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CANADIAN ASSOCIATION OF CRITICAL CARE NURSES

Canadian Association of Critical Care Nurses

Vision statement

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

Mission statement

We engage and inform Canadian critical care nurses through scholarship, education, and networking providing 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

From the Desk of the Chief Editor

As the seasons are changing, we at CJCCN continue to change and grow. We have begun to establish some standard content that we believe contains information relevant to critical care nurses, regardless of their role as direct care providers, researchers, educators, policymakers, and leaders.

In this issue, we are thrilled to present a guest editorial by Dr. Lucinda Canty, RN, Dr. Peggy Chinn, RN, and Dr. Christina Nyirati, RN. These innovators and leaders have begun to Reckon with Racism in Nursing in the United States and this has sparked an international conversation. We invite you to learn more about their incredible work and encourage you to join the movement toward anti-racism in nursing. As Canadian critical care nurses, we owe it to our patients, their families, and each other to address issues of racism within the profession. Issues of colonization, and its impact, particularly on Indigenous, First Nation, Inuit, and Métis people, as well as black and people of colour within Canada, are beginning to be spoken about openly. For many, this is a painful topic, and for others, it is foreign, or just background. In the previous issue of CJCCN, we talked about how people do not see colour, and what that means. In this issue, the guest editors show us the impact of racism and offer ways to become enlightened. We are challenged to understand and come to our own reckoning as Canadian critical care nurses.

In addition, we have an article from our partners at ISMP about secondary, piggyback, and concurrent infusion pump delivery. Practice Pearls by Brenda Morgan will focus on neurological assessment, and this is the first of a three-part series to support direct care providers. Finally, there are two manuscripts, one by Dr. Brandi Vanderspank-Wright and Sarah Crowe about the protocol used to revise the Critical Care Standards for the Canadian Association of Critical Care Nurses, and a manuscript by Melissa Richard-Lalonde and her team about the development of a patient-oriented music intervention for use in adult ICUs.

We hope you are engaged, informed, challenged, and inspired by this issue's offerings. We welcome your feedback at any time. Please email "To the Chief Editor" Asha Pereira, RN, PhD, at **cjccneditor@caccn.ca**

Asha Pereira, RN, PhD
Chief Editor, Canadian Journal of Critical Care Nursing™
Canadian Association of Critical Care Nurses

EDITORIAL

History and Future: "Overdue Reckoning on Racism in Nursing"

By Lucinda Canty, PhD, CNM, FACNM, Christina Nyirati, PhD, MSN, RN, Peggy Chinn, RN, PhD, DSc(Hon), FAAN

The summer of 2020 ignited a racial reckoning. COVID-19 exposed the racial disparities that exist in healthcare delivery, and the public murder of George Floyd both created a new awareness of the injustices of racism. This raised several questions: Where is nursing? Are nurses aware of the racism in our discipline and how we work in a system where racism is deeply embedded?

As nurses, we knew we could not sit by and continue to watch from the sidelines as racism impacted the quality of life for nurses of colour and contributed to poor health outcomes among people of colour. We also knew the change that is called for could not be met by lectures and workshops, no matter how well intended. We needed a different approach to address an issue that is so painful and difficult to discuss. The change needed must come from each of us doing the work to confront our attitudes and assumptions about race and how we are all a part of a system that sustains racism. We announced a five-week series of zoom gatherings starting in September 2020, in which we hoped to inspire a process of healing and change.

Lucinda Canty, a Black nurse-midwife whose doctoral dissertation revealed racism as a primary factor in the experiences of Black childbearing women, agreed to serve as the host for the gatherings. More than 100 nurses responded to our invitation for the first session, and Lucinda opened the discussion by sharing her own experiences with racism in nursing and how these experiences had shaped her life, her practice, and her career as a nurse, midwife, educator, and scholar. Lucinda closed her opening remarks by inviting other nurses of colour to also share – an invitation that opened a flood of heartfelt, deep stories that displayed the urgency for change. By the time we had completed the five-week discussion series, we had formed a significant network of nurses – about half of whom were nurses of colour, and white nurses committed to addressing racism in nursing. In our first five sessions, we centred on the voices of nurses of colour. We asked white nurses to not speak, but instead to listen, and to use the Zoom chat to make comments or ask questions. This was done to create an environment where nurses of colour could speak uninterrupted.

We knew this was only the beginning and have continued to meet on Zoom every month. From the beginning, the intention of this project is to bring the voices of Black, Indigenous, Latina/o and other Nurses of Colour to the centre, to explore from that centre the persistence of racism in nursing, and to inspire and form actions to finally reckon with racism in nursing. We are guided by our Principles of Reckoning, which we believe form a "definition" of what it means to be anti-racist in nursing (see **https://nursemanifest.com/ongoing-overdue-reckoning-on-racism-in-nursing/**). The principles of reckoning are read at the start of every meeting. The principles are:

- We claim the courage to join together through the experience of building our anti-racist capacity in nursing.
- We cherish the contributions and honour the voices of Black, Indigenous, Latina/o and other Nurses of Colour, and yield the floor to those voices throughout our time together.
- We recognize that we cannot move forward without a deep understanding of Black, Indigenous, Latina/o and other nurses-of-colour's experiences with racism.
- The insights and recommendations of Black, Indigenous, Latina/o and other nurses of colour are vital to ground our thinking, and to guide our actions.
- We pledge to listen deeply and with respect to any and all expressions of anger, rage, despair, and grief arising from racism.
- We commit to healing those harmed by racism.
- We commit to challenging, resisting, and ending the voices and actions that sustain white privilege.
- We seek to nurture authentic anti-racist awareness.
- We will inspire and nurture action, as we boldly claim an anti-racist identity for nursing.

From the beginning of Overdue Reckoning, hosts, organizers, and those who participated in our Zoom discussions describe how they have been transformed. We all have grown and developed our understanding of racism and know that we all have to play a role in moving nursing forward to become an anti-racist discipline. While we will continue to affirm and validate experiences of nurses of colour, we know that healing cannot occur without action. This requires, in the next phase of the Overdue Reckoning, to be true to our last Principle, as we "inspire and nurture action" through making anti-racist choices.

The project now includes a rich list of resources for anti-racism action (**https://nursemanifest.com/ongoing-overdue-reckoning-on-racism-in-nursing/launch-overdue-reckoning-on-racism-in-nursing/resources-for-overdue-reckoning-on-racism-in-nursing/**), and a series of interviews featuring nurses of color who share their stories and inspire action to create an anti-racist future for nursing (**https://reckoningwithracisminnursing.org/interviews/**). Watch our website for information about the project starting in September, and join our email list for announcements about events coming up! (**https://nursemanifest.com/ongoing-overdue-reckoning-on-racism-in-nursing/join-our-reckoning-on-racism-in-nursing-email-lists/**)

The development of a patient-oriented music intervention (POMI) for use in the adult intensive care unit: Acceptability to critical care experts

Melissa Richard-Lalonde, MSc, RN, PhD candidate, Dr. Nancy Feeley, PhD, RN, FCAN, Dr. Sylvie Cossette, PhD, RN, Dr. Linda L. Chlan, PhD, RN, ATSF, FAAN & Dr. Céline Gélinas, PhD, RN, FCAN

Abstract

Background & purpose: *Pain is prevalent in the ICU at rest and during standard procedures. Clinical practice guidelines recommend a multi-modal approach to pain management, including pharmacological and non-pharmacological interventions. Music has been shown to be efficacious in reducing pain in this clinical setting when played for 20–30 minutes. A preliminary patient-oriented music intervention (preliminary POMI) was developed based on theoretical and empirical knowledge. We aimed to describe the acceptability of the preliminary POMI to critical care experts.*

Methods & procedures: *A descriptive design was used to address the study's aim. Purposive, snowball sampling was used to recruit participants who were ICU clinicians (i.e., seven nurses, one physician, one respiratory therapist, and one social worker) and music therapists (n = 3). Data were collected via video conference, using a six-item questionnaire and a semi-structured interview guide. Six attributes of acceptability were evaluated (appropriateness, suitability, convenience, effectiveness, risks, and undesirable effects), each rated from 0 (not acceptable) to 4 (most acceptable).*

Results: *Nine women and three men aged 27–68 years with 4–36 years of experience working with critically ill adults participated. All acceptability items had a median score ≥ 3 (range, 1–4). Participants highlighted the importance of taking into consideration the patient's music preferences and reported the use of streaming services as convenient. The timing of the intervention was more acceptable at rest or before instead of after a painful standard care procedure.*

Discussion & conclusion: *The preliminary POMI was found to be acceptable to critical care experts for ICU patients experiencing pain at rest. Minor modifications to the preliminary POMI are needed prior to testing the intervention for procedural pain in critically ill adults.*

Keywords: music, pain management, ICU, critically ill adult, nursing, acceptability

Richard-Lalonde, M., Feeley, N., Cossette, S., Chlan, L. L., & Gélinas, C. (2023). The development of a patient-oriented music intervention (POMI) for use in the adult intensive care unit: Acceptability to critical care experts. *The Canadian Journal of Critical Care Nursing, 34*(3), 7–17. DOI: 10.5737/23688653-3437

Implications for nursing

- Clinicians, including nurses, play a key role in pain management as well as in the evaluation of innovative interventions. They evaluated the preliminary patient-oriented music intervention (POMI) as acceptable for use in the adult intensive care unit (ICU).
- Critical care experts highlighted the importance for critically ill adults admitted to the ICU to choose the type of music that they want to listen to. When unable to communicate these music preferences, family members should be invited to participate in the selection of the music on behalf of their loved one.
- Timing of the preliminary POMI is more acceptable either when the patient is at rest or in anticipation of a standard care procedure known to be painful.

Background and purpose

Pain continues to be prevalent in the adult ICU, both at rest and during standard care procedures, leading to the common use of opioids (Burry et al., 2014; Damico et al., 2020; Puntillo et al., 2014). Because of the safety concerns arising from opioid side effects and to optimize analgesia, clinical practice guidelines for pain management for critically ill adults recommend the use of a multi-modal approach, combining pharmacological and nonpharmacological interventions (Devlin et al., 2018). Music, as a complementary nonpharmacological intervention, can reduce pain by 1–2 points on a 0–10 numeric rating scale (NRS) for critically ill adults admitted to the ICU (Richard-Lalonde et al., 2020). Because patients are critically ill and unstable in the ICU, recommendations are to play music within a specific tempo range, such as 60 to 80 beats per minute, to match the recommended heart rate (Guétin et al., 2014; Poulsen & Coto, 2018). Music that is selected by patients produces greater pain relief than music that is pre-selected by researchers (Basinski et al., 2018, 2021; Dobek et al., 2014; Howlin & Rooney, 2021). However, many ICU patients are unable to communicate due to critical illness, mechanical ventilation, sedation, and neurological impairment (Dithole et al., 2016; Happ et al., 2011; Ten Hoorn et al., 2016; Yoo et al., 2020). In such cases, family members are often involved in decisions and communication on behalf of their loved one who is critically ill (Davidson et al., 2017). Furthermore, previous studies have found that some family members of patients admitted to the ICU are interested in contributing to nonpharmacological pain management (Gosselin & Richard-Lalonde, 2019; Richard-Lalonde et al., 2018). Therefore, the involvement of family members should be considered in the development of a novel music intervention.

