Practice Patterns of Canadian Physiotherapists Mobilizing Patients with External Ventricular Drains

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ABSTRACT

Purpose: To describe current mobilization practices of Canadian physiotherapists when treating patients with external ventricular drains (EVDs). **Methods:** A quantitative, descriptive, cross-sectional study design using an online questionnaire via SurveyMonkey. An email invitation and questionnaire link was distributed in March 2010 to physiotherapists currently working with this patient population in Neurosurgical Centres across Canada. **Results:** Respondents were 25 physiotherapists (21 full-time, 2 part-time, and 2 who did not disclose work status) working in 5 different provinces who treated ≥ 1 patient/month with an EVD ($n = 9$). Slightly more than half of respondents had ≤ 10 years' clinical physiotherapy experience ($n = 14$); the remainder had > 10 years' experience ($n = 11$). The majority of respondents indicated that they felt comfortable mobilizing patients with EVDs ($n = 19$) and that it was safe to do so ($n = 20$). Clinical experience ($n = 23$) and safety concerns ($n = 25$) were most commonly cited as guiding practice. More experienced physiotherapists were more likely to use out-of-bed mobilization practices. Regardless of experience, the majority of physiotherapists (20/25) ranked intracranial pressure (ICP) as the most important factor and saturation of oxygen (SpO_2) as the least important factor to consider before mobilization. **Conclusions:** Canadian physiotherapists are mobilizing patients with EVDs, and the intensity level of their mobilization practices appears to be related to their experience level. Data from the current study may be used in developing future best-practice guidelines for the mobilization of patients with EVDs.

Key Words: clinical experience; clinical reasoning; external ventricular drain; mobilization.

RÉSUMÉ

Objectif : Décrire les méthodes actuelles de mobilisation pratiquées par les physiothérapeutes canadiens qui traitent des patients avec des drains ventriculaires externes (DVE). **Méthodes :** Étude transversale descriptive quantitative basée sur un questionnaire en ligne administré via SurveyMonkey. Une invitation électronique comportant un lien vers le questionnaire a été distribuée en mars 2010 aux physiothérapeutes qui travaillent actuellement avec cette population dans les centres de neurochirurgie du Canada. **Résultats :** Les répondants étaient 25 physiothérapeutes travaillant (21 à temps plein, 2 à temps partiel, 2 qui n'ont pas révélé leur statut) dans cinq provinces différentes qui ont traité ≥ 1 patient/mois au moyen de DVE ($n = 9$). Un peu plus de la moitié des répondants comptaient ≤ 10 ans d'expérience de la physiothérapie clinique ($n = 14$); les autres en comptaient > 10 ($n = 11$). La majorité des répondants ont indiqué se sentir à l'aise de mobiliser cette population ($n = 19$) et qu'il était sécuritaire de le faire ($n = 20$). L'expérience clinique ($n = 23$) et les préoccupations en matière de sécurité ($n = 25$) ont été les facteurs mentionnés le plus souvent comme guide de pratique. La plupart des physiothérapeutes chevronnés étaient plus susceptibles d'utiliser des méthodes de mobilisation hors du lit. Sans égard à l'expérience, la majorité des physiothérapeutes (20/25) a classé la pression intracrânienne (PIC) comme facteur le plus important et la saturation en oxygène (SpO_2) comme facteur le moins important dont il faut tenir compte avant la mobilisation. **Conclusions :** Les physiothérapeutes canadiens mobilisent les patients en utilisant le DVE et l'intensité de leurs méthodes de mobilisation semble liée à leur expérience. Les données tirées de l'étude en cours pourront servir à établir de futurs guides de pratique clinique sur la mobilité des patients au moyen de DVE.

