CACCN

The Canadian Journal of Critical Care Nursing

Volume 32, Number 2, Summer 2021

ISSN (Print): 2368-8653, (Online): 2563-8998

IN THIS ISSUE:

The Canadian Journal *of* Critical Care Nursing

Volume 32, Number 2, Summer 2021

Canadian Association of Critical Care Nurses

CACCN National Office
Chief Operating Officer:
Christine R. Halfkenny-Zellas, CIM
P.O. Box 25322, London, Ontario N6C 6B1
caccn.ca
email: caccn@caccn.ca
phone: 519-207-7007
toll-free: 1-866-477-9077
fax: 519-649-1458

The *Canadian Journal of Critical Care Nursing* is the only peer-reviewed critical care journal in Canada, and is published by Pappin Communications, Pembroke, Ontario. Printed in Canada. ISSN: 2368-8653 (Print), 2563-8998 (Online).

Advertising information: For advertising enquiries, contact Heather Coughlin, Pappin Communications, 1012 Snake River Line, Cobden, ON K0J 1K0, telephone: 613-633-1938, email: heather@pappin.com, website: www.pappin.com

Author Enquiries: All manuscript submissions are to be sent to Chief Editor, Canadian Journal of Critical Care Nursing (CJCCN): cjccneditor@caccn.ca and CACCN National Office: caccn@caccn.ca. For Author Guidelines, refer to the Canadian Journal of Critical Care Nursing (CJCCN) website: https://cjccn.ca/

Subscription Rates for 2021: Individual Subscriptions (within Canada): $90.00 CDN plus applicable taxes; Individual Subscriptions (outside Canada): $100.00 CDN (no taxes); Institutional Subscriptions (within Canada): $115.00 CDN plus applicable taxes; Institutional Subscriptions (outside Canada): $125.00 CDN (no taxes). To order subscriptions, please contact CACCN National Office, P.O. Box 25322, London, Ontario N6C 6B1 or caccn@caccn.ca

Article reprints: Electronic copies (PDF) of articles appearing in the *Canadian Journal of Critical Care Nursing* are available from the CACCN National Office, P.O. Box 25322, London, Ontario N6C 6B1, at a cost of $15 (plus HST, as applicable) per article. Back issues may be purchased for $30 (plus HST, as applicable, subject to availability. Back issues may be delivered electronically (PDF).

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
  - Respectful, healing and humane critical care environments
  - Combining compassion and technology to advocate and promote excellence
- Integrity and Honesty
  - Accountability and the courage to speak up for our beliefs
  - Promoting open and honest relationships

Pathways to success

1. **Leadership:**
   - Lead collaborative teams in critical care interprofessional initiatives
   - Develop, revise and evaluate CACCN Standards of Care and Position Statements
   - Develop a political advocacy plan

2. **Education:**
   - Provision of excellence in education
   - Advocate for critical care certification
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

The influence of simulation in predicting intent to stay, among critical care nurses

Sandra Goldsworthy, PhD, RN, CNCC(C), CMSN(C), CCSNE

Abstract

Aim: *This paper will present a study, which tested a theoretical Critical Care Nurse Retention model and mechanisms that may influence intent to stay in the organization, unit and nursing profession.*

Background: *The current international nursing shortage is worsening and is particularly acute in critical care settings. There is a rapidly aging nursing workforce and at the same time a significant shortfall in the number of new graduates to replace the large numbers of retiring nurses. Intensive care units have been shown to have the highest turnover rates and there is limited scientific evidence on how to retain critical care nurses. One of the most commonly listed incentives for nurses is organizational support in the form of access to educational opportunities and career development.*

Design: *A quasi-experimental longitudinal design was used in a random sample of 363 critical care nurses from multiple hospital sites in Ontario.*

Method: *The 374-hour intervention included an online component, high-fidelity simulation, and a preceptored clinical component.*

Data Analysis: *ANCOVA and hierarchical regression were used to analyze the hypothesized model.*

Results: *Findings showed the professional development intervention had a direct effect on intent to stay in the unit and intent to stay in the profession. Final analysis revealed that the model explained 23% of the variance in intent to stay in the profession.*

Conclusion: *This research provides new evidence supporting the relevance and importance of investing in professional development opportunities and its subsequent impact on intent to stay.*

Key words: simulation, education, professional development, intent to stay, quantitative

Goldsworthy, S. (2021). The influence of simulation in predicting intent to stay among critical care nurses. *The Canadian Journal of Critical Care Nursing, 32*(2), 5–13. DOI: 10.5737/23688653-322513

Implications for nurses

- Critical care has the highest turnover of all nursing units and there is a worsening nursing shortage internationally.
- The professional development intervention that included simulation, predicted nurses' intent to stay in the intensive care unit and intent to stay in the nursing profession.
- These findings can be used to develop strategies for stabilizing the nursing workforce in critical care.
- Findings from this study inform managers and educators about educational needs of nurses transitioning to critical care.
- The study demonstrates the impact of simulation as a retention strategy for critical care nurses.

Background

The nursing shortage

The COVID-19 pandemic has highlighted the critical shortages of healthcare workers and specifically the shortage of critical care nurses, as the number of cases dramatically increases daily. "If 30% of Ontarians fall ill with COVID-19, as projected by health officials, around 5% or 217,500 patients will end up in an intensive care bed" (Basky, 2020, p. E415). In the most recent pan-Canadian study that examined turnover among more than 8,000 nurses in acute care settings, it was found that critical care units reported the highest turnover of all acute settings that were measured (O'Brien-Pallas et al., 2010). There are many contributing factors to the nursing shortage including the following: the rapidly aging nursing workforce, the increased demand for health services due to increased aging of the population, and difficulties in recruiting and retaining sufficient nurses in the profession (Aiken et al., 2013) and factors such as manager and peer support in the nurse work environment (American Association of Critical Care Nurses [AACN], 2017). Compounding these factors, the COVID crisis has put tremendous strain on critical care nurses. Ms. Credland, Chair of the British Association of Critical Care Nurses, states that: "ICU nurses are physically and psychologically exhausted. Many are off sick with significant mental health issues due to their experiences of managing the first COVID-19 surge. They have seen death on a scale not experienced before. They have been unable to support families grieving for loved ones" (Credland, 2020).

The average age of a Canadian nurse is increasing and is currently 46.2 years (Statista, 2018). In Canada, in 2007 there was already a shortage of 11,000 full-time equivalent (FTE) registered nurses and it is projected that if no policy interventions are implemented there will be a shortfall of 60,000 FTE registered nurses by 2022 if this trend continues (Tomblin Murphy et al., 2009). Nurse retention is of great concern to organizations because of the costs associated with nurse turnover. Turnover costs include employee replacement, lost productivity and potential negative effects related to the provision of safe, quality care (Hayes et al., 2012). Indirect costs of turnover also include a decrease in staff morale and group productivity (Hayes et al., 2006).

Critical care nursing

The critical care practice setting requires nurses to have specialized skills and knowledge and to be able to critically think rapidly in life-and-death situations. High-level cognitive and emotional

competencies are associated with the technical and relational dilemmas encountered daily in these settings. This environment can be very stressful, and nurses can be susceptible to high levels of job dissatisfaction. Given the complexity of the critical care setting and the high turnover rates in this area, there is an urgent need to examine factors associated with nurse retention. Currently there is limited scientific evidence on how to retain critical care nurses. Studies have shown that one of the most commonly listed incentives for this group of nurses is organizational support in the form of access to educational opportunities and career development (Abualrub & Al-Zaru, 2008; Ulrich et al., 2014).

Aim

The aim of this quasi-experimental, longitudinal study was to examine the influence of a professional development intervention that included high-fidelity simulation and asynchronous online learning modules on critical care nurses' intent to stay and the influence of other organizational factors on these relationships.

Nurse retention factors

There is empirical evidence to demonstrate that professional development and ongoing educational activities are highly valued by nurses and serve as a key motivator in relation to intent to stay and perceived organizational support (AACN, 2017; Bournes & Ferguson-Paré, 2007). In addition, professional development opportunities are linked to healthy work environments (AACN, 2017). Professional development and ongoing educational activities are highly valued by nurses and serve as a key motivator in relation to intent to stay and a signal that the organization values and recognizes them.

Professional development: Simulation research

Although nurses have indicated they value professional development opportunities at all career stages, no research has examined which method of educational delivery is the most effective in retaining nurses. An educational strategy that has been gaining traction within nursing over the last five to 10 years is the use of high-fidelity human simulators (Goldsworthy & Graham, 2013; Hardenberg et al., 2019). High-fidelity simulation mimics the practice setting and allows students to practice in a safe setting, where the repetition of skills can occur along with reflective debriefing, to deepen and possibly extend the learning that occurs during the simulation. A recent systematic review evaluated the use of simulation in undergraduate education (Foronda et al., 2013). In the 101 research papers that were examined, seven themes emerged from the synthesis of the research (Foronda et al., 2013). The themes included: *confidence/self-efficacy, satisfaction, skills/knowledge* and *anxiety/stress*. The researchers concluded that more robust simulation research is needed in nursing. In another recent systematic review that examined simulation-based learning in nursing education, a total of 12 studies were included in the final review (Cant & Cooper, 2010). The authors found that simulation improved knowledge/skill, critical thinking, and confidence among nurses. The research also showed that simulation may be advantageous over other teaching methods, depending on the context, method, and whether or not simulation best practices were followed. Examples of best practices in simulation include: curriculum-based scenarios, use of a three-step simulation process (briefing, simulation, and debriefing), and preparation of the physical environment that closely mimics the practice setting (International Nursing Association for Clinical Simulation and Learning, 2016).

A few studies have explored the impact of skills learned in simulation and how this transfers to the practice setting. A U.S. study of critical care nurses (N = 24, over 880 medication doses) compared a simulation intervention versus traditional lecture on medication error rates in critically ill patients and found significantly fewer medication errors occurred in the group that received the simulation intervention (Ford et al., 2010). Another U.S. study compared lecture with simulation among senior-level nursing students (N = 54) and found that neither teaching strategy was effective in isolation (White et al., 2013).

A small number of research studies on simulation have demonstrated increased clinical performance and self-efficacy in specific situations, such as among nursing students (N = 54) in caring for patients with distributive shock (White et al., 2013), registered nurses (N = 47) handling obstetrical emergencies such as eclampsia and pre-eclampsia (Christian & Krumweide, 2013), preparing nursing students (N = 120) for paediatric practice settings (Meyer, 2011), and decreasing medication administration errors among nursing students (N = 54) in acute medical surgical practice settings (Sears et al., 2010).

Simulation has been shown to positively impact competency among critical care nurses in emergency situations specifically related to focused assessments and interventions (Hardenberg et al., 2019).

The disengagement process

The decision to leave a workplace does not happen suddenly, but rather occurs by disengagement over a period of time. Studies have shown that when nurses consider leaving, the progression of disengagement happens in stages and usually includes intending to first leave the unit, then the organization and finally the nursing profession (Morrell, 2005). O'Brien-Pallas and colleagues (2010) conducted a large pan-Canadian turnover study and found that the majority of nurses leaving their positions did so within six months of making that decision. Primary reasons for leaving were poor working relationships with managers, lack of autonomy, workload and lack of support for professional development activities (O'Brien-Pallas et al., 2010).

Intent-to-stay models

Three models of intent to stay have informed the development of the model being tested in the current research. The first model is Price and Mueller's (1981) and Price (2000) *Causal Model of Turnover*; the second is Boyle et al.'s (1999) *Critical Care Nurse Intent to Stay Framework*; and the third is Cowden and Cummings' (2012) *Theoretical Framework of Clinical Nurses' Intent to Stay* model. The dependent variable, intent to stay, was the focus of all three frameworks. These three different conceptual models were used to illustrate the hypothesized relationship between organizational characteristics, individual characteristics, and the work environment. The historical context has been important in developing the intent-to-stay models and reflects cycles of nursing shortages including the current context and the sustained shortage. The new

model tested in this study, the *Critical Care Nurse Retention Model,* focuses on similar elements found in Boyle's (1999) and Cowden and Cummings' (2012) intent-to-stay models (see Figure 1). New concepts were added to the current model that have not yet been explored in the nursing literature. These include professional development, perceived organizational support, transfer of learning, general self-efficacy, and critical care self-efficacy. The elements that were similar to previous models included: work environment characteristics (i.e., manager leadership style and support, staffing resources, and workload) and individual nurse characteristics (i.e., age, tenure, and education level).

Research hypotheses

This paper will focus on the two research hypotheses that had significant results from the larger study.

Research hypothesis 1. There will be a significant difference in critical care nurses' intent to stay (unit, organization, and profession) for nurses who receive the professional development intervention (simulation, online learning and preceptorship).

Research hypothesis 2. Perceived organizational support will mediate the relationship between the professional development intervention (simulation, online learning, and preceptorship) and intent to stay among critical care nurses.

Design

This study used a quasi-experimental design to test the effects of a professional development intervention on critical care nurses' intent to stay. It also tested the *Critical Care Nurse Retention Model*.

Participants

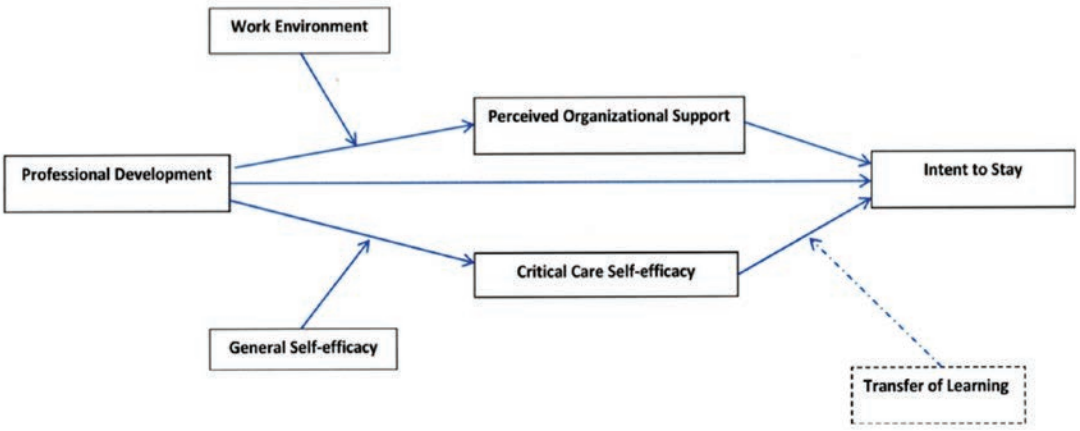
A total of 363 participants were recruited for the study (comparison group $n = 181$, treatment group $n = 182$). The comparison group was composed of critical care registered nurses recruited from the College of Nurses of Ontario registry, while the treatment group was recruited from a college critical care certificate program in Ontario. Participants included a convenience sample of critical care nurses who had attended a professional development program that consisted of simulation and practicum components, and a comparison group that consisted of a random sample of critical nurses obtained from the professional licensure registry in the same province (see Table 1).

Table 1. Description of Sample at Time 1

Characteristic	Treatment Group ($n = 182$)	Comparison Group ($n = 181$)
	f (%)	f (%)
Age (years) *M(SD)*	29(*SD* = 8)	45(*SD* = 10)
Gender		
Male	23(13%)	11(6%)
Female	159(87%)	166(94%)
Highest Nursing Education		
Diploma	13(7%)	95(54%)
Baccalaureate	165(91%)	75(42%)
Masters	4(2%)	7(4%)
Certificates/ Certifications		
CNCC	0	20(9%)
Critical Care Certificate	0	107(59%)
Employment Status		
Full Time	128(70%)	105(59%)
Part Time	50(28%)	65(37%)
Type of Hospital		
Teaching	93(51%)	57(31%)
Community	84(46%)	101(56%)
Small	4(2%)	24(13%)

Note. CNCC = Certified Nurse Critical Care (national certification)

Figure 1. The Critical Care Nurse Retention Model



Data collection

Data were collected at four time points in the treatment group and two time points in the comparison group. In the treatment group, data collection time points included: Time 1 (prior to the simulation portion of the intervention), Time 2 (two weeks after Time 1 – post-simulation), Time 3 (three months after Time 2 – at the end of the practicum portion of the intervention) and Time 4 (6-8 months after Time 3 dependent on practicum completion time). In the comparison group, data collection for Time 1 aligned with Time 1 data collection in the treatment group and Time 4 aligned with Time 4 data collection in the treatment group.

Method

Measures

Three established scales, two adapted scales and one researcher-developed scale were used in this study in addition to researcher-generated questions. The established instruments that were utilized in this study included the Survey of POS (SPOS; Eisenberger et al., 1986), the Practice Environment Scale of the Nurse Work Index (PES-NWI; Lake, 2002) and the General Self-efficacy Scale (GSE; Schwarzer & Jerusalem, 1995). One adapted measure was used in this study: the Kim et al. (1996) Intent to Stay scale. In addition, there was a researcher-developed measure, the Critical Care Nursing Self-efficacy (CCSE) Scale based on Bandura's guide to developing domain specific self-efficacy measures (Bandura, 2006). After receiving ethics approval, the CCSE scale was piloted with 25 critical care nursing students enrolled in the critical care e-learning program to assess its internal consistency. The Cronbach's alpha for the Critical Care Self-efficacy Scale was 0.83.