Developing personalized music playlists with a pre-specified tempo can require extensive time and resources. However, in the ICU setting, there is limited time to create personalized

playlists due to several factors, such as patient sedation, procedural workload, restricted visitation hours, and limited resources (Gagné et al., 2018). At the same time, there is a growing use of music streaming services worldwide giving immediate access to an immense collection of music pieces along with their properties, such as tempo, valence, and arousal (Curry, 2022; International Federation of Phonography Industry, 2022; Spotify AB, 2023; Statista, 2019). Therefore, music streaming technology is an important avenue to rapidly generate individualized music playlists composed of pieces within a specific tempo range.

A preliminary version of a POMI was initially developed (see Table 1 and Supplementary Figure 1 for more details) by integrating theoretical and empirical knowledge, as proposed by Sidani and Braden (2011). Next, to produce a more comprehensive intervention, we sought to further refine the preliminary POMI by acquiring and integrating the experiential knowledge of health professionals with critical care experience. Thus, the goal of this study was to describe the acceptability of the preliminary POMI from the perspectives of critical care experts.

Methods and procedures

Design. This study used a descriptive design and employed both quantitative and qualitative methods to inform the acceptability of the preliminary POMI more fully. Recruitment began after institutional research ethics board (REB) approval (research ethics number: Project # 2020-2273).

Sample. Health professionals with at least three years of experience working with critically ill adults were eligible to participate (Benner, 2004). Twelve ICU clinicians (n = 10) and music therapists (n = 3, with one music therapist also being a bedside nurse) were recruited using a purposive and snowball sampling strategies. This sample size was estimated to be the point at which saturation would be likely to have occurred (Guest et al., 2006).

Table 1
Preliminary POMI Detailed Description

Item	Description	
Brief name	**Preliminary POMI (Patient-Oriented Music Intervention)**	**Refined Version of POMI**
Why?	The goal of the POMI is to use music to act multimodally to reduce pain in ICU adult patients, by targeting multiple dimensions of the pain experience (Guétin et al., 2014; Williams & Craig, 2016).	N/A
What and how (materials and procedures)?	Music is provided to adults admitted to the ICU either via headphones, earbuds, or by music pillow. Although headphones were efficacious in reducing pain in ICU patients who can self-report, some participants have withdrawn from random control trials (RCTs) due to their dislike of headphones, so they should be offered alternative options (Richard-Lalonde et al., 2020). The music offered should reflect the patient's preferences to be effective in pain management (Basinski et al., 2021; Basinski et al., 2018; Dobek et al., 2014; Guétin et al., 2014; Howlin & Rooney, 2021; Richard-Lalonde et al., 2020; Van Criekinge et al., 2019). This can best be accomplished via the use of streaming services, which is the form of music that is increasingly being used, and which gives the listener instant access to tens of millions of music pieces (Musical Pursuits, 2022; Spotify AB, 2019; Statista, 2015). Therefore, the preliminary POMI uses a Web-based tool (linked to Spotify) that can be accessible from any smart device, available at https://pomi.glitch.me (see Supplemental Figure for sample screenshot). The preliminary POMI is designed to be operated by ICU patients and/or family members in a critical care setting (with or without clinician assistance). It requires a limited amount of simple information regarding music preferences to create individually tailored music playlists, drawing from a music streaming service that holds over 80 million songs (Spotify AB, 2022). The generated music playlists tailored to the ICU patients' preferences are composed of pieces that range in tempo from 60 to 80 beats per minute (bpm), as per evidence-based practice recommendations (Poulsen & Coto, 2018).	Music is provided to critically ill adults admitted to the ICU either via headphones or music pillow for those patients able to self-report their preference. The music pillow is the option for patients unable to self-report.
Who provides, and where?	When admitted to the ICU, music preferences are established by the patient or the family (for patients unable to self-report). ICU patients self-administer the preliminary POMI to the extent that they can, with assistance from the family or healthcare providers if necessary. For ICU patients who cannot communicate their music preferences, a family member who has knowledge of their music preferences will act as a surrogate and select music on behalf of the patient.	N/A
When and how much?	A minimum of 20–30 minutes of music from the generated playlist is played either when the patient is at rest, or immediately after a patient undergoes a standard care procedure while admitted to the ICU. This duration is required to obtain an efficacious reduction in pain as evidenced by a recent systematic review (Richard-Lalonde et al., 2020).	Music from the generated playlist is played either when the patient is at rest, or ideally before a patient undergoes a standard care procedure while admitted to the ICU.

Preliminary POMI. The features of the preliminary POMI were determined based on theory and evidence drawn from the literature, including a systematic review and meta-analysis that we conducted on the effect of music on pain in adult ICU patients (Richard-Lalonde et al., 2020). The psychophysiological model of music and pain proposes that music modulates pain multimodally (Guétin et al., 2014; Guétin & Touchon, 2018). More specifically, music acts on the sensory dimension of pain by reducing the pain sensation via the activation of descending pathways of the modulation process (Guétin et al., 2014; Guétin & Touchon, 2018). Music is also proposed to act on the cognitive dimension by diverting attention away from the painful stimulus (Guétin et al., 2014; Guétin & Touchon, 2018). In addition, music can act on the emotional dimension of pain via emotional regulation, leading to a less distressful pain experience (Guétin et al., 2014; Guétin & Touchon, 2018). Behaviourally, music reduces muscle tension, which is a common indicator of pain (Guétin et al., 2014; Guétin & Touchon, 2018). Psychosocially, music promotes communication between patients and caregivers, such as through the discussion and consideration of the patient's music preferences (Guétin et al., 2014 ; Guétin & Touchon, 2018). The preliminary POMI is described in Table 1, as per the TIDieR guidelines (Hoffmann et al., 2014).

Study context. The study protocol was initially submitted to the REB in March 2020. Due to the COVID-19 pandemic, all non-COVID-19 research was suspended in the ICU where the study would have been conducted in person, with patients, family members and clinicians. Therefore, we modified the research protocol for the study to be conducted online only with ICU clinicians and music therapists, thus excluding patients and family members, who could no longer be recruited at that time. The study was approved in December 2020, and we recruited participants and collected data from January to March 2021.

Data collection. Once recruited, one-on-one virtual conference meetings were scheduled (Zoom Video Communications, Inc., Version 5.5.1), where a brief presentation of the preliminary POMI was given. Then, participants answered a sociodemographic questionnaire and a six-item treatment acceptability questionnaire (TAP), followed by a semi-structured interview on the acceptability of the preliminary POMI. Acceptability was evaluated on six attributes (appropriateness, suitability, convenience, effectiveness, risks, and undesirable effects), each rated 0–4 with 0 being not at all acceptable and 4 being very much acceptable (Sidani et al., 2009; Sidani & Fox, 2020). Because pain in the ICU is known to occur at rest and following standard care procedures, each TAP item was evaluated for the preliminary POMI being administered to a patient at rest and following procedures.

The semi-structured interview guide (see Figure 1) included questions addressing the responses on the TAP, in addition to asking feedback on preliminary POMI features (e.g., duration, mode of delivery, etc.).

Figure 1

Semi-Structured Interview Guide

1. What makes the POMI acceptable/unacceptable? (10 min)
    a. … appropriate or not appropriate to address pain?
    b. … suitable or not suitable for the ICU?
    c. … effective or ineffective in reducing pain?
    d. What makes you be willing or unwilling to use the POMI?
    e. Were you familiar with the music proposed in your playlist?
2. Which risk/undesirable effect (if any) might arise from the use of the POMI? (5 min)
3. What is your opinion of the following POMI features? (20 min)
    a. Ability to select music based on personal preferences (genres, tracks, artists)
    b. Use of streaming service (ability to create a playlist; to pause; to skip tracks)
    c. Playing music for a duration of 20 to 30 minutes
    d. Playing music immediately after a painful procedure vs. at rest (when in pain)
    e. Use of headphones to deliver the music vs music pillow
    f. Assistance from family to select music preferences
    g. Assistance from clinicians to use POMI web-based tool
4. What do you like least about POMI? (5 min)
5. What do you like best about POMI? (5 min)
6. What could be done to improve POMI? (5 min)

Data analysis (quantitative data). Descriptive statistics were computed to describe the demographic characteristics of the participants and to summarize the acceptability questionnaire data using the software IBM SPSS Statistics for Windows, Version 23.0. Due to the small sample size, medians and interquartile ranges (IQR) were calculated for continuous variables such as age. Frequencies and percentages were calculated for categorical variables such as gender. For the TAP, median and IQR were calculated for each item, as well as the frequency and percentage of participants who rated the acceptability at least three out of four. The preliminary POMI was considered acceptable if at least 80% of the respondents rated each item at a 3 or 4 (acceptable or very much acceptable) on the acceptability rating scale.

Data analysis (qualitative data). Video recordings of interviews were transcribed as follows. The audio portion was transcribed verbatim by the first author (MRL), who also noted any relevant nonverbal expression from the video portion of the recording. Content analysis was performed by MRL and CG using an unconstrained deductive coding scheme (Elo & Kyngas, 2008). To begin with, transcripts were analyzed deductively by coding relevant data content into pre-determined categories based on the interview guide, including acceptability items (appropriateness, suitability, convenience, effectiveness, risks, and undesirable effects) and POMI features (e.g., duration, mode of delivery, music characteristics). Subsequently, transcripts were analyzed inductively, so that any emerging ideas that did not fit into the pre-determined categories were coded and then used to develop new categories (Elo & Kyngas, 2008, p. 112). Codes were identified, highlighted, and organized into categories using QDA Miner (version 5.0) software. Participants were given pseudonyms to protect confidentiality, and identified as either a clinician (i.e., nurse, physician, respiratory therapist [RT], social worker) or music therapist.

Results

Descriptive analysis. Table 2 describes the sample characteristics. Nine women and three men participated in this study, with a mean age of 42 years old (SD, 13). Participants included music therapists (n = 3), bedside nurses (n = 6, with one bedside nurse also being a music therapist), nurse educator (n = 1), physician (n = 1), respiratory therapist (n = 1), and social worker n = 1), with a mean of 15 (SD, 9.5) years of professional experience working in a critical care setting. At the time of the interview, participants worked either in Canada, France, or the United States of America. The descriptive results for the TAP questionnaire are reported in Table 3.

