Physiotherapy Models of Service Delivery, Staffing, and Caseloads: A Profile of Level I Trauma Centres across Canada

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ABSTRACT

Purpose: To examine and describe physiotherapy models of service delivery, staffing, and caseloads in Level I trauma centres across Canada. **Methods:** A telephone questionnaire was administered to one experienced trauma physiotherapist at each of the 19 Level I trauma centres in Canada. Quantitative data were analyzed descriptively for national trends. **Results:** Data were collected from all 19 centres (100%), 89% of which provided physiotherapy services 5 days per week with priority weekend coverage. Physiotherapist assistants (PTAs) were employed by 89% of centres and were used across the continuum of care. Centres with PTAs appear to be more likely to provide patients with additional daily treatment. Departmental organizational structures were the most common (41%) and were associated with higher caseloads. Higher caseloads also appear to be linked with having less than 10 years of experience as a physiotherapist. **Conclusions:** Variations exist between centres with respect to the delivery of physiotherapy services. These variations may result from differences in province-specific legislation, differences in funding structure, and the lack of evidence-informed guidelines. Future research is needed to establish optimal models of physiotherapy services that are cost-effective and provide best patient care.

Key Words: trauma center; physical therapy department, hospital; personnel staffing and scheduling.

RÉSUMÉ

Objectif : Étudier et décrire les modèles de prestation de services, de dotation et de charge de travail de la physiothérapie dans les centres de traumatologie de niveau 1 au Canada. **Méthodologie :** Un questionnaire téléphonique a été envoyé à un physiothérapeute d'expérience de chacun des 19 centres de traumatologie de niveau 1 au Canada. Des données quantitatives ont fait l'objet d'une analyse descriptive afin de dégager des tendances nationales. **Résultats :** Des données ont été recueillies dans les 19 centres (100 %). De ce nombre, 89 % assuraient des services de physiothérapie cinq jours par semaine, avec couverture prioritaire les fins de semaine. Des assistants-physiothérapeutes (APT) sont employés dans 89 % des centres et sont mis à contribution dans tout le continuum de soins. Ces centres qui disposent d'APT semblaient davantage en mesure de prodiguer aux patients des soins quotidiens supplémentaires. Les structures organisationnelles de type départemental sont les plus habituelles (41 %) et ont été associées à des charges de travail plus élevées. Une charge de travail plus élevée semble également être liée à une expérience professionnelle de moins de 10 ans comme physiothérapeute. **Conclusions :** La prestation de services de physiothérapie varie selon les centres. Ces variations peuvent s'expliquer par des différences dans les lois propres à chaque province, par la structure de financement de ces centres, ainsi que par le manque de guides de pratique fondés sur les faits probants. De futures études seront nécessaires pour établir des modèles optimaux de services de physiothérapie qui seront rentables et permettront d'offrir les meilleurs soins possibles aux patients.

Physiotherapists play an integral role in trauma centres, providing interventions targeting cardiorespiratory, musculoskeletal, and neurological systems to improve patients' functional skills and independence. Trauma

centres focus on integrated models of care provided by multidisciplinary health care teams.¹

Because of the significant mortality rates associated with traumatic injuries,² provincial health systems across

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Canada have attempted to streamline service delivery by regionalizing trauma centres. These trauma systems have led to a decrease in preventable deaths after traumatic injuries.¹ Since health care funding and delivery fall within provincial jurisdiction, it is each province's responsibility to independently designate trauma centres, using guidelines established by the Trauma Association of Canada. Designation is based on geographical area, population, and number of trauma patients seen. Each province assigns its trauma centres a ranking from Level I to Level V. Level I centres are typically located in large metropolitan areas, affiliated with an academic institution, and responsible for specialized trauma care;³ Level II–V centres may provide primary care to trauma patients but often transfer patients with critical injuries to Level I centres, as they lack the resources to provide optimal care on site.³

The trauma service at a Level I centre generally comprises multiple levels of intensive-care units (ICUs) and several designated beds at the trauma-unit level. In the ICU, physiotherapists play an important role in ensuring that adequate ventilation is maintained, encouraging early mobilization, and promoting neuromuscular recovery. Physiotherapists in this setting must therefore have a diverse skill set to treat patients with multiple types of injuries at different stages.⁴