Modern critical-care medicine has begun to implement a new approach to treating the critically ill patient, one of early mobilization and reduced sedation. The idea that a patient in the intensive care unit (ICU) can be out

of bed, and even ambulate, is not new, but it is still not reflected in normal practice in many ICUs in Canada. In the past 5 years, the body of evidence supporting the benefits and safety of early mobilization for a variety of

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critically ill patients on mechanical ventilation has grown.¹⁻⁵ Improved cardiopulmonary function, functional independence, and psychological well-being, as well as decreased length of stay, have been associated with early mobilization in the ICU.^{1,6-8} The negative effects of inactivity, such as increased depression, lack of coordination, decreased muscle strength, altered balance, and decreased cardiovascular and respiratory status, have also been well established in the literature for a variety of populations within acute care settings.^{1,6-8}

The use of an external ventricular drain (EVD) to manage intracranial pressure (ICP) dates back to 1850 and is the most common neurosurgical procedure in North America; an estimated 20,000 are performed each year in the United States alone.⁹⁻¹¹ (Canadian statistics for this procedure have not been identified in the literature.) ICP (the combined pressure of brain tissue, cerebrospinal fluid, and cerebral blood within the cranium¹¹) must be maintained within normal limits, as an increase in pressure can lead to increased cerebral arterial resistance, culminating in ischemic brain injury and even herniation of the brain through the foramen magnum.¹⁰

There are abundant descriptive studies to guide doctors in the placement of EVDs^{9,12} and nursing staff in the daily care of an EVD site,^{13,14} but no specific guidelines for the mobilization of this population exist. Stiller (2007) addressed high ICP or low cerebral perfusion pressure (CPP) as factors identifying a patient as unstable and presenting a barrier to mobilization.¹ These concerns can be managed by the insertion of an EVD, which can stabilize ICP and CPP, making the patient safe to mobilize. Stiller's study recommends caution when mobilizing a person with an EVD, however, as this implies that the patient may have a severe brain injury. Stiller also recommends an interdisciplinary team approach to mobilizing members of this population.¹ Concerns about the drain becoming dislodged or hemorrhaging occurring around the drain site may lead some to be cautious in deciding whether or not to move the patient,¹⁵ though we found no reports of incidents of this nature in the literature. The lack of specific guidance as to whether a patient with an EVD but stable vital signs can be mobilized may lead physiotherapists to not include this option in their treatment plan and therefore exclude this patient population from the benefits of early mobility in the ICU.

There is abundant literature exploring the relationship between work experience and level of clinical reasoning, an intersection that may translate into variations in clinical practice.¹⁶⁻²² Physiotherapists with more experience have been shown to have advanced cognitive strategies and problem solving skills supporting their clinical rationale for treatment application.¹⁶ Furthermore, experienced physiotherapists are more readily able to adapt to varying clinical circumstances and develop their own criteria for standards of practice and treatment selection.¹⁷ A recent study by Wainwright and

colleagues¹⁹ suggested that novice physiotherapists are more reliant on informative factors (e.g., profession-specific education/training) to guide their clinical decision-making, whereas experienced physiotherapists are more likely to rely on their own observations and interactions with the patients and directive factors gathered from their medical records.

This study seeks to explore the current practice patterns of physiotherapists in neurosurgical centres across Canada when mobilizing patients with EVDs. Specific objectives of this study are (1) to describe the demographics of physiotherapists working in Canadian neurosurgical centres with patients who have EVDs; (2) to describe the practice patterns of Canadian physiotherapists for mobilizing patients with EVDs; and (3) to determine whether mobilization practices differ based on the medical status and stability of the patient (i.e., with stable, unstable, and borderline stable patients).

Future guidelines could be especially important to help guide the practice of entry-level physiotherapists, who have less clinical experience and are consequently more reliant on informative factors such as academic training, literature, or colleagues' practices. We anticipate that the results of this study will serve as a platform to guide future research focusing on evidence-based recommendations for physiotherapy practice with the EVD population in acute care settings.

METHODS

Study design

The study used a descriptive, cross-sectional design consisting of a web-based questionnaire administered to registered physiotherapists currently practising in neurosurgical centres across Canada. We received approval for the study from the University Health Network Research Ethics Board in November 2009 and from the University of Toronto Research Ethics Board in December 2009.