Table 2

Participant Characteristics

Characteristics	*n* (%)
Gender	
Woman	9 (75)
Man	3 (25)
Profession	
Clinician with no music therapy training	9 (75)
Music therapist	3 (25)
Prior Use of Streaming Services	
Yes	11 (92)
No	1 (8)
Prior Use of Music with Patients	
Yes	10 (83)
No	2 (17)

Note. Participants had a median age of 43 years old (IQR = 21) with a median of 11 years of experience working in a critical care setting (IQR = 15.5); IQR = interquartile range.

Table 3

Treatment Acceptability Preferences Questionnaire Results

Question	Median (IQR) Scores		% Participants who rated ≥ 3	
	At rest	Post procedure	At rest	Post procedure
1. Does the music intervention seem appropriate (logical) to address pain?	4.0 (0.5)	3.5 (1.5)	100	67
2. Is the music intervention suitable for the intensive care unit setting?	4.0 (1.0)	3.0 (1.5)	92	58
3. How willing would you be to support/assist with this music intervention?	4.0 (0.0)	4.0 (0.0)	100	100
4. In your opinion, how effective would the music intervention be in reducing pain?	3.0 (1.0)	4.0 (1.0)	100	100
5. How would you rate the presence of risk involved in the use of this intervention?	3.5 (2.0)	3.0 (2.0)	75	67
6. How would you rate the presence of undesirable effects caused by this intervention?	3.0 (1.5)	3.0 (2.0)	75	75

Note. IQR = Interquartile range; questions 5 and 6 were reverse coded so that higher values represent higher levels of acceptability.

Content analysis. Content analysis was based on the qualitative analysis of the interview transcripts. The categories included the items of the TAP questionnaire (appropriateness, suitability, effectiveness, convenience, and risks/undesirable effects), the use of a music streaming service, duration, timing, mode of delivery, ability to control the music, the role of family, the role of clinician, standardized playlist, as well as the ICU environment.

Appropriateness. All participants rated the intervention as appropriate (at least ¾) to address pain when administered at rest. One participant explained: "les gens sourient, les gens sont décontractés, quand ils aiment la musique, et vous allez voir tout de suite, je pense" ["people smile, people are relaxed, when they like the music, and you will see that right away, I think"] (participant "Charlie", clinician). Four participants (33%) considered the intervention as less appropriate (ratings <3/4, with 2/4 as lowest score) if administered following a standard care procedure known to be painful. Reasons given were the anticipated difficulty in coordinating with standard care procedures (n = 2) and the likelihood that a patient prefers to not be stimulated after a procedure (n = 2): "sometimes after a procedure, you just want to be left alone, without any outside stimulation" (participant "Kim", clinician).

Suitability. Eleven participants (92%) rated the intervention as being suitable for the ICU setting when administered at rest, apart from one participant. This participant recommended to modify the intervention by controlling the tempo progression so that the tempo should slow down gradually (i.e., from 80 bpm to 60 bpm, as the playlist progresses) and to increase the duration of the intervention to at least 35–45 minutes, instead of 20–30 minutes, for the intervention to be suitable for the ICU. Five participants (42%) rated the intervention to be less suitable (ratings <3/4) when administered after a standard care procedure known to be painful because of anticipated timing issues (n = 2) and expectation that a procedure would increase pain to a level that is too high to want to listen to music (n = 3): "after the procedure, the damage is done" (participant "Kim", clinician).

Convenience. Regarding the willingness to support/assist in providing the intervention, all participants reported the rated intervention as being acceptable (scores ≥3 out of 4) both at rest and post-procedure. One participant shared : Oui, je l'appuierais [POMI]. Je sais qu'il… y aurait beaucoup d'étapes, là, compte tenu de nos logiciels, en ce moment au (lieu de travail), mais ça serait probable. Je laisse déjà mon identifiant [d'employée] dans les chambres des patients pour [que le patient ait accès à l'ordinateur qui joue la musique]. [Yes, I would support [POMI]. I know that… there would be several steps, taking into consideration our software, at the moment, at [the hospital where I work], but it would be probable, I already leave my [employee] ID in the patient room for [the patient to have access to the computer that plays the music].] (participant "Drew", clinician).

Effectiveness. Regarding the anticipated effectiveness of the intervention, all participants reported the intervention as being acceptable (scores ≥3 out of 4) both at rest and post-procedure. One participant explained : "Dans les deux cas, je dirais que je pense que c'est un potentiel important, au moins 3 [sur 4]. Par contre, combien ça pourrait atténuer une douleur ? J'aurais tendance à penser que ça atténuerait moins pendant une procédure qu'au repos" ["In both cases, I would say that I think it has good potential, at least 3 [out of 4]. However, how much could it attenuate pain? I would tend to think less so during a procedure than at rest"] (participant "Charlie," clinician). One participant refused to answer the question on effectiveness because she did not feel qualified to provide an answer.

Risks and undesirable effects. The most frequently reported risks and undesirable effects were the undesired emotional reaction to music (n = 7); pressure sores/pain caused by headphones (n = 5); cross-contamination because of shared equipment between patients (n = 4); and too many wires (linked to headphones or pillow) in a setting that already has many (n = 4). When referring to the risk of an undesired emotional reaction, one participant stated that "[a patient] can hear a song that might bring up emotions that [they] weren't anticipating or expecting … or for someone who's had traumatic experiences, a song or a piece of music might trigger that traumatic experience… [With the POMI], patients have control of the app, which allows them the choice of music [and] giving patients the power of choice helps to minimize this risk" (participant "Jay", music therapist).

Use of a music streaming service. Several advantages were reported about the use of a music streaming service, such as the accessibility to a vast selection of music, allowing it to accommodate the patients' preferences, regardless of age or culture (n = 9). Another advantage noted by participants was the ability to play music continuously without having ads interrupt the intervention (n = 3). Reported technical constraints included needing to have access to Wi-Fi (n = 8) and to be familiar with the technology (n = 6).

Duration. All participants reported that 20–30 minutes of music was an acceptable duration, with 10 out of 12 participants (83%) stating that a longer duration would be acceptable, depending on the individual patient preferences: "I could see other people wanting more, and I could see people that I've worked with who would say 'No; 20 to 30 minutes is good' or 'Nothing'" (participant "Ezra", music therapist).

Timing (rest versus post-procedure*)*. Nine participants (75%) reported that providing the intervention after a standard care procedure known to be painful would not be as optimal as providing it before the procedure:

> *Je verrais encore plus l'effet si on le faisait avant. Là, je le sais, au niveau recherche, c'est plus challengeant, là, mais dans la pratique clinique, je me demande si ça serait pas plus pertinent de le faire quasiment avant que après… parce que si l'idée c'est de libérer les endorphines, j'ai l'impression que de les avoir avant, dans ton corps, avant la procédure douloureuse, ça va diminuer le pic de douleur [I would see the effect even more if [the intervention] was done before. I know that for research, it's more challenging, but in clinical practice, I wonder if it wouldn't be more pertinent to do [the intervention] before instead of after… because if the idea is to release endorphins, I think that having them before, in your body, before the painful procedure, that will reduce the pain peak…]* (participant "Alex", clinician).

Mode of delivery. Six participants (50%) reported a preference for the music pillow "I find the pillow very impressive … it frees you up from having one more thing on your body, in the ICU" (participant "Hayden", clinician), especially for the patients unable to communicate: "I think the pillow would probably be more comfortable … we have patients who are comatose… and I think the pillow would be more appropriate with them" (participant "Inali", clinician). Others preferred the use of headphones ($n = 4$) "I like to make sure that I'm blocking out, especially in an ICU, because they're kind of noisy, that we're blocking out that sound because then it enhances the music listening experience" (participant "Jay", music therapist). On the other hand, earbuds were reported as being most problematic (i.e., risk of getting lost, least comfortable option, difficult to clean properly) and, therefore, less acceptable in an ICU setting. Two participants had no preference with regard to the mode of delivery of the POMI.

Ability to control the music. Eight participants (67%) mentioned the importance for the patients to have control over the music intervention:

> *C'est le contrôle qu'on donne aux patients. Moi j'y crois beaucoup que c'est important. Les patients, ils [n'ont] de pouvoir sur rien aux soins intensifs. Si au moins, ils pouvaient avoir un petit peu de pouvoir qu'on peut leur donner l'autonomie, ça nous permet de mieux les connaître, il y a toutes sortes d'autres avantages que la douleur. Pour l'avoir testé [l'utilisation de la musique] sur plusieurs patients, souvent, ça diminuait aussi leur anxiété, pis ça a diminué leur douleur pour la plupart, aussi. [It's the control that we give patients. I strongly believe that this is important. The patients, they have no power over anything in the ICU. If, at least, they could have a little bit of power that we could give them, this allows us to get to know them… Having tested [the use of music] on several patients, often… it reduced their pain, for the majority]* (participant "Alex", clinician).

Family role. All participants agreed that asking the family about their loved one's music preferences is acceptable when the patient is unable to communicate their preferences. Three participants (25%) noted that the music intervention could also be helpful to the family, either because they could also listen to the music, or because they could feel comforted if the music intervention was beneficial to the patient. One ICU nurse shared the following story that happened on her unit, when a family member was not consulted in the music selection of the patient admitted to the ICU:

> *C'était un patient … incapable de communiquer… Fait que nous, on lui mettait des chansons sur YouTube, tsé des listes, pis ça part, un vidéo entraîne un autre vidéo, pis ça continue, et sa conjointe, qui était dévastée, déjà, [par l'état de santé du patient], elle arrive, et c'est genre le groupe qu'il déteste le plus au monde qui joue, … je pense qu'elle, ça l'a fait flipper, parce qu'elle … c'est la seule affaire qu'elle contrôle, dans toute l'expérience… fait que c'était pas, rien de grave, le patient, lui, il peut pas nous communiquer à ce moment-là, mais l'effet que la famille a ressenti comme si on le prenait pas en considération… il n'y a pas eu, rien n'est arrivé au patient, c'est juste une espèce de situation avec la famille, là… ça les a un peu déçu… [This was a patient who… was unable to communicate... So, we were playing some songs on YouTube, you know playlists, they start, and then one video leads to another, and it goes on… and his partner, who was devastated already [by his state of health], arrives in the room, and it's the [music] band that [the patient] hates the most in the world, you know… I think that made her flip, because … it's the only thing she can control, in the whole event… so it's nothing too serious, the patient, he cannot communicate at this time, but the impact that the family felt was as if we did not take him into consideration… nothing happened to the patient, it's just a sort of situation with the family that… they… were a bit disappointed, you know.]* (participant "Drew", clinician).

