COVID-19 transmission	307	60.4
Low risk for COVID-19 transmission	201	39.6
The reason for PCR		
Suspected contact	309	60.8
Screening	109	21.5
Presence of COVID-19 symptoms	90	17.7
Prophylactic HCQ use	40	7.9
Diagnosis of COVID-19	152	29.9

Data are presented as number (%) except age.
HCP, health care personnel; HCQ, hydroxychloroquine sulfate; PCR, polymerase chain reaction; COVID-19, coronavirus disease 2019.

related side effects (arrhythmia). All demographic data are shown in Table 1.

HCP who had been diagnosed with COVID-19 were significantly younger than HCP who had not been diagnosed with COVID-19 (33.97, SD = 8.45, t = 3.47 $P = .001$). A total of 84 (55.3%) nurses, 43 (28.3) paraprofessional support personnel, and 25 (16.4%) physicians had been diagnosed with COVID-19. The paraprofessional support personnel were diagnosed significantly more than nurses and physicians (χ^2 = 9.15, $P = .01$). Most of the HCP diagnosed with COVID-19 (n = 84, 55.3%) were working in high-risk areas. Among the HCP who had used prophylactic HCQ, 15 (40%) had been diagnosed with COVID-19 and 25 (60%) had not. There was no significant difference in sex, working area, and prophylactic HCQ medication between diagnosed and undiagnosed HCP. The intergroup comparisons are summarized in Table 2.

Of the HCP who had been diagnosed with COVID-19, 62 (40.8%) were asymptomatic. The most common symptom was joint pain (n = 48, 31.6%), followed by weakness (n = 33, 21.7%) and anosmia (n = 32, 21.1%). The PCR result was a false negative in 30 (19.7%) HCP. COVID-19 was confirmed in these participants by symptoms related to COVID-19; 2 of these showed positive COVID-19 on the chest CT. A total of 5 (3.3%) HCP

TABLE 2

Comparison of infected and uninfected healthcare professionals

Demographic characteristic	Infected HCPs		Uninfected HCPs			
	Mean	**SD**	**Mean**	**SD**	***t* value**	***P* value**
Age	33.97	8.45	36.71	8.01	3.47	.001
	N	**%**	**N**	**%**	**χ^2 value**	***P* value**
Sex					0.03	.86
Male	53	34.9	127	35.7		
Female	99	65.1	229	64.3		
Occupation					9.15	.01[†]
Nurses	84	55.3	226	63.5		
Paraprofessional personnel	43	28.3	59	16.6		
Physicians	24	16.6	71	19.9		
Working area					2.24	.12
High risk for COVID-19 transmission	84	55.3	223	62.6		
Low risk for COVID-19 transmission	68	44.7	133	37.4		
Prophylactic HCQ use					1.19	.28
Yes	15	9.9	25	7		
No	137	90.1	331	93		

HCP, health care personnel; HCQ, hydroxychloroquine; COVID-19, coronavirus disease 2019; PCR, polymerase chain reaction.

[†] In post-hoc analysis, statistically significant difference for paraprofessional support personnel ($P < .05$).

had a positive chest CT for COVID-19. Three of these were hospitalized. Acetylsalicylic acid and enoxaparin, in addition to HCQ, favipiravir, and paracetamol, were administered to the 2 discharged HCP. Plasma and predni-SONE were added to this treatment for the 3 hospitalized HCP. Two of the 3 hospitalized HCP required noninvasive mechanical ventilation and were placed in the prone position. Hypoxia worsened, and 1 HCP who had used HCQ as prophylaxis required intubation. This HCP was extubated on the 4th day of hospitalization, fully recovered on the 13th day, and discharged on the 14th day. The characteristics of the HCP diagnosed with COVID-19 are summarized in Table 3.