Study tool

The study tool was a questionnaire developed by the research team, in consultation with physiotherapists currently working with patients with EVDs at a major teaching hospital in a large urban area. We developed both French and English versions of the questionnaire.

The items were categorized to describe the demographics of the population, physiotherapists' current treatment practices with patients who have EVDs, and the rationale behind these practices. Most questionnaire items were categorical and closed-ended, incorporating Likert-type rating scales and predetermined ranked responses.

The questionnaire incorporated three case studies (CS 1-CS 3), developed by the research team, exemplifying profiles of medically stable, borderline stable, and unstable patients with EVDs:

CS 1 (Unstable)

A 37-year-old female post-op day #3 for EVD insertion is admitted to your unit. Vitals: Heart rate (HR) 73, Blood pressure (BP) 135/112, Mean arterial pressure (MAP) 119, SpO₂ 99% on room air, Glasgow Coma Scale (GCS) 8, EVD set at 10 cm above (open to drainage), stable ICP 11.

CS 2 (Borderline Stable)

A 62-year-old male had an EVD inserted 6 days ago. The EVD is currently set at 0 above (open to drainage). Vitals: HR 86, BP 101/72, MAP 82, SpO₂ 96% on 2L O₂/min via nasal prongs, GCS 13, ICP 6.

CS 3 (Stable)

A 46-year-old male had an EVD inserted 12 days ago. The EVD has been clamped for 24 hours. Vitals: HR 78, BP 124/75, MAP 91, SpO₂ 100% on room air, GCS 15, ICP 4.

Participants were unaware of the researchers' classification of medical stability in each scenario, as this was not explicitly identified on the questionnaire. The case studies were used to determine whether physiotherapists would employ different mobilization practices depending on the patient's medical status. Following each case study, participants were asked which mobilization techniques they felt were safe to employ, what factors they considered when employing those techniques, and the rationale behind their consideration of each factor.

Before beginning the study, we pilot-tested the questionnaire with practising physiotherapists at the study site who met the inclusion criteria and were not part of the research team. The questionnaire was revised based on the pilot evaluation before being sent to the study sample.

For the purposes of the study, we developed the following operational definitions:

- *Clinical experience*: Practical experience in a health-related field. Physiotherapists were classified as *more experienced* if they had worked for more than 10 years as a physiotherapist in any practice setting.
- *Mobilization practices*: The approaches of physiotherapists regarding the activities that they might have a patient with an EVD perform; possible categories of activity include passive range of motion (PROM), active range of motion (AROM), bed mobility (rolling and bridging), dangling, standing transfers, and ambulation.
- *In-bed mobilization*: Engaging in PROM, AROM, and bed mobility.
- *Edge-of-bed mobilization*: Engaging in dangling.
- *Out-of-bed mobilization*: Engaging in standing transfers and ambulation.
- *Relative importance*: The factors to be considered before mobilizing a patient were ranked from most important to least important. The three highest-ranked factors were combined into a single group considered *more important*. Likewise, the three lowest-ranked factors were collapsed into a *less important* group.

The factor ranked in-between most and least important was designated as *neutral*.

Recruitment

The sample consisted of physiotherapists currently practising in neurosurgical centres across Canada. Participant recruitment was done by first conducting a provincial search for physicians specializing in neurosurgery using the Canadian College of Physicians and Surgeons website, then cross-checking this information against the institutions associated with each listed neurosurgeon to identify 36 sites across Canada potentially capable of performing neurosurgical procedures (and therefore EVD insertions). A volunteer conducted introductory telephone screening to contact and recruit a professional practice leader (PPL) at each eligible location, who was then responsible for disseminating the study information and questionnaire link to the physiotherapists at their site who (1) were registered for practice with their provincial college, (2) were currently employed in a neurosurgical centre in Canada, (3) had recent clinical experience with patients with an EVD (within the last year), (4) worked with adult patients (≥ 18 years of age), and (5) were able to read English or French. Physiotherapy residents without an independent practice license were excluded.