On the other hand, another ICU nurse shared a different personal experience that occurred when a family member requested personalized music for a patient admitted to the ICU in an end-of-life context:

> *La semaine passée, je faisais des soins de conforts palliatifs à un patient aux soins intensifs, et la conjointe m'a demandé si c'était possible de mettre de la musique de préférence du patient pendant le moment où il décédait... Pis lui, ce qu'il aimait, c'était le death métal, ok? Fait que, est-ce que c'était un peu spécial d'avoir du death métal au chevet du patient pré-mortem? Tout à fait! Mais la conjointe était vraiment satisfaite, et le patient était très satisfait lui aussi. Ça fait que, perso, je pense que c'est très, très intéressant comme intervention. [Last week, I was giving comfort care to a patient in the ICU, and the partner asked me if it would be possible to play music preferred by the patient at the time that he wouId die... What he liked was death metal, right? So, was it a bit special to have death metal at the bedside pre-mortem? Absolutely! But the partner was really satisfied, and the patient was really satisfied too. So, personally, I think this [POMI] is a very, very interesting intervention.]* (participant "Blake", clinician).

Clinician role. Although all participants reported being willing to support/assist in providing the intervention, eight (67%) suggested that clinicians be trained to do so, or that a document be created of the steps for clinicians to know how to administer the intervention. Five participants (42%), including all three music therapists, recommended that clinicians assess and follow-up with patients during the music intervention in case of the need to readjust the music (either by stopping or changing the music being played) based on the patient's response:

> *We should, if we're putting music on someone we do want to observe their response to it, especially if they don't have words or can't communicate. What are we seeing in their behaviour? Even if it's 'they're grimacing' or we're seeing tears, then we should pay attention to that. I think that we certainly don't want to overstimulate someone if they're already in a very fragile state, so I think it's really important that we don't just put something on and then we just walk away" (participant "Jay", music therapist) and "it's like a debrief: 'how was that for you? … I noticed that you seem sad, is that [so]?'"* (participant "Ezra", music therapist).

Four participants (33%) raised the idea that the music could also be beneficial to clinicians and lead to improvement in the

clinician-patient communication. On the other hand, two participants (17%) mentioned that in their experience, clinicians sometimes prefer to listen to music that is different from their patients' preferences. Thus, the patients' music preferences may not always match the clinicians' preferences.

Standardized playlist. Nine participants (75%) stated that they would like to have an option for a "standard-type" playlist that they could use with patients whose music preferences were unknown:

> *My concern with ICU population is that most of them will be sedated paralyzed, most of them will not be able to voice their preference, and I was wondering if there is some universal tune or universal type of music, like one size fits all. So, if we could find this, that would be amazing*" (participant "Kim", clinician), and also:

> *Je ne pense pas que d'imposer, c'est nécessairement bon. Par contre, quand on est dans l'impossibilité de demander l'avis des patients, il faudrait peut-être que ce soit quelqu'un qui choisisse pour eux autres, à ce moment-là, et de voir, peut-être, la réponse au choix qu'on a imposé et essayer un autre choix si on voit que ça ne fonctionne pas; peut-être qu'on n'est juste pas tombé sur le bon à ce moment-là [I don't think that it's necessarily good to impose [a type of music]. However, when we are unable to ask the patients' opinion, maybe it should be someone that chooses for them, in that case, and to see, maybe, the response to the choice that was imposed, and try another choice if we see that it doesn't work; maybe we just didn't find the right one at this specific moment in time…]* (participant "Leslie", clinician).

ICU environment. Seven participants raised the notion that the ICU is known to be a noisy, distressful environment, and preferred music can help palliate this situation by creating a more familiar environment for the patient:

> *Il y a aussi un enjeu de ramener, un peu, du contexte naturel de la personne dans ses soins, parce que, mine de rien, chez nous, moi je vais pas rester là en train de faire, mettons, je sais pas; si je vais au fauteuil pendant toute la journée, ben je vais pas regarder le mur pendant toute la journée. Fait que d'avoir de la musique, c'est certain que ça rapproche le patient d'un contexte un peu plus naturel… il y a un peu d'humanité là-Dedans; de retrouver un peu de la personnalité de la personne, pis lui donner un peu de choix dans son environnement; d'avoir un environnement familier; un environnement où elle se sent un peu plus « at home »; fait que ça, c'est peut-être un point que je trouve qui est bien. [There is also the issue of bringing back a little bit of the person's natural context in their care because, it may not sound like much but, at home, I am not going to stay there…if I am going to sit on a chair all day, well I'm not going to stare at the wall all day. So having music, for sure, brings the patient closer to a more natural context… there is a bit of humanity in there; to recover a bit of the person's personality and give them some choice in their environment; to have a familiar environment where they feel a bit more at home]* (participant "Blake", clinician).

> *Je trouve que, [la musique], c'est plus présent maintenant, depuis mars [2020]... Je pense que c'est vraiment le fait que nos patients … n'ont pas de famille, pas de visite, nous on va moins les voir aussi, ils ont moins de consultants qui rentrent dans les chambres. Donc, oui, j'ai l'impression que pour pallier à ça, les infirmières ont commencé à utiliser la musique. [I find that [music] is more present now, since March [2020] … I think that it's really because our patients… have no family, no visit, we don't go in to see them as often, there are fewer professionals entering their rooms. So yes, I get the impression that to palliate this, nurses have started to use music]* (participant "Drew", clinician).

Discussion

More than 80% of participants rated the preliminary POMI as acceptable when provided to patients while at rest. In contrast, some participants found it to be unacceptable if provided immediately after a standard care procedure known to be painful. Instead, participants reported that the intervention should be provided before a standard care procedure known to be painful, in line with current clinical practice guidelines and preventive analgesia in anticipation of a noxious stimulus (de Jong et al., 2013; Devlin et al., 2018; Vadivelu et al., 2014).

To mitigate the risks and undesired effects that were noted, participants recommended that a strict disinfection protocol should be in place and approved by the infection prevention and control department when the material is shared among patients; for example, medical-grade disposable headcovers can be used for headphones. Additionally, participants advised that those who administer the POMI to ICU patients should pay attention to any undesired reaction (e.g., grimacing, crying) to the music and adjust the intervention, if needed, by either changing the type of music or stopping it. Participants recommended that patients should always be given as much control over self-administration of the intervention, to the extent that is possible in the context of critical illness. Finally, participants suggested that wireless options should be prioritized when possible and the music pillow utilized over headphones for patients unable to communicate to reduce the risk of pressure injury and/or discomfort due to wearing headphones.

Giving patients the ability to control the music selection and delivery (i.e., self-administration, when possible, to promote a sense of control) was considered by participants as an important feature of the preliminary POMI. This is in line with what is reported in the literature in other clinical settings, where the perception of control in music selection can increase the analgesic effect (Howlin & Rooney, 2021; Howlin et al., 2022). Related to this, participants agreed that an important criterion for acceptability of the preliminary POMI is that the music selection should be congruent with individual patient preferences. More specifically, the music played should be what the patient wants to hear in the moment, as defined by the individual, which can be specified in terms of genre, artists, specific pieces, and/or music characteristics, such as valence (emotion, ranging from negative to positive, perceived as being encouraged by the music, e.g., melancholic versus cheerful), and arousal (energy). Studies on the use of music listening interventions for pain management have found that sometimes, patients want to listen to "low energy" music (e.g., a Bach prelude) while in other cases, patients prefer "high-energy" music, such as death metal, which can be different from what some clinicians might expect (Howlin & Rooney, 2020; Howlin et al., 2023).

This is also in line with the literature that preferred music characteristics play an important role in pain reduction (Basinski et al., 2018; 2021). Related to this, some participants proposed that the preliminary POMI should not only ask what music the patient would like to listen to (i.e., to know what to add on to the individualized playlist), but also what music the patient does not want to listen to (i.e., to know what to remove from the individualized playlist). For ICU patients unable to communicate their preferences, participants supported the involvement of family members in determining the patient's music preferences.

Regarding clinician involvement in the provision of the preliminary POMI, participants suggested the option of having a standard playlist as a desirable addition to the intervention. However, participants specified that such a pre-specified playlist should only be considered when the patient is unable to communicate their preferences, and there is no one (e.g., family member) who knows and can communicate the patient's music preferences with the care team. Standard playlists have been used in research, and there is some evidence that these can also be effective in reducing pain in adult ICU patients (Richard-Lalonde et al., 2020). However, to date, there is insufficient data to support the use of standardized music characteristics to objectively produce analgesia (Martin-Saavedra et al., 2018). Therefore, more research is needed to determine the possibility of developing such standardized music playlists for pain management purposes and to determine for whom this type of standardized playlist would work.

In this study, participants agreed that the use of smart devices to provide the intervention was acceptable. This is consistent with findings from a previous study in which the use of an electronic tablet was found as acceptable and feasible as a mode of delivery to provide music in the ICU setting (Knudson et al., 2018).

According to the theoretical framework used to guide the development of the POMI, music modulates pain multimodally by acting on the sensory, cognitive, emotional, behavioural, and psychosocial dimensions (Guétin et al., 2014; Williams & Craig 2016). Many of the categories related to POMI discussed by participants in this study, drawn from their personal perspectives, can also be linked with how music is proposed to act on the different dimensions of pain, both theoretically and empirically.

More specifically, most participants in this study agreed that a wide range of music choices using a music streaming service was an important component of the preliminary POMI, allowing access to a wide range of music choices. This is consistent with theoretical and empirical evidence that preferred music (i.e., based on individual preferences) acts on the emotional (affective pathway) and cognitive (redirection of attention) dimensions of pain (Basinski et al., 2021; Guétin et al., 2014; Villareal et al., 2012). In addition, several participants in this study mentioned the importance of giving patients more control in the selection of music to increase the efficacy of the music on pain. Providing such control to patients has also been reported in the literature as modulating pain via cognitive and emotional processes (Garza-Villarreal et al., 2017; Guétin et al., 2014; Howlin & Rooney, 2020).

The relaxation of facial expressions that occurs when listening to music, as reported by some participants, is consistent with the behavioural dimension of pain, whereby music acts on muscle tension, as proposed in the theoretical framework and further evidenced by empirical data (Guétin et al., 2014; Tan et al., 2010; Van Criekinge et al., 2019).

Participants in this study proposed that the POMI should be used to address procedural pain by timing the intervention prior to the procedure in anticipation of the painful stimulus. This use of music to pre-emptively decrease the pain intensity peak is analogous to pharmacological approaches to procedural pain management and pertains to the sensory dimension of pain, by which music attenuates the sensation of pain (Devlin et al., 2018; Guétin et al., 2014).

