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Canadian Association of Critical Care Nurses

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CANADIAN ASSOCIATION OF CRITICAL CARE NURSES

Canadian Association of Critical Care Nurses

Vision statement

All critical care nurses provide the highest standard of patient and family-centred care through an engaging, vibrant, educated and research-driven specialized community.

Mission statement

We engage and inform Canadian critical care nurses through education and networking and provide a strong unified national identity.

Values and beliefs statement

Our core values and beliefs:

- Excellence and Leadership
  - Collaboration and partnership
  - Pursuing excellence in education, research, and practice
- Dignity and Humanity
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  - Combining compassion and technology to advocate and promote excellence
- Integrity and Honesty
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1. **Leadership:**
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   - Develop, revise and evaluate CACCN Standards of Care and Position Statements
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2. **Education:**
   - Provision of excellence in education
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3. **Communication and Partnership:**
   - Networking with our critical care colleagues
   - Enhancement and expansion of communication with our members
4. **Research:**
   - Encouraging, supporting, facilitating to advance the field of critical care
5. **Membership:**
   - Strive for a steady and continued increase in CACCN membership

Editorial

To our Canadian Association of Critical Care Nurses Members and *Canadian Journal of Critical Care Nursing*™ Readership,

Over the past year, the editorial team in collaboration with the editorial review board and the national board of directors of the Canadian Association of Critical Care Nurses (CACCN), have had many conversations regarding the *Canadian Journal of Critical Care Nursing*™ (CJCCN). Our aim has been to ensure that the CJCCN continues to be a major vehicle for critical care nursing scholarship and knowledge dissemination in Canada and internationally. We have engaged in several transition initiatives to achieve this aim.

First, in 2021, the CJCCN will be launching a stand-alone website. The website will feature current and archived publications. The website will also be the primary home for all information pertinent to the CJCCN including updated information specific to publication in the journal (i.e., Guidelines for Authors), as well as our policies and procedures from manuscript submission and peer review through to publication. CACCN members will receive access to the CJCCN website and all journal issues freely through continued membership. The website will feature advertising opportunities and will provide a mechanism for subscription, as well as acquiring access to manuscripts for those who are not members of the association.

Second, following the conclusion of the 2020 publication year, all future publications of the CJCCN will be electronic. For a variety of reasons, the editorial team, in collaboration with the national board of directors, has decided that we will no longer provide the journal in print format. While there may be some exceptions where print is available (i.e., for archival purposes, fulfilling pre-existing agreements and organizational subscribers), moving forward in 2021, CACCN members and CJCCN readers will be provided with electronic access via the new CJCCN website.

Finally, as we continue to move forward in meeting our aim of producing a high-quality, critical care nursing journal, we anticipate that there will be other transitions forthcoming. The continued success and impact of the CJCCN is essential not only in Canada, but internationally as well. As the Chief Editor of the CJCCN, I am excited to see what the future will bring!

Dr. Brandi Vanderspank-Wright, PhD, RN, CNCC(C)
Chief Editor, Canadian Journal of Critical Care Nursing

How knowledge translation is improving during the COVID-19 pandemic

By Crystal McLeod, BScN, RN

Abstract

Written from the perspective of a critical care nurse, this commentary examines how the author envisions knowledge translation becoming more effective in the year 2020. The coronavirus pandemic, social media dissemination, and digital innovations are contended as central to such improvements in knowledge translation. Future directions for knowledge translation within the nursing profession are central to this commentary.

Key words: knowledge translation, nursing, COVID-19, social media, digital innovation

McLeod, C. (2020). How knowledge translation is improving during the COVID-19 pandemic. *The Canadian Journal of Critical Care Nursing, 31*(3), 6–8.

Implications for Nurses

- Nurses should engage with learning by seeking out topics that evoke an emotional response or seem timely. Emotion and urgency can both be powerful motivators of knowledge translation.
- Knowledge can be found in creative and unexpected places, but ensure the knowledge source is always reputable and trusted.
- Knowledge translation is a unique process to every profession, and nursing is no exception. The COVID-19 pandemic may be an optimal time to explore how nurses incorporate research into practice.

Preface

At first, only a rustle is heard coming down the corridor. Then the group, a haze of white coats and green scrubs, appear at the end of the patient bay. The team's presence signals the beginning of critical care rounds.

Although critical care rounds are not new to my unit, the rounds have looked quite a bit different these past few weeks. All staff wear personal protective equipment, family members are absent, and patient room doors are kept closed. But, perhaps, the starkest change can be noted in our conversations. Previous to the emergence of severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2) and the resulting coronavirus disease (COVID-19) pandemic, rounds were more procedural and transactional in nature. Now, however; the team engages in long runs of debate. "I read in *The Lancet*…" says one resident, while another adds "My friends in Italy tweeted…" Then a nurse will point out an article she read in *The New York Times*, or a respiratory therapist will bring forth a recommendation from their respective professional college. We are all trying, as complicated as it is, to make sense of this disease through the cumulation and sharing of knowledge that has been in constant evolution.

Knowledge translation is changing

Knowledge translation (KT), often described as "bridging the gap of what is known and what is actually done"(World Health Organization, 2004, p. V), surfaced as a concept four decades ago (Wallin, 2008; Wensing & Grol, 2019). Since that time, what constitutes as effective KT in healthcare and health research has been in a constant state of flux (Wensing & Grol, 2019). I would argue that the COVID-19 pandemic has seen the most consequential improvement to date in how KT occurs in healthcare settings.

Specifically, from my position as a critical care nurse, I see colleagues both collecting and utilizing new evidence in innovative, creative, and advantageous ways. The motivation to seek out new information related to COVID-19, a disease we are only just beginning to understand, is indeed a large part of this new KT shift. Yet, the impact of the pandemic amassed with social media dissemination and digital innovation has forged new synergy within the realm of KT. Long term, this recent progression in KT could reap unique and positive outcomes for the nursing profession.

New motivation for KT

Motivation is considered an important part in the KT process by influencing individual healthcare professionals to initially engage with evidence-based practice (Barton & Merolli, 2019). Beyond rationale, emotion and urgency are considered especially powerful motivators for KT (Barton & Merolli, 2019; Heath & Heath, 2010). For healthcare professionals, the COVID-19 pandemic has played strongly on each of these entities. The emotions of doubt, anxiety and fear surrounding COVID-19 are driving healthcare professionals to seek informative and innovative knowledge (Chan et al., 2020; Rochwerg et al., 2020). Likewise, urgency has created a need to locate effective and safe treatments for COVID-19 in the face of rapid disease transmission and burden (Kim et al., 2020; Rochwerg et al., 2020). As such, healthcare professionals have been continually motivated to engage in KT during the COVID-19 pandemic.

Added motivation to pursue KT during the COVID-19 pandemic may be garnered from the positive affects KT can have on mental health and well-being. Increasing workplace demands and occupational risks during a pandemic can be psychologically harmful to healthcare professionals (Chan et al., 2020). Knowledge translation has the potential to remedy

such challenges by increasing feelings of control and empowerment among professionals over their workplace environments (Kitson & Harvey, 2016). Although further research is required to validate this phenomenon, researchers suspect that clear communication and dissemination of knowledge within healthcare organizations has already been empowering to individuals working during the COVID-19 pandemic (El-Jardali et al., 2020; Van den Broucke, 2020). As well, a rapid review of psychological distress among healthcare professionals experiencing various infectious disease outbreaks over the last 20 years found mental well-being could be benefited through workplace education (Kisely et al., 2020).

Social media optimizes dissemination

During the 2003 Severe Acute Respiratory Syndrome (SARS) global epidemic, access points for KT between researchers and healthcare professionals were limited. Internet and email alone were not sufficient tools (Chan et al., 2020). In today's COVID-19 pandemic, there are many more options to connect and find emerging research using social media, which was designed to rapidly spread information and share content (Chan et al., 2020). Twitter™ and WeChat™ dispersed infographics, displaying the management of COVID-19 patients in operating theatres and critical care settings, were positive contributors to timely KT in the early days of this pandemic (Chan et al. 2020).

Of course, social media is not a fail-proof method to improve KT. The over-simplification and interpretation of research findings is a notable challenge that can be exacerbated by social media. One example that was readily observed during the early phase of the COVID-19 pandemic was information circulated on social media related to the antimalarial, hydroxychloroquine (Kim et al., 2020; Rochwerg et al., 2020). Additionally, it is reasonable to verify information stemming from the COVID-19 pandemic across multiple sources (El-Jardali et al., 2020). However, due to the unprecedented speed of knowledge generation seen during this pandemic, published research may be less rigourous than under typical circumstances (El-Jardali et al., 2020) and requires thorough critical appraisal before its uptake into clinical practice.

Overall, the accuracy of content from social media must be critically appraised by individual healthcare professionals (Barton & Merolli, 2019; Chan et al., 2020). Preference on social media should continue to be given to reputable, transparent organizations or Free Open Access Medical (#FOAMed) education platforms that contextualize content and sources appropriately (Chan et al., 2020). However, if used responsibly and appropriately, the success of social media in rapidly sharing disease-specific knowledge and optimizing opportunities for KT in the COVID-19 pandemic will continue (Barton & Merolli, 2019; Ghosh et al., 2020).

Digital innovation provides connection

The final component I perceive as improving KT during this pandemic is digital innovation, which has led to the creation of multimedia. In my clinical work, I have recently seen healthcare professionals gravitating to varying forms of media to suit their personal learning preferences. Where media like mainstream news, peer-reviewed journals, and emails can invoke uneasiness, colleagues have found improved comprehension and engagement among podcasts, videos, and blogs. Like social media, multimedia content must be appraised for quality, but effective KT is still possible across these formats too (Barton & Merolli, 2019; El-Jardali et al., 2020).

The assertion that multimedia is forging improved KT in year 2020 is best supported by the idea that an emotional connection is created with learners through this content. Multimedia formats of learning during the COVID-19 pandemic have been primarily rich narratives that openly share the sacrifices, successes, and humour of creators (Rosenberg et al., 2020). In turn, these stories promote human intimacy and comfort in a difficult time of crisis and isolation (Rosenberg et al., 2020; Ghosh et al., 2020). Such connection may keep learners coming back to the content, or better reinforce the knowledge taken in (Rosenberg et al., 2020). A specific example of connection can been seen in the tweets of Dr. Yale Tung Chen, an emergency physician, who shared knowledge of COVID-19 through his own personal experience of contracting the disease (Rosenburg et al., 2020). Positive narratives from multimedia may also be more effective at promoting KT in the COVID-19 pandemic by offering a 'lift of the spirits' to healthcare professionals (Kisely et al., 2020; Rosenberg et al., 2020).

Evolving KT in the nursing profession

Adoption and challenges with KT vary widely between professional groups (Thompson et al., 2007; Wensing & Grol, 2020). For nursing, the profession's relationship with KT has not been without deficiencies (Thompson et al., 2007). In particular, there is little evidence to direct nurses how and when to engage in KT, which leads to a systemic failure in the incorporation of research into practice (Thompson et al., 2007; Yost et al., 2015).