Data collection

Data were collected following a modified version of the web-based questionnaire delivery model described by Dillman.²³ Data were gathered electronically through a self-administered online questionnaire distributed to the identified PPLs, who then disseminated an introductory letter and questionnaire link to all potential participants via email. The PPLs then provided the total number of physiotherapists they had emailed, which was used to calculate the sample size and response rate. A first reminder email including the questionnaire link was sent 2 weeks later; a final email, serving as both thank-you and second reminder, was distributed after another 2 weeks. All responses were coded in numeric format for statistical analysis. A single researcher organized and deleted all identifiable data (e.g., IP addresses) in preparation for data entry and analysis.

Further follow-up with PPLs after the initial closure of data collection yielded four additional completed questionnaires. Our final data analysis was performed on all questionnaires, including those completed during follow-up.

Data analysis

Responses to questionnaire items requiring a rating of *strongly agree*, *agree*, *neutral*, *disagree*, and *strongly disagree* were response-coded 1–5, respectively. Similarly, all items requiring nominal responses were given a numerical code, starting at 1. The resulting data were exported into MS Excel 2010 (Microsoft Corp., Redmond, WA) from SurveyMonkey. For open-ended questions, we

Table 1 Respondent Demographics

Demographic characteristic*	No. (%) of respondents
Current province of practice	
Ontario	10 (40)
British Columbia	7 (28)
Quebec	5 (20)
Saskatchewan	2 (8)
Newfoundland and Labrador	1 (4)
Education for entry level to practice	
MScPT, MPT	6 (24)
BScPT, BPT	19 (76)
Research-based education	
MSc	3 (12)
PhD	1 (4)
Neither	21 (84)
Employment status ($n = 23$)	
Full time (31–40 h/wk)	21 (91)
Part time (20–30 h/wk)	2 (9)
Years of practice as a physiotherapist	
≤10	14 (56)
>10	11 (44)
Practice setting ($n = 23$)	
Academic health science centre/teaching hospital	20 (87)
Community hospital	2 (9)
Other	1 (4)
No. of patients with EVD treated ($n = 16$)	
<1/mo	7 (44)
≥1/mo, <1/wk	6 (38)
≥1/wk	3 (19)
Mobility clearance ($n = 16$ for each response)	
Doctor's order for physiotherapy	11 (69)
Hospital protocol	9 (56)
Activity order	14 (88)

* $n = 25$ unless otherwise noted.

MScPT = Master of Science in Physiotherapy; MPT = Master of Physiotherapy; BScPT = Bachelor of Science in Physiotherapy; BPT = Bachelor of Physiotherapy; MSc = Master of Science; PhD = Doctor of Philosophy; EVD = external ventricular drain.

analyzed responses and sorted them into groups according to evident trends. We further explored the data by dividing respondents into more and less experienced groups; for between-group differences, the significance threshold was set at $p < 0.05$.

RESULTS

Data are expressed as frequency distributions for each section of the questionnaire. We used data from all fully

and partially completed questionnaires for analysis. Due to the small sample size ($n = 25$), we were not able to determine statistical significance for all parameters measured and the responses are presented as frequencies.

Response rate

PPLs at the 36 neurosurgical centres included in the study distributed questionnaires to 42 physiotherapists who met the inclusion criteria; we received 29 questionnaires (24 English and 5 French), for a response rate of 69%. Of the 29 respondents who started the questionnaire, 4 withdrew from the study; 2 indicated that they did not meet the inclusion criteria, 1 did not want to participate, and 1 did not provide a reason. Of the total sample of 25 useable questionnaires, 16 were fully completed and 9 were only partially completed.

Demographic characteristics of the sample

Demographic characteristics of respondents are presented in Table 1. The majority (22/25, 88%) practised in Ontario, British Columbia, or Quebec, and 20/23 (80%) were employed in an academic health science centre/teaching hospital. Most respondents held a BScPT or BPT (19/25, 76%) and practised full time (21/23, 91%). Just under half (11/25, 44%) had >10 years of clinical experience; the remaining 14 (56%) had ≤10 years of clinical experience. Just over half of respondents (9/16, 56%) treated ≥1 patients with EVDs per month.