Hospitals generally use one of three structural organization models: departmental, programme management, and matrix. Hospitals that implement departmental systems have a separate physiotherapy department, and decision making and quality assurance focus on the best interests of the department as a whole.⁵ In Canada in the 1990s, as a result of funding cuts by the federal and provincial governments, there was pressure to implement models of health care that would provide high-quality services at low cost;⁶ one result was a move from the functionally organized departmental model to the process-oriented programme management model.⁶ Departmental models tend to be more costly than programme management models because of the multiple levels of management associated with each profession.^{6,7} Programme management decentralizes decision making to managers of multidisciplinary teams, so that a physiotherapist may be part of an ICU instead of a physiotherapy department. Programme management is associated with higher clinical productivity and improved integration of staff roles.⁷ Ideally, programme management models provide opportunities to expand leadership roles and promote communication among health care professionals.^{6,8} However, physiotherapists working within such models have reported professional isolation, lack of educational opportunities, and decreased time for patient care due to administrative duties.⁸ Some hospitals use a matrix model, in which health professionals work within a specific programme (reporting to a programme manager) but support, leadership, and profes-

sional accountability are the responsibility of a discipline-specific leader. Theoretically, this model provides better teamwork and use of human resources, but difficulties can arise from the two levels of accountability.⁹

Hospitals often provide physiotherapy services 5 days/week with priority care on weekends. Patients treated on weekends are selected by the physiotherapists based on specific criteria established by individual hospitals. As no guidelines for establishing the criteria are set out in the literature, each hospital designs its own priority list with the aim of providing the best possible patient care.¹⁰

Research into weekend services has investigated the impact of weekend physiotherapy service provision but has not yet focused explicitly on trauma centres. Boxall and colleagues¹¹ cohort study investigated potential differences in length of stay (LOS) for acute orthopaedic patients given physiotherapy treatments either 5 days or 7 days per week. Seven-day-per-week physiotherapy significantly decreased LOS in certain subsets of this population (ankle fractures and total knee replacements), but no statistically significant changes were noted in the overall population. Boxall and colleagues suggested that organizational delays—including difficulties with discharge planning for patients living outside the hospital's catchment area, difficulties in procuring beds in rehabilitation hospitals, and the fact that other health care professionals essential for discharge worked 5 days per week instead of 7—were responsible for the non-significance of changes in LOS in the overall population.¹¹ Rapoport and colleagues¹² examined neurological and orthopaedic populations in evaluating the effectiveness of 7-day coverage. Both groups had shorter LOS when physiotherapy treatment was provided 7 days per week.¹² On the other hand, Holden and Daniele¹³ found that providing 7 days of physiotherapy treatment per week for patients with acute orthopaedic injuries was no more beneficial in decreasing LOS than providing 5 days of treatment. In that study, however, no additional physiotherapists were hired; instead, physiotherapists alternated shifts to allow for 7-day coverage, meaning that patients did not receive additional treatments in the 7-day model because fewer physiotherapists were working on any given day.¹³ An overall lack of consistency in the types of studies used to establish the effectiveness of 7-day physiotherapy services for patients has made it difficult to determine which model of service delivery is most effective.

At present, there is little evidence that can be used to determine appropriate caseloads and staffing levels for physiotherapists working in Level I trauma centres. The Canadian Physiotherapy Association (CPA) recognizes the need for physiotherapy caseload and staffing guidelines to enhance quality of care, improve budgeting and funding allocation, and promote cost-effective delivery of health services.¹⁴ Broad caseload-management guidelines were developed by CPA in 1984 based on evidence, best practice, cost-effectiveness, accountability, profes-

sional leadership, comprehensiveness, and flexibility. Key elements to consider within caseload-management processes include patient characteristics (diagnosis, severity, complexity, population, and demographics), facility characteristics (services offered, type of unit/facility, size of facility, and the resources available), physiotherapist characteristics (roles, skills, and experience), and treatment characteristics (plan and frequency of treatment, assessments, and discharge planning).¹⁴ However, rather than giving specific recommendations to guide calculations for the ideal number of physiotherapists, these guidelines recommend that each centre consider the factors mentioned above to devise its own practices for physiotherapy staffing and caseloads.