The COVID-19 pandemic, a time where an immense volume of information is being produced across society, presents as an opportune time to derive guidelines for successful KT within the nursing profession (Rochwerg et al., 2020). Understanding the influence of motivation, social media, and digital innovation on KT during the COVID-19 pandemic, could be the shift needed to advance research implementation among nurses. Other professional groups, like physicians specialized in pain management and surgery, have started to form and put into action lessons learned about KT from the first month of the pandemic (Ghosh et al., 2020). Nurses can likewise look to promote KT by the same means, taking a multi-discplinary approach where gaps exist for the nursing profession itself (Wensing & Grol, 2002). Channeling the attributes that have promoted KT during the COVID-19 pandemic into post-pandemic healthcare, could reasonably push the profession's capacity for evidence-based care to new heights.

The field of KT has undergone many trends and false 'break throughs' in the past (Barton & Merolli, 2019; Wensing & Grol, 2020). I am open to the possibility that the events experienced during the COVID-19 pandemic may not have a continuous or long-term impact on nurses' engagement with KT. Yet, if we can understand the desire and actions of healthcare professionals

seeking information on COVID-19 in this unique time in history, then we could ignite a turning point for KT in healthcare that is both necessary and sustained.

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Maintenance of clinical competencies with in situ nursing simulation

By David Hersey, BA, BScN, RN, Elinor Kelly, BA, BScN, RN, Jamie Hersey BN, ACP, RN

Abstract

Background. *Critical care nurses must master a wide variety of clinical competencies. Clinical competencies can be defined as a combination of clinical knowledge (job-related knowledge, interpretation of clinical situations and the need for an intervention) and technical proficiency (ability to operate and troubleshoot equipment) needed to provide patient care. High-acuity, low-occurrence (HALO) competencies are rarely performed (less than four times per year) limiting opportunities for nurses to maintain clinical competencies.*

Objectives. *The primary objective was to determine if low-fidelity in situ simulations (LFISS) improve nurses HALO clinical competencies. The secondary objective was to determine if LFISS will identify latent safety threats.*

Method*. Study participants were registered nurses from two critical care units at a large university affiliated hospital. Convenience sampling of on-duty critical care nurses was utilized and simulations were conducted twice per week between 1000h and 2200h for seven weeks. Participation in the simulations was voluntary.*

Results. *LFISS are an effective educational tool for critical care nurses to maintain HALO clinical competencies. Multiple latent safety threats were identified and corrected during this study.*

Conclusion. *LFISS improves nurses HALO clinical competencies and provides opportunity to identify latent safety threats.*

Key words: critical care nurse, high-acuity low occurrence competencies, low-fidelity simulation, in situ simulations

Hersey, D., Kelly, E., & Hersey, J. (2020). Maintenance of clinical competencies with in situ nursing simulation. *The Canadian Journal of Critical Care Nursing, 31*(3), 9–11.

Implications for nurses

- Simulation combined with debriefing improves critical care nurses' clinical knowledge and technical proficiency.
- Low-fidelity in situ simulations can identify errors, knowledge gaps and latent safety threats.
- In situ simulations do not impede patient care and are appreciated by critical care nurses.

Background

Critical care nurses must master a wide variety of clinical competencies. Clinical competencies can be defined as a combination of clinical knowledge (job-related knowledge, interpretation of clinical situations and the need for an intervention) and technical proficiency (ability to operate and troubleshoot equipment) needed to provide patient care.

High-acuity low-occurrence (HALO) competencies are rarely performed (less than four times per year), limiting opportunities for nurses to maintain clinical competencies. If these competencies are performed by unprepared nurses under considerable psychological, physiological, and time pressures, errors will occur (Galy et al., 2012).

Simulation education enhances competencies of healthcare workers (Abe et al., 2013) by replacing real experiences with guided interactive experiences (Gaba, 2007). These interactive experiences can be low-fidelity (less realistic), high-fidelity (more realistic), onsite (in situ) or off site (simulation centres).

Low-fidelity in situ simulations (LFISS) can provide nurses with HALO experiences to integrate into their cognitive framework (Lisko & O'Dell, 2010). Unfortunately, there is limited literature discussing the use of simulation-based learning in maintaining clinical competencies for practising nurses (Lucas, 2014). This study addresses that gap.

Objective

The primary objective of this study was to determine if LFISS can improve critical care nurses' HALO competencies (clinical knowledge and technical proficiency). The secondary objective was to determine if LFISS would reveal latent safety threats.

Method

Study participants were part-time and full-time registered nurses from two critical care units at a large university affiliated hospital in Halifax, Nova Scotia. Site 1 was a 12-bed medical, surgical, trauma and neurosurgical unit (MSNICU) and Site 2 was a nine-bed medical and surgical unit (MSICU). Convenience sampling of on-duty critical care nurses was utilized and simulations were conducted by a unit resource nurse twice per week (1000h to 2200h) for a seven-week period. Participation in the simulations was voluntary.

On each unit, a simulation room was created and stocked to emulate actual patient care rooms. All simulation equipment and supplies were clearly marked as 'simulation only' to ensure patient safety. Two low-fidelity manikins (ALS Skills Trainer; Laerdal, Sweden) were used to simulate patients.

Two unit resource nurses, with previous simulation and debriefing experience, developed brief (30- to 40-minute), focused (one HALO competency per simulation) simulations grounded in experiential learning theory (Fewster-Thuente & Batteson, 2018). Each simulation was followed by a debriefing, giving nurses the opportunity to reflect on their experiences. Four HALO competencies were identified after consultation with nursing staff: prone patient positioning (PPP), massive transfusion protocol (MTP), Advanced Cardiac Life Support (ACLS) Pulseless Algorithm and cardiac pacing (transcutaneous and transvenous).

The objective of the PPP simulation was for the participants to understand the indications for prone positioning and to safely prone an intubated manikin with a central line and multiple intravenous infusions. During the MTP simulations, nurses had to safely administer simulated blood products with the rapid infuser (Belmont Rapid Infuser; Belmont Instruments, USA) while adhering to institutional policy and procedures. For the ACLS Pulseless Algorithm simulations, nurses had to demonstrate high-quality CPR; operate the defibrillator (LifePac20e; PhysioControl, USA); identify ventricular fibrillation (VF), pulseless ventricular tachycardia (pVT) and pulseless electrical activity (PEA), while administering simulated code medications. For the cardiac pacing simulation, nurses had to identify the loss of transvenous pacing (TVP) electrical/mechanical capture and successfully transition to transcutaneous pacing (TCP) with a LifePac20e.

A quasi experimental, pre-test and post-test design was used to test the primary objective. Prior to each simulation, nurses completed a confidential questionnaire using a five-point interval scale to rank their clinical knowledge and technical proficiency. Following each simulation, participants ranked their post-test clinical knowledge and technical proficiency. A paired sample (pre-test and post-test intervention) t-test was performed to ascertain the statistical significance of the intervention. Data analysis was completed using Microsoft Excel (2010).

Debriefing sessions were conducted after each simulation.

Results

In total, 93 (79%) of the 118 full-time and part-time nurses participated in the study. Sixty-four nurses (63%) participated in two or more simulations (Table 1). Study results indicate that LFISS are an effective educational tool for critical care nurses to maintain HALO clinical competencies. Multiple latent safety threats were identified and corrected during this study.

Discussion

Nurses who participated in HALO simulations demonstrated a statistically significant improvement in clinical knowledge and technical proficiency (Table 2). Prone patient positioning simulation participants showed both improved clinical knowledge ($n = 55$, $p < 0.01$) and technical proficiency ($n = 55$, $p < 0.01$). Massive transfusion protocol simulations participants showed improved clinical knowledge ($n = 56$, $p < 0.01$) and technical proficiency ($n = 56$, $p < 0.01$). Advanced Cardiac Life Support Pulseless Algorithm simulations participants showed improved clinical knowledge ($n = 35$, $p < 0.01$) and technical proficiency ($n = 35$, $p < 0.01$). In the cardiac pacing (TVP and TCP) simulations, participants showed improved capabilities related to this competency ($n = 28$, $p < 0.01$).

Table 1. Nurse Participation in Simulations

	n	Percentage of Nursing Staff
No Simulations	25	21.1%
One Simulation	29	24.5%
Two Simulations	35	29.6%
Three Simulations	21	17.1%
Four Simulations	7	5.9%
Five Simulations	1	0.84%

High-acuity low-occurrence simulations provide nurses with an experiential learning opportunity to reinforce strengths and reveal deficiencies. Experiential learning occurs during the experience, reflection afterwards and during debriefing. This cycle enables nurses to develop new ways of thinking and new behaviours (Fewster-Thuente & Batteson, 2018; Lisko & O'Dell, 2010).

Psychological, physiological, and time pressures increase errors (Galy et al., 2012). Low-fidelity in situ simulations provided nurses with the opportunity to develop strategies to deal with these stressors, thereby reducing errors. This enhanced performance may have a secondary benefit. Research suggests that feelings of inadequacy can contribute to burnout (Lewis et al., 2015) particularly among young nurses (<35 years of age) new to critical care (Chuang et al., 2016). Potentially, ongoing simulations may reduce feelings of inadequacy and subsequent burnout, especially among young nurses new to critical care, but more research on this is required.

Improved clinical knowledge and technical proficiency are finite and will decay over time. Therefore, ongoing simulations would prevent this decay. Research suggests that simulations should be conducted at least every six months (Abe et al., 2013; Singleton et al., 2018). Multiple latent safety threats were identified during the simulations (Table 3).

Table 2. Low-fidelity in situ High Acuity Low Occurrence Simulations

Simulation	*n*	(SD)	*p*-value
Prone Patient Positioning			
Pre-Test Clinical Knowledge	55	4.11(0.76)	
Post-Test Clinical Knowledge	55	4.87(0.34)	<0.01
Pre-Test Technical Proficiency	55	3.80(0.36)	
Post-test Technical Proficiency	55	4.80(0.36)	<0.01
Massive Transfusion Protocol			
Pre-Test Clinical Knowledge	56	4.28(0.80)	
Post-Test Clinical Knowledge	56	4.91(0.29)	<0.01
Pre-Test Technical Proficiency	56	3.21(1.13)	
Post-Test Technical Proficiency	56	4.82(0.43)	<0.01
ACLS Pulseless Algorithm			
Pre-Test Clinical Knowledge	34	3.71(0.76)	
Post-Test Clinical Knowledge	34	4.59(0.50)	<0.01
Pre-Test Code Blue	34	3.68(0.84)	
Post-Test Code Blue	34	4.24(0.65)	<0.01
Cardiac Pacing			
Pre-Test Transvenous Pacing	34	2.76(1.17)	
Post-Test Transvenous Pacing	34	4.07(0.06)	<0.01
Pre-Test Transcutaneous Pacing	34	3.21(1.13)	
Post-Test Transcutaneous Pacing	34	4.32(0.05)	<0.01

During an MTP simulation session, the Belmont Rapid Infuser dual-lumen extension tubing was inadequately primed with intravenous fluids resulting in an air embolism. The root cause of this adverse event was miscommunication among multiple nurses operating the rapid infuser. Training now emphasizes one nurse being responsible for operation of the rapid infuser and the dual-lumen extension lines were removed from service.