General mobilization practice patterns

Respondents reported that a variety of factors typically determined their ability to mobilize patients with EVDs, including doctors' orders referring to physiotherapy (11/16, 69%), hospital protocol (9/16, 56%), and activity order (14/16, 88%). Almost all respondents (22/23, 96%) agreed or strongly agreed that in-bed mobilizations should be performed with medically stable patients with EVDs. Physiotherapists agreed or strongly agreed that edge-of-bed (18/23, 78%) and out-of-bed mobilizations (17/23, 74%) should also be performed with this population. Most indicated that they felt comfortable mobilizing general patients in the ICU (19/23, 83%) and felt that it was safe to do so (20/23, 87%). There was no significant difference ($p > 0.05$) in these practice trends based on level of experience (see Table 2).

Table 2 Mobilization Practices for Medically Stable Patients with External Ventricular Drains

Mobilization practice	No. (%) of respondents who agree or strongly agree		
	Total group ($n = 23$)	LE ($n = 12$)	ME ($n = 11$)
In-bed mobilizations should be done	22 (96)	12 (100)	10 (91)
Edge-of-bed mobilizations should be done	18 (78)	10 (83)	8 (73)
Out-of-bed mobilizations should be done	17 (74)	9 (75)	8 (73)
I feel comfortable mobilizing patients in an acute care setting	19 (83)	10 (83)	9 (82)
I feel it is safe to mobilize patients in an acute care setting	20 (87)	11 (92)	9 (82)

LE = less experienced; ME = more experienced.

Table 3 Mobilizations Performed Depending on Status/Stability of Patient

Type of mobilization	No. (%) of respondents performing mobilization					
	Medically unstable (CS 1)		Borderline stable (CS 2)		Medically stable (CS 3)	
	ME*	LE†	ME*	LE†	ME*	LE†
PROM	7 (100)	8 (89)	7 (100)	8 (89)	7 (100)	7 (78)
AROM	6 (86)	6 (67)	7 (100)	9 (100)	7 (100)	8 (89)
Bed mobility	4 (57)	5 (56)	7 (100)	6 (67)	7 (100)	9 (100)
Dangling	3 (43)	1 (11)	4 (57)	2 (22)	6 (86)	8 (89)
Standing transfers	1 (14)	0 (0)	4 (57)	2 (22)	6 (86)	8 (89)
Ambulation	1 (14)	0 (0)	3 (43)	1 (11)	5 (71)	8 (89)

**n* = 7.†*n* = 9.

CS = case study; ME = more experienced; LE = less experienced; PROM = passive range of motion; AROM = active range of motion.

Mobilization practices depending on the medical status of patient

Three hypothetical case studies were used to determine whether physiotherapist mobilization practices would be influenced by the patient's medical stability. As Table 3 shows, there was a high level of agreement between groups (more and less experienced physiotherapists) regarding mobilization practices, especially in-bed interventions, for medically unstable (CS 1) and medically stable (CS 3) patients. There was less agreement between groups with regards to out-of-bed mobilization practices with the borderline stable patient (CS 2); 57% of more experienced physiotherapists elected to dangle or stand the patient, versus 22% of less experienced physiotherapists.

In general, regardless of the patient's medical stability or the therapist's level of clinical experience, the majority of respondents indicated that they would engage in all forms of in-bed treatment, including PROM, AROM, and in-bed mobility. Less than half of respondents said they would start edge-of-bed or out-of-bed forms of treatment, such as dangling, standing transfers, and ambulation, with unstable patients. Among more experienced physiotherapists, 4/7 would use dangling and standing transfers and 3/7 would ambulate a patient with borderline medical stability. Among less experienced physiotherapists, in contrast, only 2/9 would use dangling and standing transfers and just 1/9 would ambulate these same patients.