In an effort to determine numerical guidelines for optimal staffing levels, Jorden and colleagues¹⁵ conducted a survey focused on physiotherapy services in acute-care settings across Canada, measuring patient and facility demographics, patient population, LOS, and average number of physiotherapy treatment sessions.¹⁵ However, a low response rate of 59%, wide variations in the data, and lack of measures of case complexity made their data difficult to interpret. Similarly, the College of Physiotherapists of Ontario funded a study investigating outpatient caseloads, physiotherapist to physiotherapist assistant (PTA) ratios, and the factors that affect case complexity in both hospitals and private clinics in Ontario,¹⁶ but because there was no evaluation component relating caseloads to patient outcomes, conclusive guidelines could not be devised. The European Society of Intensive Care Medicine has suggested that a physiotherapist be allocated for every 12 beds in Level I and II ICUs;¹⁷ physiotherapists in Europe have different responsibilities than those in Canada, however, specifically in the area of cardiorespiratory care, such as managing ventilators. Current staffing practices in many Canadian hospitals, including Level I trauma centres, are often based on traditional staffing levels and budgetary constraints.¹⁶ Before attempting to develop more definitive guidelines for staffing in Canada, it is important to understand what current practices are and the reasoning behind these caseload and staffing decisions.

Few studies currently exist that provide evidence on the provision of physiotherapy services in acute-care settings in Canada, and there is virtually no research on services in Level I trauma centres. Current trends in physiotherapy services are not known, and optimal practices cannot be ascertained without first documenting these trends. The purpose of this study, therefore, was to examine and describe the profile of physiotherapy services in Level I trauma centres across Canada. To address this purpose, we created four study objectives: (1) to examine physiotherapy models of service delivery in adult Level I trauma centres across Canada; (2) to examine the models of physiotherapy staffing used in these facilities; (3) to examine the caseloads of physiothera-

pists working with trauma patients in these facilities; and (4) to examine how Ontario compares to the rest of Canada with respect to objectives 1–3.

We hypothesized that the majority of Level I trauma centres in Canada would provide physiotherapy services 5 days per week with priority weekend coverage. We expected to find that most centres employ PTAs to work with trauma patients and that programme management would be the most prevalent model of organization. Finally, we hypothesized that physiotherapists working within a departmental structure would have smaller caseloads than those employed in a programme management or matrix model.

METHODS

Study design

To address the research objectives, we conducted a cross-sectional telephone survey, aiming to interview 1 physiotherapist providing care to trauma patients from each of the 19 Level I trauma centres across Canada. We chose a telephone survey design because the population was relatively small and to enable participants to explain and expand on their answers to ensure that the scope of physiotherapy staffing, caseload, and service delivery was clear to the investigators.

Questionnaire

We developed a questionnaire to target the specific study objectives through a review of the literature and consultation with three physiotherapists experienced in both trauma care and research. The initial version of the questionnaire was pilot-tested with three physiotherapists who work with trauma patients in a Level I trauma centre; based on their feedback, we made alterations to improve item specificity and clarity before finalizing the 17-item questionnaire.

The questionnaire had three sections: models of physiotherapy service delivery, staffing, and caseloads. General background information was first collected from each participant to ensure that he or she was the most appropriate person to complete the questionnaire. To facilitate comparisons between centres, we tried to survey physiotherapists working with trauma patients on the trauma unit who had at least 1 year of experience. The questionnaire contained both open-ended and closed-ended questions. The latter, which constituted the majority of questionnaire items, used nominal, ordinal, and ratio measurement scales; the open-ended questions were used to clarify responses and to obtain related details. Because of the high level of diversity among hospitals, the option of choosing “other” and providing an explanation was included where applicable. We developed verbal prompts to aid responses and to define terms that physiotherapists might not be familiar with. The questionnaire was marked only with the hospital’s unique identification number, to maintain the anonymity of the

trauma centre and of the physiotherapist being interviewed.

Selected items from the questionnaire that we expected would require additional investigation (e.g., number of trauma patients admitted per year) were compiled in an electronic form sent to each participating physiotherapist before his or her interview.

For the purposes of this study, we needed to establish definitions of selected terms. Each province designates the rankings assigned to its trauma centres, and although national guidelines are in place, provinces may use varying criteria to designate rankings. For our purposes, therefore, we defined a Level I trauma centre as a hospital with a Level I ICU that provides the highest level of specialized care to trauma patients. We generated a list of Level I trauma centres in Canada from the Trauma Association of Canada Web site,¹⁸ an article by Lavoie and colleagues,¹⁹ and input from the investigation team. The initial list was confirmed via hospital Web sites or by telephone contact. Only Level I trauma centres as defined above as of February 1, 2009, were eligible to participate; primary paediatric Level I trauma centres and Level II–V designated adult trauma centres were excluded.

Hospitals have various categories of ICUs, defined by patient:RN ratio (Level I ICU, 1:1; Level II, 2:1; Level III, 3:1). For the purposes of our study, the term “model of service delivery” described the amount of weekly physiotherapy coverage provided (5-day coverage, 5-day coverage with priority weekend coverage, 7-day coverage, or other).