Validity/reliability

All study measures showed good internal consistency with alpha coefficients greater than .79 with the exception of intent to stay in the organization (treatment group, α = .66), intent to stay in the profession (treatment group, α = .78 and comparison group, α = .68). The highest Cronbach's alphas were demonstrated with the work environment measure (PES-NWI, α = .90, treatment group and α = .92 comparison group), POS (α = .85, treatment group and α = .91, comparison group) and CCSE (α =.85 treatment group and α = .91, comparison group). Cronbach's alphas for all measures (at Time 1) are displayed in Table 2.

Professional development intervention

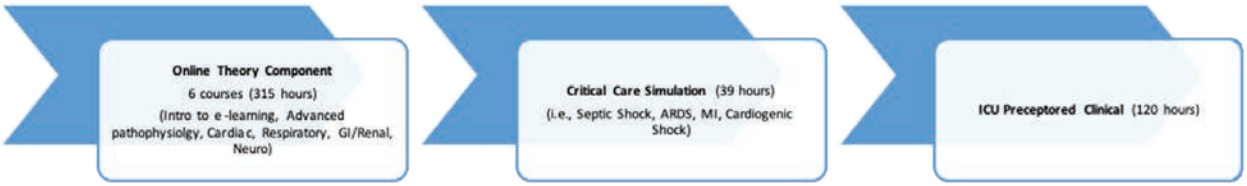
The professional development intervention was a 324-hour self-paced, critical care certificate program offered over a maximum of a one-year period (see Figure 2). The program included three components: a) six instructor-facilitated asynchronous online learning modules offered in an asynchronous format; b) an onsite instructor-facilitated, 39-hour, high-fidelity simulation course held over two weekends; and c) a preceptored practicum over ten 12-hour shifts in an adult critical care unit. This professional development intervention is intended to prepare registered nurses for the critical care practice setting. The program curriculum is standardized and has been delivered for five years with a consistent faculty team. Traditional models of

Table 2. Hierarchical Regression Analysis Results for Variables Predicting Intent to Stay in the Profession at Time 4 (N = 138)

	B	SE B	β	CI (95%)	R^2	Change in R^2
Model 1:						
ITSprofT_1	-.06	.13	-.04	-.31, .19	.00	.00
Model 2:						
ITSprofT_1	-.04	.12	-.03	-.28, .21	.08	.08
Education	1.85	.55	.28***	.77, 2.93		
Model 3:						
ITSprof T_1	-.02	.12	-.01	-.25, .21	.18	.10
Education	.85	.57	.13	-.28, 1.8		
Intervention	2.41	.58	.36***	1.25, 3.57		
Model 4:						
ITSprof T_1	-.02	.12	-.01	.25, .21		
Education	.84	.57	.13	0.29, 1.8	.18	.00
Intervention	2.45	.61	.36***	1.24, 3.64		
WE T_4	-.00	.03	-.01	-.05, .05		
Model 5:						
ITSprof T_1	.00	.11	.00	-.22, 23		
Education	.88	.56	-.23, 2.00	.22	.04	
Intervention	1.99	.62	.30***	.76, 3.22		
WE T_4	-.02	.03	-.05	-.07, .03		
POS T_4	.10	.04	.21**	.02, .18		
Model 6:						
ITSprof T_1	.02	.12	.11	-.21, .24		
Education	.86	.56	.13	-.26, 1.98	.23	.01
Intervention	1.85	.64	.28***	.59, 3.12		
WE T_4	-.02	.03	-.05	-.-7, 3.12		
POS T_4	.10	.04	.21**	.02, .18		
GSE T_1	-.06	.07	-.07	-.20, .08		
Model 7:						
ITSprof T_1	.02	.12	.01	-.21, 25		
Education	.86	.57	.13	-.27, 1.99	.23	.00
Intervention	1.85	.66	.28**	.55, 3.16		
WE T_4	-.02	.03	-.05	-.07, .04		
POS T_4	.10	.04	.21**	.02, .18		
GSE T_1	-.06	.07	-.07	-.20, .08		
CCSE T_4	-1.77	.00	.00	-.01, .01		

Note. WE = work environment, POS = perceived organizational support, GSE = General Self-efficacy, CCSE = Critical Care Self-efficacy, ITSprof = intent to stay in the profession, β = standardized beta coefficient; R_2 = .23, Model 3: F (1, 133) = 16.98, CI (95%) = 95% confidence intervals. *p < .05, ** p < .01, ***p < .001.

Figure 2. The Professional Development Simulation Intervention



critical care training for nurses entering critical care include a condensed classroom format to deliver theory followed by a practicum course. The professional development program is unique compared to traditional critical care training models since it is comprised of three discrete training modalities, with a distinct sequencing model of interactive online learning followed by an intensive simulation laboratory course and finally a practicum component.

The Simulation Intervention Component

The simulation component of the intervention was comprised of 39 hours of simulated critical care cases conducted within the simulation lab. Participation in the cases included three preparation stations that included arrhythmia/12 lead ECG interpretation, management of mechanical ventilation and hemodynamic monitoring management (i.e., arterial lines and pulmonary artery catheters). Following the preparation stations, each student participated in nine critical care cases, which consisted of patients experiencing: respiratory distress/acute respiratory failure, septic shock, hypovolemic shock, myocardial infarction, abdominal aortic aneurysm repair (AAA), hemodynamic instability, end of life (mock family conference), acute renal failure and head injury/trauma.

Each case was delivered via a pre-determined template that included learning objectives, pre-test questions, an initial patient phase, an evolving patient phase and a conclusion phase. The case was followed by guided debriefing and post-test questions. The duration of each case was 60 minutes and included 10 minutes for pre-brief and review of the learning objectives, a 20-minute case and 30 minutes for debriefing and a post-quiz.

All eight instructors were registered nurses with greater than 25 years each of critical care practice experience. Each of the instructors had mentored with the core critical care simulation team prior to independently running simulation cases. The evaluation and testing of the students was completed by instructors via competency-based checklists that were created by a team of critical care experts and had been trialed over a five-year period prior to being used in the study.

Ethical considerations

Study approval was obtained from the University of British Columbia Behavioural Research Ethics Board and the Durham College Research Ethics Board.

Data analysis

The main analytic strategies used were one-way analysis of covariance (ANCOVA) and hierarchical multiple regression. One-way ANCOVA analyses were used to compare the effectiveness of the professional development intervention in relation to intent to stay in the organization, the unit and the profession. Hierarchical multiple regression analyses were used to assess the direct effects of the professional development intervention on intent to stay, controlling for intent to stay at Time 1, participants' demographic characteristics (i.e., age, education and employment status), and other key variables in the *Critical Care Nurse Retention Model*. The PROCESS analysis was performed to test for mediating effects of perceived organizational support on the relationship between the professional development intervention and intent to stay. In addition, the test was repeated to evaluate the mediating effects of critical care self-efficacy on the relationship between the professional development intervention and intent to stay.

Results

Research hypothesis 1

A one-way between-groups ANCOVA was conducted to compare the effectiveness of a professional development intervention that included high-fidelity simulation designed to increase critical care nurses' intent to stay in the unit, the organization and in the profession. The independent variable was the critical care program intervention and the dependent variable consisted of scores on the intent to stay in the organization, unit and profession scales eight months after the intervention was completed.

Intent to stay in the organization.

After controlling for intent to stay at Time 1 (pre-simulation and pre-practicum), there was no significant difference between the intervention group and the control group on post-intervention scores on the intent to stay in the organization scale F (1,138) = .91, p = .34, partial eta squared = .01.

Intent to stay in the unit.

After controlling for intent to stay in the unit at Time 1 (pre-simulation and pre-practicum), there was a significant difference found between groups with the intervention group having higher scores than the comparison group on post-intervention scores on the intent to stay in the unit scale F (1,138) = . 5.76, p = .02, partial eta squared = .04 (see Table 3).

Table 3. Intent to Stay in the Unit: Differences between Groups						
Source	SS	df	MS	F	*p*	Partial eta squared
ITSunitT_1	.14	1	.14	.01	.92	.00
Group	81.02	1	81.02	5.76	.02*	.04
Error	1941.78	138	14.07			
Note. ITSunit = intent to stay in the unit, T_1 = Time 1, R^2 = .04 *p < .05						

Table 4. Intent to Stay in the Profession: Differences between Groups						
Source	SS	df	MS	F	*p*	Partial eta squared
ITSprofT1	1.09	1	1.09	.11	.74	.00
Group	268.63	1	268.63	28.04	.00	.17
Error	1312.69	137	9.58			
Note. ITSprof = intent to stay in the profession, T_1 = Time 1, R^2 = .17 *p < .05, ** p < .01, ***p < .001.						

Intent to stay in the profession.
After controlling for intent to stay in the profession at Time 1 (pre-simulation and pre-practicum), there was a significant difference found between groups with the intervention group having higher scores than the comparison group on post-intervention scores on the intent to stay in the profession scale F (1,137) = 28.04, p = .00, partial eta squared = .17 (see Table 4).

Research hypothesis 2
The professional development intervention was entered as the independent variable, POS was entered as the mediator variable and intent to stay in the profession at Time 1 was entered in each analysis as the covariate. The total effect and the direct effect were significant in predicting the relationship between the professional development intervention and intent to stay in the profession. The indirect effect, or effect of POS in mediating the relationship between the professional development intervention and intent to stay in the profession was significant (indirect effect = .46, 95% *CI* .09, .97), therefore the hypothesis that POS will mediate the relationship between the professional development intervention and intent to stay in the profession among critical care nurses was supported.

Results summary
Through the use of ANCOVA, after adjusting for intent to stay Time 1 scores, significant differences were found between groups on the intent to stay in the unit and intent to stay in the profession (Tables 3 and 4, respectively) scores. No significant difference was found between groups for intent to stay in the organization. Furthermore, through the use of hierarchical regression, it was found that the total model was responsible for 8% of the variance in intent to stay in the unit and 23% of the variance in intent to stay in the profession. The hierarchical regression analyses did not show statistically significant results for the intervention on intent to stay in the organization in this study sample. Therefore, the hypothesis was supported for two of the intent to stay outcomes (unit and profession).

Discussion
The primary purpose of this study was to examine the influence of a professional development intervention that included simulation and online learning on critical care nurses' intent to stay, the mechanisms of effect, and the influence of other organizational factors on these relationships in comparison to critical care nurses who did not receive the intervention.

Theoretical model implications
In this study, a new model of intent to stay for critical care nurses was tested, based on the literature evidence described above. The current *Critical Care Nursing Retention Model* tested in this study adds to the previous intent to stay models by demonstrating the impact of professional development and perceived organizational support on intent to stay. Another addition to this model is the mediating effect of critical care self-efficacy between professional development and intent to stay.

Implications for education, practice, research and policy
The findings from this study suggest that investment in professional development opportunities may motivate nurses to stay in their units and in the profession. Careful consideration needs to be given to investing not only in new nurses' educational needs as they transition into the unit, but also to experienced nurses' need for professional development. Educational opportunities are important at all stages of a nurse's career (Lavoie-Tremblay et al., 2008). This study also made linkages

between the investment in professional development for nurses that includes high-fidelity simulation.

The decision to stay or leave is a gradual process often starting six months or longer in advance of actually leaving (Morell et al., 2005; O'Brien-Pallas et al., 2010). Professional development opportunities may provide an incentive or mechanism for recruitment, and they may also serve as a protective buffer against nurses' decisions to leave or retire—adding some stability to the current workforce where many nurses are reaching retirement age.

Nurses transitioning into a critical care specialty area typically require additional preparation beyond the undergraduate level. Historically, critical care programs are comprised of a classroom theoretical component followed by a preceptored practicum. In this study, the critical care program consisted of three discrete components: online, simulation and a preceptored practicum. Simulation training allows nurses to be evaluated prior to proceeding to the practice setting and provides an assessment of where additional training may be required. The results of this study suggest that professional development that includes simulation may be an effective strategy for increasing confidence, permitting nurses to practice in a 'safe' environment where no harm occurs to patients while learning new, high-risk competencies. These findings have implications for nurse educators in the creation and provision of effective training programs for nurses transitioning to critical care and also for existing staff in ICU. In planning professional development opportunities, nurse educators need to give attention to competencies nurses report they are the least confident in and consider designing orientations and critical care programs that will enhance practice opportunities by providing intensive case-based simulation scenarios. Simulation provides opportunity for practice with skills not frequently seen in the ICU (high-risk/low-frequency skills). The findings suggest that attention needs to be given to the ongoing learning needs of not only nurses new to critical care, but also to experienced ICU nurses and consideration given to professional development opportunities in this group, as well. Other implications for nurse educators include the notion of creating an environment conducive to transfer of learning. Creating a positive transfer climate includes factors such as: opportunity to practice and apply new skills, manager and peer support, encouragement and adequate resources (Noe, 2006). The findings in this study suggest that professional development opportunities should be provided to all ICU nurses on an ongoing basis and that consideration to the most effective educational strategy (i.e., simulation) is made prior to program delivery.

Next steps in understanding the effects of professional development among nurses and intent to stay include validating findings in larger samples with a broader pan-Canadian or broader international sample of critical care nurses. The Critical Care Nurse Retention Model could also be replicated in other nursing specialty areas such as emergency or oncology and also within the general nursing population. Further research could follow nurses beyond the first 18 months of their tenure in ICU to determine whether the results are sustained over time. In addition, newer emerging simulation technologies such as virtual simulation or a hybrid approach of combining high-fidelity simulation and virtual simulation could be explored in relation to which method is the most effective at retaining nurses, increasing self-efficacy and the ability to transfer or apply the learning into the practice setting.

The hypothesis that transfer of learning will moderate the relationship between critical care self-efficacy and intent to stay among critical care nurses was not supported in this study. Literature has shown that to promote transfer of learning, employees require specific conditions in the immediate work environment that promote transfer of learning such as: manager support, adequacy of resources, and opportunity to practice skills. One possible explanation is that nurses in the treatment group had not worked in ICU for long enough to impact the relationship between these variables at Time 1. At Time 4, through attrition in the sample over time, the sample size may not have been large enough to detect a relationship in this sample. In addition, the work conditions may not have been conducive to transfer in this sample, therefore impacting the results. Further study is needed with a larger ICU sample population to further explore the impact of critical care self-efficacy and transfer of learning on intent to stay. Further exploration of the relationships between general self-efficacy, critical care self-efficacy and transfer of learning since this study was the first to begin to examine this relationship. Future research could examine which elements of a favourable work environment promote an optimal climate that enhances transfer of learning.

In order to invest in front-line nursing staff in the ICU, sustainable, protected funding must be made available so that effective education programs can be provided utilizing strategies such as simulation to increase confidence and competence and the ability to transfer learning into the practice environment for nurses at all phases of their careers. This funding needs to be protected, consistently administered at regular intervals that coincide with hospital hiring cycles and with advance notice to allow for human resource planning. It is recommended that consideration for an increase in the critical care training funding be advocated for to meet the high turnover needs in ICUs and to assist in stabilizing the nursing workforce in this area. Funding could be made contingent on nurse outcomes such as retention over time and the development of partnerships between educational institutions that house well-developed simulation education resources and hospitals. This study showed that professional development was related to intent to stay in the profession. If a nurse leaves the profession altogether, this could have serious implications for the worsening nursing shortage.

The importance of sustainable funding for ongoing critical care training cannot be understated. If cuts are made to training funding for critical care nurses this could negatively impact intent to stay of nurses in critical care. In the short term, cost cutting may seem efficient. However, longer term outcomes must be considered such as organizational costs, productivity costs, patient safety and further destabilization of the critical care workforce where turnover is currently the highest across Canada.

Limitations

There were several limitations to this study that must be considered. The first limitation was attrition rates at each subsequent timeframe of data collection. The attrition could have impacted the non-significant findings in this study. Data were collected via mail and in person. Mail response rates were low (29-33%) despite use of the Dillman (2000) method and offered incentives. In contrast, in person recruitment yielded 98-100% response rates. More research is needed in this area with larger ICU sample populations.

Another limitation to the study could have been the potential for the introduction of measurement bias or common method variance through the use of self-report survey. Several procedural remedies were implemented in this study to mitigate the potential influence of common method variance and included: balancing positive and negative scale items, avoiding ambiguity of scale items, use of valid and reliable measures, eliminating common scale properties by the use of different scale formats and varying anchor points (Podsakoff et al., 2012). Even with precautions being taken to limit the possibility of common method variance, it still must be considered when interpreting the results. Future research is needed with larger sample sizes and a wider geographical area to overcome limitations and validate the generalizability of the results from this study.

Conclusion

This research provides new evidence supporting the relevance and importance of investing in professional development opportunities and its subsequent impact on intent to stay. This study highlights the importance of professional development as a motivator and incentive for nurses to feel valued and continue to stay in the ICU and in the nursing profession. The results of this study further advocate for policies that enable implementation of strategies such as the provision of ongoing professional development opportunities and training for nurses transitioning into critical care. In addition, this study also suggests that an intervention that includes simulation may be a key educational strategy to increase confidence of nurses as they develop competency in critical care and transition into the critical care practice setting.

Author notes

Sandra Goldsworthy, PhD, RN, CNCC(C), CMSN(C), CCSNE

***Address for Correspondence**: Sandra Goldsworthy, PhD, RN, CNCC(C), CMSN(C), CCSNE, Associate Professor, School of Nursing, Nipissing University, North Bay, ON*

Email: Sandrag@nipissingu.ca

***Conflict of Interest:** No conflicts of interest expressed.*

***Acknowledgements:** The author would like to acknowledge Drs. Maura MacPhee and Susan Dahinten, School of Nursing, University of British Columbia for their supervisory support for this dissertation work.*

REFERENCES

Abualrub, R., & Al-Zaru, M. (2008). Job stress, recognition, job performance and intention to stay at work among Jordanian hospital nurses. *Journal of Nursing Management, 16*(3), 227-236. https://doi.org/10.1111/j.1365-2834.2007.00810.x.