During the ACLS simulations nurses experienced difficulties in identifying the reversible causes of a PEA arrest; differentiating between shockable (VF, pVT), non-shockable rhythms (PEA); and operation of the LifePac20e. On three occasions, the incorrect initial dose of Amiodarone was administered and on two occasions, PEA was defibrillated. Multiple ACLS courses are now offered throughout the year for the MSNICU and the MSICU nurses.

Table 3. Observed Latent Safety Threats During Low-Fidelity In Situ Simulations

Simulation	***n***
Massive Transfusion Protocol	
Difficulty programing Belmont	3
Failure to plug in Belmont	1
Air embolism	1
Advanced Cardiac Life Support	
Incorrect pad placement	1
Defibrillation of PEA	2
Incorrect Amiodarone dose	3
Symptomatic Bradycardia	
Delay connecting EKG and pads	2
Difficulty locating pace button	4
Difficulty adjusting rate and output	3
Prone Patient Positioning	
No safety threats identified	

Limitations

This study has several limitations. First, it is limited to one university-affiliated medical centre. Second, the simulations were not strictly scripted, which resulted in some variance from simulation to simulation. Third, nurses self-reported their pre-test and post-test clinical knowledge and technical proficiency, which could be subject to bias.

Conclusion

Simulation combined with debriefing improves nurses' clinical knowledge and technical proficiency while identifying latent safety threats. The LFISS does not impede patient care and are appreciated by critical care nurses. The should be conducted every six months to prevent clinical knowledge and technical proficiency performance decay.

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Validation of the French-Canadian version of the Nursing Activities Score

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Abstract

Background and purpose: *The Nursing Activities Score (NAS) is a widely used tool for measuring nursing workload representing the time spent carrying it out in Intensive Care Units (ICUs).*

Objective: *To present the results of the validation of the French-Canadian version of NAS according to known-groups validity and predictive validity criteria.*

Method: *This methodological study was conducted at cardiac and pulmonary ICUs. The Chi-square and paired Student's t tests were used to test the known-groups validity; and the Pearson coefficient, the convergent validity.*

Results: *The items scored differently in both units, confirming the known-groups validity. NAS at admission correlated with length of stay and number of adverse outcomes in the cardiac ICU, and with APACHE II in the pulmonary ICU, partially confirming the convergent validity.*

Conclusion: *The known-groups validity of NAS is confirmed. The predictive validity has been partially confirmed, as the NAS at admission did not correlate with clinical severity, but rather with related adverse outcomes and length of stay.*

Key words: intensive care unit, nursing activities score, validation, workload, nursing activities

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Implications for nursing

- A previous study provided a reliable and culturally adapted version of the Nursing Activities Score for the French-Canadian context.
- The validity assessment of the French-Canadian version of the Nursing Activities Score confirms that the instrument is able to demonstrate the variability of nursing activities in different intensive care units and that its score is associated with adverse outcomes and length of stay.
- The validated French-Canadian version of the Nursing Activities Score can be used to support decision-making on the distribution of human resources in nursing, to estimate costs related to direct nursing care and to improve practices regarding the most frequent nursing activities in different ICUs and thus, to contribute to better patient outcomes.

Background

Healthcare services face a major challenge in determining the best distribution of nursing resources, considering the quality and safety of care, as well as budget limits. Since the nursing staff in intensive care units (ICUs) is responsible for continuous direct critical patient care and, consequently, for a considerable amount of the unit's total budget (Debergh et al., 2012), a body of literature has been produced aimed at understanding the nursing workload. Nursing workload is a common term used in health literature. It encompasses several attributes: the amount of nursing time; the level of nursing competency; the weight of direct patient care; the amount of physical exertion; and complexity of care (Alghamdi, 2016). Understanding of the real nature of nursing work can help increase nurse productivity, boost nurse satisfaction, cut turnover, reduce work stress, guarantee sufficient staffing according to patient care needs, and provide a clearer understanding of the costs in these units (Alghamdi, 2016; Miranda & Jegers, 2012).

Several tools have been developed to estimate nursing workload or parts of its attributes for use in the ICU. However, most of the tools are based on patient clinical severity or on medical acts, as the Therapeutic Intervention Scoring System-28 (TISS-28), frequently used in the past. Yet,TISS-28 has an important limitation in that it only identifies therapeutic interventions related to medical procedures, which only cover 43% of ICU nursing activities. The same is observed for the Italian Time-Oriented Score System (TOSS), which is also based on clinical severity (Miranda et al., 1996). These tools are limited because the relationship between disease severity and nursing activities is not linear; clinical severity only partially explains the variability of the time spent in nursing activities carried out directly with the patient and their family (Miranda et al., 1996). There are also complex tools, such as the Canadian Project of Research in Nursing (PRN), which was developed in 1980; however, its use has not been reported in the literature in the last two decades (Miranda et al., 2003).

Gaining a basic grasp of nursing workload requires a tool that can identify most of the nursing activities related to direct care, as well as the time needed to carry them out. Such an instrument would make it possible to obtain an accurate portrait of the nursing activities involved in providing direct care to ICU patients, to estimate the associated costs, and to better organize human resource planning in nursing.

Considering the importance of better describing and quantifying nursing activities and their relationship with patient costs

in ICU, Miranda et al. (2003) developed the Nursing Activities Score (NAS), a tool, which is aimed at identifying and measuring the time spent on nursing activities related to direct patient care. Since its development, the NAS has been one of the most internationally recognized tools for understanding nursing workload. Moreover, it has been increasingly used in ICUs in more than a dozen countries (Stafseth et al., 2011).

The fact that Miranda et al. (2003) developed the NAS with the involvement of 15 countries and 99 ICUs, demonstrates their conviction of the need for a generic tool that could effectively represent all the activities common to the various ICUs in a multicultural context. As members of the group that created TISS and TISS-28, the NAS authors used TISS-28 as the basis for the new tool, adding other activities to increase the representativeness of nursing activities. Subsequently, the time spent on each new activity was added. Several steps were necessary to arrive at the final tool. The first phase was an international Delphi study with 10 nurses and 15 physicians from 15 countries that identified nursing activities not included in the TISS and TISS-28. The inclusion criteria for new activities to be included in the tool were to be related to the patient's condition and significantly influence nursing time in ICUs. Those activities cofounding with a medical diagnosis as well as non-routine interventions were excluded. In the second phase, a committee of eight experts (two nurses and two physicians working in ICUs in three different countries, as well as four of the NAS tool's authors) prepared the selection and description of the final list of items. Five new nursing activities were identified: monitoring, hygiene procedures, mobilization and positioning, family support, and management tasks. The list of activities produced by this committee, combining the elements of TISS-28 and the five newly described activities, was distributed and approved by a committee of 25 experts.

A work-sampling study was carried out to validate the new score (Miranda et al. 2003). The principle underlying this method is that the relative amount of time spent on each activity can be estimated by obtaining multiple simultaneous samples of nursing activities performed by ICU bedside nurses. A time pattern can then be established for each activity (Groover, 2007). To broaden the variation in the data collected, 99 ICUs from 15 countries were involved at this stage. The work sampling was obtained by multimoment recordings (MMRs), consisting of several moments of recordings of nurse activities during each 24-hour period. The authors report that the five newly included items were reported in almost every patient/day and that the provision of direct patient care accounted for approximately 81% of total nursing time in ICUs. Approximately 6% of the nurses' time was spent on activities not directly related to the patient and about 11% of nurses' time was spent on personal activities. Other activities (meetings, training) accounted for only 2% of activities. Based on the MMR results, the weighting of NAS items—representing the relative duration of each activity—were estimated. The estimated weights of the 23 items in the final tool range from 1.3 to 32.0 and their sum varies from 0% to 177%, with each unit representing 1.8% of nursing time (see Miranda et al. [2003] for more details).

The representativeness of the NAS, as well as its user-friendliness and usefulness in ICU management, are factors contributing to its broad use worldwide since being published in 2003 (Miranda et al., 2003). The NAS has been used in different cultures (Stafseth et al., 2011; Arias-Rivera et al., 2013; Bruyneel et al., 2019; Carmona-Monge et al., 2013; Gerasimou-Angelidi et al. 2014; Lucchini et al., 2014; Quintana et al., 2017;) to evaluate ICU nursing activities and associated factors (Conishi & Gaidzinski, 2007; Gonçalves et al., 2006; Gonçalves & Padilha, 2007; Kakushi & Evora, 2014; Lucchini et al., 2013; Padilha et al., 2008; Stafseth et al., 2018) in different ICU settings (Giakoumidakis et al., 2011; Nogueira et al, 2013; Queijo et al., 2013; Sousa et al., 2008;) to evaluate the patient-to-nurse ratio (Debergh et al., 2012; Padilha et al., 2010; Stafseth et al., 2011) in relation to patient outcome (Cremasco et al., 2013; Daud-Gallotti et al., 2012; Gerasimou-Angelidi et al., 2014; Giakoumidakis et al., 2011; Margadant et al., 2020; Scruth, 2020; Silva et al., 2011), and even in contexts other than ICUs, such as intermediate care units (Armstrong et al., 2015; Brito & Guirardello, 2011; Catalan et al., 2011; Trepichio et al., 2013).

NAS: French-Canadian version

In Canada, and specifically in the French-Canadian province of Quebec, no tools were available to measure the nursing activities in ICUs. Our consultation of the heads of nursing at the main hospital centres in Quebec City made clear their interest in having such a tool to better manage the nursing human resources in their ICUs. Thus, a broad project to implement the NAS was proposed. The first step was to proceed to the cross-cultural adaptation and validation of the NAS for the French-Canadian context. The steps involved in the cross-cultural adaptation and testing its reliability are presented elsewhere (Lachance et al., 2018).

The cross-cultural adaptation of the tool, as well as of its tutorial, followed the five steps recommended by Guillemin et al. (1993): translation, synthesis of translation, back-translation, evaluation by an expert committee (including experts representing the research and clinical domains), and pretesting. The reliability of the adapted version was assessed according to inter-rater equivalence. The process included a nursing consultant and nine bedside nurses from different shifts of the targeted ICU grouped in different pairs to score patients. An expert in NAS use (one of the authors) also scored the patient, thereby producing three distinct scores for the same patient. There was good inter-rater agreement (interclass correlation coefficient = 0.9) for the total score. Good inter-rater agreement was observed for 15 out of the 17 dichotomous items when taken separately. The multiple-choice items presented only weak or minimal inter-rater agreement (Lachance et al., 2018), reproducing data in the literature (Padilha et al., 2015) and reinforcing the need for training and supervision to standardize the scoring of these items.

This paper presents the results of the validation of this tool according to the known-groups validity and convergent-validity criteria. The validation hypotheses were:

1. The frequencies of NAS items, as well the total NAS, would be different in the specialty ICUs because such units provide diagnosis-specific care for select patient populations, as opposed to general ICUs (Nguyen & Milbrandt, 2009).
2. The NAS at admission would be higher than at discharge because patients are discharged after achieving a minimal level of clinical stability, therefore, a significant lower intensity of nursing activities.
3. Patients with a higher clinical severity at admission would have a higher mean NAS throughout their length of stay (LOS), because, although not linear, some correlation is expected between the severity of the patient and the intensity of nursing care required (Altafin et al., 2014; Lucchini et al., 2014).
4. A higher NAS at admission would be related to a longer LOS and a higher number of adverse outcomes, because patients requiring high-intensity levels of care are not supposed to be ready for ICU discharge and the presence of complications increases the complexity of care.