Participants in this study also reported on the use of music to improve the clinician-patient-family relationship stating that music could also be beneficial to family and clinicians, provide a more comfortable environment, and palliate the social isolation from the pandemic context in the ICU. These reported perspectives fit directly with the psychosocial pathway through which music is proposed to modulate pain by promoting communication and encouraging communication between patients and caregivers (Guétin et al., 2014; Guétin & Touchon, 2018). Thus, in addition to the sensory, emotional, cognitive, and behavioural dimensions of pain, the POMI could be used to target the psychosocial dimension of pain by improving the caregiver-patient communication, providing a more comfortable, familiar environment, and reducing the feeling of isolation. This is especially relevant in the context of the COVID-19 pandemic, as well as in other situations (e.g., due to infection or immunosuppression), where patients tend to be more isolated and stay longer in the ICU (Rivi et al., 2021).

Limitations

The participants in this study were limited to clinical experts who volunteered. We could not recruit ICU patients and family members because of the COVID-19 pandemic context at the time of the study. Therefore, the protocol was adapted, and the acceptability of the preliminary POMI was assessed only by clinical experts. However, in the next steps, ICU patients and families will be asked for their input on the acceptability of the refined preliminary POMI, as part of the pilot testing that will follow this study (Richard-Lalonde et al., 2023).

Conclusion

The preliminary POMI was found to be acceptable to participants for ICU patients experiencing pain at rest. Based on the feedback of the participants, modifications will be made to refine the preliminary POMI, including administration of the intervention before, instead of after, standard care procedures known to be painful. The refined preliminary POMI will be pilot tested in the adult ICU to describe the perspectives of not only clinicians but also patients and family members of patients unable to self-report.

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Supplementary Figure

Screenshot Sample of Web App for POMI

Revising the Canadian Association of Critical Care Nurses Standards for Critical Care Nursing Practice: A Modified Delphi Protocol

Brandi Vanderspank-Wright, PhD, RN, CNCC(C), Sarah Crowe, MN, PMD-NP(F), NP, CNCC(C), for The Canadian Association of Critical Care Nurses, National Board of Directors

Abstract

Background: *Since 1992, the Canadian Association of Critical Care Nurses (CACCN) has set the Standards of Practice for Canadian critical care nurses. The current Standards were revised in 2017, after undergoing the fifth review since inception. The Association's practice has been to review the Standards approximately every five years.*

Aim: *The aim of this protocol is to provide a transparent and replicable process for Standards revision.*

Methods: *A two-phased design that includes a systematic review modelled on Joanna Briggs Institute (JBI) Scoping Review methodology and second, a Modified-Delphi consensus process. The reporting of this protocol is guided by PRISMA-P reporting guidelines.*

Outcomes: *All items included in the final consensus will be utilized to create the revised sixth edition of the CACCN Standards for Critical Care Nursing Practice. The standards will be published in the Canadian Journal of Critical Care Nursing, posted on the CACCN website (www.caccn.ca), and shared among the CACCN network to help inform Critical Care Nursing practice in Canada.*

Keywords: practice standards, systematic review, modified-Delphi, critical care nursing, protocol

Vanderspank-Wright, B., & Crowe, S. (2023). Revising the Canadian Association of Critical Care Nurses Standards for Critical Care Nursing Practice: A Modified Delphi Protocol. *The Canadian Journal of Critical Care Nursing, 34*(3), 18–21. DOI: 10.5737/23688653-34318

The Canadian Association of Critical Care Nurses (CACCN) is the national association representing critical care nurses (CCN) in Canada. Since 1992, the CACCN has set the standards of practice for Canadian CCNs. Standards of care provide legal guidance for what constitutes "safe and appropriate patient care" (Shapiro, 2019, p.102); nurses "are obligated to provide knowledgeable, competent, and safe care and act in the best interests of their patients" (Shapiro, 2019, p.101). Standards of practice also "delineate the scope, function, and role of the nurse in practice" (Shapiro, 2019, p.102). The Standards for Critical Care Nursing Practice (CACCN, 2017) are used to guide and to provide a resource for CCNs to ensure that best practices are utilized in Canadian critical care units. The Standards provide broad, overarching guidance that is then individualized at the unit level to ensure high quality care is provided to all patients and families accessing critical care in Canada.

The current Canadian Standards were revised in 2017, after undergoing the fifth review since inception. The Standards were initially developed utilizing literature reviews and expert nurse input in the past (Kidd et al., 1987). Although every attempt to complete a robust review has been made in the past, with the exception of the first published standards, there has not been a defined, standardized methodological process applied to the development or the review. Therefore, the aim of this protocol is to provide a transparent and replicable process for Standards revision. The reporting of this protocol is guided by PRISMA-P reporting guidelines.

Methods

Design: A two-phased design that includes a systematic review modelled on Joanna Briggs Institute (JBI) Scoping Review methodology and second, a Modified-Delphi consensus process.

Phase I: Identifying critical care nursing standards

In consultation with a medical information specialist, we will develop a rigorous search strategy to identify existing critical care nursing standards. The search will be two-fold.

First, we will conduct a systematic search of peer-reviewed publications specific to critical care nursing standards of practice. Dates for the search will be limited to 2017 to present, with the rationale that the current CACCN Standards were published in 2017. Language limits will be set to English and French given that these are the two official languages used in Canada. The following databases will be searched: Medline-OVID, CINAHL, Nursing & Allied Health. The search strategy will be developed in Medline and peer-reviewed. It will then be translated and executed into the remaining databases.

Second, we will conduct a robust grey literature search. Given the Canadian healthcare structure, which is under the auspices of individual provinces and territories, we will carefully collect all existing critical care nursing standards in Canada. Further, we will ensure that our grey literature search explores all major critical care nursing associations/federations. The latter will include a thorough review of websites and contact with each association via email if necessary. As a preliminary attempt to create a list of critical care nursing associations, we have drawn

on the membership of the World Federation of Critical Care Nurses (WFCCN) membership.

Citations retrieved from the first systematic search will then be uploaded into Covidence for screening. All duplicates will be removed. We will then use a two-step screening process completed by two reviewers who will act as independent reviewers. First, the title and abstract will be screened followed by full-text screening. In instances where consensus is needed, the two principal investigators (BVW or SC) will discuss and attempt to reach consensus. If consensus cannot be reached, a third expert will be consulted. A review of reference lists of included articles will also be done to satisfy hand-searching. A PRISMA flow diagram will be used to illustrate the screening process. Inclusion and exclusion criteria have been determined a priori and are articulated in Table 1.

For grey literature, we will search and include all documents that clearly indicate they are critical care nursing practice standards and collaborate with our medical information specialist for strategies to ensure we have adequately identified this literature.

Table 1

Inclusion and Exclusion Criteria

Inclusion	Exclusion	Rationale
Practice Standards	All other literature	We are specifically looking for practice standards.
Nursing	All other disciplines	We are specifically looking for practice standards that guide nursing practice.
Critical Care Defined as: Intensive Care Level 2 or 3 Neonatal, Pediatric, Adult	All other practice settings	Level 2 and 3 Critical Care Units are categories used within the Canadian context. This may include High Acuity Units and/or Progressive Care Units.

Quality appraisal

For peer-reviewed publications retrieved in the systematic search, we will use JBI quality appraisal tools. We will not exclude based on quality.

Data extraction

We will approach data extraction in two ways. First, from the peer-reviewed literature, we will extract the following data using the extraction tables.

Data Synthesis

Following extraction of the data from both the systematic search and grey literature retrieved we will then synthesize the extracted standards. We will engage in a process of mapping the standards against one another. Critical care nursing standards are generally written in the following way: an overarching standard statement and then more granular/itemized elements that reflect how the standard is actualized in clinical practice. As a result, we will group all high-level statements together and include all itemized elements with their respective statements.

The identified and mapped standards will be used to begin the Modified Delphi process. The findings from Phase 1 will constitute the literature review for this Modified Delphi.

Phase 2 – Modified Delphi

Design

A Modified Delphi modelled on Keeney et al. (2011).

Sample – Expert Panel Composition

We will establish an expert panel to participate in the consensus building process. We will aim to have maximum variation in our expert panel. We will recruit critical care nurses in a variety of roles (see Table 2), provinces and territories, as well as representation from rural, remote, community and academic centres and adult, pediatric, and neonatal clinical contexts. We will also ensure CACCN National Board of Directors Member representation in addition to the project leads (BVW, SC). All participants who express interest will be invited to participate. All participants must be members of the CACCN; have a minimum of 5 years of experience in critical care; and be actively practicing in critical care in Canada.

Extraction Table 1.0

Study ID#	Author and Title	Publication, Year	Country of Origin	Methodology Used to Establish Standards	Practice Setting Description	Sample Size	Data Collection	Data Analysis

Extraction Table 2.0

Setting Characteristics

Study ID#	Author and Title	Population: Neonatal, Pediatric, Adult	Unit Classification	Hospital Setting (Academic, Rural, Community) if described

Extraction Table 3.0

Reported Standards

Study ID#	Author and Title	Reported Standards	Supporting Evidence +/- GRADE[2] if reported

Table 2

Nursing Roles

Nursing Role
Clinical Nurses
Advanced Practice Nurses
Nurse Educators
Nurse Managers (Assistant)

Recruiting Expert Panel Members

The CACCN head office will send an email communication to the membership advertising the recruitment. Interested participants will be asked to provide relevant demographic information through a link to an online survey using the University of Ottawa's secure Survey Monkey to ensure that we satisfy the representation needed for the expert panel. Interested participants will be asked to provide their email address for future communication about the study including the Delphi rounds. Only the two project leads (BVW and SC) and the research assistant(s) will have access to the master list of participants' demographics and emails.

Data Collection – Delphi Rounds

All rounds of this Modified Delphi will be completed as follows: Using the online survey platform, Survey Monkey (license held by the University of Ottawa), we will seek consensus on revisions to the Standards. The first round will focus on the overarching standards statements/themes while the second, third (and fourth if necessary) rounds will focus on the itemized elements within each overarching standard statement. Each round will consist of six weeks, using Dillman's (1978) Total Design for Survey Research for survey distribution and reminders. An email with the electronic survey link to participate in the round will be sent with two reminders sent at weeks two and four.

All standards statements/itemized elements will be assigned a 5-Likert scale defined as follows: **1 – Not Applicable**, **2 – Not at All Important**, **3 – Somewhat Important**, **4 – Important** and **5 – Essential**. Consensus for rounds 1-3 will be established a priori as 75% based on recommendations from Foth et al. (2016).

In **Round 1**, overarching statements that are ranked at 4 and 5 with a minimum of 75% consensus (Important and Essential) will move forward to Round 2. Participants will be given the opportunity to identify missing elements that should be included through an open-ended question.