Factors guiding clinical practice

The highest percentage of respondents from both groups identified clinical experience (22/23, 96%) and safety concerns (23/23, 100%) as factors that would guide their use of mobilization in the treatment of patients with EVDs. Current policies (19/23, 83%) and a colleague's practice (15/23, 65%) were also cited by most respondents as being pertinent factors to consider. Just over half of the respondents identified their practice as being guided by evidence from the literature (12/23,

52%), while the least significant factor identified was a past incident (5/23, 22%). Less experienced physiotherapists (*n* = 14) were more likely than more experienced physiotherapists to identify use of existing literature (7/14, 50%) and a colleague's practice (6/14, 43%) as guiding factors in their own practices.

Ranking of factors affecting mobilization practices based on patient's medical stability

While our intent was to present three cases that differed in terms of medical stability, the patient's stability was not explicitly identified for the respondents. Regardless of medical stability, ICP was consistently ranked as more important, and SpO₂ and HR as less important, among the factors to consider when mobilizing patients with an EVD (see Figure 1).

The weighting of factors (ICP, HR, SpO₂, CPP, BP, MAP, and GCS) varied somewhat between experienced and less experienced respondents (see Figure 2). For CS 1, 100% (*n* = 7) of more experienced physiotherapists identified ICP as more important, versus 55.6% (*n* = 5) of less experienced physiotherapists. For CS 2, 85.7% (*n* = 6) of more experienced and 55.6% (*n* = 5) of less experienced respondents did so; for CS 3, the proportions were 57.1% (*n* = 4) and 55.6% (*n* = 5), respectively.

When physiotherapists were asked to explain their ranking choices, they noted that more stable patients would be able to comply with, cooperate with, and tolerate more out-of-bed mobilization practices. With the borderline stable patient, four respondents noted that the EVD was described as "open to drainage," and therefore they would only mobilize the patient in bed. One respondent stated that hospital policy prohibits mobilization with an unclamped EVD.

Impact of internal and external factors on mobilization

The majority of respondents (>60%) identified patient-related and external factors, including bleeding risk, unstable vitals, level of consciousness, lack of assistance, and involvement of other health professionals with the

Figure 1 Ranking of factors for decision making regarding mobilization for each case scenario.

CS = case study; GCS = Glasgow coma scale; CPP = cerebral perfusion pressure; ICP = intracranial pressure; MAP = mean arterial pressure; BP = blood pressure; HR = heart rate; SpO₂ = saturation of peripheral oxygen.

patient, as barriers that would prevent the mobilization of patients with EVDs (see Table 4). Less than 50% of respondents identified skin integrity, unsafe environment, caseload/time constraints, or equipment as barriers. The more experienced physiotherapists were more likely than their less experienced colleagues to identify bleeding risk ($n = 6$), involvement of other health professionals ($n = 6$), and equipment constraints ($n = 3$) as barriers.

DISCUSSION

This study describes Canadian physiotherapists' current practice patterns when mobilizing patients with EVDs. We also explored the relationship between clinical experience and clinical practice, and found that more experienced physiotherapists demonstrate different clinical reasoning and are more likely to conduct higher level edge-of-bed or out-of-bed mobilization than their less experienced colleagues.

Safe mobilization of critically ill patients demands the continuous monitoring of certain medical status factors.²⁴ According to the literature, factors that should be considered during therapeutic interventions with neurological patients and that may influence clinical decision making include ICP, CPP, HR, BP, and SpO₂.^{24–26} One must ensure that ICP does not rise above 25 mmHg and that CPP does not fall below 50 mmHg.²⁵ Stiller and Phillips (2003) have recommended that physiotherapists ensure that resting HR is no more than 50% of age-predicted maximum, SpO₂ is never less than 90%, and variability in BP has not exceeded 20% during or before mobilization.²⁴

Our results indicate that when Canadian physiotherapists mobilize members of this population, they base their decisions on safety concerns identified in the research literature. This includes relevant medical factors, but the respondents also indicated that EVD status is pertinent. It has been suggested in the literature that the EVD must be clamped during patient mobility to avoid excessive cerebrospinal fluid drainage.²⁵ Respondents in our study were aware of this, and it influenced their treatment choices; however, none of them suggested seeking approval for the drain to be clamped to permit mobility. This shows that current clinical practice may not fully reflect recommendations in the literature.