Aiken, L., Sloane, D., Bruyneel, L., VandenHeede, K., & Sermeus, W. (2013). Nurses' reports of working conditions and hospital quality of care in 12 countries in Europe. *International Journal of Nursing Studies, 50*(2), 143-153. https://doi.org/10.1016/j.ijnurstu.2012.11.009

American Association of Critical Care Nurses (2017). *Standards for establishing and sustaining healthy work environments* (2nd ed) https://www.aacn.org/nursing-excellence/standards/aacn-standards-for-establishing-and-sustaining-healthy-work-environments

Bandura, A. (2006). Guide for constructing self-efficacy scales. In F. Pajares & T. Urdan (Eds.). Self-efficacy beliefs of adolescents, (Vol. 5., pp. 307-337). Greenwich, CT: Information Age Publishing.

Basky, G. (2020). All hands on deck as cases of COVID-19 surge. *CMAJ, 192*(15), E415-E416. https://doi.org/10.1503/cmaj.1095859

Bournes, D., & Ferguson-Paré, M. (2007). Human becoming and 80/20: An innovative professional development model for nurses. *Nursing Science Quarterly, 20*(3), 237-253. https://doi.org/10.1177/0894318407303126

Boyle, D., Bott, M., Hansen, H., Woods, C., & Taunton, R. (1999). Manager's leadership style and critical care nurses' intent to stay. *American Journal of Critical Care, 8*(6), 361-371. PMID: 10553177.

Cant, R., & Cooper S. (2017). Use of simulation-based learning in undergraduate nurse education: An umbrella systematic review. *Nurse Education Today, 49*, 63-71. https://doi.org/10.1016/j.nedt.2016.11.015.

Christian, A., & Krumwiede, N. (2013, September). Simulation enhances self-efficacy in the management of preeclampsia and eclampsia in obstetrical staff nurses. *Clinical Simulation in Nursing*, *9*(9), e369-e377. https://doi.org/10.1016/j.ecns.2012.05.006

Cowden, T., & Cummings, G. (2012). Nursing theory and concept development: A theoretical model of clinical nurses' intentions to stay in their current positions. *Journal of Advanced Nursing, 68*(7), 1646-1657. https://doi.org/10.1111/j.1365-2648.2011.05927.x

Credland, N. (2020). Why the ICU nursing shortage can no longer be ignored. *Nursing Standard*. https://rcni.com/nursing-standard/opinion/why-icu-nursing-shortage-can-be-ignored-no-longer-167891

Dillman, D. (2000). *Mail and Internet surveys: The tailored design method, 2nd ed.* John Wiley and Sons.

Eisenberger, R., Huntington, R., Hutchison, S., & Sowa, D. (1986). Perceived organizational support. *Journal of Applied Psychology, 71*(13), 500-507. https://doi.org/10.1037/0021-9010.71.3.500

Ford, D., Smithburger, L., Kobulinsky, L., Samosky, J., & Kane-Gill, S. (2010). Impact of simulation-based learning on medication error reduction rates in critically ill patients. *Intensive Care Medicine*, *36*(9), 1526-1531. https://doi.org/10.1007/s00134-010-1860-2

Foronda, C., Gattamorta, K., Snowden, K., & Bauman, E. (2013). Use of virtual

clinical simulation to improve communication skills of baccalaureate nursing students: A pilot study. *Nurse Education Today,* 34(6), e53-e57. https://doi.org/10.1016/j.nedt.2013.10.007

Goldsworthy, S., & Graham, L. (2013). *Simulation simplified: A handbook for nurse educators.* Lippincott.

Hardenberg, J., Rana, I., & Tori, K. (2019, March). Simulation exposure improves clinical skills for postgraduate critical care nurses. *Clinical Simulation in Nursing, 28*, 39-45. https://doi.org/10.1016/ j.ecns.2018.12.007

Hayes, L., O'Brien-Pallas, L., Duffield, C., Shamian, J., Buchan, J., Hughes, F., Laschinger, H., North, N., & Stone, P. (2006). Nurse turnover: A literature review. *International Journal of Nursing Studies, 43*(2), 237-263. https://doi:10.1016/j.ijnurstu.2005.02.007

Hayes, L., O'Brien-Pallas, L., Duffield, C., Shamian, J., Buchan, J., Hughes, F., Laschinger, H., & North, N. (2012). Nurse turnover: A literature review-an update. *International Journal of Nursing Studies, 49,* 887-905. https://doi:10.1016/j.ijnurstu.2011.10.001

Heinen, M., van Achterberg, L., Schwendimann, R., Zander, B., Matthews, A., Kozka, M., Ensio, A., Sjetne I., Moreno Casbas, T., Ball J., & Schoonhoven, T. (2013). Nurses' intention to leave their profession: A cross sectional observational study in 10 European countries. *International Journal of Nursing Studies, 50*(2), 174-184. http://dx.doi.org/10.1016/j.ijnurstu.2012.09.019

International Nursing Association for Clinical Simulation and Learning (INACSL) (2016). *Standards of Best Practice: Simulation.* https://www.inacsl.org/i4a/pages/index.cfm?pageid=3407

Kim, S., Price, J., Mueller, C., & Watson, T. (1996). The determinants of career intent among physicians at a US Air Force hospital. *Human Relations, 49*(7), 947-976. https://doi.org/10:1177/001872679604900704

Lake, E. (2002). Development of the practice environment scale and the nurse work index. *Research in Nursing and Health, 25*(3), 176-188. https://doi.org/10.1002/nur.10032

Lavoie-Tremblay, M., O'Brien-Pallas, L., Gelinas, C., Desforges, N., & Marchionni, C. (2008). Addressing the turnover issue among new nurses from a generational viewpoint. *Journal of Nursing Management*, *16*, 724-733. https://doi.org/10.1111/j.1365-2934.2007.00828.x

Meyer, M. (2011). The effect of simulation on clinical performance: A junior nursing student clinical comparison study. *Simulation in Healthcare*, *6*(5), 269-277. https://doi.org/10.1097/SIH.0b013e318223a048

Morrell, K. (2005). Towards a typology of nursing turnover: The role of shocks in nurses' decision to leave. *Journal of Advanced Nursing, 49*(3), 315-322. https://doi.org/10.1111/j.1365-2648.2004.03290.x

Noe, R. (2006). *Employee training and development.* 4th ed. McGraw-Hill Irwin.

O'Brien-Pallas, L., Tomblin-Murphy, G., Shamian, J., Li., X., Hayes, L. (2010). Impact and determinants of nurse turnover: A pan-Canadian study. *The Journal of Nursing Management, 18*(8), 1073-1076. https://doi.org/10.1111/j.1365-2834.2010.01167.x

Podsakoff, P., Mackenzie, S., & Podsakoff, N. (2012). Sources of method bias in social science research and recommendations on how to control it. *Annual Review of Psychology,* 63, 539-569. https://doi.org/10.1146/annurev-psych-120710-100452

Price, J., & Mueller, C. (1981). *Professional turnover: The case of nurses.* Spectrum Publications.

Price, J. (2000). Reflections on the determinants of voluntary turnover. *International Journal of Manpower, 22*(7), 600-624. https://doi.org/10.1108/EUM0000000006233

Schwarzer, R., & Jerusalem, M. (1995). Generalized Self-Efficacy scale. In J. Weinman, S. Wright, & M. Johnston, *Measures in health psychology: A user's portfolio. Causal and control beliefs* (pp. 35-37). NFER-NELSON.

Sears, K., Goldsworthy, S., & Goodman, W. (2010). The relationship between simulation and medication safety. *Journal of Nursing Education*, *49*(1). 52-5. https://doi.org/10.3928/01484834-20090918-12

Statista. (2018). *Statistics Portal: Average age of Canadian RNs*. https://www.statista.com/statistics/497000/average-age-in-registered-nursing-canada-by-province/

Tomblin Murphy, G., Birch, S., Alder, S., Mackenzie, A., Lethbridge, L., Little, L., & Cook, A. (2009). *Tested solutions for eliminating Canada's registered nurse shortage.* Canadian Nurse's Association.

Ulrich, B., Lavendero, R., Hart, K., Woods, D., & Early, S. (2014). Critical care nurses' work environments 2013: A status report. *Critical Care Nurse*, *34*(4), 64-79. https://doi.org/10.4037/ccn2014731

White, A., Brannan, J., Long, J., & Kruszka, K. (2013). Comparison of instructional methods: Cognitive skills and confidence level. *Clinical Simulation in Nursing, 9*(10), e417-423. http://dx.doi.org/10.1016/j.ecns.2012.12.002

A call for standardized national guidelines on QT/QTc monitoring in Canada

By Kathleen Hutton, MA, and Darlene Hutton, MSN, RN

Abstract

Background: *With QT-prolonging drugs being trialed for the treatment of COVID-19, national health associations allude to the importance of proficient QT interval assessment. However, in Canada there is no policy in place that clearly identifies a single method for routine QT monitoring.*

Aim: *To demonstrate the need for a clear Canadian guideline for the measurement of the QT/QTc interval and to advocate for a standardized approach to education.*

Methods: *This paper uses a medical anthropological approach to scale this practice gap from the individual provider to the institutions that govern practice and education. Nurses and emergency medical personnel from hospitals across Canada were polled with questionnaires on their confidence and knowledge of assessing the QT/QTc interval. We seek to identify causes for the widespread lack of confidence that goes beyond the context of nursing and is interdisciplinary in nature.*

Findings: *Of the 292 participants who were polled, roughly 75% report measuring the QT interval. However, more than 50% of participants are not confident in their measurement. Although critical care nurses report the highest levels of confidence, the rate of correct answers amongst the whole of participants on knowledge-based questions is shockingly low (only nine percent attempted to provide a value for the QTc; 34% of those who were unsure of the normal QTc say they were not taught). Ninety percent of participants report they do not analyze the QTc, with critical care nurses accounting for 34% of participants.*

Conclusion: *The lack of consensus on a QTc formula and the absence of clear guidelines on this well-documented issue exacerbate the continued gap in practice observed in our findings. We urge leading organizations to create a national guideline that supports a standardized approach to QT/QTc measurement that can be taught to and used by not only critical care nurses, but everyone in healthcare who provides cardiac monitoring.*

Keywords: QT/QTc, Torsades de Pointes, QT prolonging medications, interdisciplinary healthcare, cardiac arrest

Hutton, K., & Hutton, D. (2021). A call for standardized national guidelines on QT/QTc monitoring in Canada. *The Canadian Journal of Critical Care Nursing, 32*(1), 14–19. DOI: 10.5737/23688653-3221419

Implications for nurses

- There is a lack of routine QT/QTc interval measurement by healthcare providers, despite its importance in preventing life-threatening dysrhythmias.
- Consistent education is required for training critical care nurses and other cardiac monitoring healthcare providers on QT/QTc interval measurement.
- A standardized Canadian guideline on how to measure QT/QTc for all healthcare providers is needed.

Introduction

A wide range of drugs are known to involve some risk for prolonging the QT interval, such as antiarrhythmics, antibiotics, antipsychotics, antidepressants, antimalarials, chemotherapeutics, non-sedating antihistamines, methadone and ondansetron (Al-Khatib et al., 2003; Singh et al., 2015; U.S. Food and Drug Administration, 2012; Woosley et al., 2019). Left untreated, QT prolongation can lead to a potentially fatal type of polymorphic ventricular tachycardia called Torsades de Pointes (TdP). With QT-prolonging drugs such as hydroxychloroquine and azithromycin being trialed for the treatment of COVID-19, there is an increased recognition of the importance of healthcare providers' proficiency at assessing the QT/QTc, as well as interpreting the 12-lead ECG (Roden et al., 2020; Simpson et al., 2020). However, several studies indicate that nurses, as well as physicians, are not confident in the routine monitoring of the QT/QTc (Al-Khatib et al., 2005; Postema et al., 2008; Sandau et al., 2015; Viskin et al., 2005).

To situate this study in the broader socio-political context, we turn to Lock and Scheper-Hughes (1996) who state that there are three interconnected levels on which the regulation of health practices unfolds: the individual body, the social body, and the body politic. In this study, we observe the intersections of the knowledge base of healthcare providers, the social working-unit that coordinates patient care and the institutions whose co-responsibility it is to set guidelines to regulate the practice of in-hospital cardiac care. While many teach about QT/QTc monitoring, and despite cardiac machines being available to assist in the interpretation of the QTc, there is a disconnect between the experts who seek to advance the viability of a universal QTc formula and the healthcare providers who require a viable, user-friendly approach to the consistent monitoring of the QT/QTc of individuals.

Background

Recognition of the lack of routine QT/QTc measurement is well-captured by Al-Khatib et al. (2005) in their study of 517 psychiatry and internal medicine physicians. Most of the surveyed physicians (57%) could not correctly measure the QT interval and could not identify medications and conditions that can prolong the QT interval. A study by Visken et al. (2005) finds that fewer than 25% of 902 general cardiologists and

non-cardiologists from 12 countries can identify the QT/QTc in two samples with prolonged QTc and two that had normal QTc. Furthermore, in a survey of 180 registered nurses (RNs) at various hospitals in Canada on the routine monitoring of the QT/QTc interval, Hutton (2008) finds that only 30% of RNs routinely measure the QT; 45% of RNs report measuring the QT/QTc interval sometimes and 25% never measure this interval. A lack of understanding how to measure the QT/QTc and not understanding why it must be measured are cited as the two most frequent reasons provided by participants for not measuring the QT/QTc interval (Hutton, 2008).

Despite the acknowledged need for improved education of physicians and nurses on the importance of the QT/QTc interval measurement, there has not been a measurable improvement in practice over this decade. Based on research by Sandau et al. (2015), the practice of routine QT/QTc monitoring appears even to be in decline. Sandau et al. (2015) demonstrate that only 17.3% of the 3,232 nurses participating in their study were able to appropriately measure the QTc.

Teaching about the QT interval is challenging because the interval changes according to heart rate, age, and sex (Giudicessi et al., 2020; Postema, 2014). Additionally, the phrase "the normal QT" is commonly mentioned in literature and professional discourse, yet numeric values are rarely articulated by experts. In this review of literature, we have found reports of an upper QT interval limit of 0.44 seconds (Goto et al., 2008; Postema et al., 2014). However, part of the reason why the phrase "normal QT" is confusing is because "a norm" can only be determined from QTs that have been corrected for the heart rate—the QTc. "Normal" refers to a statistical distribution where the norm is determined based on an individual's proximity to the mean of the population. However, to compare QT intervals at all requires their conversion into the QTc. For this reason, the "normal QT" is almost always discussed in terms of QTc values (Viskin, 2009).

A practical method that will prioritize the consistent quality of patient care is to teach that within less than half of the R-R interval in a normal sinus rhythm can be considered a normal QT, and in the case that the heart rate is too fast or too slow, the QTc would then need to be calculated (Giudicessi et al., 2020). Several studies of large populations (>10,000) demonstrate that the QTc values of a general population create a "normal" distribution from which the ranges of a normal QT interval can be determined (Viskin, 2009). According to Viskin (2009), the values for a normal QT are a QTc of 0.36-0.39 seconds for men and 0.37-0.40 seconds for women. This is an excellent reference. However, considering the QT interval in terms of the QTc is not always necessary, such as when healthcare providers work on a patient-to-patient basis, and the QT interval is first assessed relative to that patient alone.

Despite the evidence outlined by Viskin (2009), there is still discrepancy amongst experts on the upper limit of the normal QTc: Locati et al. (2017) and Porta-Sanchez et al. (2017) suggest 0.44 seconds for males and 0.46 seconds for females; the American Heart Association (AHA) notes 0.45 seconds for males and 0.46 seconds for females (Sandau et al., 2017); and Giudicessi et al. (2020) suggest 0.47 seconds for males and 0.48 seconds for females. Most experts agree that the risk of developing a life-threatening TdP increases once the QTc is ≥0.50 seconds or there is a change of >0.06 seconds from the patient's baseline (Postema et al., 2014; Sandau et al., 2015). The question of which formula to use to calculate the QTc creates additional issues. There are currently more than 20 formulae that can produce disagreeing results of an adjusted QT interval (Rabkin & Cheng, 2015; Sandau et al., 2017).

Health Canada (2010, p. 27) reports that "the acquisition, reading, and analysis of QT/QTc data are currently subjects of intensive discussion and research activity." In 2016, an update was provided with recommendations that "Fridericia's correction is likely to be appropriate in most situations, but other methods could be more appropriate" (Health Canada, 2016, p. 8). To further add to the complexity of QTc analysis, Rabkin and Cheng (2015, p. 2) report that, "while the formulae developed by Bazett and Fridericia (QTcBZT and QTcFRD, respectively) are most often used in clinical research, other formulae, specifically QTcDMT and QTcRTHa appear to be better to adjust QT for heart rate in clinical practice." These contradictions in recommendations and the confounding formulae further exacerbate the issue of low levels of QT/QTc assessment.

Evidence of the issues related to the absence of QT/QTc guidelines are articulated by Gollob (2020), who warns that in all 155 current studies underway for the treatment of COVID-19, only six have implemented ECG assessment as part of the study design. Gollob (2020, p. 3185) estimates that of the 85,000 research subjects, more than 3,400 asymptomatic, healthy research subjects will be at elevated risk of a drug-provoked cardiac event. Although the majority will survive unscathed, it can be certain that the absence of ECG screening and monitoring will result in the sudden death of previously healthy subjects during these studies.