In **Round 2**, all itemized elements associated with the overarching statements will be included as well as missing elements identified from the open-ended question. Each element will require a rating. In this round, any element with a ranking of 4–5 with a 75% consensus will move forward to Round 3.

In **Round 3**, only elements ranked at 4 and 5 with a 75% consensus will move forward and constitute final consensus on the included Standards. If a fourth round is necessary because consensus was not reached during Round 3, we will require a 75% consensus on items ranked at Essential only.

In order for a participant to partake in a round they must have completed the previous round (if applicable; e.g., this would apply to all but Round One). We will track participation based on the 4-digit code created by participants. For Rounds 2–4, invitations to participate will only be sent for subsequent rounds based on confirmation of participation in the previous.

Data analysis

Analysis of data collected in each Delphi round will be analyzed primarily through descriptive statistics (N, %). Open ended Responses from Round 1 will be summarized, organized thematically and transformed into a standard statement.

Ethical considerations

Ethics consultation occurred and this project was deemed quality improvement by the University of Ottawa Research Ethics Board. We will seek implied consent from all participants at the beginning of each Delphi Round as part of the electronic survey. As indicated, participants will create a 4-digit identifier that will be used as their unique participant code to track participation across the Delphi rounds. A master list of participants and codes will be kept separately from the data and will be housed on the uOttawa secure SharePoint server. Only the principal investigators (BVW and SC) will have access to the master list. All collected data will be stored on uOttawa Survey Monkey account or in a separate, secure uOttawa SharePoint file. All files, folders, and platform access will be password protected. All uOttawa software/platforms/servers require a two-factor authentication.

Data will be kept for the maximum conservation period and at minimum until the next CACCN Standards revision. Following publication of the 6th edition of the Standards, the data will then be safely destroyed.

Outcomes and Prioritization

Upon completion of the final round of the Delphi, the elements ranked at 4 and 5 with a 75% consensus will move forward and constitute final consensus. All items included in the final consensus will be utilized to create the revised sixth edition of the CACCN CCN Standards. The standards will be published in the Canadian Journal of Critical Care Nursing, posted on the CACCN website (www.caccn.ca), and shared among the CACCN network to help inform CCN practice in Canada.

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Secondary, piggyback, or concurrent: How does your infusion pump deliver?

By Lynn Riley, RN, Dorothy Tscheng, RPh

Riley, L., & Tscheng, D. (2023). Medication Safety Practice Corner: Secondary, piggyback, or concurrent: How does your infusion pump deliver?. *The Canadian Journal of Critical Care Nursing, 34*(3), 22–26. DOI: 10.5737/23688653-34322

ismp CANADA Report a med error

In this regular column, ISMP Canada will feature a critical care-related medication story and share practical learning for critical care nurses.

Nurses are often faced with using different types of pumps, even within the same facility. During programming of an infusion pump, correct set-up depends on the user recognizing the various ways in which intravenous fluids and medications can be delivered by the pump. The Institute for Safe Medication Practices Canada (ISMP Canada) has analyzed several error reports related to infusion pump set-up. This article highlights one of these incidents, describes infusion set-ups and pump delivery modes, and shares learning to prevent harm to patients in critical care settings.

Reported incident from an intensive care unit

A pump was set up with the intention to administer two intravenous fluids at the same time, each containing a different critical additive. The infusion pump was programmed using the piggyback mode rather than the concurrent mode. As a result, the contents of only one bag were infused before the error was detected. This error led to serious patient harm.

Infusion set-ups and pump delivery modes

Primary infusion

Figure 1 (right) shows the set-up for intravenous infusion of a primary fluid at a consistent rate for a prescribed time through a large-volume infusion pump (Cassano-Piché,et al., 2012).

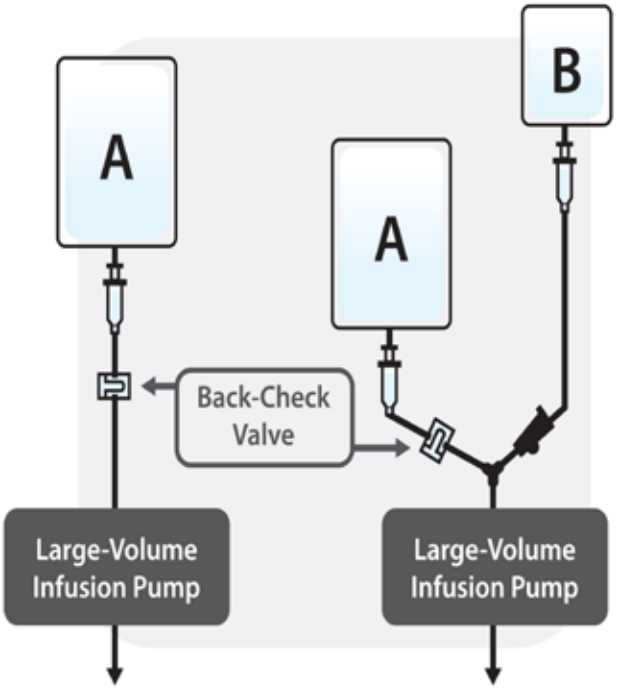
Secondary infusion

A secondary infusion is typically used for an infusion that is given once (e.g., electrolyte replacement) or that is repeated at a prescribed frequency (e.g., antibiotics). Figure 1 (right) illustrates a set-up using a head-height differential to deliver secondary infusions.

A head-height differential refers to the difference in height of the top of the fluid in both the primary and secondary containers (Guiliano et al., 2021). It is achieved when the primary bag (labelled A) is hung lower than the secondary bag (labelled B) (ISMP, 2020). This positioning establishes a higher hydrostatic pressure in the secondary line relative to the primary line, resulting in fluid being drawn first from the secondary bag. This pressure closes the back-check valve in the primary tubing to prevent reverse flow from the secondary bag into the primary bag (Giuliano, 2021). If all clamps are open, the two infusions will be administered sequentially (ISMP, 2020). An incorrect head-height differential can lead to unintended flow rates (AAMI Foundation, 2016; Berndt & Steinheiser, 2021; ISMP, 2020). Some pumps, however, allow the user to deliver a secondary infusion without a head-height differential. Correct infusion set-up is key to ensuring that the fluids or additives are administered as intended.

Figure 1

Primary Infusion Line (A) with Secondary Infusion Line (B); adapted from Cassano-Piché, 2012 with permission (TBC)



Piggyback infusion

Although the terms "secondary" and "piggyback" are often used interchangeably, the latter is intended to describe the secondary line set-up shown in Figure 1 (right), as well as broader scenarios, such as the following (Cassano-Piché, 2012):

- switching between two continuous infusions of the same medication
- administering intermittent medications to a patient with a saline lock

Inconsistency in the use of the term "piggyback" extends to commercial products and equipment. For example, some intravenous tubing packages are labelled as secondary medication tubing, but the corresponding pump option for administering a secondary medication is labelled "piggyback."

Concurrent infusion

During concurrent infusions, two or more infusions are administered simultaneously, each at their own rate. This can be achieved in a number of ways, for example:

- Using two separate pumps, with a pump controlling the rate for each infusion (Figure 2). The two infusion lines can be run as two separate lines, connected to one intravenous site distal to the pump or can also be run using two separate intravenous sites.
- Using a cassette-based infusion system with two input lines and one output line (Figure 3). This pump gives the user an option to run a concurrent or piggyback infusion.

Figure 2

Configuration for Concurrent Infusion; adapted from Cassano-Piché, 2012 with permission (TBC)

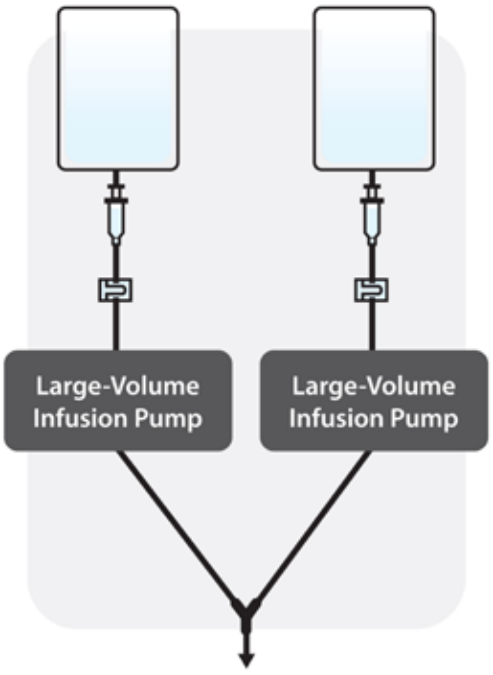
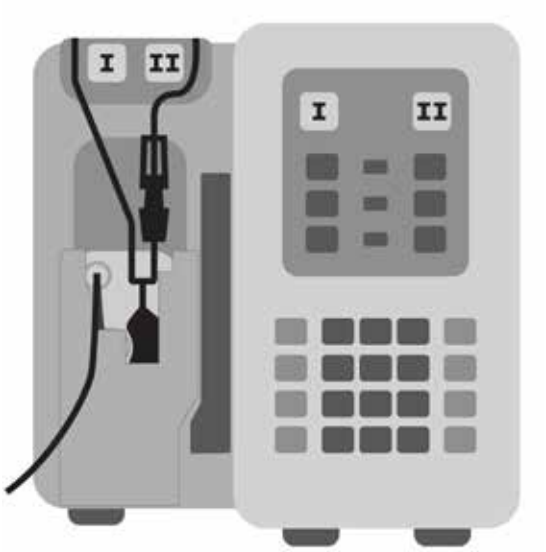


Figure 3

Example of a cassette-based infusion system with concurrent and piggyback mode options



Key practice tips

For bedside nurses

- Understand the capabilities, delivery functions, and workflow of the infusion pump in use in each clinical setting.
- Perform an independent double check in accordance with your organizational policy. This should include checking for (a) the right patient, (b) the right medication and right solution, and (c) the right infusion set-up and pump settings for intended flow and rate (Berndt, 2021; ISMP, 2020).
- Follow the manufacturer's instructions for correct positioning of primary and secondary solutions, which may require a head-height differential.
- Check the drip chamber for each infusion to ensure the pump is pulling fluid from the correct solution bag (AAMI Foundation, 2016).
- Monitor and assess the patient's condition for unexpected changes throughout each infusion. Check for potential infusion errors if an unexpected change occurs.
- Ensure appropriate hand-offs, including a review of pump settings (e.g., patient weight for weight-based infusions).