There are several out-of-bed mobilizations that a physiotherapist can use with a critically ill patient;²⁵ appropriate or acceptable mobility activities for a patient in the ICU identified in the literature include, but are not limited to, dangling, standing transfers, and ambulation. However, 63% (10/16) of respondents stated that other health professionals represent a barrier to the mobilization of a patient with an EVD. This may reflect the culture in the ICU, where early mobilization of a patient with an EVD may not always be supported by staff; their lack of buy-in may be guided by the lack of literature or by the belief that a patient with an EVD is unstable and should not be mobilized.

Our findings were not consistent with the literature; we found that physiotherapists were willing to use all forms of mobilization with the EVD population, though they were selective depending on the medical status of individual patients. Further research is needed to determine efficacy and to guide the mobilization of this patient population.

Figure 2 Graphical representation of the different factors more experienced and less experienced physiotherapists consider when mobilizing patients with external ventricular drains.

In addition to describing mobilization practice patterns, our study yielded an interesting adjunct finding relating to the clinical reasoning used by physiotherapists working with the EVD population. Currently there is an abundance of literature examining health professionals' level of work experience in relation to their clinical reasoning, but very few studies have explored the clinical reasoning of physiotherapists in acute care settings, and none have been specific to those working with patients with EVDs. The related medical literature documents a difference in the clinical reasoning processes when comparing novice and experienced physicians and physiotherapists; those who are more experienced demonstrate more detailed and refined clinical reasoning.¹⁸ Case and colleagues (2000) have demonstrated that physiotherapists' cognitive strategies and their organization of knowledge develop with experience, and these factors contribute to their clinical reasoning and problem solving skills.¹⁶ It has also been suggested that physiotherapists' choice of treatment techniques is usually based on the initial academic and clinical training they received and their prior experience with patients, not on the literature.^{20,27} However, our results are not directly comparable to those of

Wainwright and colleagues (2011),¹⁹ as we did not use the same classification system for clinical decision-making factors.

Our study is one of the first to explore the potential relationship between level of clinical experience and degree of mobilization practice. We found that physiotherapists with more experience were more likely to conduct higher level out-of-bed mobilization practices, including standing transfers and ambulation, when a patient was medically stable and, to a lesser extent, when a patient was unstable. We postulate that more clinical experience may translate into a higher comfort level with acute care patients, a more extensive knowledge base, and more refined observational skills. In addition, more and less experienced physiotherapists prioritize patients' medical data differently during mobilization; we noted a difference in how factors were ranked within similar clinical scenarios.

The differences between more and less experienced physiotherapists and their clinical reasoning may be the result of a variety of characteristics, such as level of education, likelihood to consult literature, and environmental circumstances. Turner and Whitfield (1999)

Table 4 Factors Preventing Mobilization of Patients with External Ventricular Drains

Factor	No. (%) of respondents agreeing that the factor would act as a barrier to mobilization		
	Total group (<i>n</i> = 16)	LE (<i>n</i> = 9)	ME (<i>n</i> = 7)
Patient-related factors			
Bleeding risk	12 (75)	6 (67)	6 (86)
Unstable vitals	16 (100)	9 (100)	7 (100)
Level of consciousness	12 (75)	7 (78)	5 (71)
Skin integrity	2 (13)	1 (11)	1 (14)
External factors			
Unsafe environment	6 (38)	3 (33)	3 (43)
Lack of assistance	10 (63)	6 (67)	4 (57)
Caseload/time constraints	5 (31)	3 (33)	2 (29)
Involvement of other health professionals	10 (63)	4 (44)	6 (86)
Equipment constraints	4 (25)	1 (11)	3 (43)