Method

Design and setting

This methodological study was conducted in two ICUs in the Quebec Heart and Lung Institute at Laval University (IUCPQ-UL). Both the Cardiac Care Unit (CCU) (20 beds), and the pulmonary ICU (9 beds) had an occupancy rate of about 70% during the data-collection time frame, which ran from September 8 to October 6, 2016.

Sample

The non-probabilistic convenience sample included patients aged 18 years or older, regardless of the type of treatment in the 24 hours after their ICU admission. Patients who had already been hospitalized in the ICU for more than 24 hours at the time of data collection were excluded. The estimation of sample size was based on the convergent-validity test. Then a minimal sample of 137 patients was estimated for a minimum correlation of 0.30 with alpha and beta values of 0.05 of 0.20, respectively. A margin of error of about 15% was considered for missing data, and a total of 155 patients were enrolled.

Measurements

Demographic and clinical data

Demographic and clinical data included age (years), sex (male/female), discharge condition (survivor or non-survivor), length of stay (LOS in days), clinical severity, and number of adverse outcomes (clinical complications).

Clinical severity

Clinical severity was assessed with two indexes: APACHE II and Simplified Acute Physiology Score (SAPS 3). Severity scales are important adjuncts of treatment in the ICU to predict patient outcomes. The outcomes of intensive-care patients depends on several factors present upon admission to the ICU and subsequently on the patient's course in ICU, so most of these models are applied in the first 24 hours of hospitalization (Rapsang & Shyam, 2014). As there is no perfect index, two of the generic and most used models were adopted for this study: APACHE II and SAPS 3, both available in free electronic versions.

APACHE II

APACHE II (Acute Physiology and Chronic Health Evaluation) is a severity-of-disease classification system applied within 24 hours of a patient's admission to an ICU. This instrument uses a point score based upon the worst values for the 12 routine physiologic measurements during a patient's initial 24 hours in an ICU, as well as age and past health status, thereby providing a general measurement of the severity of the disease and an estimated probability of mortality. Physiologic measurements include temperature, blood pressure, arterial pH, heart and respiratory rate, oxygenation, sodium, potassium, creatinine, hematocrit, white blood cells, and Glasgow score. The score varies from 0 to 71 (Knaus et al., 1991). This tool was not applied to patients admitted for coronary artery bypass (CABG) because the Knaus et al. study of risk prediction using APACHE II (1991) revealed a very low mortality rate, making it unwise to trust the linearity assumption of multivariate logistic regression in predicting mortality for such patients.

SAPS 3

SAPS 3 is a tool for predicting risk adjustment in critical patients. It consists of 20 variables in three categories: (1) patient's characteristics before ICU admission: age (0 to 18 points), comorbidities (0 to 11 points), location before ICU admission (0 to 8 points), LOS in the hospital before ICU admission (0 to 7 points), use of major therapeutic options before ICU admission (0 to 3 points); (2) circumstances surrounding ICU admission: planned or unplanned ICU admission (0 to 3 points), surgical status on ICU admission (0 to 6 points), anatomical site of surgery (if applicable) (-11 to 5 points), reasons for ICU admission neurological (-4 to 11 points), cardiological (-5 to 5 points), gastrological (0 to 9 points), infection on ICU admission (0 to 5 points), ICU admission (16 points); and (3) physiologic issues on ICU admission (within 1 hour of ICU admission): Glasgow score (0 to 15 points), temperature (0 to 7 points), systolic blood pressure (0 to 11 points), heart rate (0 to 7 points), oxygenation (0 to 11 points), arterial pH (0 to 3 points), creatinine (0 to 8 points), bilirubin (0 to 5 points), leukocytes (0 to 2 points), and platelets (0 to 13 points). The final score varies from 16 and 217 points and allows for estimating the risk of mortality (Metnitz et al., 2005).

Adverse outcomes

These variables are related to the development of clinical complications. These data were obtained by auditing a specific form in the patient's chart for recording complications. Afterwards, the data were categorized by the first author as agitation, neurologic, pulmonary, cardiovascular, renal, intestinal, metabolic, hematologic, or miscellaneous. This categorization was confirmed by the ICU head nurse and another researcher from the research project team.

Nursing Activities Score French-Canadian version

The Nursing Activities Score (NAS) French-Canadian version (Lachance et al., 2018) is a French-language version adapted from the instrument developed by Miranda et al. (2003). It consists of seven categories of nursing activities, as indicated in Table 1. The tool is applied for each patient and the final score is the sum of points, which can range from

Table 1. Nursing activities and scores	
General Activities	**Score**
1. Monitoring and titration	
- Normal - More than normal - Much more than normal	4.5% 12.1% 19.6%
2. Laboratory, biochemical, and microbiological investigations (zero or 4.3%)	
- No - Yes	Zero 4.3%
3. Medication, vasoactive drugs excluded	
- No - Yes	Zero 5.6%
4. Hygiene procedures	
- Normal - More than normal - Much more than normal	4.1% 16.5% 20.0%
5. Care of drains, all (except gastric tube)	
- No - Yes	Zero 1.8%
6. Mobilization and positioning	
- Normal - More than normal - Much more than normal	5.5% 12.4% 17.0%
7. Support and care of relatives and patient	
- Normal - More than normal	4.0% 32.0%
8. Administrative and managerial tasks	
- Normal - More than normal - Much more than normal	4.2% 23.2% 30.0%
Respiratory	
9. Respiratory support	
- No - Yes	Zero 1.4%
10. Care of artificial airways	
- No - Yes	Zero 1.8%
11. Treatment for improving lung function	
- No - Yes	Zero 4.4%
Cardiovascular	
12. Vasoactive medication, disregard type and dose	
- No - Yes	Zero 1.2%
13. Intravenous replacement of large fluid losses	
- No - Yes	Zero 2.5%
14. Left-atrium monitoring	
- No - Yes	Zero 1.7%
15. Cardiopulmonary resuscitation after arrest	
- No - Yes	Zero 7.1%
Renal	
16. Hemofiltration techniques, dialysis techniques	
- No - Yes	Zero 7.7%
17. Quantitative urine output measurement	
- No - Yes	Zero 7.0%
Neurological	
18. Measurement of intracranial pressure	
- No - Yes	Zero 1.6%
Metabolic	
19. Treatment of complicated metabolic acidosis/alkalosis	
- No - Yes	Zero 1.3%
20. Intravenous hyperalimentation	
- No - Yes	Zero 2.8%
21. Enteral feeding through gastric or other gastrointestinal route	
- No - Yes	Zero 1.3%
Specific interventions	
22. In the ICU	
- No - Yes	Zero 2.8%
23. Outside the ICU	
- No - Yes	Zero 1.9%
TOTAL	0 – 176.8%

continued…

0% to 176.8%, representing the proportion of nursing time required by patients for direct care in the preceding 24 hours. Patients with scores of 100% require one nurse; patients with scores over 100% require more than one nurse (Miranda et al., 2003).

Data collection

The six ICU nurses who collected all data, including the NAS, patient variables, and adverse outcomes, also participated in the former step of the project related to the reliability assessment of the adapted tool (Lachance et al., 2018). These nurses received two hours of theoretical and practical training on the NAS to reinforce their scoring ability (Lachance et al., 2018). In the theoretical training, the instrument and its outcome were presented to the participants along with how to score and interpret instrument results. In the practical training, clinical situations were proposed to let the nurses practise scoring the items. In addition to the training, the nurses were supported by the researchers throughout the entire data-collection process.

The NAS was applied by the trained nurses every 24 hours for all patients during their ICU stay. The demographic and clinical data as well as adverse outcomes were obtained daily from the patients' medical records. All data were collected directly on tablets and managed using Research Electronic Data Capture (REDCap) tools hosted at the Research Center of the Quebec Heart and Lung Institute at Laval University (CRIUCPQ-UL). REDCap is a secure, web-based application designed to support data capture for research studies, providing an intuitive interface for validated data entry, audit trails for tracking data manipulation and export procedures, automated export procedures for seamless data downloads to common statistical packages, and procedures for importing data from external sources (Harris et al., 2009). Each nurse collected data in a different ICU where they worked during the 28 days between September 8 and October 6, 2016.

Data analysis

The data were extracted into Excel spreadsheets, checked, and exported to the Statistical Package for Social Sciences (SPSS), version 19.0, for descriptive and inferential analysis, and described according to absolute and relative frequencies and central-tendency measures (mean and standard deviation), when appropriate. Normality of the quantitative variables was analyzed with the Kolmogorov-Smirnov test. The following inferential tests were used to test the validity assessment:

1. Chi-square test and the paired Student's t-test were used to evaluate the known-groups validity. The chi-square test was applied to test the difference of the frequencies of NAS responses between units and the paired Student's t-test to compare the means of NAS at admission and at discharge between units.
2. The Pearson correlation coefficient was applied to test the convergent validity. This parametric test was used because the variables APACHE II, SAPS 3, number of adverse outcomes, and LOS presented a normal distribution. The magnitude of correlations was interpreted as low (0.20–0.29), moderate (0.30–0.49), or high (≥ 0.50) (Cohen, 1988). The statistical significance was set at $p < 0.05$.

Ethical approval

The study was approved by the Research Ethics Committee of the Quebec Heart and Lung Institute at Laval University (IUCPQ-UL) (MP-10-2015-2457, 21161).

Results

The study included 143 patients (CCU $n = 113$ and pulmonary ICU $n = 30$), for a total of 355 NAS registers (CCU $n = 249$; pulmonary ICU $n = 106$). The main diagnoses for admission during the study period were valve replacement, thoracic surgery, and CABG for the CCU, and pneumonia and general complications for the pulmonary ICU. APACHE II was applied for 53 out of 113 CCU patients from CCU. APACHE II was not applied for the other 60 patients that had coronary artery bypass procedures because of the lack of consistency of this index in this population (Knaus et al., 1991).

The CCU patients were mostly male (70.8%); the pulmonary ICU patients were predominantly female (66.7%). The rate of survivors was 97.3% in the CCU and 93.3% in the pulmonary ICU. There was no significant difference in patient age between the two ICUs ($p = 0.1$). The mean LOS was significantly higher in the pulmonary ICU than in the CCU (3.5 ± 4.8 vs. 2.2 ± 2.3 days; $p < 0.05$), as well as the probability of death estimated with SAPS 3 (22.3 ± 18.8 vs. 16.2 ± 12.7; $p < 0.05$), which is consistent with the survival rates (Table 2).