In response to Gollob's statement, Viskin says, "it is not only inexplicable, but also inexcusable that clinical investigators would dare to include healthy individuals in a clinical trial involving QT-prolonging medications without bothering to screen their electrocardiogram" (Zoler, 2020, p. 1). The critical lack of valuation, as indicated by Gollob (2020) of the importance of ECG monitoring throughout these clinical trials demonstrates just how broadly pervasive the problem is surrounding routine QT/QTc monitoring practices.

Purpose

We seek to identify whether and if so, the extent to which there has been noticeable change in the QT/QTc measurement practices amongst cardiac monitoring healthcare providers in Canada in the decade since Hutton's 2008 study. Though it may not be the perfect or lasting solution, we argue that the long-term benefits to be gained from one nationwide guideline for QT/QTc practice are not mutually exclusive from the ongoing science to find a viable QTc formula, and that consensus can be made to satisfy effective QT/QTc education for healthcare practitioners.

Methodology

Design

The scope of this study was broadened from Hutton's 2008 research to include healthcare providers from emergency medical services (EMS) and nurses working in emergency, intensive care (ICU), coronary care (CCU), post-anesthetic care (PACU), operating room (OR), telemetry, psychiatry and private clinics. A quasi-experimental design was used to consider differences that may occur in QT monitoring practice from unit-to-unit and between new and experienced practitioners.

Sample

A questionnaire was handed out to more than 300 individuals and 292 were returned. Participant recruitment occurred at 16 hospitals across Canada in remote, rural, and urban locations.

Instruments

The questionnaire was written in plain language and was comprised of 10 questions regarding participants' knowledge of the QT interval and their practice, if any, in monitoring the QT/QTc. The work area and years of experience of participants were recorded. Sex/gender was not recorded.

Data collection

Data collection spanned from 2018 to 2019. The participants of this study were recruited during their participation in a range of cardiac educational courses. Course attendees were asked to complete the survey prior to the course discussion on the QT/QTc interval. The inclusion criteria for participating in this study was that participants currently work with and have some experience with cardiac monitoring or the 12-lead ECG. If attendees had no experience in cardiac monitoring, or if they did not want to participate, they were not given a survey. The educational courses had no pass-or-fail component and the attendees were not evaluated in any way. There was no incentive for participants to complete the survey and participation was anonymous.

Data analysis

Questionnaires from one location were kept together and each location folder was coded to keep hospital-identifying information anonymous during analysis. Results were inputted onto a spreadsheet and turned into tables. The results of each survey question were then separately analyzed and cross-tabulated to observe trends.

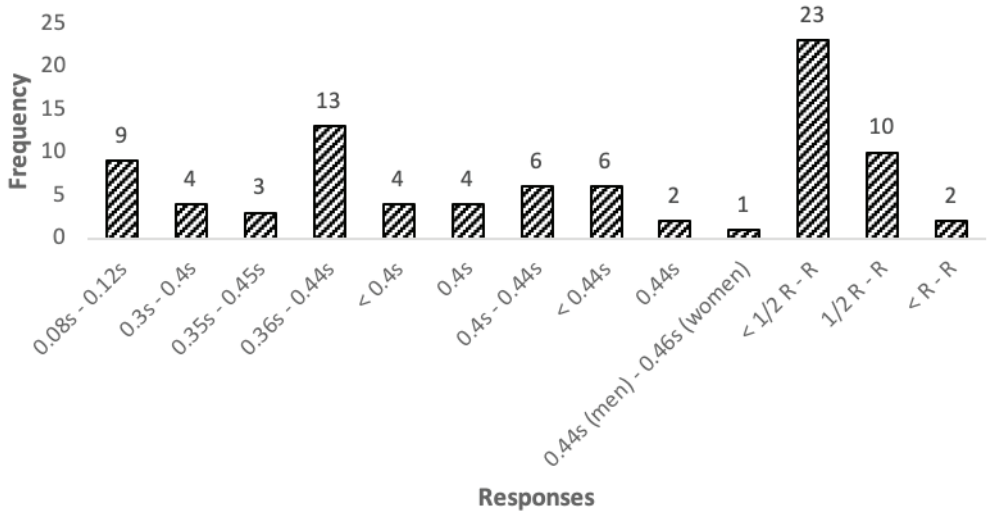
Findings

Nearly half (49%) of participants have been working in their current units for one to five years and approximately one quarter (25%) between five to 10 years. Most participants work in emergency (36.4%), followed by ICU (24.4%), telemetry (14.7%), CCU (9.7%), EMS (8.9%), PACU (3.1%), OR (1.2%), psychiatry (1.2%), and private clinics (0.4%).

Most participants (37.9%), when asked to choose one of four options, report that they include a QT interval measurement in their rhythm strip interpretation "all the time." Of the participants who report that they do not measure the QT interval (25.5%), the following reasons are indicated for not doing so: 32% state they have not been taught; 25.8% state that measurement is not always required; 24.7% state it is not their responsibility; and 17.5% state that they do not know how.

On a scale of four options from "not knowing how" to "very confident," most participants (41.9%) report that they are "not confident" in measuring the QT interval and 10.6% report they do not know how. Participants were also asked to provide the normal QT interval, with 54% responding that they were unsure. The responses of the 46% who did provide a value for the normal QT interval can be viewed in Figure 1. Most significantly, almost all participants (90%) report that they do not analyze the QTc. Furthermore, only 9% of participants attempt to provide a correct value for the normal QTc.

Figure 1. What is the Normal QT?



Discussion

No current Canadian national guidelines on the frequency of QT interval measurement can be found. The following national and provincial organizations were explored for a policy statement on QT/QTc assessment: Canadian Cardiovascular Society (2020); Registered Nurses Association of Ontario (2009 & 2020); Canadian Association of Critical Care Nurses (n.d.); Health Canada (2014); Institute for Safe Medication Practice Canada (2016; 2020); and Canadian Pharmacists Association (2020). More thorough QT/QTc monitoring guidelines by the American Heart Association (Sandau et al., 2017) recommend documentation of the QT/QTc is done at baseline and then, at least every 8–12 hours and with more frequency if QTc prolongation occurs during drug administration. Documentation of the QTc is also recommended before and after increases in dose of any medication affecting the QT interval (Sandau et al., 2017).

Of importance though, is that the AHA's recommendations suggest that the QTc is analyzed and documented only under certain conditions, which may contribute to the 24.7% of participants in our study who do not consider the measurement of the QT interval to be their responsibility. We recommend that all patients who are on a cardiac monitor regardless of medications or conditions have routine QT/QTc assessment and documentation.

We expected that ICU and CCU would have a higher rate of measuring the QT interval routinely, as was indicated in our findings, because these units oversee more unstable patients who may require medication that would potentially affect this interval. However, ICU and CCU are not the only units where QT prolonging medications are administered. The reasons why participants do not measure the QT interval suggest a lack of specific education initiatives that focus on QT/QTc awareness and measurement. A clear and direct national co-statement from leading organizations would establish the relevance for all healthcare providers of the routine measurement the QT/QTc and ensure a consistent educational program.

Awareness of QT interval

The wide range of results that participants provide for the scope of the normal QT interval (see Figure 1) may be due to the absence of available data in literature on the QT interval and the disparate modes used for teaching about the QT across the country. The lack of significance placed on assessing a QT interval in terms relative to a single patient and instead discussing the QT (QTc) in statistical terms in literature also impacts a basic foundation for education material. Of the 46% who provide a value for the normal QT, just over half (57%) cite a value that could be considered correct in relation to current literature. Of the 54% of participants who report they are unsure of the normal QT, 20% are nurses who work in critical care units (ICU and CCU). A possible strategy toward increasing QT interval awareness and monitoring routine is to discuss when a simple QT interval assessment alone would be appropriate and when the QTc should also be done.

Frequency of QTc measurement

Although we expected that there would be fewer participants who report measuring the QTc compared to the QT, it was surprising just how low this frequency was. There appears to be an inverse relationship between the abundance of literature on the QTc and general confidence in QTc assessment. Despite very few experts who cite a range for the normal QT, many participants were able to provide correct values, whereas only 10% of participants reported measuring the QTc at all despite the QTc being discussed very frequently in literature.

The lack of knowledge and confidence surrounding QTc measurement despite its widespread discourse indicates general confusion on this topic. Impressively, 91% of participants report they are unsure of the normal QTc values. Given that all governing authorities recommend the measurement of the QTc, this is clearly problematic.

The quality and efficacy of QT/QTc monitoring practices in Canada must be considered from the ground up: prioritizing the streamlining and ease of everyday practice as well as the topic's teachability. This will enable institutions and social work units of individuals to communicate and practice with a commonly recognized set of terms. Individual healthcare providers will subsequently benefit in their education and routine and the efficacy of care that patients will receive will increase.

Conclusion

With heightened awareness of potentially dangerous life-threatening rhythms in the era of COVID-19 therapies, many experts and authorities are stressing the importance of QT/QTc interval measurement. However, given the responses seen in this research along with previous studies that demonstrate similar findings, it is clear that national guidelines must express acceptance of one routine step-by-step approach in order for the consistent measurement of this interval to take place nationwide.

This approach includes acknowledgement that the QT, at the very least, needs to be assessed and documented when performing all rhythm and ECG analyses, not just in certain conditions and with certain medications. Less than half the R-R in a normal sinus rhythm will relate to a normal QTc and, given that most patients have a normal sinus rhythm, this method should be stressed as the first approach. In cases where the rhythm is other than sinus rhythm, for example, bradycardia, tachycardia, atrial fibrillation, and bundle branch blocks, the QTc must be measured. There are already numerous guidelines available on methods to measure the QTc: applying the formula manually after measuring with calipers; having the cardiac monitor compute the QTc; or, performing a 12-lead ECG to determine the QT/QTc (Guidicessi, 2020; Health Canada, 2010; Sandau et al., 2017; Visken, 2018). Also available to calculate the QTc are free reference apps, such as MDCALC.com. Though these options exist for measuring the QTc, there still lacks a guideline on which formula to use.

Many branches of health governance intersect surrounding QT/QTc measurement and this is why an interdisciplinary approach is so important. A solution to unite key stakeholders would be to invite representatives from all governing agencies and guiding organizations – for example, Health Canada, Canadian Pharmacists, Institute for Safe Medical Practice, Canadian Cardiovascular Society and Canadian Nurses

Association—to form a committee which can issue a QT/QTc measurement statement for all Canadian healthcare providers.

A unified statement on QT/QTc measurement would enable the development of consistent educational objectives across the domains of interrelated medical fields. Studies such as those by Pickham et al. (2019), Sandau et al. (2015) and Postema et al. (2008) demonstrate the efficacy of standardized education initiatives of nurses, as well as medical students surrounding the QT/QTc interval. The exploration of these studies is beyond the scope of this paper, but warrants attention from future research, as they outline how a single standard method works to affect a higher retention of practice.

Change must be enacted on all levels—not only at the individual basis of knowledge but also at the level of national policy to effect consistent embodied, institutional and cultural change.

The measurement of the QT/QTc interval should not be an assessment done only in certain conditions as suggested by the American Heart Association (2017), but rather, this interval must be included in the larger routine practice of all health care providers in all units who are monitoring patients' cardiac rhythm or conducting 12 Lead ECGs.

Author Notes

Kathleen Hutton, MA, Specialized in Medical Anthropology

Darlene Hutton, MSN, RN

Conflict of Interest: *Both authors express no conflicts of interest.*

Address for correspondence: *Kathleen Hutton, MA, email kathutton@protonmail.com*

REFERENCES

Al-Khatib, S., LaPointe, N., Kramer, J., & Califf, R. (2003). What clinicians should know about the QT interval. *Journal of the American Medical Association, 289*, 2120-212. https://doi.org/10.1001/jama.289.16.2120.

Al-Khatib, S., LaPointe N., Kramer J., Chen, A., Hammill, B., Delong, L., & Califf, R. (2005). A survey of healthcare practitioners' knowledge of the QT interval. *Journal of General Internal Medicine, 20,*392-396. doi:10.1111/j.1525-1497.2005.0101.x

Canadian Association of Critical Care Nurses. (n.d.). *Practice guidelines, position statements.* https://caccn.ca/publications/practice-guidelines-position-statements/

Canadian Cardiovascular Society. (2020). *Guidelines and position statements library*. https://www.ccs.ca/en/guidelines/guidelines-library

Canadian Pharmacist Association. (2020). *Practice tools and resources.* https://www.pharmacists.ca/education-practice-resources/patient-care/

Giudicessi, J., Noseworthy, P., Friedman, P., & Ackerman, M. (2020). Urgent guidance for navigating and circumventing the QTc-prolonging and torsadogenic potential of possible pharmacotherapies for Coronavirus disease 19 (COVID-19). *Mayo Clinic Proceedings, 95,* 1213-122. https://doi.org/10.1016/j.mayocp.2020.03.024.

Gollob, M. (2020). COVID-19, Clinical trials and QT-prolonging prophylactic therapy in health subjects: First, do no harm. *Journal of the American College of Cardiology, 75,* 3184-3186. https://doi.org/10.1016/j.jacc.2020.05.008.

Goto, H., Mamorita, N., Ikeda, N., & Miyahara, H. (2008). Estimation of the upper limit of the reference value of the QT interval in rest electrocardiograms in healthy young Japanese men using the bootstrap method. *Journal of Electrocardiology, 41,* 703.e1-703.e10. https://doi.org/10.1016/j.jelectrocard.2008.08.001

Health Canada. (2010). *Guide for the Analysis and Review of QT/QTc Interval Data.* https://www.canada.ca/en/health-canada/services/drugs-health-products/drug-products/applications-submissions/guidance-documents/interval-prolongation/guide-analysis-review-interval-data.html

Health Canada. (2014). *QT/QTc interval prolongation*. https://www.canada.ca /en/health-canada/services/drugs-health-products/drug-products/applications-submissions/guidance-documents/interval-prolongation.html

Health Canada. (2016). *Adoption of International Conference on Harmonization of Technical Requirements for the Registration of Pharmaceuticals for Human Use (ICH) guidance: E14 questions and answers (R3): The clinical evaluation of QT/QTc interval prolongation and proarrhythmic potential for non-antiarrhythmic drugs*. https://www.canada.ca/content/dam/hc-sc/migration/hc-sc/dhp-mps/alt_formats/pdf/prodpharma/applic-demande/guide-ld/ich/efficac/e14r3-qa-qr-step-4-etape-eng.pdf

Hutton, D. (2008). The importance of routine QT interval measurement in rhythm interpretation. *Canadian Association of Critical Care Nurses, 19*(3), 29-33.

Institute for Safe Medication Practice Canada (2016). A multi-incident analysis on QT prolongation in the community. *Pharmacy Connection. Fall*, 28-33. https://www.ismp-canada.org/download/PharmacyConnection/PC2016-QT-Prolongation.pdf

Institute for Safe Medication Practice. (2020). ISMP Canada/US Search. https://www.ismp-canada.org/gsearch.php?cx-=014500574205844645071%3Axt9s-neuil_a&cof=FORID%3A11&q=QT%2FQTc+interval&newwindow=1

Locati, E., Bagliani G, & Padeletti L. (2017). Normal ventricular repolarization and QT interval: Ionic background, modifiers, and measurements. *Cardiac Electrophysiology Clinics, 9*, 487-513. https://doi.org/10.1016/j.ccep.2017.05.007

Lock, M., & Scheper-Hughes, N. (1996). A critical interpretive approach in medical anthropology: Rituals and routines of discipline and dissent. In C. F. Sargent & T. M. Johnson (Eds.), *Medical Anthropology: Contemporary Theory and Method* (pp. 41-70). Praeger.

Pickham, D., Shinn, J., & Chan, G. (2019). Quasi-experimental study to improve nurses' QT interval monitoring: Results of QTIP study. *American Journal of Critical Care, 21,* 195–200. http://ajcc.aacnjournals.org/content/21/3/195.full.pdf+html?sid=188b50b9-e623-4990-9bb4-4742de558c03.

Porta-Sanchez, A., Gilbert, C., Spears, D., Amir, E., Chan, J., Nanthakumar, K., & Thavendiranathan, P. (2017). Incidence, diagnosis, and management of QT prolongation induced by cancer therapies: A systematic review. *Journal of the American Heart Association, 6*(12), e007724. https://doi.org/10.1161/JAHA.117.007724.

Postema, P., DeJong, J., Van der Bilt, I., & Wilde, A. (2008). Accurate elec-

trocardiographic assessment of the QT interval: Teach the tangent. *Heart Rhythm, 5,* 1015-1018.

Postema, P., & Wilde, A. (2014). The measurement of the QT interval. *Current Cardiology Reviews, 10,* 287–294. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4040880/.

Rabkin S & Chen, X., (2015). Nomenclature, categorization and usage of formulae to adjust QT interval for heart rate. *World Journal of Cardiology, 7,* 315–325.

Registered Nurses Association of Ontario (RNAO) (JULY 2009) *Best Practice Guideline for Supporting Clients on Methadone Maintenance Treatment.* https://rnao.ca/sites/rnao-ca/files/Supporting_Clients_on_Methadone_Maintenance_Treatment.pdf.

Registered Nurses Association of Ontario. (2020). *International affairs and best practice guidelines*. https://rnao.ca/bpg/guidelines.