Discussion

We evaluated the testing and infection characteristics of 508 HCP who had been tested for SARS-CoV-2 using PCR. Over the 5-month study period, 152 HCP were diagnosed with COVID-19. A false-negative PCR result was found in 30 HCP. Most of those infected with COVID-19 were asymptomatic and recovered with outpatient treatment. One HCP developed respiratory failure and required intubation. There was no evidence to support that prophylactic HCQ medication was effective against SARS-CoV-2 transmission.

SARS-CoV-2 spreads person-to-person through direct contact or indirectly through contact with contaminated surfaces.[19] HCP working in the emergency department, isolation services, and intensive care units where aerosol-generating procedures, such as noninvasive ventilation and tracheal intubations, are frequently used are at a high risk for transmission.[20] Enhanced PPE use is recommended for HCP to prevent the risk of infection.[21] Simpler PPE, such as surgical masks alone or in combination with a face shield, is used in areas such as outpatient clinics where the risk is relatively lower and routine hospital operation continues.[4] The risk of transmission to HCP has increased as the number and required health care of cases has increased; however, the rate of infected HCP decreases with appropriate PPE use, pandemic design within hospitals, and community protective measures. At the beginning of the pandemic, in January 2020, the rate of infected HCP was reported as 29% among hospitalized patients in Wuhan.[22] In Italy, there were 15 314 cases of COVID-19 infections among HCP by April 2020, which accounted for 11% of all confirmed cases.[23] Chou et al[24] have reported that the COVID-19 infection rate among HCP from various countries ranged from 1.9% to 12.6% in the third update of their review in August 2020. In the absence of official data, medical society research has shown that 29 865 HCP have been infected, which corresponds to 11.5% of all confirmed cases by September 17, 2020 in Turkey.[25] The total

TABLE 3

Characteristic of health care personnel diagnosed with COVID-19 (n = 152)

Variables	Number	%
Symptoms		
Asymptomatic	62	40.8
Fever	12	7.9
Sore throat	5	3.3
Anosmia	32	21.1
Shortness of breath	23	15.1
Cough	8	5.3
Joint pain	48	31.6
Weakness	33	21.7
The reason for PCR		
Suspected contact	60	39.5
Screening	2	1.3
Presence of COVID-19 symptoms	90	59.2
Positive PCR	122	80.3
Diagnostic criteria		
Only PCR	61	40.1
Only COVID-19 symptoms	28	18.4
PCR and COVID-19 symptoms	58	38.1
PCR and CT	1	0.65
COVID-19 symptoms and CT	2	1.3
PCR and COVID-19 symptoms and CT	2	1.3
Positive chest CT for COVID-19 pneumonia	5	3.3
Hospitalization for COVID-19	3	2
Treatment		
Favipiravir and HCQ	147	96.7
Favipiravir, HCQ, paracetamol, acetylsalicylic acid, and enoxaparin	2	1.3
Favipiravir, HCQ, paracetamol, acetylsalicylic acid, enoxaparin, predniSONE, and plasma	3	2

Data are presented as number (%).
HCQ, hydroxychloroquine sulfate; COVID-19, coronavirus disease 2019; PCR, polymerase chain reaction; CT, computed tomography.

number of confirmed cases and the infected HCP rate in our city are unknown owing to a lack of official data. However, during the study period, 1957 patients have been hospitalized and only 3 (0.15%) were HCP. This rate seems low when compared with the literature, which may be related to the consistent use of PPE and working conditions in the hospital. For example, shorter working hours reduces viral load exposure, which means a better prognosis in COVID-19.[26]