Nursing Activities Score data are presented in Table 3 as frequency for the items separately and as the mean (standard deviation) for the total score for both ICUs. The activities with the highest frequencies in both units were items 2 (laboratory, biochemical, and microbiological investigations: 100.0%),

Table 2. Patient characteristics according to ICU (CCU *n* = 113; pulmonary ICU *n* = 30)

Variables	*n* = 17	CCU Mean (SD)	Pulmonary ICU Mean (SD)
Age (years)	66.7 (12.0)	67.4 (11.2)	63.7 (14.4)
Length of stay (days)	2.5 (3.0)	2.2 (2.3) *	3.5 (4.8) *
Number of adverse outcomes	2.7 (2.4)	2.8 (2.6)	2.6 (1.9)
APACHE II	7.7 (8.8)	12.4 (6.1)†	15.6 (9.3)
SAPS 3	48.6 (11.5)	47.7 (10.3)	52.2 (14.9)
Probability of death (SAPS 3) (%)	17.4 (14.4)	16.2 (12.7) *	22.3 (18.8) *

*CCU: Cardiac intensive-care unit; ICU: Intensive-care unit; SAPS 3: Simplified Acute Physiology Score 3; *p<0.05: Student's t-test; †: 53 patients*

Table 3. Frequency of activities according to item (n = 355 registers)				
NAS items (score)	**Total Sample (*n* = 355) *n* (%)**	**CCU (*n* = 249) *n* (%)**	**Pulmonary ICU (*n* = 106) *n* (%)**	***p*-value**
Item 1 ***Monitoring and titration***				
a. Normal (4.5)	131 (36.9)	36 (14.5)	95 (89.6)	<0.05*
b. More than normal (12.1)	193 (54.4)	183 (73.5)	10 (9.4)	
c. Much more than normal (19.6)	31 (8.7)	30 (12.0)	1 (1.0)	
Item 2 ***Laboratory, biochemical, and microbiological investigations (4.3)***	355 (100.0)	249 (100.0)	106 (100.0)	n/a
Item 3 ***Medication, vasoactive drugs excluded (5.6)***	354 (99.7)	248 (99.6)	106 (100.0)	0.5
Item 4 ***Hygiene procedures***				
a. Normal (4.1)	275 (77.5)	171 (68.7)	104 (98.1)	<0.05*
b. More than normal (16.5)	66 (18.6)	64 (25.7)	2 (1.9)	
c. Much more than normal (20.0)	14 (3.9)	14 (5.6)	0	
Item 5 ***Care of drains, all (except gastric tube)*** **(1.8)**	295 (83.1)	243 (97.6)	52 (49.1)	<0.05*
Item 6 ***Mobilization and positioning***				
Normal (5.5)	36 (10.1)	3 (1.2)	33 (31.1)	<0.05*
More than normal (12.4)	310 (87.3)	244 (98.0)	66 (62.3)	
Much more than normal (17.0)	9 (2.6)	2 (0.8)	7 (6.6)	
Item 7 ***Support and care of relatives and patient***				
a. Normal (4.0)	342 (96.3)	240 (96.4)	102 (96.2)	0.9
b. More than normal (32.0)	13 (3.7)	9 (3.6)	4 (3.8)	
Item 8 ***Administrative and managerial tasks***				
a. Normal (4.2)	199 (56.1)	110 (44.2)	89 (84.0)	<0.05*
b. More than normal (23.2)	135 (38.0)	118 (47.4)	17 (16.0)	
c. Much more than normal (30.0)	21 (5.9)	21 (8.4)	0	
Item 9 ***Respiratory support*** **(1.4)**	313 (88.2)	238 (95.6)	75 (70.8)	<0.05*
Item 10 ***Care of artificial airways*** **(1.8)**	2 (1.9)	114 (45.8)	56 (52.8)	0.2
Item 11 ***Treatment for improving lung function*** **(4.4)**	330 (93.0)	232 (93.2)	98 (92.5)	0.8
Item 12 ***Vasoactive medication, disregard type and dose*** **(1.2)**	195 (54.9)	172 (69.1)	23 (21.7)	<0.05*
Item 13 ***Intravenous replacement of large fluid losses*** **(2.5)**	2 (0.6)	1 (0.4)	1 (0.9)	0.5
Item 14 ***Left-atrium monitoring*** **(1.7)**	163 (45.9)	163 (65.5)	0	<0.05*
Item 15 ***Cardiopulmonary resuscitation after arrest*** **(7.1)**	3 (0.8)	2 (0.8)	1 (0.9)	0.9
Item 16 ***Hemofiltration techniques, dialysis techniques*** **(7.7)**	16 (4.5)	15 (6.0)	1 (0.9)	<0.05*
Item 17 ***Quantitative urine output measurement*** **(7.0)**	335 (94.4)	243 (97.6)	92 (86.8)	<0.05*
Item 18 ***Measurement of intracranial pressure*** **(1.6)**	5 (1.4)	5 (2.0)	0	0.1
Item 19 ***Treatment of complicated metabolic acidosis/ alkalosis*** **(1.3)**	12 (3.4)	6 (2.4)	6 (5.7)	0.1
Item 20 ***Intravenous hyperalimentation*** **(2.8)**	21 (5.9)	19 (7.6)	2 (1.9)	<0.05*
Item 21 ***Enteral feeding through gastric tube or other gastrointestinal route*** **(1.3)**	97 (27.3)	64 (25.7)	33 (31.1)	0.3
Item 22 ***Specific interventions in the ICU*** **(2.8)**	277 (78.0)	248 (99.6)	29 (27.4)	<0.05*
Item 23 ***Specific interventions outside the ICU*** **(1.9)**	40 (11.3)	19 (7.6)	21 (19.8)	<0.05*
*CCU: Cardiac intensive-care unit; ICU: Intensive-care unit; NAS: Nursing Activities Score; n/a: not applicable; *p<0.05: Chi-square test.*				

3 (medication, vasoactive drugs excluded: 99.7%), 17 (quantitative urine output measurement: 94.4%), and 11 (treatment of improving lung function: 93.0%). The items with the lowest frequencies were 13 (intravenous replacement of large fluid losses: 0.6%), 15 (cardiopulmonary resuscitation after arrest: 0.8%), 18 (measurement of intracranial pressure: 1.4%), 19 (treatment of complicated metabolic acidosis/alkalosis: 3.4%), and 16 (hemofiltration techniques, dialysis techniques: 4.5%) (Table 3).

Comparing the CCU and the pulmonary ICU, items 5 (care of drains, all except gastric tube: 97.6% vs 49.1%), 9 (respiratory support: 95.6% vs 70.8%), 12 (vasoactive medication, disregard type and dose: 69.1% vs 21.7%), 14 (left-atrium monitoring: 65.5% vs 0%), 16 (hemofiltration techniques, dialysis techniques: 6.0% vs 0.9%), 17 (quantitative urine output measurement: 97.6% vs 86.8%), 20 (intravenous hyperalimentation: 7.6% vs 1.9%), 22 (specific interventions in the ICU: 99.6% vs 27.4%) were performed more frequently in the CCU. Moreover, multiple-choice items 1 (monitoring and titration), 4 (hygiene procedures), 6 (mobilization and positioning), 8 (administrative and managerial tasks) were more frequently scored as (b) (more than normal) or (c) (much more than normal) in the CCU than the pulmonary ICU, where the (a) (normal) were mostly frequently scored. Item 23 (specific interventions outside the intensive-care unit), was, however, observed more frequently in the pulmonary ICU (Table 3).

Consistent with these findings, all measurements of total mean of NAS were higher in the CCU than the pulmonary ICU. Considering the NAS at admission, the CCU presented a mean of 86.9 (SD = 14.6) and the pulmonary ICU a mean of 66.8 (SD = 20.3). The significant differences in the scores between units confirmed the first hypothesis of known-groups validity.

Inpatients with a LOS of 48 hours or more had their NAS for the times of discharge and admission compared. The NAS was significantly higher at admission than at discharge for the total sample (83.9 ± 19.7 vs. 64.5 ± 19.2; $p < 0.05$), as well as when the units were considered separately (CCU: 89.1 ± 17.4 vs. 70.5 ± 18.3; $p < 0.05$); pulmonary ICU: 68.9 ± 18.4 vs. 47.1 ± 8.5; $p < 0.05$), confirming the second hypothesis of known-groups validity (Table 4).

For the correlation analysis, the NAS at admission in the CCU was not correlated with any of the severity scores, but it was correlated with LOS and the number of adverse outcomes. In the pulmonary ICU, the NAS score at admission was correlated significantly with the APACHE II, but not with LOS or the number of adverse outcomes (Table 5). These data only partially confirmed the hypotheses of convergent validity.

Table 4. NAS scores at admission and discharge

ICU	NAS at Admission All Patients	NAS at Admission LOS < 48 h	NAS at Admission LOS > 48 h	NAS at Discharge LOS > 48 h
	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)
Total sample	82.7 (17.9) *n* = 143	81.7 (16.3) *n* = 77	83.9* (19.7) *n* = 66	64.5* (19.2) *n* = 66
CCU	86.9 (14.6) *n* = 113	85.3 (11.9) *n* = 64	89.1* (17.4) *n* = 49	70.5* (18.3) *n* = 49
Pulmonary ICU	66.8 (20.3) *n* = 30	63.9 (23.0) *n* = 13	68.9* (18.4) *n* = 17	47.1* (8.5) *n* = 17

Paired Student's t-test: *$p < 0.05$; NAS: Nursing Activities Score; LOS: length of stay

Table 5. Correlations between the NAS at admission and clinical variables according to the total sample (*n* = 143) and ICUs: CCU (*n* = 113) and pulmonary ICU (*n* = 30)

NAS at Admission	APACHE II (*n* = 53)†	SAPS 3	Number of Adverse Outcomes	LOS
Total sample	0.102	**0.198***	0.131	0.068
CCU	0.091	0.181	**0.220***	**0.272***
Pulmonary ICU	**0.379***	0.331	0.207	0.043

†*n = 53; APACHE II was not applied to CABG patients in the CCU; LOS: length of stay; *p<0.05: Pearson's correlation coefficient*

Discussion

This study evaluated the known-groups and convergent validity of the French-Canadian version of the NAS in two specialty ICUs: a CCU and a pulmonary ICU. As hypothesized for the known-groups validity, the particularities of nursing activities provided to patients in both ICUs seem to be captured by the NAS because most of the specific nursing activities as well as the total NAS values were significantly different between the ICUs. With respect to specific activities, Table 6 presents discussion related to items scoring differently in the ICUs. There were no differences between the ICUs for items 2 (laboratory, biochemical, and microbiological investigations), 3 (medication, vasoactive drugs excluded), 7 (support and care of relatives and patient), 10 (care of artificial airways), and 11 (treatment for improving lung function). This could be expected because these activities are ubiquitous in ICUs.

These results reinforce that the NAS items reflect different aspects of the nursing activities in direct ICU patient care. The multiple-choice items related to basic nursing activities allow for estimating variations in patient needs with accuracy and sensitivity. Because of that, the intensity of nursing care is reflected in some items that were observed more than others, depending on patient characteristics and demands (Debergh et al., 2012; Miranda & Jegers, 2012).

The total NAS were higher in CCU than in the pulmonary ICU at admission, as well as at discharge. This could be expected because of the high intensity of activities required by that patient population.

The known-groups validity also considered that there should be a significant difference in the total NAS between the time of admission to and discharge from the ICU. In fact, we found that patients in both ICUs with LOS > 48 hours had a NAS at admission significantly higher than at discharge. That was expected because patients must be clinically stable when discharged and would thus require a lower level of nursing activities than at admission. The literature reports similar results (Adell et al., 2005; Carmona-Monge et al., 2013; Nogueira et al., 2013). A lower NAS at discharge suggests some guarantee of patient safety outside the ICU, as patients go to departments with lower levels of intensity of care that can be adequately provided by the lower number of nursing resources in these units. The attribution of resources according to patient needs is important to preserve patient clinical evolution, prevent readmissions, and reduce intrahospital mortality (Sinuff et al., 2004).