Roden, D., Harrington, R., Poppas, A., & Russo, A. (2020) Considerations for drug interactions on QTc in exploratory COVID-19 treatment. *Circulation, 141,* e906-e907. https://www.ahajournals.org/doi/pdf/10.1161/CIRCULATIONAHA.120.047521

Sandau, K., Funk, M., Auerbach, A., Barsness, G., Blum, K., Cvach, M., Lampert, R., May, J., McDaniel, G., Perez, M., Sendelbach, S., Sommargren, C., & Wang, P. (2017). American Heart Association scientific statement. Update to practice standards for electrocardiographic monitoring in hospital settings. A scientific statement from the American Heart Association. *Circulation, 136,* e273–e344. https://www.ahajournals.org/doi/pdf/10.1161/CIR.0000000000000527

Sandau, K., Sendelbach, S., Fletcher, L., Frederickson, J., Drew, B., & Funk, M. (2015). Computer assisted interventions to improve QTc documentation in patients receiving QT-prolonging drugs. *American Journal of Critical Care, 24*(2), e6-e15. doi: 10.4037/ajcc2015240

Simpson, T., Kovaks, R., & Stecker, E. (2020). Ventricular arrhythmia risk due to hydroxychloroquine-azithromycin treatment for COVID-19. *American College of Cardiology.* https://www.acc.org/latest-in-cardiology/articles/2020/03/27/14/00 / ventricular-arrhythmia-risk-due-to-hydroxychloroquine-azithromycin-treatment-for-covid-19

Singh, C, P., Mittal, R., & Javed, A. (2015). Antipsychotic medication and QT prolongation. *Pakistan Journal of Medical Sciences, 31,*1269–1271. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4641296/

U.S. Department of Health and Human Services Food and Drug Administration Center for Drug Evaluation and Research (CDER) Center for Biologics Evaluation and Research (CBER) (2017). *E14 Clinical evaluation of QT/QTc interval prolongation and proarrhythmic potential for non-antiarrhythmic Drugs —questions and answers (R3). Guidance for industry. June 2017 ICH. Revision 2*. https://www.fda.gov/downloads/Drugs/GuidanceComplianceRegulatoryInformation/Guidances/UCM073161.pdf

U.S. Food and Drug Administration. (2012). *FDA Drug Safety Communication: Abnormal heart rhythms may be associated with use of Zofran (ondansetron)*. https://www.fda.gov/Drugs/DrugSafety/ucm271913.htm

U.S. Food and Drug Administration. (2005). *Guidance for industry. E14 clinical evaluation of QT/QTc interval prolongation and proarrhythmic potential for non-antiarrhythmic drugs.* https://www.fda.gov/ media/71372/download

Viskin, S. (2009). The QT interval: Too long, too short or just right. *Heart Rhythm, 6,*711-715. https://doi.org/10.1016/j.hrthm.2009.02.044

Viskin, S., Rosovski, R., Sands, A., Chen, E., Kistler, P., Kalman, J., Chavez, L., Torres, P., Cruz, F., Centurion, O., Fujiki, A., Maury, P., Chen, X., Krahn, A., Roithinger, F., Zhang, L., Vincent, G., & Zeltzer, D. (2005). Inaccurate electrocardiographic interpretation of long QT: the majority of physicians cannot recognize a long QT when they see one. *Heart Rhythm, 2,* 569-574. https://pubmed.ncbi.nlm.nih.gov/15922261/. https://doi.org/10.1016/j.hrthm.2005.02.011.

Woosley, R., Heise, C., & Romero, K. (2019). Overview of long QT syndrome and torsades de pointes. *Credible Meds, AZCERT, Inc.* https://www.crediblemeds.org/healthcare-providers/practicalapproach/

Zoler, M. (2020). Many hydroxychloroquine COVID-19 prophylaxis trials lack ECG screening. *Theheart.org.* https://www.medscape.com/viewarticle/930382

Rôle de l'infirmière lors de la prise en charge d'une personne ventilée aux soins intensifs : une revue narrative

Mylène Suzie Michaud, Inf., M.Sc.Inf., Ph.D(c), CSI(C), Marilou Gagnon, Inf., Ph.D., Jean Daniel Jacob, Inf., Ph.D., et Krystina B. Lewis, Inf., M.Sc.Inf., Ph.D.

Résumé

En pratique clinique, l'infirmière joue un rôle essentiel dans la prise en charge de la personne ventilée aux soins intensifs. Afin de mieux comprendre ce rôle, une revue narrative de la littérature a été effectuée en sciences infirmières et plus précisément, la littérature qui porte sur la prise en charge des personnes ventilées aux soins intensifs. Une recherche des bases de données MEDLINE, Nursing & Allied Health Database, CINAHL et PsycINFO a généré 1107 écrits. Après avoir appliqué nos critères de sélection, un total de 45 écrits ont été sélectionnés et analysés. Nos résultats suggèrent que la gestion de l'anxiété, l'agitation, la douleur, la dyspnée, l'hygiène, le sommeil et l'environnement font partie intégrante du rôle de l'infirmière vis-à-vis de la prise en charge d'une personne ventilée aux soins intensifs. L'infirmière est également le lien de communication entre la personne ventilée, les membres de sa famille et l'équipe de soins. Toutefois, l'infirmière rencontre plusieurs obstacles lorsqu'elle prend en charge une personne ventilée, notamment le manque de connaissances, de ressources, de temps, de collaboration et d'autonomie. D'autres recherches sont nécessaires afin de relever les nombreux obstacles auxquels les infirmières sont confrontées et d'identifier des pistes de solutions au plan clinique.

Mots clés : ventilation mécanique, unité des soins intensifs, infirmière, rôle, prise en charge, mechanical ventilation, intensive care unit, nurse, role, management

Michaud, M. S., Gagnon, M., Jacob, J. D., Lewis, K. B. (2021). Rôle de l'infirmière lors de la prise en charge d'une personne ventilée aux soins intensifs : une revue narrative. *The Canadian Journal of Critical Care Nursing, 32*(1), 20–26. DOI: 10.5737/23688653-32220

Implications infirmières

- La gestion de l'anxiété, l'agitation, la douleur, la dyspnée, le sommeil, l'hygiène et l'environnement font partie intégrante du rôle de l'infirmière vis-à-vis de la prise en charge d'une personne ventilée aux soins intensifs.
- L'infirmière joue un rôle important pour maintenir un lien de communication entre la personne ventilée, les membres de sa famille et l'équipe de soins.
- Les diverses barrières auxquelles l'infirmière fait face dans la prestation des soins à la personne ventilée affectent la qualité des soins et limitent la relation infirmière-soignée.
- Une approche globale des soins à la personne ventilée, une meilleure distribution des ressources infirmières, l'exercice de la pleine étendue du champ de pratique de l'infirmière et une formation continue pourraient contribuer à améliorer la prise en charge des personnes ventilées aux soins intensifs.
- D'autres recherches qui portent sur la prise en charge des personnes ventilées aux soins intensifs sont nécessaires afin de relever les nombreux défis auxquels les infirmières sont confrontées et d'identifier des pistes de solutions au plan clinique.

Introduction

À l'unité des soins intensifs (USI), la ventilation mécanique est une intervention complexe qui permet de traiter non seulement une insuffisance respiratoire, mais aussi d'autres problématiques de santé au niveau du système respiratoire, cardiovasculaire, neurologique ou musculo-squelettique (Lewis et al., 2019). Le nombre de personnes ventilées ne cesse d'augmenter vu le vieillissement de la population, la complexité des comorbidités et la difficulté grandissante à gérer les maladies chroniques (Institut Canadien d'Information sur la Santé [ICIS], 2016). Au Canada, 33 % de la population des soins intensifs nécessite comme traitement la ventilation mécanique, ce qui représentait 65 927 personnes ventilées en 2013-2014, soit une hausse de 5 % par rapport à l'an 2007-2008 (ICIS, 2016). Bien que la plupart des aspects techniques de la gestion et du sevrage du respirateur relèvent de la responsabilité du thérapeute respiratoire (Burns, 2009; Rose et al., 2011), l'infirmière prodigue la vaste majorité des soins directs à la personne ventilée (Grossbach, Chlan et al., 2011; Urden et al., 2018). Le rôle de l'infirmière en soins intensifs vise prioritairement à minimiser les inconforts physiques et psychologiques vécus lors de la ventilation mécanique, ainsi qu'à promouvoir le bien-être de la personne ventilée (Garrett, 2016; Mortensen et al., 2019; Tracy & Chlan, 2011). Afin de mieux comprendre ce rôle, une revue narrative a été entreprise afin de répondre à la question suivante : Comment décrit-on le rôle de l'infirmière lors de la prise en charge d'une personne ventilée aux soins intensifs dans la littérature en sciences infirmières ? Cet article, présente les résultats de cette revue narrative et propose des pistes de solutions pour répondre aux lacunes en matière de pratique infirmière, d'éducation et de recherche.

Méthode

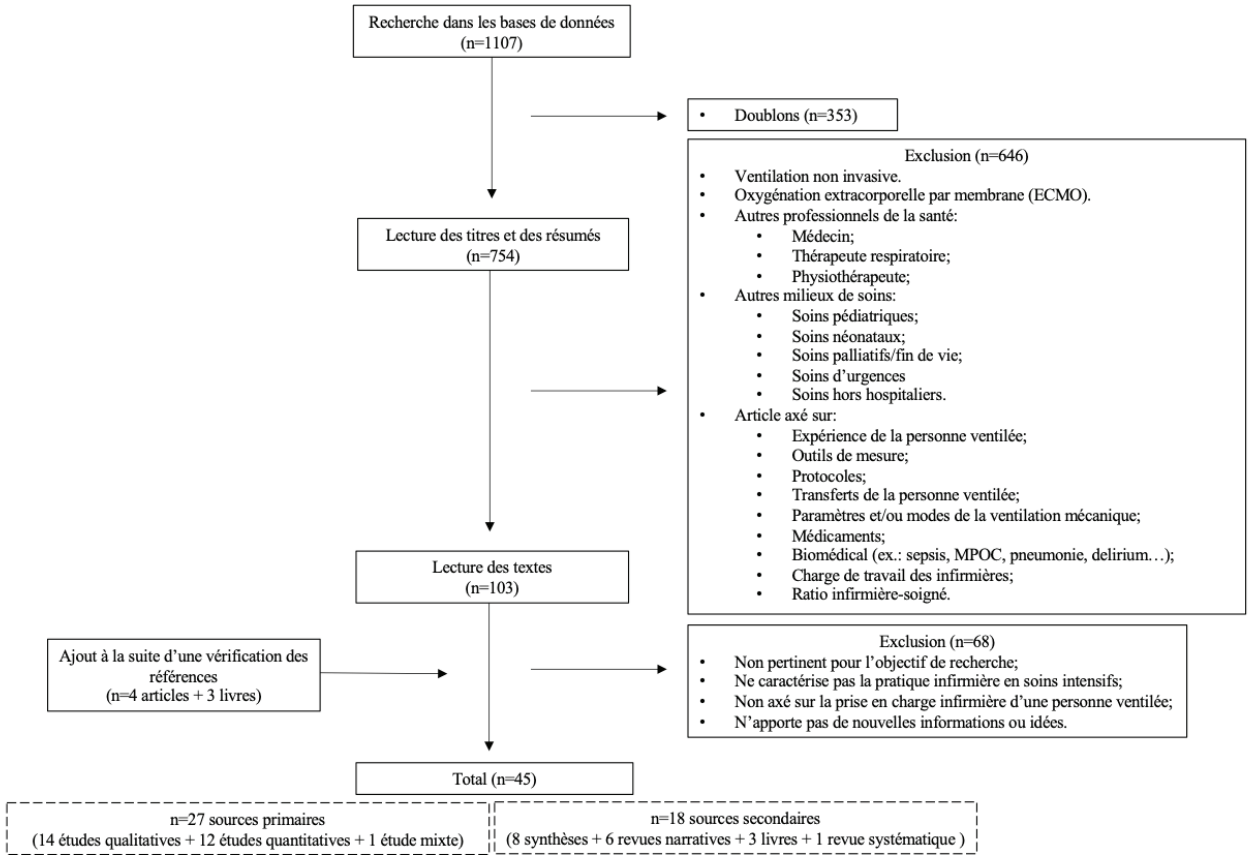
Une revue narrative de la littérature a été effectuée (Cronin et al., 2008; Green et al., 2006). Ce type de revue est utile pour résumer les écrits sur un sujet spécifique, en plus de susciter une discussion et soulever de nouvelles questions empiriques (Cronin et al., 2008; Green et al., 2006).

La première étape de la revue narrative est de développer une question de recherche (Cronin et al., 2008). Dans le but de préciser davantage la problématique et répondre à la question de recherche identifiée, les notions physiopathologiques et psychopathologiques (biomédicales) inhérentes à la ventilation mécanique et les aspects techniques du respirateur n'ont pas été incluses. De plus, aux fins de cette revue narrative, les soins directs de la personne ventilée ont été ciblés, ce qui exclut tous les autres aspects du rôle infirmier, dont les soins à la famille. Par ailleurs, ce dernier aspect pourrait faire l'objet d'une revue narrative de la littérature et se greffer à nos résultats.

La recherche de la littérature consiste la deuxième étape de la revue narrative, soit l'identification des données empiriques qui sont pertinentes au sujet (Cronin et al., 2008). Au cours des mois de juillet et août 2019, les bases de données MEDLINE, Nursing & Allied Health Database, CINAHL et PsycINFO ont été consultés en utilisant les mots-clés [(nursing or nurse or nurses) AND (intensive care unit or icu or critical care) AND (mechanical ventilation or mechanically ventilated or artificial ventilation) AND (care or practice or role or duty or job or function or contribution or responsibility or management or intervention)]. Les écrits, incluant les sources primaires et secondaires et tous les types d'études qualitatives ou quantitatives, ont été sélectionnés s'ils répondaient aux critères d'inclusion : ventilation mécanique, USI, revus par les pairs, anglais ou français, soins centrés sur la personne ventilée et traitant de la prise en charge infirmière d'une personne ventilée, c'est-à-dire la période durant laquelle la personne reçoit une assistance ventilatoire mécanique (entre l'intubation et l'extubation). Puis exclus, s'ils étaient en milieux hors hospitaliers, reliés à la ventilation mécanique non invasive, utilisés en unités des soins intensifs pédiatriques et néonataux, aux soins palliatifs ou aux urgences. Seuls les écrits publiés dans les derniers 15 ans ont été retenus afin d'atteindre un échantillon assez large tout en représentant la pratique infirmière actuelle. Notre stratégie de recherche est détaillée dans la Figure 1. À la suite d'une lecture des titres et des résumés, plusieurs écrits ont été exclus selon les critères établis. Ainsi, une première sélection pour la revue narrative a réduit le nombre à 103 écrits. Puis, les textes intégraux ont été lus afin de sélectionner les plus pertinents. La vérification des références a ajouté d'autres écrits jugés pertinents, totalisant 45 écrits scientifiques.

L'analyse des écrits sélectionnés constitue la quatrième étape d'une revue de la littérature (Cronin et al., 2008). Chaque article

Figure 1. Sélection des articles



a été lu en entier une première fois pour faire sens du contenu, puis une révision plus systématique a été effectuée. Les informations suivantes ont été incluses dans un tableau : source, but, méthode, résultats ou thèmes principaux ainsi que les interprétations et les réflexions. Cette stratégie est recommandée afin de faciliter l'organisation des informations et la rédaction des résultats (Cronin et al., 2008; Green et al., 2006). Une fois le tableau complété, les connaissances en sciences infirmières sur la prise en charge d'une personne ventilée ont été synthétisées et rédigées d'après les thèmes récurrents et cliniquement pertinents au rôle de l'infirmière en soins intensifs, ce qui consiste la cinquième et dernière étape de la revue narrative de la littérature (Cronin et al., 2008; Green et al., 2006). À titre d'exemple, le Tableau 1 démontre l'organisation des informations d'un article sous forme de tableau.

Résultats

Les résultats indiquent que dans la littérature en sciences infirmières le rôle infirmier vis-à-vis des soins à la personne ventilée se résume à la gestion de 7 dimensions : 1) l'anxiété et l'agitation, 2) la douleur, 3) la dyspnée, 4) la communication, 5) l'hygiène, 6) le sommeil et 7) l'environnement de la personne ventilée. L'analyse a aussi permis de cerner les obstacles aux soins des personnes ventilées à l'USI. Ceux-ci seront présentés à la toute fin de cette section.