For nursing leadership

- Advocate for standardization of pumps across the institution to enhance user familiarity.
- Address the following topics in nursing education:
  - Underlying intravenous infusion principles, such as hydrostatic pressure and the role of the back-check valve
  - Areas of vulnerability in infusion pump set-ups (e.g., container heights, tubing, selection of piggyback or secondary versus concurrent settings on the infusion pump)
  - Best practice for performing a visual check of infusion drip chambers
  - Hands-on practice for all infusion set-ups
- Engage bedside nurses and encourage them to report concerns and incidents related to the pumps in use, including any safety concerns with infusion set-ups.

Shared learning leads to quality improvement. Every report to ISMP Canada's **Individual Practitioner Reporting program** provides an opportunity to learn and share improvement strategies to strengthen intravenous infusion safety (ISMP Canada, 2020).

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Introduction to Neuro Assessment in Critical Care: Part 1 in a Series

Brenda Lynn Morgan, MSc, RN, CNCC(C)

Critical Points

This article is the first in a series on neurological assessment in critical care.

Neurological assessment is an essential critical care nursing skill, regardless of the critical care patient population. All critically ill patients are at risk for neurological complications secondary to hypotension or low cardiac output, hypoxemia, infectious or inflammatory conditions, injury, and/or thrombotic or hemorrhagic disorders (including use of antiplatelet, anticoagulant and fibrinolytic agents). Risk increases among patients with preexisting medical conditions. The use of sedatives, narcotics and neuromuscular blockers can delay recognition of important neurological changes or lead to incorrect assumptions about the likely cause. Patients admitted with neurological disorders require increased intensity of assessment.

Observation is the most important component of a neurological assessment. However, observations of a patient's behaviours and responses during routine conversations or spontaneous activities also informs a nurse's neurological assessment.

All patients should have a minimum baseline neurological assessment upon admission (prior to administration of sedation and/or intubation whenever possible), and at the start of each shift. The focus, intensity and frequency of neurological assessments are then adjusted based on the presence and acuteness of any abnormal findings, the potential for new, worsening or improving neurological outcomes, and/or the patient's ability to interact. Nurses do not require an order to increase the frequency or intensity of neurological assessment.

Descriptive documentation that provides details of an assessment test with a patient's response often fills important communication gaps. Observations are often difficult to accurately discern from assessment tools alone. Change of shift is a high risk time to miss important neurological change; handover should always include the joint performance of a neurological assessment between the oncoming and outgoing nurses. This reduces errors due to uncertainty about the patient's previous assessment findings.

Components of the Neurological Assessment in Critical Care

Neurological assessments should begin by evaluating Level of Consciousness (LOC). Normal consciousness requires both arousal (wakefulness/eye opening) and awareness (the ability of the brain to perceive stimuli from various domains including visual, somatosensory and auditory). Loss of arousal implies damage to the Ascending Reticular Activating System (ARAS), bilateral cerebral cortexes, or unilateral cerebral cortex damage with herniation. Loss of awareness in one or more domains suggests cerebral cortex or thalamus disruption.

1 Determine whether patient is *Arousable, Arousable and Aware, or Non-Responsive*

Arousable: Wakefulness (spontaneous or stimulus induced eye opening with/or without reflexes such as coughing, sucking, swallowing and grimacing).

Aware: Requires arousability plus awareness of self or environment (follows verbal commands or gestures, visual or auditory stimulation, localizing or tracking an object).

Coma: A state of unarousable unconsciousness. Neither awake or aware. Identified by failure to open eyes to stimulation, with best verbal response, nonword sounds, and best motor response, simple withdrawal (GCS E1, V2, M4).

Assessing Level of Consciousness with least invasive stimulus required.

1. Awake spontaneously? If yes, is patient oriented or confused to person, place and time? If no;
2. Does patient respond to normal voice (opens eyes, make sounds or moves)?; If no;
3. Does patient respond to loud voice? If no;
4. Does patient respond to light touch/rubbing of limbs/shoulder? If no;
5. Does patient respond to central pain using one of the following methods* (follow unit policy) **Trapezius Squeeze:** squeeze and twist upper trapezius muscle (avoid if shoulder injury)
   Supraorbital Pressure: pressure below eyebrow at nasal edge (contraindicated with raised ICP or ocular injuries)
   Mandibular Pressure: pressure at angle of jaw (contraindicated in facial fractures)
   Sternal Rub is not considered central pain and it can be difficult to differentiate withdrawal from localizing. Many centres do not permit nurses to use it because it is associated with significant injury
   Nail bed pressure: if no response to central testing. Spinal reflexes can complicate interpretation.

Assessment using painful stimulus

*Repeated use of any site can cause soft tissue injury and pain. Try an alternate method if unable to elicit a response. Observe and document presence of eye opening, vocalization or movement to pain. Assess motor for symmetry and response to pain including: localizing (reaches up to noxious stimulus and attempts to push it away or remove it; reaches across the midline), withdrawal (flexion of limb in attempt to pull away from noxious stimulus; does not cross the midline), rigid flexion or extension or no response at all.

Observe patient when not being stimulated and during family visits. Are they pulling at lines and tubes (localizing), and is movement strength and type symmetrical during spontaneous movements?

2 – 8 The focus and depth of the remaining neurological assessment will depend upon the patient's LOC, diagnosis, stability and previous findings

2. History and Medical Background
3. Mental status/higher function/speech
4. Vital signs
5. Cranial nerves
6. Motor/reflexes
7. Sensory
8. Cerebellar function

2 HISTORY AND BACKGROUND (if possible)

- Review reason for admission from patient/family and validate findings documented in the patient care record
- Collect information on past medical history, mental health, baseline function (ADLs/IADLs), psychosocial history.

Neurological History

For each sign or symptom, determine onset and timeline (acute or gradual) and whether they went away or recurred from a previous event. Where possible, validate patient reported signs with family observations.

- Loss of consciousness, decreased attentiveness, memory impairment/cognitive decline/confusion?
- Difficulty speaking or understanding speech?
- Visual changes? One eye or both? Describe (diplopia, decreased acuity, photophobia)?
- Motor weakness in limbs or face? Unilateral (suggests focal) or bilateral?
- Pain or numbness of limbs or face? Unilateral or bilateral?
- Twitching or periods of flatness/non-responsiveness suggestive of seizure? Where did the seizure start and did it begin in one spot (focal), bilaterally (generalized) or in one spot and became generalized (secondary generalized)? Was consciousness lost? Was there any incontinence?
- Auditory changes, tinnitus (does it beat with the patient's pulse suggestive of vascular origin)? Unilateral or bilateral?
- Recurrent pneumonias (that might suggest aspiration)?
- Were there other associated symptoms (headache, neck stiffness, nausea and vomiting)?
- Where possible, validate patient-reported symptoms.

3 MENTAL STATUS/SPEECH/GAIT
(Higher Function)

Mental Status: Orientation, memory, intelligence (ability to carry out orders)

Speech Assessment:

- Fluency and volume (speech flows easily with normal volume of words and sentences)
- Comprehension (Can follow 3-step task – lift your right index finger up and touch your left ear)
- Naming (point to familiar object and have patient name it)
- Repetition (have patient repeat "no ifs, ands, or buts")

Identify disorders of comprehension and execution of speech (dysphasia); differentiate from hoarseness (dysphonia) or slurring (dysarthria) where comprehension and context is intact.

Gait (if patient is ambulatory):

- Observe for shuffling, scissor, steppage, stiffness, ability to tandem walk (if appropriate), altered balance
- Differentiate from generalized weakness of critical illness.

4 VITAL SIGNS

- Correct Airway, Breathing, Circulation, Drug or Glucose (ABCDG) cause for neurological deterioration.
- Hypertension may be cause for neurological deterioration or a life-saving compensation. Urgent imaging is required to determine cause and guide correct blood pressure treatment targets.
- Bradycardia, long QT, ST and T wave changes or arrhythmias can occur with neurological injury or stroke. Hypothyroid crisis can also cause bradycardia and neurological decline.
- Irregular breathing patterns or periods of apnea may indicate brainstem involvement and requires urgent intervention.
- Fever or meningeal signs may indicate meningitis or subarachnoid hemorrhage. Brudzinski sign (passive neck flexion elicits involuntary flexion of the knees in supine patient). Kernig sign (resistance or pain is induced by extension of knee immediately after 90-degree hip flexion).

5 CRANIAL NERVES (CN)
Ipsilateral function except CN IV
(Primary Function)

I Olfactory (sense of smell)
II Optic (vision)
III Oculomotor (pupil constriction, eye movement (except CN IV and VI) and eyelid opening)
IV Trochlear (eye rotation and down toward nose)
V Trigeminal (feeling to cornea/face, chewing)
VI Abducens (eye movement toward temple)
VII Facial (face movement, eye closure/tearing, anterior tongue sensation)
VIII Auditory (hearing and balance)
IX Glossopharyngeal (sensation pharynx/motor pharynx and larynx)
X Vagal (parasympathetic organ function, gag)
XI Accessory (shoulder shrug, neck rotation)
XII Hypoglossal (tongue movement)

Important initial cranial nerve (CN) assessments

Light reflex (CN II and III), top of brainstem

Corneal blink reflex (CN V and VII) – midbrain/pons
Gag and Cough (CN IX and X)

6 MOTOR STRENGTH

The motor strip in the posterior frontal lobe controls contralateral voluntary movement. Compare strength and symmetry of motor function. For patients able to obey commands, report motor function from 0–5/5.

0 – no movement
1 – flicker
2 – movement but not against gravity
3 – movement against gravity
4 – overcomes mild resistance
5 – overcomes normal resistance

Assessing Pupils

1. Open eyelids and allow to adjust to room light
2. Assess for size, shape and equality
3. Use 4 point "swinging flashlight" technique to assess for reactivity.
   - Shine the light in the right eye while only watching the right pupil for reactivity (R direct response)
   - Shine the light in the left eye while only watching the left pupil for reactivity (L direct response)
   - Shine the light in the right eye again, while only watching the left pupil for reactivity (L indirect/consensual response).
   - Shine the light in the left eye again, while only watching the right pupil for reactivity (R indirect/consensual response).

Deep Tendon Reflexes

Test if patient has a focal weakness (one side); hyperreflexia (3+ or 4+) in a weak muscle suggests a contralateral upper motor neuron lesion or spinal cord injury. Hyporeflexia (0 or 1+) in a weak muscle suggests ipsilateral lower motor neuron weakness (such as a brachial plexus or spinal nerve root injury). Exception acute spinal shock.

Upgoing toe (Babinski) is hyperreflexia (except infants).

7 SENSORY

All sensory messages are interpreted in the contralateral cerebral hemisphere. Pain and temperature, light touch, vibration and proprioception are carried in different tracts and are tested separately. Test pain using pin (blunt needle).

Sensory testing is not usually done during routine neurological assessment in critical care, but should be included when performing spinal cord testing, to evaluate patient reported sensation changes or to monitor patients at risk for spinal cord ischemia (including thoracoabdominal aneurysm repair or spinal cord injury/disease).