LE = less experienced; ME = more experienced.

found that level of formal education has a substantial impact on treatment selection and that those with a higher level of education are more likely to use literature to support their clinical decisions.²⁷ In our study, very few respondents had higher levels of research-based education, yet more than half reported using literature to guide their practice. It has also been found that decision making by cardiorespiratory physiotherapists in the acute care setting is influenced by the complexity of the decision, the context, and the individual's knowledge and experience;¹⁷ physiotherapists with more experience are better able to adapt to a wider variety of clinical situations and have developed individual criteria for determining an appropriate intensity of mobilization treatment.¹⁷ It has become clear that decision making in acute care contexts is a multifaceted process, involving experience, patient presentation, and staff support.

We did not find any relationship between intensity of mobilization treatment and the number of encounters with patients who have EVDs. It may be that since this patient population is very specific, even physiotherapists who are employed at neurosurgical centres and provide care to an above-average number of these patients still treat only one per week or per month. Similarly, we found no relationship between a respondent's level of physiotherapy education (BSc vs. MSc) and the degree of intensity of treatment he or she would use with patients who have an EVD.

Although there are safety concerns to take into account when considering mobilizing critically ill patients with EVDs, the benefits should not be overlooked.⁷ Furthermore, our study identified potential differences between more and less experienced physiotherapists in the clinical decision-making process, specifically as it relates to intensity of mobilization and treatment selection.

The main limitation of our study was the small sample size (25 participants in total), which is likely related

to the small number of physiotherapists working with patients who have EVDs, as well as to our methodology, which required PPLs to disseminate the questionnaire to individual physiotherapists. Only 42 physiotherapists that we know of (but see below) received an invitation to participate in the study, perhaps because of a lack of time or interest on the part of the PPLs. As a result of the limited response, several provinces and neurosurgical centres are not included in our results; as a result, the data may not be representative of practice among all Canadian physiotherapists.

The PPLs' involvement in the questionnaire distribution process posed several challenges. Many PPLs did not respond to our initial e-mail or follow the protocol it outlined. We also relied on the PPLs to disclose the number of eligible physiotherapists who received the questionnaire at their site; because few PPLs responded, despite our reminders, we do not know precisely how many eligible physiotherapists received an invitation to participate in the questionnaire.

Our initial intent was not to identify clinical reasoning patterns but, rather, to identify practice patterns. Nonetheless, the influence of participants' clinical reasoning was an interesting finding and may be an area of future research.

CONCLUSION

Canadian physiotherapists are mobilizing patients with EVDs both in bed and out of bed, where appropriate, based on clinical findings and considerations of patient safety. Substantial agreement exists between more and less experienced physiotherapists with regards to mobilizing stable and unstable patients. More experienced physiotherapists, however, are more likely than their less experienced colleagues to use out-of-bed techniques for borderline stable patients. Physiotherapists' clinical reasoning and inclination towards use of mobilization practices for patients with EVDs appear to be

related to their level of experience. While we agree that this is acceptable practice, we recognize that these findings could be capitalized on by further research to help establish best-practice guidelines for the mobilization of this patient population. The development of such guidelines would assist less experienced physiotherapists working with this patient population while also standardizing the care these patients receive across Canada.

KEY MESSAGES

What is already known on this topic

Early use of mobility activities with critically ill patients in ICUs helps prevent the detrimental effects of prolonged bed-rest and inactivity. It is a safe practice, assuming that safety concerns are taken into consideration. Little is currently known about the practice patterns of physiotherapists in neurosurgical units with respect to mobilizing patients with external ventricular drains (EVDs).

What this study adds

The present study describes the current practice patterns of Canadian physiotherapists with regards to the mobilization of patients with EVDs, explores the rationale for these patterns, explores the potential relationship between level of clinical experience and intensity of mobilization treatment, and provides a platform for further research into evidence-based practice and continuing education for entry-level physiotherapists on the mobilization of critically ill patients.

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