Anxiété et agitation

L'anxiété et l'agitation sont intimement liées puisqu'au fur et à mesure que le niveau d'anxiété s'élève la personne ressent de plus en plus les effets physiologiques de la réponse au stress (Urden et al., 2018). Alors, les comportements de la personne ventilée deviennent un indice visible d'anxiété, notamment, un faciès tendu, des grimaces, une résistance aux soins, le retrait d'équipements (ex. : moniteur cardiaque, cathéter intraveineux), une agitation et des mouvements saccadés de la tête (Tate et al., 2012; Urden et al., 2018). Découvrir la cause d'anxiété ou d'agitation est important, la première action est d'exclure les causes physiologiques (ex. : hyperthermie, hypoxémie, sevrage d'alcool ou drogues, délirium) (Lindgren et Ames, 2005; Tracy et Chlan, 2011; Urden et al., 2018). L'anxiété et l'agitation peuvent aussi être le résultat d'une douleur non soulagée, une difficulté à communiquer, un manque de sommeil, un sentiment de peur et de frustration ou une détresse émotionnelle (Tate et al., 2012; Tracy et Chlan, 2011). Chez les personnes sous ventilation mécanique alertes et orientées, le *Faces Anxiety Scale* peut être utilisé pour évaluer l'anxiété (Adam, Osbrone, & Welch, 2017; McKinley et al., 2004). Si une autoévaluation n'est pas possible, l'infirmière reste à l'affut des comportements ou réponses physiologiques évocateurs d'une anxiété (Adam et al., 2017). L'infirmière peut aider à apaiser l'anxiété et l'agitation de la personne ventilée, en assurant une gestion optimale de la douleur, en la réassurant verbalement, en étant présente et en encourageant la présence des membres de sa famille à son chevet (Barr et al., 2013; Eckerblad et al., 2009; Feeley & Gardner, 2006; Lind et al., 2018; Tate et al., 2012; Tracy & Chlan, 2011). Lorsqu'une politique est en place pour permettre la visite d'animaux à l'USI, l'animal de compagnie de la personne ventilée peut lui rendre visite afin de soulager son anxiété (Tracy & Chlan, 2011; Urden et al., 2018). Dans un but thérapeutique, la musique peut diminuer l'anxiété en prodiguant une distraction des bruits alarmants, des pensées négatives et des procédures invasives ou désagréables (Lindgren & Ames, 2005; Tate et al., 2012; Tracy & Chlan, 2011). D'ailleurs, les résultats d'un essai randomisé contrôlé démontrent que l'écoute (20 minutes) de sons de la nature (ex. : oiseaux, pluie) lors du sevrage de la ventilation mécanique réduit significativement le niveau d'anxiété ($p < 0{,}002$) et d'agitation ($p < 0{,}001$) (Aghaie et al., 2014). En cas d'agitation ou d'anxiété grave, des agents pharmacologiques (sédation) peuvent être administrés pour maintenir la sécurité des personnes ventilées (Tracy & Chlan, 2011). Les lignes directrices recommandent une perfusion continue avec ou sans arrêt quotidien des médicaments et un niveau de sédation léger plutôt que profond, à moins d'une indication clinique (Barr et al., 2013). La sédation est jugée adéquate si la personne ventilée est confortable, calme et qu'elle collabore (Barr et al., 2013). L'Échelle de vigilance-agitation de Richmond et l'Échelle d'Agitation-Sédation de Riker sont les outils de mesure les plus fiables pour évaluer l'état d'éveil et la profondeur de la sédation (Agrément Canada, 2017; Barr et al., 2013; Chanques et al., 2006; Riker et al., 1999; Sessler et al., 2002). L'infirmière à l'USI surveille et ajuste étroitement les sédatifs administrés afin d'éviter les conséquences de la sursédation (ex. : prolongation de la ventilation mécanique) et de la sous-sédation (ex. : douleur, anxiété, agitation), et ce en tenant compte des besoins spécifiques de la personne ventilée (Hetland et al., 2018; Woodrow, 2019).

Tableau 1. Organisation des informations d'un article

	Article / But	Source	Méthode	Résultats / Thèmes	Interprétations / Réflexions
13.	Freeman, S., Yorke, J., & Dark, P. (2018). Patient agitation and its management in adult critical care: An integrative review and narrative synthesis. *Journal of Clinical Nursing*, 27(7-8), e1284-e1308. https://doi.org/10.1111/jocn.14258 But: Examiner la gestion de l'agitation dans l'environnement de l'USI pour adultes et identifier les risques et les avantages des stratégies actuelles.	- Secondaire: Revue intégrative	- CINAHL, British Nursing Index, Cochrane Library, ProQuest, Ovid dont EMBASE et MEDLINE. - n = 24	- Incertitude quant au rôle de la contention physique dans le développement de l'agitation et de sa gestion efficace. - Risque d'auto-extubation augmente avec la présence d'agitation, renforçant la nécessité d'une observation clinique constante.	- Il y a une pénurie de recherches axées sur les soins aux patients agités aux soins intensifs.

Douleur

Vu les nombreuses barrières liées à la communication et l'interférence des modalités de sédation, la gestion de la douleur est souvent sous-optimale chez les personnes ventilées (Urden et al., 2018). Les problèmes de santé sous-jacents (ex. : arthrite), les traitements, les équipements invasifs (ex. : tube endotrachéal, cathéters, drains) et les interventions infirmières (ex. : aspiration endotrachéale) peuvent tous causer de la douleur (Jacq et al., 2018; Tracy & Chlan, 2011). Étant toujours présentes au chevet, les infirmières sont bien placées pour évaluer et traiter la douleur des personnes ventilées (Feeley & Gardner, 2006). Celle-ci doit être évaluée de manière routinière et documentée afin de faciliter le suivi et la collaboration entre les membres de l'équipe de soins (Barr et al., 2013; Garrett, 2016). Compte tenu de la subjectivité de la douleur, l'autoévaluation est privilégiée (Urden et al., 2018). Selon la *American Association of Critical-Care Nurses* [AACN] (2014), l'infirmière en soins intensifs obtient l'autoévaluation de la douleur à l'aide d'échelles numériques, questions simples ou hochement de tête, évite de se fier uniquement aux signes vitaux et considère l'aide d'un membre de la famille afin d'identifier les comportements pouvant indiquer de la douleur. L'échelle d'évaluation numérique de 0 à 10 est l'outil d'autoévaluation le plus utilisé par les infirmières (98 %) en soins intensifs (Rose et al., 2012). D'ailleurs, cet outil d'évaluation de l'intensité et du soulagement de la douleur correspond à la norme de pratique acceptée en soins critiques (Agrément Canada, 2017). Si la personne ventilée ne peut pas communiquer de façon verbale ou non verbale, l'adoption d'une échelle de douleur comportementale est nécessaire, soit la *Behavioral Pain Scale* ou la *Critical-Care Pain Observation Tool* (Agrément Canada, 2017; AACN, 2014; Barr et al., 2013; Gélinas et al., 2006; Payen et al., 2001). La douleur doit être soulagée rapidement, et ce toujours avant d'administrer des sédatifs en cas d'agitation, étant donné que la douleur se manifeste parfois par une agitation (Feeley & Gardner, 2006; Garrett, 2016). Pour la gestion de la douleur, les opioïdes intraveineux (ex. : fentanyl, morphine) sont la classe de médicament de prédilection, mais d'autres types d'analgésiques non-opioïdes (ex. : acétaminophène) peuvent être administrés de même que les interventions non-pharmacologiques (ex. : musique) (Barr et al., 2013). Les résultats d'un essai clinique contrôlé randomisé avec des personnes ventilées (n = 60), attestent que l'écoute de sons de la nature (30; 60; 90 minutes) à l'aide d'écouteurs réduit significativement la douleur ($p < 0,05$) (Saadatmand et al., 2015). Selon les résultats d'un essai clinique contrôlé, mais non randomisé (n = 60), l'écoute de musique (30 minutes) lors du bain réduit significativement la durée de la douleur (BPS ≥ 5) (2,0 [0,3; 4,0] vs 10 [4,3; 18,0]; $p <0,0001$) (Jacq et al., 2018). La musique a aussi été associée à une diminution de la douleur durant l'aspiration endotrachéale (Yaman et al., 2016). D'autres interventions non-pharmacologiques incluent l'application locale de la glace pour réduire une douleur procédurale, l'application locale d'une chaleur pour réduire la douleur musculaire, le positionnement (toutes les 2 à 4 heures) et l'utilisation d'un matelas thérapeutique pour soulager les points de pression ainsi que la visualisation pour distraire, relaxer et exercer un certain contrôle sur la douleur (Coyer et al.,2007; Urden et al., 2018; Woodrow, 2019).

Dyspnée

Chez les personnes ventilées, la dyspnée est fréquente en raison de la gravité des anomalies respiratoires (Newmarch, 2006), mais peut également être due aux modes ou réglages du respirateur (Grossbach, Chlan et al., 2011), aux problèmes de santé sous-jacents et à l'anxiété (Tracy & Chlan, 2011). La personne ventilée peut ressentir un sentiment immense de peur, panique et anxiété lors d'une toux et d'une asynchronie – situation où la respiration de la personne ne coïncide pas avec le respirateur. Le respirateur est synchrone lorsque la personne ventilée respire confortablement et qu'elle est capable de se reposer et dormir (Grossbach, Chlan et al., 2011). L'évaluation de la dyspnée sert à déterminer si les réglages du respirateur et les diverses interventions infirmières (ex. : aspiration endotrachéale, positionnement, techniques de relaxation, musique) améliorent la respiration chez la personne ventilée (Grossbach, Chlan et al., 2011). Aux soins intensifs, les outils de mesure utilisés sont le Visual Analogue Scale et le Borg Scale, mais ils nécessitent que la personne ventilée soit alerte et orientée (Grossbach, Chlan et al., 2011; Powers & Bennett, 1999). Lorsqu'une personne ventilée semble dyspnéique, asynchrone ou qu'une alarme du respirateur sonne, l'attention de l'infirmière doit avant tout se centrer sur la personne et non sur la machine (Grossbach, Chlan et al., 2011). Il est inapproprié et souvent inefficace de dire à la personne ventilée de se calmer ou respirer avec la machine (Grossbach, Stranberg et al., 2011). Dans cette situation, l'infirmière évalue en premier lieu la perméabilité des voies aériennes (entrée d'air, positionnement du tube endotrachéal, connexion au respirateur, excès de sécrétions broncho-pulmonaires), l'état respiratoire (SpO_2, fréquence respiratoire), l'état hémodynamique (fréquence et rythme cardiaque, tension artérielle), la douleur, l'anxiété, l'état d'éveil, puis vérifie les réglages et le fonctionnement du respirateur (Couchman et al., 2007; Grossbach, Chlan et al., 2011, Urden & al., 2018). Dans le but de diminuer le travail respiratoire et améliorer la synchronisation entre la personne et le respirateur, l'infirmière administre et ajuste le débit de la perfusion afin d'avoir l'effet thérapeutique recherché de la sédation (Newmarch, 2006; Urden et al., 2018). À savoir, les personnes ventilées peuvent être dans un état d'hypoventilation sans présenter de signes de détresse respiratoire étant donné l'administration de sédatifs ou paralysants, d'autant plus qu'elles sont incapables de le communiquer (Grossbach, Chlan et al., 2011). L'infirmière observe également les signes d'intolérance au sevrage de la ventilation mécanique comprenant les paramètres physiologiques (ex. : SpO_2, dyspnée, tachypnée) et psychologiques (ex. : anxiété, expressions faciales, estime de soi) (Eckerblad et al., 2009; Lindgren & Ames, 2005).

Communication

La présence du tube endotrachéal ou trachéotomie ainsi que le gonflement du ballonnet empêchent les personnes ventilées de communiquer verbalement (Grossbach, Stranberg et al., 2011; Holm & Dreyer, 2018). De plus, la sédation-analgésie, la douleur, la peur, l'anxiété et l'environnement bruyant des soins intensifs peuvent tous affecter la capacité de la personne ventilée à communiquer et à comprendre (Adam et al., 2017; Tracy & Chlan, 2011). La communication est un aspect central

au rôle thérapeutique de l'infirmière en soins intensifs, en plus d'être essentiel au développement de la relation infirmière-soigné (Dithole et al., 2016). Des explications insuffisantes de la part des infirmières et des difficultés de communication lors de la ventilation mécanique peuvent déclencher un cycle d'anxiété, d'agitation, de frustration, de peur, d'impuissance et de dyspnée chez les personnes ventilées (Grossbach, Chlan et al., 2011), en plus de se sentir seules, tristes, stupides, humiliées et prises au piège (Holm & Dreyer, 2018). À l'USI, l'infirmière a la responsabilité d'améliorer la capacité de la personne ventilée à communiquer ses besoins et ses demandes aux membres de l'équipe soignante et sa famille, en plus d'interpréter correctement le message (Grossbach, Stranberg et al., 2011; Holm & Dreyer, 2018). Pour y parvenir, l'infirmière adopte une attitude calme, communique d'une voix rassurante et apaisante, parle lentement, prend le temps d'interagir avec la personne ventilée et apprendre à la connaître, transmets les informations sur les soins et les répète, utilise diverses méthodes de communication et demande au besoin l'assistance d'une collègue de travail ou membre de la famille (Cederwall et al., 2018; Grossbach, Stranberg et al., 2011; Holm & Dreyer, 2018; Laakso et al., 2009; Urden et al., 2018). L'infirmière établit également un environnement de soins propice à la communication, elle se positionne à proximité et face à la personne ventilée, assure que la cloche d'appel est accessible, ajuste l'éclairage, réduit les bruits de fond (ex. : radio, conversations) et retire les contentions s'il y a lieu (Grossbach, Stranberg et al., 2011; Khalafi et al., 2016). L'infirmière évalue les fonctions cognitives et motrices qui affectent la communication, soit l'état mental (ex. : état d'éveil, délirium), la langue parlée, la capacité de lecture et d'écriture (ex. : analphabète), la main dominante, l'acuité auditive et visuelle (ex. : port d'un appareil auditif ou paire de lunettes) et la force musculaire (Adam et al., 2017; Grossbach, Stranberg et al., 2011; Holm & Dreyer, 2018). Lors de la ventilation mécanique, les aides à la communication (ex. : papier-crayon, illustrations ou alphabet, pictogrammes) sont utiles pour les personnes ventilées ayant une force motrice suffisante (Grossbach, Stranberg et al., 2011; Lindgren & Ames, 2006; Newmarch, 2006; Otuzoğlu & Karahan, 2014). Sinon, l'infirmière tente de lire sur les lèvres et pose une question à la fois sollicitant une réponse par oui ou non, un hochement de tête, un serrement ou signe de la main et le mouvement des yeux afin de répondre ou d'anticiper ses besoins (ex. : est-ce que vous aimeriez être repositionnée?) (Adam et al., 2017; Grossbach, Stranberg et al., 2011; Mortensen et al., 2019). Si la personne ventilée devient frustrée lorsque la communication échoue, l'infirmière doit faire preuve d'empathie, de patience et exprime sa volonté à la comprendre (Grossbach, Stranberg et al., 2011; Holm & Dreyer, 2018). Lorsqu'une personne ayant une trachéotomie est stable cliniquement, l'infirmière peut consulter à la fois le médecin, l'orthophoniste et le thérapeute respiratoire pour évaluer la possibilité d'utiliser d'autres stratégies pour permettre la phonation (ex. : dégonflement du ballonnet, valve unidirectionnelle et canule fenêtrée) (Eckerblad et al., 2009; Grossbach, Stranberg et al., 2011). Même en l'absence de réponse, il est important de parler aux personnes ventilées, car les propos de l'infirmière peuvent les réconforter (Urden et al., 2018).

Hygiène

Les besoins des personnes ventilées en matière d'hygiène sont un élément essentiel de la prise en charge aux soins intensifs (Coyer et al., 2007; 2011). D'ailleurs, lors du bain au lit, l'infirmière peut effectuer une évaluation physique complète de la personne ventilée, en plus de communiquer et d'établir une relation avec elle (Coyer et al., 2007; Happ et al., 2010). Les soins d'hygiène (ex. : bain, rasage, lavage des cheveux) favorisent notamment le confort et le bien-être de la personne ventilée (Coyer et al, 2007; Happ et al., 2010). Selon Coyer et ses collaborateurs (2007), la norme est d'un bain complet au lit par jour et les soins du méat urinaire et périnée deux fois par jour, reste que la fréquence des bains doit répondre aux préférences personnelles et aux besoins individualisés de la personne ventilée (ex. : incontinence, diaphorèse). Les soins buccodentaires sont effectués avec une brosse à dents avec succion toutes les 4 heures ou plus fréquemment, la bouche est aussi humidifiée et les lèvres lubrifiées (Landström et al., 2009; Saritas et al., 2019; Urden et al., 2018). Les soins buccodentaires promeuvent le confort, préviennent la sécheresse, permettent d'évaluer la cavité buccale et réduisent les infections nosocomiales (ex. : pneumonie acquise sous ventilation mécanique) ainsi que la sensation de soif causée par l'emplacement du tube endotrachéal (Adam et al., 2017; Landström et al., 2009; Woodrow, 2019). Les soins oculaires de la personne ventilée relèvent également de l'infirmière, elle nettoie les yeux, maintient la cornée humide en cas de sécheresse oculaire (ex. : larmes artificielles) et protège la cornée en cas d'une fermeture incomplète des paupières (ex. : compresse stérile et ruban adhésif) (Saritas et al., 2019; Woodrow, 2019).

Sommeil

Le sommeil est impératif au bien-être de la personne ventilée, malgré les interruptions fréquentes du cycle du sommeil (Lindgren & Ames, 2005; Tracy & Chlan, 2011). Le bruit excessif à l'USI est l'une des causes principales de ces interruptions (Lindgren & Ames, 2006; Tembo & Parker, 2009). S'ajoutent les interventions infirmières durant la nuit, la sévérité de la maladie, la médication, la douleur et l'inconfort (Tembo & Parker, 2009; Tracy & Chlan, 2011). Le manque de sommeil contribue entre autres à l'anxiété, la fatigue, l'agitation, la détresse émotionnelle et le délirium (Adam et al., 2017; Feeley & Gardner, 2006; Tembo & Parker, 2009). Tracy et Chlan (2011) proposent de déterminer les habitudes de sommeil de la personne ventilée, puis les imiter le plus possible. Réduire les bruits et la lumière, appliquer des bouchons d'oreille, limiter les médicaments qui peuvent interférer avec le sommeil, favoriser le confort (ex. : positionnement, température de la chambre) et la détente (ex. : massage), prévoir des moments de repos d'au moins 90 minutes sans interruption (quiet time) et regrouper les interventions infirmières sont tous des moyens efficaces pour promouvoir le sommeil (Adam et al., 2017; Barr et al., 2013; Lindgren et Ames, 2005; McAndrew et al., 2016; Tembo & Parker, 2009; Tracy & Chlan, 2011; Woodrow, 2019). L'exposition à la lumière naturelle le jour peut également aider à réguler le cycle circadien (Feeley & Gardner, 2006).