Regarding the total NAS values, it is interesting to note that the patients in the pulmonary ICU had a lower NAS, despite having a higher probability of death and longer LOS than those in the CCU. This reinforces the notion that patients' clinical severity does not exactly reflect the intensity of the nursing activities they require.

On the subject of the convergent validity, the NAS at admission was tested against the level of clinical severity at admission, LOS, and number of adverse outcomes. It was hypothesized that patients with a higher NAS at admission would have a higher severity score, a longer LOS, and a greater number of adverse outcomes. The correlation between the NAS at admission with clinical severity measured by the SAPS 3 was positive and significant when both ICUs were considered. The correlation was moderate for the pulmonary ICU alone when using APACHE II. Some studies indicated no correlation between the NAS and severity as measured with APACHE II or SAPS II (Cudak & Dyk, 2010; Kraljic et al., 2017; Lucchini et al., 2014). These findings reinforce that patient severity has no perfect correlation with the intensity of nursing care. This can be explained mostly by patients with lower levels of clinical severity that require a high intensity of nursing care, for example, family and patient support, administrative tasks, hygiene, monitoring for agitation, and so on (Miranda & Jegers, 2012). This is an important point, considering that NAS aims to evaluate the patient's need of nursing care and not their clinical severity. Indeed, there are several other clinical indexes for that.

From the standpoint of LOS, the hypothesis was confirmed only for the CCU: patients with higher NAS at admission and a longer LOS in the CCU. This indicates that patients with a more complex presentation and requiring a higher intensity of nursing care upon admission will stay in the ICU until they are stable enough to be discharged (Azarfarin et al., 2014; Cudak & Dyk, 2010; Giakoumidakis et al., 2011).

Lastly, it was found that an increase in the intensity of nursing activities at admission was related to a higher number of adverse outcomes, but only in the CCU, which can be explained by the impact of the complexity of clinical conditions and related procedures in nursing care. In one study, available nursing resources was added to the analysis of the relationship between the intensity of nursing activities and adverse effects. They found that in the contexts requiring a high intensity of nursing but with a reduced number of nursing professionals, there was a 6% increase in infections of surgical wounds, urinary-tract infections, and pneumonia, as well as a 7% increase in pressure ulcers (Twigg et al., 2015).

Our results contribute to clinical practice and research in the French-Canadian context of ICUs. The combination of the results of the present study on the validity of the French-Canadian version of the NAS, along with those already published, about the process of cross-cultural adaptation and reliability assessment of the adapted tool, provide growing evidence of the instrument's appropriateness in evaluating nursing time spent in direct patient care in ICUs. The next step is to electronically implement the instrument in all ICUs in Quebec City and potentially throughout the province; daily, real-time NAS data could be available once the instrument has been implemented. In this study, we applied the NAS once every 24 hours, but the tool can be applied on a per-shift basis. As stated by Miranda (n.d.), "the study of the prevalence of the nursing activities per shift in each ICU, including all patients during a representative period of time, may disclose valid information for improving the management of care."

Future research could consider using the framework of quality of care of Donabedian (1988), according to whom patient

outcomes are the result of interaction between structure and process. Thus, NAS data could be placed along with other variables in the concept of process, and the analysis of these data together with those from structure can provide important insights in understanding the impact of nursing care on patient outcomes (Lachance et al., 2015). From a different perspective, at a time when health funding in Quebec is turning to patient-focused funding, in which the cost of care through clinical pathways is critical (MSSS, 2018), NAS use is of singular value in determining the contribution of the costs of nursing care based on the needs of the patients during their ICU stay.

There are a number of important challenges to appropriate widespread use of the NAS, such as ensuring the nurses complete the NAS on daily basis, staff training in its use and periodic cross-validating the data. Knowledge translation strategies may be useful to mitigate these challenges (Graham et al., 2006).

Limitations

The non-probability convenience sample limits the population representativity. The exclusion of CCU bypass patients from the application of APACHE II scoring could influence the analysis of correlation between the severity index and the NAS. Moreover, the sample from the population in the pulmonary ICU was small and no power calculation was done. The study was developed in one institution. The continued use of the instrument should contribute to the validation process of the instrument considering that the validation of a tool is always an ongoing process.

Conclusion

The hypothesis of the known-groups validity was confirmed through the findings of significant differences in the mean of the NAS and frequencies of nursing activities between the CCU and pulmonary ICU. The hypothesis of convergent validity was partially confirmed, as the NAS at admission did not correlate with clinical severity, but rather with related adverse outcomes and LOS. Additional validation studies would be useful to further test the tool's psychometric performance.

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Intensive care nurses providing end-of-life care in a community hospital

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Abstract

The literature has identified how intensive care unit (ICU) nurses perceive their role and describe their experiences of providing end-of-life care (EOLC). However, there is an empirical gap in what is known about nurses' provision of EOLC in ICUs of community hospitals. Using a qualitative approach and interpretive description (ID) design, this study sought to explore nurses' experiences providing EOLC in an ICU of a community hospital. Face-to-face, semi-structured interviews were conducted with seven registered nurses who worked in a community hospital ICU and had experiences of providing care to dying patients in the unit. Interviews were transcribed verbatim, and verified for accuracy by the authors. Follow-up interviews were also conducted to explore the findings with the participants and obtain their feedback.

Study findings highlighted participants' struggles in providing EOLC in a community hospital ICU context. These struggles included mandated transfers of dying patients out of the ICU, needing help to provide care, and 'wearing multiple hats' that involved various roles and responsibilities often related to patients outside of the ICU. This study enhances our knowledge and understanding about the challenges nurses encounter in the community ICU context, while providing EOLC to patients and families. Specifically, clinical implications from the study include improving staff allocation, limiting patient transfers, and improving communication to make space and place for the dying patients in the ICU.

Key words: end of life, qualitative approaches, critical care, hospitals, community,

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Background

Patient death in the intensive care unit (ICU) often results from the inability to recover from critical illness and decisions are then made to shift goals of care from recovery to end-of-life care (EOLC). In the majority of cases, EOLC follows a collaborative decision-making process to withdraw or withhold life-sustaining measures/treatment, and focus on pain and symptom management (Downar et al., 2016; Vanderspank-Wright et al., 2018). EOLC is provided during patients' final stages of dying and extends to the care of the body after death and bereavement support for the family (Canadian Nurses Association et al., 2015). As part of this clinical reality, ICU nurses frequently provide EOLC for dying patients and their families.

Extant literature has explored ICU nurses' roles and experiences in providing EOLC. Many studies have described nurses to be actively involved with patients, families and the interdisciplinary team in end-of-life decision-making by organizing patient care conferences and facilitating communication about the patient's changing clinical condition (Bloomer et al., 2013; Peden-McAlpine et al., 2015). While ICU nurses are involved in the end-of-life decision-making, studies have also highlighted that they encounter inter- and intra-professional conflicts due to varying perspectives about prognosis, appropriate treatments and goals of care for the patient (Coombs et al., 2012; International Nurses' End-of-Life Decision-Making in Intensive Care Research Group, 2015).

Other studies have explored ICU nurses' roles after a decision to shift goals of care to a palliative focus. These studies reveal nurses to enact the withdrawal of life-sustaining treatments and to intently provide care that conserves the dignity of the dying patient (Coombs et al., 2015; Efstathiou & Walker, 2014; McMillen, 2008). Findings from these studies also reveal that nurses experienced elements of uncertainty, as well as emotional labour associated with the care of dying patients and their families (Coombs et al., 2015; Efstathiou & Walker, 2014).

Understanding of ICU nurses' role and experiences in providing EOLC has been informed largely by studies conducted in teaching hospitals. Although there are ICUs in community hospitals, only a few studies have included community hospitals or have been exclusively conducted in such contexts.

One study by Gélinas et al. (2012) explored the stressors experienced by nurses while providing EOLC and palliative care in the ICU setting. Using a descriptive qualitative design, nurses were sampled from ICUs of five hospitals (specifically four teaching and one community) in Quebec, Canada. One of the stressors identified in the study related to nurses describing how they needed more training in end-of-life and palliative care, and more direction (i.e. protocols) to help manage symptoms and overall care. However, this study did not differentiate between those who practised in teaching hospitals and those of community hospitals. Yet, the different hospital contexts may influence the role of education and training, as well as protocols to support the provision of EOLC in ICUs.

To address the community hospital context, a study was conducted by Sarti et al. (2014) in which they designed and implemented a needs assessment to identify gaps in caring for critically ill patients in a community hospital in Ontario, Canada. A mixed method design was employed to identify intra-hospital needs, as well as inter-hospital needs between the community hospital and a referral hospital where patients could be transferred. A further publication by Sarti et al. (2015) based on the critical care needs assessment in the community hospital revealed gaps in the provision of palliative care. Factors that influenced the provision of palliative care included physician availability, frequent transfers to other facilities, and the priority of caring for critically ill patients. Sarti et al. (2015) described how physicians and nurses held differing perceptions in regards to the timing, as well as roles and responsibilities associated with initiating and/or leading goals of care discussions with patients and families. Because of these differing perceptions, discussions and decision-making about shifting goals of care to EOLC occurred inconsistently. The findings from the study by Sarti et al. (2015), in part, suggest that physicians and nurses in the community ICU context may view EOLC differently (both philosophically and practically), as compared to their counterparts in ICUs of teaching hospitals.

Considering the limited and inconclusive evidence, there is a need for further exploration of the community ICU context, in particular nurses' roles and experiences, as they spend the most time with the dying patients and their families.

Nursing in community hospitals through a nursing geography lens

A nursing geography lens is relevant in considering nurses' experiences providing EOLC in the community ICU context. Broadly speaking, nursing geography is an area of scholarship that focuses on exploring the relational dynamics between the profession, and space and place (Andrews & Shaw, 2008; Liaschenko et al., 2011). Notably there is a subset of nursing geography studies that focus on examining the impact of space and place within professional-patient and inter-professional relationships (Andrews & Shaw, 2008; Liaschenko et al., 2011).

The concept of space. The concept of space is viewed as the proximity or distance within the nurse-patient relationship (Liaschenko et al., 2011). Malone (2003) proposes three types of space: physical, narrative, and moral. Physical proximity refers to physical touch and nearness between the nurse and patient through daily nursing care, whereas narrative proximity is relational in nature and implies that the nurse hears and knows the patient's biographical story and meaning of illness, and then relays this knowledge on to others caring for the patient. Moral proximity occurs when the nurse develops both physical and narrative proximity. Moral proximity facilitates gaining knowledge of the patient through physical intimacy and relational connection, and necessarily situates the patient as a person (Malone, 2003). Through engagement with these elements of proximity, the nurse uses this situated knowledge, interprets and takes a moral course of action on behalf of the person (Malone, 2003). These three types of proximity in the nurse-patient relationship are interrelated and time-dependent. Furthermore, Malone (2003) theorized that certain "spatial-structural effects" (p. 2320) or organizational changes can constrain proximity and subsequently, render more distance within the nurse-patient relationship. For instance, Malone (2003) described how reduced length of hospital stay has shortened the time available for nurses to care for patients and eliminated certain traditional nursing practices, such as "backrubs" (p. 2321), which provided nurses an opportunity for assessment as well as providing comfort, and relationship building with the patient. Malone (2003) argued such change has disrupted the levels of proximity, and instead has emphasized efficiency and productivity in nursing work.