Nosocomial transmission has been recognized as an important amplifier in the epidemics of SARS in 2003 and Middle East respiratory syndrome in 2012.[27] However, some studies have reported that this is not valid during the SARS-CoV-2 pandemic. Hunter et al[28] have reported that the infection rates of patient- and nonpatient-facing HCP were similar, and nosocomial transmission from patients to staff is not an important factor. The observations from China, where personnel screening tests are widely applied, are similar.[20] In this study, we found no significant difference in the number of COVID-19 diagnoses between high- and low-risk areas, in line with the literature. This result provides important information regarding SARS-CoV-2 transmission measures in a hospital. Low infection rates in high-risk working areas are associated with transmission prevention protocols and PPE use that is sufficient to prevent transmission. By contrast, the high infection rates in low-risk working areas may be due to low personnel compliance with PPE use. PPE use is included in the standard training curriculum of physicians and nurses in medical faculties; however, paraprofessional support personnel, such as secretaries or technical staff, were not trained on how to use PPE at this facility. The results of our study confirmed this lack of training; paraprofessional support personnel had a greater likelihood of being infected with COVID-19. We concluded that training on the correct use of PPE should be repeatedly conducted for all HCP working in the field, as recommended by WHO. This is particularly important for paraprofessional support personnel because the benefits of such training are lost within 6 months.[5,29] In addition, screening testing is not being performed on the people who have no COVID-19 symptoms and suspicious contact in many countries. Therefore, many SARS-CoV-2 carriers remain undetected, and HCP working in low-risk areas who use simpler PPE face a higher risk of contracting the disease.

COVID-19 infections are commonly asymptomatic or show mild symptoms.[30] However, this infection can be life-threatening by causing severe respiratory failure, acute ischemic stroke, or myocardial involvement.[31,32] It is often more severe in the elderly and individuals with comorbidities.[33,34] In line with previous studies, most HCP were asymptomatic in this study. No life-threatening complications were observed, except in 1 case requiring respiratory support. At the beginning of the pandemic, fever and dyspnea were the main symptoms of COVID-19 in Wuhan, China.[20,35] However, after the spread of SARS-CoV-2 worldwide, joint pain and weakness are observed as the main viral symptoms.[35,36] In addition, gastrointestinal symptoms, such as diarrhea, nausea, and vomiting are common in patients with COVID-19.[37,38] In this study, the most common symptoms noted were joint pain, weakness, and anosmia, which are similar to recent literature. Only

12 of the 152 HCP reported having a fever. Gastrointestinal symptoms were not observed among any of our HCP diagnosed with COVID-19.

Multiple vaccines have been developed for SARS-CoV-2; however, specific treatment has not been developed, which increases the anxiety of HCP regarding transmission and leads to them seeking alternative chemoprophylaxis options.[6,7,39] Yao et al[40] have demonstrated that HCQ could reduce the spread of SARS-CoV-2 in vitro. In a retrospective study conducted in India, Chatterjee et al[41] have reported that the SARS-CoV-2 incidence is significantly lower in HCP who used prophylactic HCQ. However, Abella et al[16] have reported no significant difference in the incidence of SARS-CoV-2 between HCP administered with HCQ or a placebo. WHO reported no significant difference in patient improvement following the use of HCQ and subsequently removed HCQ from routine treatment recommendations.[17] The results of this study support that HCQ is not effective in preventing SARS-CoV-2 transmission. In addition, the HCP that needed respiratory support and intensive care had been using prophylactic HCQ.

Limitations

This study had some limitations because of its retrospective nature. First, the number of HCP using HCQ was low compared with the total number of participants. In addition, HCP may have used other drugs/medications, such as vitamin supplements, that were not reported during the study. This situation may have affected the effectiveness of prophylactic HCQ use. PPE use, rule compliance, and HCP behavior against possible transmission in normal daily life were unknown. These limitations prevented any comparisons of transmission occurrence in HCP. To address these factors, multicenter, prospective studies are needed.

Conclusions

In summary, protective measures in the low-risk areas of hospitals must be improved. All HCP should be trained on proper PPE use at regular intervals, particularly paraprofessional support personnel, such as secretaries or technical staff. Furthermore, according to the results of this study, there was no evidence to support the use of prophylactic HCQ against SARS-CoV-2 transmission.

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