Environnement

L'environnement à l'USI est à la fois bruyant et agressant (ex. : voix, alarmes et lumières). Afin d'améliorer le confort de la

personne ventilée, les infirmières peuvent apporter des changements à l'environnement physique des soins intensifs, selon le principe que les personnes sont influencées par et interagissent avec leur environnement (Urden et al., 2018; Woodrow, 2019). Dans la mesure du possible, l'infirmière réduit les bruits dans la chambre ainsi que dans l'unité en cessant d'utiliser tout équipement inutile, réduisant la sonnerie du téléphone, limitant les conversations de l'équipe de soins près des chambres et en fermant les portes de la chambre (Adam et al., 2017; Tracy & Chlan, 2011; Urden et al., 2018). L'infirmière règle aussi au plus bas le volume des alarmes, en particulier le moniteur cardiaque et le respirateur placés à la tête du lit, mais sans compromettre la sécurité (Tracy & Chlan, 2011). Pour rendre la chambre plus familière, l'infirmière la décore avec des photographies, dessins ou objets préférés de la personne ventilée. La réorientation fréquente et la description de ce qui les entoure (ex. : alarmes, équipements) fournissent des informations précieuses aux personnes ventilées sur l'environnement de soins (Newmarch, 2006; Tracy & Chlan, 2011). Bref, les infirmières doivent à la fois se centrer sur le caractère personnel, individuel et humain des personnes ventilées tout en gérant l'environnement hautement technologique des soins intensifs (Laerkner et al., 2015).

Obstacles aux soins

Dans la prestation des soins aux personnes ventilées, les infirmières sont confrontées à diverses barrières : manque de connaissances, de ressources, de temps, de collaboration et d'autonomie (Cederwall et al., 2018; Danielis et al., 2018; Hetland et al., 2018; Landström et al., 2009; Lind et al., 2018; Mortensen et al., 2019; Saritas et al., 2019; Tate et al., 2012; Tracy & Chlan, 2011). Aux soins intensifs, 1:1 et 1:2 sont les ratios infirmière-soigné signalés dans les recherches lorsque l'infirmière prend en charge une personne ventilée (Cederwall et al., 2018; Guttormson et al., 2019; Mortensen et al., 2019). La dotation en personnel doit être suffisante pour permettre aux infirmières d'être attentives, encourageantes et présentes auprès de la personne ventilée (Karlsson & Bergbom, 2015). En raison de l'utilisation décroissante des sédatifs au cours des dernières années, les infirmières jugent que la prise en charge des personnes éveillées sous ventilation mécanique est exigeante, car elle nécessite plus de temps et de présence au chevet ainsi qu'une plus grande attention aux symptômes d'inconfort (ex. : agitation et anxiété) et aux besoins psychosociaux (ex. : communication) (Cederwall et al., 2018; Guttormson et al., 2019; Karlsson & Bergbom, 2015; Laerkner et al., 2015; Mortensen et al., 2019). La surcharge de travail contraint d'ailleurs les infirmières à utiliser des contentions physiques (Cederwall et al., 2018). Au Canada, les contentions physiques sont fréquemment utilisées dans les USI, à savoir la majorité des personnes restreintes (n=141) sont sous ventilation mécanique (n=118, 84 %) (Luk et al., 2015). Pourtant, les recherches n'ont pas été en mesure d'établir si leur utilisation est favorable ou défavorable en cas d'agitation, en plus d'une inefficacité rapportée dans les cas d'auto-extubation (Danielis et al., 2018; Freeman et al., 2018; Hofsø & Coyer, 2007; Perez et al., 2019). La surcharge de travail a même un impact sur les modalités de sédation (Cederwall et al., 2018), par exemple les infirmières indiquent administrer des sédatifs afin de s'acquitter d'autres tâches (Guttormson et al., 2019; Hetland et al, 2018). Vu les nombreuses tâches durant le jour, les infirmières effectuent le bain complet la nuit perturbant ainsi le sommeil de la personne ventilée (Coyer et al., 2011). Les infirmières considèrent également que les politiques et procédures qui portent sur la sédation et le sevrage de la ventilation mécanique comme des obstacles à la prestation de soins individualisés (Eckerblad et al., 2009; Hetland et al., 2018), voir même les objectifs de l'administration de la sédation diffèrent entre les infirmières et les médecins (Tate et al., 2012). Enfin, les infirmières trouvent difficile d'interagir avec les personnes ventilées, car elles n'ont pas toujours les connaissances ni les outils nécessaires pour faciliter la communication (Hetland et al., 2018; Holm et Dreyer, 2018; Mortensen et al., 2019). Dans ces conditions, le manque de contrôle ressenti par les infirmières, l'incapacité de réconforter les personnes ventilées et les difficultés de communication causent de la frustration chez les infirmières (Hetland et al., 2018; Karlsson et Bergbom, 2015; Lind et al., 2018; Mortensen et al., 2019). Bien que certains écrits mentionnent des éléments facilitateurs, comme l'assignation d'une même infirmière à la personne ventilée facilite le sevrage (Eckerblad et al., 2009), les obstacles aux soins occupent une place plus importante. Les résultats de cette revue narrative reflètent donc l'importance accordée aux obstacles, et ce au détriment des éléments facilitateurs.

Discussion

Compte tenu de la nature fragmentaire de la littérature en sciences infirmières qui porte sur la prise en charge des personnes ventilées, ce que d'autres auteurs constatent également (Couchman et al., 2007; Coyer et al., 2007), la revue narrative de la littérature s'est avérée difficile. Dans l'ensemble, il y a un manque d'écrits en sciences infirmières qui définissent clairement le rôle de l'infirmière en matière de prise en charge d'une personne ventilée, ainsi que d'études qui s'intéressent à l'expérience vécue des infirmières en milieu de soins intensifs. En fait, la littérature en sciences infirmières qui porte sur la ventilation mécanique a tendance à réduire les soins infirmiers au plan physique (ex. : soins médicaux, technologiques et techniques) ou mental (soins psychosociaux), en plus de les opposer constamment l'un à l'autre. Gordon (2006) fait référence à ce phénomène comme une nouvelle forme de cartésianisme — une vision réductionniste qui divise les besoins des patients et les soins en deux catégories opposées, soit mentale et physique. De plus, l'instabilité hémodynamique des personnes ventilées fait en sorte que les besoins physiques sont souvent perçus comme ayant une plus grande priorité que ceux de nature psychologique (Wilkin & Slevin, 2004). Dans un tel contexte de soins, les infirmières ont tendance à poser un regard réductionniste sur la personne soignée, c'est-à-dire qu'elles ne voient plus qu'un corps divisible en composantes physiques nécessitant surveillance et monitorage (Henderson, 1994, 2003). Les personnes soignées admises aux soins intensifs se sentent ainsi comme des objets soumis à des rituels de pouvoir, selon les résultats d'une étude phénoménologique (n=9) (Almerud et al., 2007). Pourtant, la personne ventilée est bien plus qu'un corps brisé et l'infirmière doit voir au-delà de la dimension physique des soins. Idéalement, les infirmières aux soins intensifs devraient être en mesure d'adopter une approche englobante et

atteindre un équilibre pour mieux répondre aux besoins physiques et psychologiques des personnes ventilées (Almerud et al., 2007). Le *AACN Synergy Model for Patient Care* (Hardin & Kaplow, 2017) s'avère utile, car il permet de voir la personne soignée dans sa globalité, en plus d'identifier les besoins de la personne soignée dans tous les aspects de sa vie (Hardin & Kaplow, 2017). Or, les infirmières se heurtent à de nombreuses barrières qui affectent la prestation des soins aux personnes ventilées.

À partir des résultats, les implications importantes pour la pratique infirmière, l'éducation et la recherche ont été identifiées dans le but d'améliorer la prise en charge des personnes ventilées aux soins intensifs. Ces implications se résument à une meilleure distribution des ressources infirmières, l'exercice de la pleine étendue du champ de pratique de l'infirmière, une formation continue ciblant la communication et la ventilation mécanique ainsi que des études supplémentaires portant sur la prise en charge des personnes ventilées aux soins intensifs.

Pratique infirmière

Dans le but d'assurer la qualité des soins infirmiers, un ratio minimal infirmière-soigné 1:1 est recommandé lorsqu'il s'agit de la prise en charge d'une personne ventilée aux soins intensifs (Association Canadienne des Infirmiers et Infirmières des Soins Intensifs [ACIISI], 2019; Chamberlain et al., 2018). Tant qu'une meilleure distribution des ressources infirmières ne sera pas mise en place aux soins intensifs, bon nombre des recommandations vis-à-vis de la prise en charge de la personne ventilée resteront purement théoriques. Pour mieux répondre aux besoins spécifiques de la personne ventilée, il serait judicieux d'accroître l'autonomie des infirmières en soins intensifs. Zampieri et ses collègues (2019) ont constaté qu'une plus grande autonomie dans les actions de l'infirmière en soins intensifs généraux (l'ajustement du débit thérapeutique des vasopresseurs, de la sédation, de la FiO2 et de la nutrition, le sevrage du respirateur, la mobilisation et la gestion pharmacologique des symptômes) est associée à de meilleurs résultats chez les personnes ventilées. Pour ce faire, il faudrait s'en remettre davantage au jugement clinique et à l'expertise des infirmières pour individualiser les soins au lieu de multiplier les politiques et les procédures (Crocker & Scholes, 2009; Woodrow, 2019). Pour pallier les problèmes de communication avec la personne ventilée, une variété d'outils, comme des tableaux de communication et des pictogrammes, devrait être mise à la disposition des infirmières pour maximiser les opportunités de communication (Dithole et al., 2017; Happ et al., 2011; Karlsen et al., 2019).

Éducation

La communication entre l'infirmière et la personne ventilée nécessite des connaissances et des compétences spécifiques qui vont au-delà de celles acquises lors de la formation initiale. Il faudrait donc éduquer les infirmières sur les méthodes de communication (verbale ou non verbale) auprès de personnes soignées non communicantes dès le baccalauréat en sciences infirmières, lors de formation spécialisée sur la gestion du respirateur, puis de manière continue lors de la formation des infirmières en soins intensifs (Dithole et al., 2017). L'acquisition de connaissances et de compétences en communication est très importante puisque l'infirmière contrôle quand, sur quoi et comment les personnes ventilées communiquent (Happ et al., 2011). Celles-ci sont d'ailleurs des compétences attendues d'une infirmière pour l'obtention d'une certification en soins infirmiers intensifs (adultes) de l'Association des infirmières et infirmiers du Canada (AIIC) ([AIIC], 2017). Compte tenu d'une diminution de l'utilisation des sédatifs, une formation additionnelle sur les modalités de sédation pourrait accroître le confort des infirmières lors de la prise en charge des personnes ventilées éveillées et interactives (Guttormson et al., 2019). Pour assurer la sécurité des personnes ventilées, les infirmières en soins intensifs devraient obtenir une formation spécialisée sur la gestion du respirateur et travailler en étroite collaboration avec les thérapeutes respiratoires (Burns, 2009).

Recherche

Vu les diverses barrières rencontrées lors de la prise en charge d'une personne ventilée, la fragmentation des soins dans la littérature en sciences infirmières et le manque de clarté du rôle de l'infirmière en soins intensifs, d'autres recherches sont plus que nécessaires afin de clarifier la pratique infirmière dans ce contexte clinique. Il serait utile d'explorer de nouvelles interventions infirmières améliorant la gestion des symptômes (ex. : douleur, dyspnée, anxiété et agitation) et le confort de la personne ventilée, et ce sans avoir à manipuler l'état de conscience (Deutschman et al., 2012; 2019; Hetland et al., 2018). Il serait aussi recommandé que les protocoles élaborés et mis en œuvre aux soins intensifs fassent l'objet d'un examen plus approfondi pour déterminer s›ils améliorent réellement les résultats des personnes ventilées et l'autonomie des infirmières, car certaines données suggèrent que la dotation en personnel (médecins, infirmières et thérapeutes respiratoires), le jugement clinique et l'expérience des infirmières sont plus importants qu'un protocole en soi, par exemple lors du sevrage de la ventilation mécanique (Brochard, 2008; Crocker & Scholes, 2009; Elliot & Morrell-Scott, 2017). Enfin, il serait utile d'explorer et d'observer les actions des infirmières aux soins intensifs lorsqu'elles prennent en charge une personne ventilée, leurs besoins pour surmonter les obstacles aux soins, les stratégies employées pour y faire face ainsi que les éléments qui facilitent la prise en charge. Les résultats présenteraient des avenues potentielles pour non seulement soutenir la pratique infirmière en soins intensifs auprès des personnes ventilées, mais aussi améliorer l'expérience de soins des personnes ventilées et de la famille lors d'un séjour à l'USI.

Conclusion

Les résultats de la revue narrative de la littérature en sciences infirmières ont permis de décrire le rôle de l'infirmière vis-à-vis de la prise en charge d'une personne ventilée aux soins intensifs, ce qui inclut, mais sans s'y limiter, la gestion de l'anxiété et l'agitation, la douleur, la dyspnée, la communication, le sommeil, l'hygiène et l'environnement. De plus, les infirmières font face à de nombreux obstacles affectant la qualité des soins et limitant la relation infirmière-soignée. Quoique des recherches aient été réalisées sur les soins prodigués aux personnes ventilées, d'autres recherches sont nécessaires afin de relever les nombreux défis auxquels les infirmières sont confrontées et identifier

des pistes de solutions au plan clinique. En fait, il y a très peu de connaissances en sciences infirmières sur la façon dont les infirmières prennent réellement en charge la personne ventilée aux soins intensifs, encore moins au Canada. À la lumière des résultats, de nouvelles questions empiriques sont soulevées : Quel est le processus de soins spécifique à la personne ventilée aux soins intensifs du point de vue des infirmières ? Quelles sont les barrières au processus de soins ainsi que les stratégies, les ressources et les besoins particuliers des infirmières pour les surmonter ?

Notes de l'auteur

Mylène Suzie Michaud, Inf., M.Sc.Inf., Ph.D(c), CSI(C), École des sciences infirmières
Faculté des sciences de la santé, Université d'Ottawa
Marilou Gagnon, Inf., Ph.D., Professeure agrégée, École des sciences infirmières, Université de Victoria
Jean Daniel Jacob, Inf., Ph.D., Directeur adjoint aux études de premier cycle, Professeur agrégé, École des sciences infirmières, Faculté des sciences de la santé, Université d'Ottawa
Krystina B. Lewis, Inf., M.Sc.Inf., Ph.D., Professeur adjointe, École des sciences infirmières, Faculté des sciences de la santé, Université d'Ottawa

Addresse pour Correspondance : *Mylène Suzie Michaud*

Courriel : mmich094@uottawa.ca

Conflits d'intérêts : *Aucun*

Financement : *La première auteure exprime sa reconnaissance au financement octroyé par la Fondation des infirmières et infirmiers du Canada et la Bourse d'études supérieures de l'Ontario.*

RÉFÉRENCES

Agrément Canada (2017). *Normes : soins critiques.*

Adam, S., Osbrone, S., & Welch, J. (2017). *Critical care nursing: science and practice* (3e éd.).Oxford University Press.

Aghaie, B., Rejeh, N., Heravi-Karimooi, M., Ebadi, A., Moradian, S. T., Vaismoradi, M., & American Association of Critical-Care Nurses [AACN] (2014). Assessing pain in the critically ill adult. *Critical Care Nurse*, *34*(1), 81-83.

Association des infirmières et infirmiers du Canada [AIIC] (2017). *Plan directeur de l'examen et compétences de la spécialité*. https://www.cna-aiic.ca/-/media/cna/page-content/pdf-fr/exam-blueprint-and-specialty-competencies_critical-care-fr_jan2019.pdf?la=fr&hash=88868AF-F8A8E7AC1395169524B-25357B68C58F52

Association Canadienne des Infirmiers et Infirmière en Soins Intensifs [ACIISI] (2019). Position statement: models of nursing care in the critical care unit. *The Canadian Journal of Critical Care Nursing, 30*(2), 7-8.