8 CEREBELLUM

The cerebellum is responsible for ensuring IPSILATERAL coordination and smoothness of motor function. Rapid alternating movements evaluate cerebellar function (such as "playing the piano" or flipping the hand palm up/palm down on the palm of the opposite hand). Asking the patient to touch their finger to their nose with eyes closed (test both hands) is another assessment that can be performed in critical care.

Tandem walking or Romberg tests are rarely performed in critical care. Cerebellar dysfunction can cause difficulty with swallowing. Patients unable to hold up their trunk when sitting at the bedside should be evaluated for cerebellar dysfunction.

Baseline Critical Care Neuro Assessment: Patient ABLE TO OBEY COMMANDS

1 2 3

- Is patient spontaneously awake and interacting? Assess orientation. Obtain history and/or talk to patient to assess speech for fluency/volume and appropriateness/comprehension, have patient name an object and repeat "no ifs ands or buts." Screen for delirium.
- Observe behaviour and evaluate face and limbs for symmetry or weakness.
- If not spontaneously awake and alert, assess response to normal voice followed by loud voice. Observe patient's ability to remain awake. If no response to voice, follow assessment for patient's unable to obey commands.
- Complete Glasgow Coma Score based on findings.

4 VITAL SIGNS*

Consider vital signs, medications and blood sugar in context of any neurological findings. Report and intervene promptly.

5 CRANIAL NERVE SCREENING (Ipsilateral)*

Awake Patient

II Optic (vision) – "how many fingers". Does the patient report visual concerns?

III Oculomotor – Both eyes open equally, have patient close eyes and observe pupil reaction. Assess size and symmetry while open (flashlight not necessary in alert patient). Does patient report blurred vision or photophobia?

III and VI – Have patient follow an object horizontally and vertically. Eyes should move in same direction (conjugate) without nystagmus. Does patient report diplopia (double vision)?

VII – Observe for droopiness of face or flattening of nasal labial fold. Ask patient to close eyes tightly, wrinkle forehead and smile. Look for symmetry.

For patients with abnormal neurological findings, additional CN testing may be indicated.

7 MOTOR AND SENSORY (Contralateral)* (Ipsilateral)*

Motor (contralateral activation):
Have patient close eyes and hold arms out, palms up. Observe for pronation or drift.

Can assess hand grip/release, bicep (bend elbow) and tricep (straighten elbow). Assess ability to flex hip, press on gas (plantar flexion) and dorsiflex feet. Grade strength of each muscle 0–5 / 5.

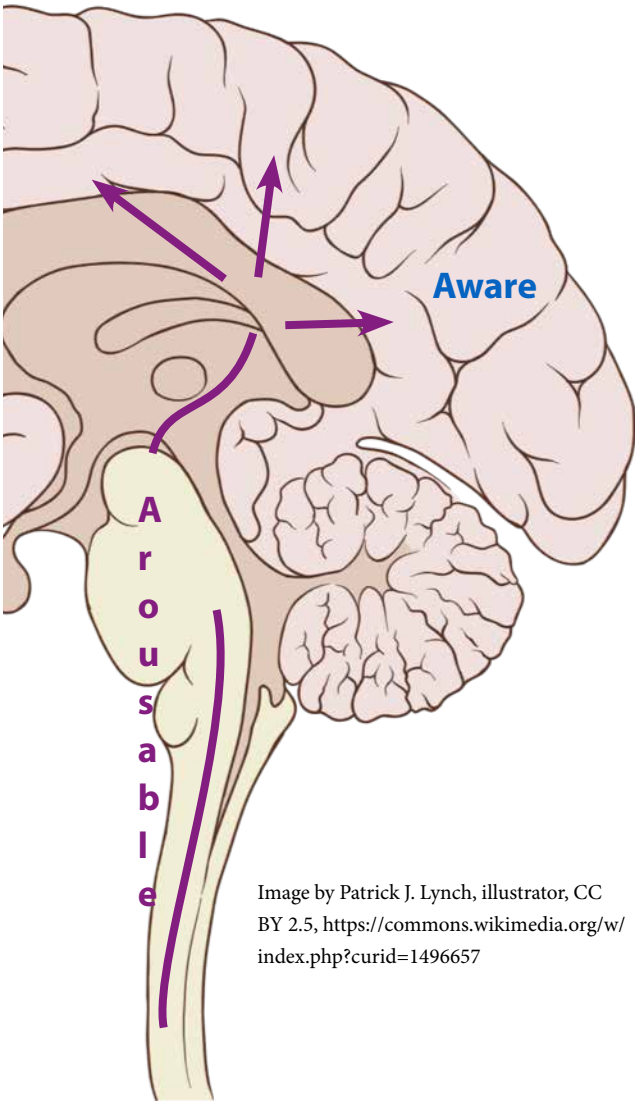
Sensory Testing if indicated:
Have patient close eyes. Test sensation with a cotton fluff and then pin (blunt needle). Test one side, then same spot on opposite side using the same amount of pressure. Test using pin (blunt needle) and cotton fluff (light touch) if indicated.

8 CEREBELLUM (Ipsilateral)*

"Play the piano"
Close eyes and touch index finger on right hand to nose. Repeat with middle finger on right hand (assesses both ability to following instructions and cerebellum).

Observe patient when sitting on bed (tilting to one side may indicate cerebellar problem).

Report any abnormal findings or changes from previous assessment immediately. Asymmetrical findings or discrepancies in upper versus lower limbs suggests focal or spinal cord lesion and warrant reflex testing. Increased frequency and focus of assessment indicated.



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Baseline Critical Care Neuro Assessment: Patient UNABLE TO OBEY COMMANDS
1 2 3

- If not spontaneously awake and alert, assess response to normal voice, then loud voice, then light touch and finally pain (if no response to lesser stimuli).
- Preferred initial method is trapezius squeeze. If no response to central pain or sternal rub, assess response to nail bed pressure.*Repeated use of any site can cause soft tissue injury and pain. Try an alternate method if unable to elicit a response.
- Complete Glasgow Coma Score based on findings.
- Obtain/validate reason for admission, past medical history and baseline functioning with family.

4 VITAL SIGNS

Consider vital signs, medications and blood sugar in context of any neurological findings. Report and intervene promptly. Sedation should not cause focal findings.

5 CRANIAL NERVE SCREENING (Ipsilateral)

II and III (reflex) – Pupillary light reflex. Should be present with neuromuscular blocking agent.

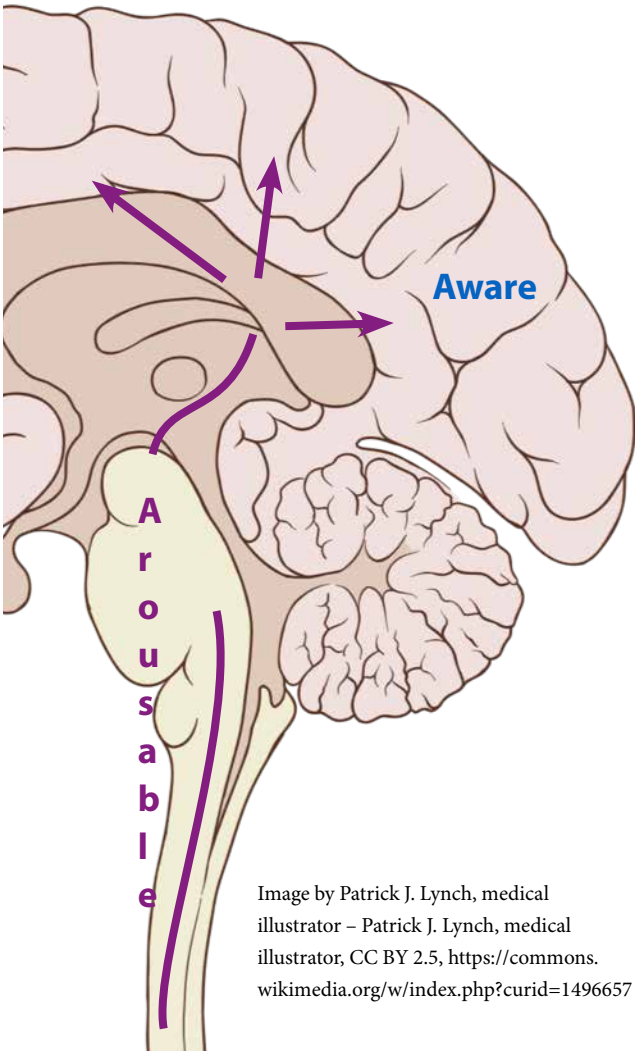
Extraocular Movements (III, IV and VI) Cannot be reliably tested; gaze is often dysconjugate in unconscious, sedated or emerging patients. As patient's become lighter, observe for tracking. A level of awareness is required to track an object.

V and VII (reflex) – Corneal reflexes test sensation in the first branch (V1) of CN V and the motor reflex of CN VII. Touching the cornea or lower lashes (with a moistened cotton) should induce bilateral eye blink. Contact lens wearers may have decreased response. Do not perform more than once per shift to prevent eye injury; eye drops may produce a similar response without corneal risk.

Nasal tickle also tests V1 and VII

VII – Observe for droopiness of face or inability to close one eye. Loss of forehead wrinkle (smooth) and wide-open eye on side of facial weakness is suggestive of Lower Motor Neuron problem (e.g. Bell's Palsy, Middle Fossa basal skull fracture). Stroke (Upper Motor Neuron lesion) produces unilateral face weakness with preserved bilateral forehead weakness and less profound eye closure failure.

IX and X (reflex) – gag (test sensation to each side of pharynx separately). Assess cough reflex with suctioning (or spontaneously).



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6 7 MOTOR AND SENSORY (Contralateral)

Motor (contralateral activation): Observe response to painful stimulation.

Determine whether response is localizing (pushing away, crossing midline, bringing hand above shoulder), withdrawal (weakly pulling away), abnormal flexion or extension or no response. Peripheral pain that produces withdrawal movement may be a spinal cord reflex (independent of brain function). Observe patient positioning and spontaneous movements to identify localization, weakness, spasticity and/or asymmetry.

Asymmetry suggests a focal finding. Discrepancy between arm and leg strength can also occur in the setting of spinal cord lesions. Reflex testing is indicated to help differentiate Upper Motor Neuron (brain and cord) from Lower Motor Neuron (spinal nerves) as the reason for muscle weakness.

Sensory testing other than pain or cranial nerve reflex testing is generally not possible in an unconscious patient.

Report any abnormal findings or changes from previous assessment immediately. Asymmetrical findings or discrepancies in upper versus lower limbs suggests focal or spinal cord

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