Malone's (2003) conceptualization of space brings forth a lens to explore the ways in which nurses are engaged in caring for dying patients and their families in the ICU of the community hospital. Furthermore, it allows for an in-depth examination of the community ICU context as well as the factors that enable or constrain ICU nurses' abilities to provide EOLC.

The concept of place. The concept of place has diverse meanings in nursing geography literature. Carolan et al. (2006) described place as the setting of healthcare services, a healing environment for patients and the social environment that affects nursing care. For this study, the concept of place refers to the community ICU context.

In the province of Ontario, community hospitals are geographically located in areas with populations between 10,000 and 100,000 (outside of large cities) and, as opposed to teaching hospitals, they are generally not associated with the teaching and training of medical students/residents and fellows (Ministry of Health and Long-Term Care [MOHLTC], 2009; Canadian Rural Revitalization Foundation, 2015). As part of a region-wide network of critical care services, many of these community hospitals have ICUs that function as the first point of care to stabilize and to meet some of the physiological needs of critically ill patients. Many ICUs in community hospitals are limited in their ability to provide the full spectrum of critical care services, but are generally able to treat and manage patients post-operatively or with single organ failure using short-term mechanical ventilation (less than 48 hours) (MOHLTC, 2009). If the patient's condition demands further intervention they are then transferred to other facilities (Critical Care Services Ontario, 2015; Sarti et al., 2014).

Often, these community hospital ICUs operate with an open (Gottesman, 2015) model of care, where physicians without specific critical care training (e.g. general practitioners or hospitalists) manage care for patients in the unit. In contrast, ICUs in teaching hospitals frequently use closed (Gottesman, 2015) models of care in which units are staffed by an interdisciplinary team led by intensivists. Whilst ICU models of care are generally based on the type of hospital (community versus teaching), it is also dependent on the region's critical care needs and the resources available (i.e. specialized physicians, nurses, respiratory therapists). Regardless, differences in ICU capacity in services and personnel can have implications to the overall delivery of care (including EOLC) for critically ill patients.

Objective

The objective of this study was to explore nurses' experiences with EOLC in an ICU of a community hospital. Study questions were the following:

1. How do nurses describe their provision of EOLC in the community hospital ICU context?
2. How does nursing geography shape our understanding of nursing care of dying patients in a community hospital ICU?

Methods

Design

This study was conducted using Interpretive Description (ID) as articulated by Thorne (2008). ID is a qualitative research approach with a nursing disciplinary framework geared towards exploring relevant and practical clinical issues, such as the provision of EOLC (Thorne, 2008). The theoretical lens of nursing geography was used to inform the design, the interpretation, as well as the discussion of the findings.

This study was conducted in an ICU of a community hospital located in Ontario. The ICU has less than 15 beds (exact number withheld to protect confidentiality), and serves a mixed medical and surgical, adult patient population with occasional pediatric patients. The unit is equipped to care, on a short-term basis, for patients needing mechanical ventilation. However, limited resources exist and, therefore, patients requiring other interventions such as continuous renal replacement therapy are transferred to a larger centre (often a teaching hospital).

Intensivists managed the medical care of patients admitted to this closed unit. At the time of data collection, the ICU was staffed with fewer than 40 registered nurses (RNs) of which almost two-thirds were employed full-time, and the remainder were part-time and casual. The nurse-to-patient ratio was usually one nurse to two patients, but in situations where patients were mechanically ventilated, the ratio was one to one. On every shift, there were three roles assigned to more experienced nurses: charge nurse, telemetry monitoring and codes. The charge nurse oversaw the delivery of care, while the telemetry nurse was responsible for monitoring up to 10 patients on portable telemetry throughout the hospital. The nurse assigned to codes responded to, and attended critical events, such as cardiac arrest and stroke, throughout the hospital including the emergency department (ED).

Data collection

In this study, the first author (S.W.) was a nurse in a tertiary care teaching hospital and who had previous experiences of providing EOLC in a critical care setting. The first author had no prior relationship to the community hospital, and the agreement with conducting the study followed after the approval from the hospital's research committee and the unit manager.

Table 1. Implications for nurses

- Study findings provided insight to nurses' experience and particularly, the struggles they faced while providing EOLC in an ICU of a community hospital.
- Underpinning these struggles were factors of limited (physical and human) resources and a limited focus on the needs of the dying patient and family in this context.
- Implications from this study merit further exploration in the way in which resources are optimally managed and how this impacts EOLC

The first author (S.W.) met with potential participants during scheduled meetings on the unit to introduce the study's overall purposes and the participation required. The first author's (S.W.) business cards were distributed and flyers were posted on the bulletin board in the nursing station to inform nurses of the study. Interested nurses contacted the first author (S.W.) via phone or email to discuss the details of the study and to arrange a meeting. Participants were eligible to participate if they met the following inclusion criteria: (1) were a RN working full- or part-time in the ICU of the study hospital; (2) had previous experiences in caring for dying patients in the ICU; and (3) were English speaking.

A purposive sample was employed. Seven RNs agreed to participate. The majority of participants (n = 6) had at least 10 years' experience in critical care and, of these, five had worked (part-time or full-time) in the study ICU for more than 10 years. Almost all participants had completed additional training in critical care (associated with hospital training or college certificates) and had a diploma in nursing as their highest educational level. About half the participants identified that they had received palliative care education either through their formal nursing studies or through seminars.

The data were collected through two sets of face-to-face interviews: an initial and a follow-up. The initial interviews were semi-structured in nature. Participants were asked questions from the guide (Table 2), but were also free to elaborate and to

Table 2. Guide for initial semi structure interviews

Questions

- Please describe your experiences in caring for dying patients on your unit and provide some examples.
- Can you please describe how it is you are involved in providing end-of-life care (EOLC)?
- Please describe what good EOLC means to you.
- Are there any barriers to you providing EOLC on your unit? Please elaborate.
- Are there any facilitators that assist you in providing EOLC in your unit? Please elaborate.
- Are there EOLC situations that you felt have gone well? Or EOLC situation that could have improved? Please explain.
- If you were given the opportunity to make changes, how would you like to see EOLC provided to patients on your unit?

Probing Questions

- What is it like to practise in a community critical care unit? How does it compare to your other critical care experiences?
- Have you practised EOLC in any other critical care setting? Please share your experiences. How are these experiences differing or alike from your experiences of providing EOLC in this unit?
- Is there anything else you would like to add?

discuss as they wished regarding EOLC. Follow-up interviews were conducted approximately six months after the initial ones, where a summary of the findings was provided to participants, offering them the opportunity to clarify and explore further the findings. All participants were contacted, but only four were available for follow-up interviews.

Interviews were conducted at a private location chosen by the participant. All initial and follow-up interviews were conducted by the first author (S.W), audio-recorded and transcribed verbatim. Then the transcripts were verified for accuracy. Initial and follow-up interviews lasted approximately 60 to 90 minutes depending on participants' articulation of their experiences and the findings shared.

Data analysis

Within the method of ID, data analysis is an iterative process of immersing, analysing and reflecting on the data as it is collected (Thorne, 2008). All authors of the study reviewed the original transcripts, and the first author (S.W) coded the transcribed interview data following the analytic technique Thematic Networks (Attride-Stirling, 2001), where data was organized in a web-like network and patterns and relationships were observed. These patterns and relationships were interpreted and organized into preliminary themes by all authors. Themes were further refined into a thematic analysis, a product of ID and a representation of the participants' experiences that provides a new perspective on the topic of EOLC (Thorne, 2008).

Rigour

Several methods were taken to ensure rigour throughout the study: representative credibility, auditability, and transferability, which were consistent with principles articulated by Thorne (2008), and Polit and Beck (2012). In terms of representative credibility, the first author (S.W.) conducted follow-up interviews where themes were shared with participants. During these interviews, participants were able to confirm, discuss, and challenge whether the findings were representative of their experiences. For auditability, the first author (S.W.) kept a journal, which was used to record important decisions related to data analysis, and as a means for reflexivity. Furthermore, the themes were verified by all authors (F.F.B., K.T., D.W.) who had expertise in critical care nursing and/or qualitative research. Lastly, transferability was also considered. A description of the study setting and basic demographics of the participants allowed readers to discern whether the findings of the study were transferable to other community hospital contexts.

Research ethics approval for this study was obtained from the academic institution Research Ethics Board (H08-16-14) and the community hospital's research committee. Prior to data collection, written informed consent was received from each participant. Pseudonyms were used to maintain participants' confidentiality.

Findings

The analysis of the data revealed an overarching theme of "switching gears." Participants viewed switching gears as an intentional change in the focus from providing life-sustaining medical treatment to EOLC when it was no longer possible to save the patient's life and death was inevitable. Participants' involvement with switching gears included discussions with the interdisciplinary team and patients, achieving consensus, and providing care (i.e. pain and symptom management and comfort measures). The switching of gears created struggles that seem to be related to a community ICU context. This paper discusses participants' struggles, as they relate to transferring patients out of the ICU, needing help to provide care, and wearing multiple hats.

Transferring patients out of ICU

One of the most common "struggles" participants expressed was the frequent transfers of dying patients out of the ICU to the medical floors. All participants viewed private rooms in the ICU to be an ideal space for dying patients and their families to spend their remaining time together. Furthermore, many participants expressed that staying in the ICU allowed the families to benefit from the relationships built with the nurses who knew them. Beth explained, "*We* [nurses] *have a rapport with the patient* [and] *the family, it's important that they stay in that bed…*"

Yet, tensions existed due to limited resources including place and space in the community hospital. For example, participants expressed that often it was not possible to keep the dying patient in the ICU, because they "needed the bed" for another critically ill patient who was often already waiting in the Emergency Department (ED). As such, nurses' prioritization of beds and transferring of patients (particularly dying patients) were frequently out of necessity, and in line with the mandate of the community ICU in stabilizing critically ill patients. Karen discussed a situation where she had to transfer someone to the medical floor. She reflected, "*With the acuity of patients* [who] *are coming in, very seldom… would a palliative care patient remain in ICU until they die…We transferred a gentlemen out at 1:30 am and he passed away at 5:30, but we needed the bed. So those circumstances are hard too because you kind of uproot the family and have them move.*"

This quote by Karen demonstrates how transfers affected the space and place in which EOLC was provided. These transfers were seen as a physical displacement and a disruptive relational experience for dying patients and their families, as they were required to move from one unit to another, and to receive care from staff they did not know.

Depending on the situation, participants took certain actions when it came to the transferring of dying patients to the floors. Beth shared how she and her colleagues voiced their concerns to the intensivists and asked for the patient to stay a little while longer in the ICU, especially if they were imminently dying. Beth explained, "*We say no, you're not getting that bed yet… You* [intensivists] *wanted the patient in ICU… we sometimes have to advocate, but it's a fight to palliate in the ICU...*" In some instances, nurses were able to successfully advocate for dying patients and their families to stay in the ICU.