Barr, J., Fraser, G. L., Puntillo, K., Ely, E. W., Gélinas, C., Dasta, J. F., Davidson, J. E., Devlin, J. W., Kress, J. P., Joffe, A. M., Coursin, D. B., Herr, D. L., Tung, A., Robinson, B. R., Fontaine, D. K., Ramsay, M. A., Riker, R. R., Sessler, C. N., Pun, B., Skrobik, Y., … American College of Critical Care Medicine (2013). Clinical practice guidelines for the management of pain, agitation, and delirium in adult patients in the intensive care unit. *Critical Care Medicine, 41*(1), 263-306. https://doi.org/10.1097/CCM.0b013e3182783b72

Brochard L. (2008). Sedation in the intensive-care unit: Good and bad? *The Lancet, 371*(9607), 95-97. https://doi.org/10.1016/S0140-6736(08)60082-3

Burns, S. M. (2009). Pulmonary critical care in the United States of America: A complex issue. *Intensive and Critical Care Nursing, 25*(1), 1-3. https://doi.org/10.1016/j.iccn.2008.11.001

Cederwall, C., Olausson, S., Rose, L., Naredi, S., & Ringdal, M. (2018). Person-centered care during prolonged weaning from mechanical ventilation, nurses' views: An interview study. *Intensive and Critical Care Nursing, 46*, 32-37. https://doi.org/10.1016/j.iccn.2017.11.004

Chamberlain, D., Pollock, W., Fulbrook, P., & Australian Confederation of Critical Care Nurses Workforce Standards Development Group (2018). Australian Confederation of Critical Care Nurses Workforce Standards for Intensive Care Nursing: Systematic and evidence review, development, and appraisal. Australian Critical Care, 31(5), 292–302. https://doi.org/10.1016/j.aucc.2017.08.007

Chanques, G., Jaber, S., Barbotte, E., Verdier, R., Henriette, K., Lefrant, J. Y., & Eledjam, J. J. (2006). Validation de l'échelle de vigilance-agitation de Richmond traduite en langue française. *Annales francaises d'anesthesie et de réanimation, 25*(7), 696–701. https://doi.org/10.1016/j.annfar.2006.02.017

Chlan, L., Tracy, M. F., & Grossbach, I. (2011). Achieving quality patient-ventilator management: Advancing evidence-based nursing care. *Critical Care Nurse, 31*(6), 4650. https://doi.org/10.4037/ccn2011852

Couchman, B. A., Wetzig, S. M., Coyer, F. M., & Wheeler, M. K. (2007). Nursing care of the mechanically ventilated patient: What does the evidence say? Part one. *Intensive and Critical Care Nursing, 23*(1), 4-14. https://doi.org/10.1016/j.iccn.2006.08.005

Coyer, F. M., O'Sullivan, J., & Cadman, N. (2011). The provision of patient personal hygiene in the intensive care unit: A descriptive exploratory study of bed-bathing practice. *Australian Critical Care, 24*(3), 198-209. https://doi.org/10.1016/j.aucc.2010.08.001

Coyer, F. M., Wheeler, M. K., Wetzig, S. M., & Couchman, B. A. (2007). Nursing care of the mechanically ventilated patient: What does the evidence say? Part two. *Intensive and Critical Care Nursing, 23*(2), 71-80. https://doi.org/10.1016/j.iccn.2006.08.004

Crocker, C., & Scholes, J. (2009). The importance of knowing the patient in weaning from mechanical ventilation. *Nursing in Critical Care, 14*(6), 289-296. https://doi.org/10.1111/j.1478-5153.2009.00355.x

Cronin, P., Ryan, F., & Coughlan, M. (2008). Undertaking a literature review: A step-by-step approach. *British Journal of Nursing, 17*(1), 38-43. https://doi.org/10.12968/bjon.2008.17.1.28059

Danielis, M., Chiaruttini, S., & Palese, A. (2018). Unplanned extubations in an intensive care unit: Findings from a critical incident technique. *Intensive and Critical Care Nursing, 47,* 69-77. https://doi.org/10.1016/j.iccn.2018.04.012

Dithole, K., Sibanda, S., Moleki, M. M., & Thupayagale-Tshweneagae, G. (2016). Exploring communication challenges between nurses and mechanically ventilated patients in the intensive care unit: a structured review. *Worldviews on Evidence-Based Nursing, 13*(3), 197-206. https://doi.org/10.1111/wvn.12146

Dithole, K. S., Thupayagale-Tshweneagae, G., Akpor, O. A., & Moleki, M. M. (2017). Communication skills intervention: Promoting effective communication between nurses and mechanically ventilated patients. *BMC Nursing, 16,* 74. https://doi.org/10.1186/s12912-017-0268-5

Deutschman, C. S., Ahrens, T., Cairns, C. B., Sessler, C. N., & Parsons, P. E. (2012). Multisociety task force for critical care research: Key issues and recommendations. *American Journal of Critical Care, 21*(1), 15-23. https://doi.org/10.4037/ajcc2012632

Eckerblad, J., Eriksson, H., Kärner, A., & Edéll-Gustafsson, U. (2009). Nurses' conceptions of facilitative strategies of weaning patients from mechanical ventilation – A phenomenographic study. *Intensive and Critical Care Nursing, 25*(5), 225-232. https://doi.org/10.1016/j.iccn.2009.06.008

Elliott, S., & Morrell-Scott, N. (2017). Care of patients undergoing weaning from mechanical ventilation in critical care. *Nursing Standard, 32*(13), 41-51. https://doi.org/10.7748/ns.2017.e10854

Feeley, K., & Gardner, A. (2006). Sedation and analgesia management for mechanically ventilated adults: Literature review, case study and recommendations for practice. *Australian Critical Care, 19*(2), 73-77. https://doi.org/10.1016/s1036-7314(06)80012-3

Freeman, S., Yorke, J., & Dark, P. (2018). Patient agitation and its management in adult critical care: An integrative review and narrative synthesis. *Journal of Clinical Nursing, 27*(7-8), e1284-e1308. https://doi.org/10.1111/jocn.14258

Garrett, K. M. (2016). Best practices for managing pain, sedation, and delirium in the mechanically ventilated patient. *Critical Care Nursing Clinics*, *28*(4), 437-450. https://doi.org/10.1016/j.cnc.2016.07.004

Gélinas, C., Fillion, L., Puntillo, K. A., Viens, C., & Fortier, M. (2006). Validation of the critical care pain observation tool in adult patients. *American Journal of Critical Care, 15*(4), 420-427. https://doi.org/10.4037/ajcc2006.15.4.420

Gordon, S. (2006). The New Cartesianism. In S. Nelson et S. Gordon, *The Complexities of Care: Nursing Reconsidered.* Cornell University Press.

Green, B. N., Johnson, C. D., & Adams, A. (2006). Writing narrative literature reviews for peer reviewed journals: secrets of the trade. *Journal of Chiropractic Medicine, 5*(3), 101-117. https://doi.org/10.1016/S0899-3467(07)60142-6

Grossbach, I., Chlan, L., & Tracy, M. F. (2011). Overview of mechanical ventilatory support and management of patient- and ventilator-related responses. *Critical Care Nurse, 31*(3), 30-44. https://doi.org/10.4037/ccn2011595

Grossbach, I., Stranberg, S., & Chlan, L. (2011). Promoting effective communication for patients receiving mechanical ventilation. *Critical Care Nurse, 31*(3), 46-60. https://doi.org/10.4037/ccn2010728

Guttormson, J. L., Chlan, L., Tracy, M. F., Hetland, B., & Mandrekar, J. (2019). Nurses' attitudes and practices related to sedation: A national survey. *American Journal of Critical Care, 28*(4), 255-263. https://doi.org/10.4037/ajcc2019526

Happ, M. B., Garrett, K., Thomas, D. D., Tate, J., George, E., Houze, M., Radtke, J., & Sereika, S. (2011). Nurse-patient communication interactions in the intensive care unit. *American Journal of Critical Care, 20*(2), e28–e40. https://doi.org/10.4037/ajcc2011433

Happ, M. B., Tate, J. A., Swigart, V. A., DiVirgilio-Thomas, D., & Hoffman, L. A. (2010). Wash and wean: Bathing patients undergoing weaning trials during prolonged mechanical ventilation. *Heart & Lung, 39*(6 Suppl), S47-S56. https://doi.org/10.1016/j.hrtlng.2010.03.002

Hardin, S. R., & Kaplow, R. (2017). *Synergy for Clinical Excellence: The AACN Synergy Model for Patient Care*. (2e ed.). Boston, Mass: Jones & Bartlett Publishers Inc.

Henderson, A. (1994). Power and knowledge in nursing practice: The contribution of Foucault. *Journal of Advanced Nursing, 20*(5), 935-939. https://doi.org/10.1046/j.1365-2648.1994.20050935.x

Henderson, S. (2003). Power imbalance between nurses and patients: A potential inhibitor of partnership in care. *Journal of Clinical Nursing, 12*(4), 501-508. https://doi.org/10.1046/j.1365-2702.2003.00757.x

Hetland, B., Guttormson, J., Tracy, M. F., & Chlan, L. (2018). "Sedation is tricky": A qualitative content analysis of nurses' perceptions of sedation administration in mechanically ventilated intensive care unit patients. *Australian Critical Care, 31*(3), 153-158. https://doi.org/10.1016/j.aucc.2018.02.001

Hofsø, K., & Coyer, F. M. (2007). Part 1. Chemical and physical restraints in the management of mechanically ventilated patients in the ICU: Contributing factors. *Intensive and Critical Care Nursing, 23*(5), 249-255. https://doi.org/10.1016/j.iccn.2007.04.003

Holm, A., & Dreyer, P. (2018). Nurse-patient communication within the context of non-sedated mechanical ventilation: A hermeneutic-phenomenological study. *Nursing in Critical Care, 23*(2), 88-94. https://doi.org/10.1111/nicc.12297

Institut Canadian d'Information sur la Santé [ICIS] (2016). *Les unités de soins intensifs au Canada.* https://secure.cihi.ca/estore/productSeries.htm?locale=fr&pc=PCC1475

Jacq, G., Melot, K., Bezou, M., Foucault, L., Courau-Courtois, J., Cavelot, S., Lang, A., Bedos, J. P., Le-Boeuf, D., Boussard, J. M., & Legriel, S. (2018). Music for pain relief during bed bathing of mechanically ventilated patients: A pilot study. *PLoS ONE, 13*(11), e0207174. https://doi.org/10.1371/journal.pone.0207174

Jasper, M. (2014). Effect of nature-based sound therapy on agitation and anxiety in coronary artery bypass graft patients during the weaning of mechanical ventilation: A randomised clinical trial. *International Journal of Nursing Studies, 51*(4), 526-538. https://doi.org/10.1016/j.ijnurstu.2013.08.003

Karlsen, M. W., Ølnes, M. A., & Heyn, L. G. (2019). Communication with patients in intensive care units: A scoping review. *Nursing in Critical Care, 24*(3), 115-131. https://doi.org/10.1111/nicc.12377

Karlsson, V., & Bergbom, I. (2015). ICU professionals' experiences of caring for conscious patients receiving MVT. *Western journal of Nursing Research, 37*(3), 360-375. https://doi.org/10.1177/0193945914523143

Khalafi, A., Elahi, N., & Ahmadi, F. (2016). Continuous care and patients' basic needs during weaning from mechanical ventilation: A qualitative study. *Intensive and Critical Care Nursing, 37,* 37-45. https://doi.org/10.1016/j.iccn.2016.05.005

Laakso, K., Hartelius, L., & Idvall, M. (2009). Ventilator-supported communication: A case study of patient and staff experiences. *Journal of Medical Speech-Language Pathology, 17*(4), 153-164.

Laerkner, E., Egerod, I., & Hansen, H. P. (2015). Nurses' experiences of caring for critically ill, non-sedated, mechanically ventilated patients in the intensive care unit: A qualitative study. *Intensive and Critical Care Nursing, 31*(4), 196-204. https://doi.org/10.1016/j.iccn.2015.01.005

Landström, M., Rehn, I., & Frisman, G. H. (2009). Perceptions of registered and enrolled nurses on thirst in mechanically ventilated adult patients in intensive care units—A phenomenographic study. *Intensive and Critical Care Nursing, 25*(3), 133-139. https://doi.org/10.1016/j.iccn.2009.03.001

Lewis, S. L., Bucher, L., Heitkemper, M. M., Harding, M. M., Barry, M. A., Lok, J., Tyerman, J., & Goldsworthy, S. (2019). *Medical-Surgical nursing in Canada: Assessment and management of clinical problems* (4e éd.). Elsevier.

Lind, R., Liland, H., Brinchmann, B. S., & Akeren, I. (2018). He survived thanks to a non-sedation protocol: Nurses' reflections about caring for critically ill, non-sedated and mechanically-ventilated patients. *Intensive and Critical Care Nursing, 47,* 54-61. https://doi.org/10.1016/j.iccn.2018.04.006

Lindgren, V. A., & Ames, N. J. (2005). Caring for patients on mechanical ventilation: What research indicates is best practice. *American Journal of Nursing, 105*(5), 50-60. https://doi.org/10.1097/00000446-200505000-00029

Luk., E., Burry, L., Rezaie, S., Mehta, S., & Rose, L. (2015). Critical care nurses' decisions regarding physical restraints in two Canadian ICUs: A prospective observational study. *Canadian Journal of Critical Care Nursing, 26*(4), 16-22

McAndrew, N. S., Leske, J., Guttormson, J., Kelber, S. T., Moore, K. & Dabrowski, S. (2016). Quiet time for mechanically ventilated patients in the medical intensive care unit. *Intensive and Critical Care Nursing, 35,* 22-27. https://doi.org/10.1016/j.iccn.2016.01.003

McKinley, S., Stein-Parbury, J., Chehelnabi, A., & Lovas, J. (2004). Assessment of anxiety in intensive care patients by using the Faces Anxiety Scale. *American Journal of Critical Care, 13*(2), 146-152.

Mortensen, C. B., Kjær, M. N., & Egerod, I. (2019). Caring for non-sedated mechanically ventilated patients in ICU: A qualitative study comparing perspectives of expert and competent nurses. *Intensive and Critical Care Nursing, 52,* 35-41. https://doi.org/10.1016/j.iccn.2019.01.004

Newmarch, C. (2006). Caring for mechanically ventilated patient: part one. *Nursing Standard, 20*(17), 55-66. https://doi.org/10.7748/ns2006.01.20.17.55.c6450

Otuzoğlu, M., & Karahan, A. (2014). Determining the effectiveness of illustrated communication material for communication with intubated patients at an intensive care unit. *International Journal of Nursing Practice, 20*(5), 490-498. https://doi.org/10.1111/ijn.12190

Payen, J. F., Bru, O., Bosson, J. L., Lagrasta, A., Novel, E., Deschaux, I., Lavagne, P., & Jacquot, C. (2001). Assessing pain in critically ill sedated patients by using a behavioral pain scale. *Critical Care Medicine, 29*(12), 2258-2263. https://doi.org/10.1097/00003246-200112000-00004

Perez, D., Peters, K., Wilkes, L., & Murphy, G. (2019). Physical restraints in intensive care–an integrative review. *Australian Critical Care, 32*(2), 165-174. https://doi.org/10.1016/j.aucc.2017.12.089

Powers, J., & Bennett, S. J. (1999). Measurement of dyspnea in patients treated with mechanical ventilation. *American Journal of Critical Care, 8*(4), 254-61.

Riker R. R., Picard J.T., & Fraser G.L. (1999). Prospective evaluation of the sedation-agitation scale in adult ICU patients. *Critical Care Medicine 27*(7), 1325-1329.

Rose, L., Blackwood, B., Burns, S. M., Frazier, S. K., & Egerod, I. (2011). International perspectives on the influence of structure and process of weaning from mechanical ventilation. *American Journal of Critical Care, 20*(1), e10-e18. https://doi.org/10.4037/ajcc2011430

Rose, L., Smith, O., Gélinas, C., Haslam, L., Dale, C., Luk, E., Burry, L., McGillion, M., Mehta, S., & Watt-Watson, J. (2012). Critical care nurses' pain assessment and management practices: A survey in Canada. *American Journal of Critical Care*, *21*(4), 251-259. https://doi.org/10.4037/ajcc2012611

Saadatmand, V., Rejeh, N., Heravi-Karimooi, M., Tadrisi, S. D., Vaismoradi, M., & Jordan, S. (2015). Effects of natural sounds on pain: A randomized controlled trial with patients receiving mechanical ventilation support. *Pain Management Nursing, 16*(4), 483-492. https://doi.org/10.1016/j.pmn.2014.09.006

Saritas, S., Kaya, A., & Dolanbay, N. (2019). Knowledge and practices of intensive care nurses on mechanical ventilation. *International Journal of Caring Sciences, 12*(1), 30-39.

Sessler, C. N., Gosnell, M. S., Grap, M. J., Brophy, G. M., O'Neal, P. V., Keane, K. A., Tesoro, E. P., & Elswick, R. K. (2002). The Richmond Agitation–Sedation Scale: Validity and reliability in adult intensive care unit patients. *American journal of Respiratory and Critical Care Medicine, 166*(10), 1338-1344. https://doi.org/10.1164/rccm.2107138

Tate, J. A., Devito Dabbs A., Hoffman, L., Milbrandt, E., & Happ, M. B. (2012). Anxiety and agitation in mechanically ventilated patients. *Qualitative Health Research, 22*(2), 157-173. https://doi.org/10.1177/1049732311421616

Tembo, A. C., & Parker, V. (2009). Factors that impact on sleep in intensive care patients. *Intensive and Critical Care Nursing, 25*(6), 314-322. https://doi.org/10.1016/j.iccn.2009.07.002

Tracy, M. F., & Chlan, L. (2011). Nonpharmacological interventions to manage common symptoms in patients receiving mechanical ventilation. *Critical Care Nurse, 31*(3), 19-28. https://doi.org/10.4037/ccn2011653

Urden, L. D., Stacy, K. M., & Lough, M. E. (2018). *Critical Care Nursing: Diagnosis and Management* (8e éd.). Elsevier.

Woodrow, P. (2019). *Intensive care nursing: A framework for practice* (4e éd.). Routledge.

Yaman Aktaş, Y., & Karabulut, N. (2016). The effects of music therapy in endotracheal suctioning of mechanically ventilated patients. *Nursing in Critical Care, 21*(1), 44-52. https://doi.org/10.1111/nicc.12159