For other participants, there was a sense of making the best out of the necessity of transferring dying patients. Emily explained that she and her colleagues collaborated with thebed management

department and the nurse manager to arrange a semi-private or private room for the patient. Emily added, *"It's an ongoing thing we all know the* [palliative] *patient will be transferred… I call bed management, and say, 'if they could please reserve a single or semi-private room for this patient'; and I will* [also] *ask my manager."* A single or semi-private room on the floor was recognized as a better alternative to a four-bed room for dying patients and their families in terms of privacy. Participants' continued advocacy for patients and families and their collaboration with the interdisciplinary team illustrated a desire to facilitate a positive experience despite unfortunate circumstances.

Needing help to provide care

In this community ICU context, there was generally not enough staff to accommodate for one nurse to care for one dying patient and his or her family. As such, participants discussed that it was a normalized practice in the unit for nurses to have a heavier patient assignment if one patient was dying. It seemed that, in assigning patients to staff, the assumption was that a dying patient would require less care than a patient, for example, needing assessments and interventions for ketoacidosis. The nursing staff experienced tensions associated with managing multiple competing priorities. Emily shared a situation when she had such an assignment. *I had a patient on BIPAP* (bilevel positive air pressure machine)… *very end-stage COPD* (Chronic Obstructive Pulmonary Disease)… *confused… pulling off everything, then I had this palliative patient in this end, and… I had a* [patient with] *DKA* (Diabetic Ketoacidosis) *across* [the unit], *which of course you're doing sugars every hour… the lab work, the drips… then the other nurses are so busy, that when I want to go in and turn her* [palliative patient] *and I want to provide her care… I have no help"*

Participants, like Emily, perceived heavy patient assignments to be difficult and frustrating, as they felt they were not able to commit to caring for the dying patient in the same way as their other patients. For instance, in reflection of the heavy patient assignment, Emily voiced, *"I just felt so horrible, because this is not how it should be."*

Participants discussed the actions they had taken in an effort to cope with a heavy patient assignment. Catherine shared how she tried to reprioritize her care, *"Depending on the family and depending on the level of anxiety or what's going on in the palliative room… I have to tell my other people to wait, if they can. Simple things."* For the participants, there seemed to be some flexibility to adjust their priorities in care and to respond accordingly to the situation. However, there also appeared to be limitations as to what could be reprioritized. Catherine mentioned only "simple things", such as baths, could be delayed. Otherwise, nurses had to prioritize meeting the needs of patients who were critically ill.

Sometimes participants described how their colleagues stepped in to help fulfill perceived responsibilities towards dying patients. Melanie described that her colleagues would assist her by "watching" her other patients, while she spent time with the grieving family of the dying patient. She shared, *"Our coworkers… are there to help you… watch another patient for a little bit, while you go and spend time with that family that need support."* Similarly, Emily described her colleagues providing help when a patient had died, and a newly admitted patient arrived to the unit a short time afterwards. In both situations, there was a sense of working together and sharing some of the responsibilities among the nurses to ensure that the dying patients and their families still had their needs met. Yet, this sharing of responsibility was also dependent on the complexity of patient assignments and whether nurses were able to provide help.

Wearing multiple hats—it can be a burden

An additional struggle identified by the participants was related to the multiple roles nurses assumed both within and outside of the ICU in the community hospital context. Because the vast majority of the sample was very experienced RNs, participants described how they had to assume various other roles aside from being at the bedside, such as "charge nurse", "telemetry monitoring" and "codes." Melanie, for example, described her care for two patients on this one particular shift, where she was also the designated person on "codes." She recalled, *"My vent* [patient in ICU] *was sick, but then they had called a code, and I was on codes, so I went down and met T* [patient in the ED], *and he was quite sick."* Melanie shared that she cared for this patient in the ED for some time until the interdisciplinary team decided to move him to the ICU. Because the maximum capacity of the unit to support patients on mechanical ventilation had been reached, Melanie had to return to the unit to transfer her other patient out to a larger teaching hospital. However, at the same time, decisions were made to not proceed with further life-sustaining medical treatments for the other patient in ED, who died shortly afterwards. Melanie reflected, "*Even though I'd only met T* [patient in the ED] *for a brief time, I felt like we had really connected, so I went down to speak with the family and gave my condolences. I had a lot of emotions. I think because I lost T and then my other patient* [in ICU] *who I had a good rapport with is now being flown away. It's a lot of stress, you worry a lot… you don't have time to get over it, and then you're getting the next sick patient from the floor…"*

Although Melanie's story focused on the care of the dying patient outside of the ICU, it revealed aspects of a community hospital. In this context, nurses often contended with responsibilities within and outside of the ICU, which meant the place and space in which they provided care was not limited to the ICU. Their relationships with patients and families, as well as their provision of care were impacted. Using the metaphor of 'multiple hats', Emily explained that having more than one role was difficult and a *"burden."* She elaborated, *"We carry more than one hat at a time… At the end of the day, someone and something gets set aside and that's a big burden… we're in a variety of roles… to switch and take on another, it's difficult."*

Discussion

The aim of this study was to explore nurses' experiences with providing EOLC in the ICU of a community hospital and to determine how nursing geography shapes our understanding of these experiences. Participants experienced many struggles in "switching gears," particularly in enacting the care of dying patients. These struggles included the transfer of dying patients out of the ICU, needing help to provide care and the taking on

of multiple roles. Utilizing a nursing geography lens, it could be seen that there were two factors underpinning participants' struggles: limited physical and human resources and a limited integration of EOLC in the ICU of this community hospital.

Limited physical resources emerged in the form of a finite (fixed) number of beds in the community ICU, which required transferring dying patients out of the unit. Findings showed that participants experienced tension with these transfers, as it disrupted their provision of care and their relationships with these patients and their families. Similar instances of transfers of dying patients due to finite ICU beds in teaching hospitals have also been documented in the literature (Bloomer et al., 2013; Liaschenko et al., 2011). Bloomer et al. (2013), for example, described that nurses experienced conflicted feelings and pressure from others to transfer the dying patient out of the ICU when the dying process appeared prolonged, in order to "free up beds" (p. 25) for other patients.

In the current study, there was limited structure (i.e. no existing protocol or policy) to allow for dying patients to stay in the ICU. As a result, participants took to their own initiative to create space for dying patients by continuing to provide care for them in the ICU, and when not possible, to request a transfer to a private room (on the medical floor) for them. While some of these efforts were successful, transfers of dying patients were beyond participants' control or that of first-line management. The finite beds in the ICU were organized and prioritized at a system level such that incoming critically ill patients from other areas like the ED were accommodated because the community hospital was the first point of care. This also speaks to the community ICU being operationalized as a place primarily to 'save' and treat patients with life-sustaining medical therapies.

Limited human resources also underpinned participants' struggles. Not surprising, extant literature has described that hospitals in small/non-metropolitan communities often face tremendous challenges with human resources (Medves et al., 2013; Rechel et al., 2016). Specifically, nurses working part-time and casual positions result in lack of continuity of staff caring for patients, which has been identified as problematic for nurses and their care of patients in community hospital contexts (Medves et al., 2013). In this current study, limited human resources resulted in heavy patient assignments and multiple roles for nursing staff. These findings are different from some ICUs of teaching hospitals where nurses were able to maintain a one-to-one ratio with dying patients and families, and to spend the necessary time caring for them (Holms et al., 2014). In this study, participants' experiences highlighted how their time to provide quality care (including EOLC) competed with the number of patients, and the responsibilities they had. Heavy patient assignments and multiple roles often interfered with participants' ability to maintain basic physical proximity in their nurse-patient relationships, let alone develop other levels of narrative and moral proximity.

The second factor relating to participants' struggles was a limited integration of EOLC in the community ICU. From the participants' perspective, the physician perceived that dying patients no longer needing the care provided in the ICU could be transferred to the floors. However, there are situations where dying patients need to die within the place of the ICU. For example, death can be imminent within minutes to hours after the withdrawal of life-sustaining treatments (Long et al., 2015). In these situations, in the time remaining, the ICU staff need to build on any nurse-patient relationship already established to provide care to the dying patient and to prepare the family for the death of their loved one.

When dying patients stayed in the ICU, the participants described how staffing arrangements were organized such that they would sometimes have a critically ill patient and a dying patient. This situation resulted in participants having a sense of being pulled in two directions: wanting to support the dying patient and family but needing to meet the needs of critically ill patients. The findings revealed that participants experienced conflicts as they recognized the importance of both life-sustaining treatments and EOLC, but were infrequently able to fulfill their responsibilities simultaneously. This had implications for participants who felt they were not able to commit to the care for the dying patient in the same way as other patients in the unit, especially in terms of meeting their varied needs (including emotional) and spending time with them and their families. Studies conducted in teaching hospitals have similarly described how nurses have felt frustrated and unsupported when there was a lack of understanding of the complexity of providing EOLC and a "strong curative culture" (Ranse et al., 2012, p. 7) in the ICU (Gélinas et al., 2012). While this lack of recognition for the needs of dying patients may occur in various contexts, there are fewer educational and protocol supports in place for staff to integrate EOLC in the community ICU.

Relevance to clinical practice

The participants demonstrated their advocacy role particularly in providing care and trying to keep dying patients in the ICU. However, given the community context, they also had to provide various roles outside of the ICU, which took them away from their patients. If nurses are to provide these additional roles then this should be reflected in the staffing allocation in the community hospital ICU. The focus on the nurse-patient relationship by these experienced nurses must be heeded. The importance of this relationship should not be diminished when examining the role of the nurse in the care provision. This recognition should be factored in when considering additional roles that may be common to the community hospital context to avoid adding competing demands to the nurse's workload.

The current study reveals there is a need to manage finite resources of ICU beds through the development and support of protocols. For example, leaders in both medicine and nursing can examine the criteria by which patients are admitted to ICU. If patients are already palliative then questions should arise as to why they would come to ICU only to be transferred out later. Additionally, leaders can review protocols that limit the transfer of acutely ill patients to other facilities, so that there would be continuity of care for these patients regardless of their illness trajectory.

While the focus on active treatment of patients is essential in the ICU, it can create difficulties for nurses and intensivists to shift goals of care to palliation and EOLC. Nurses and

intensivists could benefit from educational support in this area. Improving communication skills, for instance, would facilitate answering questions from family members, participating in family meetings, and discussing end-of-life-related topics (such as code status, advanced care planning and goals of care) (Krimshtein et al., 2011; Smith et al., 2013).

Limitations

Participants sampled in this study were interested in sharing their stories and perspectives with providing EOLC. As such, the findings may not have captured the experiences of other nurses in the community ICU who may have felt uncomfortable with discussing EOLC. Additionally, the majority of participants in the sample were female. Future studies could also explore ICU nurses' experiences among a more diverse sample. This study was also conducted in one community ICU, and so, findings may not reflect the experiences of nurses in other community hospitals.

Conclusion

Nurses in this study have described their efforts to advocate for patients at the end of life, and have shared some of their struggles in the provision of EOLC. With the lens of nursing geography, these struggles revealed that there were underpinning influences in the community hospital ICU context, such as limited resources and limited focus on the needs of the dying patient and family. While these influences are not unique, they do suggest overall that the experiences of nurses' provision of EOLC is complex and multifaceted in community hospital ICUs.

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