Data collection

In February 2009, upon approval from the Research Ethics Boards of both the University of Toronto and Sunnybrook Health Sciences Centre, we began making initial contact through the general phone lines of the identified Level I trauma centres. The investigator asked first for the physiotherapy department; if no physiotherapy department existed, he or she asked for the professional practice leader; if the hospital had neither, the investigator explained the purpose of the study and asked to be directed to an appropriate contact. Once the appropriate contact was reached, the investigator explained the purpose of the study and requested contact information for the best possible physiotherapist to respond to the questionnaire.

The physiotherapist was then contacted via telephone or e-mail, and the purpose of the study and participation requirements were explained. Physiotherapists who declined to participate were asked to provide contact information for a colleague who would be willing to participate. For those who agreed to participate, an interview time was scheduled and the consent form was e-mailed. Written consent was obtained via fax before the telephone interview. The participant was also e-mailed the form containing the questions requiring preparation. Investi-

gators had no prior contact or relationships with any of the participants before the study began.

Each telephone interview took approximately 30 minutes to complete and was conducted on speaker phone by one investigator while a second investigator recorded the participant's responses on a laptop computer. Over the course of the study, members of the research team participated in both recorder and interviewer capacities; each had a minimum of one practice session before conducting an interview. Any questions that participants could not answer at the time of their interviews were e-mailed to them so that they could collect the data from their trauma centres; participants were asked to e-mail their responses to us, and reminder e-mails were sent within 1 week of the interview. A thank-you e-mail was also sent to each participant within 1 week of the completed interview.

Data Analysis

All data were entered into the Statistical Package for the Social Sciences (SPSS) version 17.0.2 (SPSS Inc., Chicago, IL). A double-entry check was performed to ensure accuracy. We ran descriptive analyses to determine frequencies, means, and percentages of all applicable items. Organizational structure and number of patients seen per day, use of PTAs and treatments per patient per day, and physiotherapist experience and number of patients seen per day were examined using comparison tables to determine the frequencies of each subcategory. The open-ended items (e.g., explanations regarding the positions of physiotherapists, where PTAs are used, weekend criteria, and final comments) were analysed for general themes and reported as percentages.

RESULTS

Responses from the telephone questionnaire were collected from physiotherapists at 100% of Level I trauma centres across Canada ($n = 19$). Questionnaires containing missing data were included in the analysis, and unanswered items were coded as missing; the items with the lowest response rates were the number of trauma patients admitted per year (14 responses, 74%) and the corresponding year (11 responses, 58%). Some data were not suitable for analysis; for example, the breakdown of trauma beds and their associated physiotherapy FTEs was not reported consistently, since some facilities did not have permanently designated trauma beds in the ICU and wards. With smaller trauma numbers, some facilities combined their trauma beds within other units (such as orthopaedic) and could not isolate the bed or FTE numbers specific to trauma. Tables 1 and 2 show characteristics of Level 1 trauma centres and of ICUs respectively.

Participating physiotherapists had a mean of 17.0 years of physiotherapy practice experience and 9.5 years'

Table 1 Characteristics of Level I Trauma Centres

Characteristics	No. (%) of centres; n = 19
Organizational structure	
Programme management	7 (37)
Matrix	4 (21)
Departmental	8 (42)
Model	
5 d/wk (no weekend coverage)	1 (5.5)
5 d/wk (priority weekend coverage)	17 (89)
Other service delivery model	1 (5.5)

Table 2 Characteristics of Intensive Care Units

Resources	ICU		
	Level I	Level II	Level III
Beds			
No. of responses	18	13	3
Mean	18.6	10.7	11.3
Range	6–30	4–18	3–24
FTEs			
No. of responses	17	10	3
Mean	1.7	0.8	0.7
Range	0.4–4	0.5–1.8	0.2–1.5

FTE = full-time equivalent.

experience working with trauma patients. Of the 19 participants, 9 held a managerial position that included providing direct patient care.

Organizational structure

A departmental model of structural organization was used by 8 of the 19 centres (42%), a programme management model by 7 (37%), and a matrix model by 4 (21%). Two physiotherapists employed at centres with programme management models said they prefer a departmental organizational structure to maximize the use of physiotherapists within the centre. As Figure 1 shows, organizational structure differed across Canada: of the 7 centres in Ontario, 5 (71%) reported operating with a programme management model, 1 (14%) a matrix model, and 1 (14%) a departmental model, whereas of the 12 centres elsewhere in Canada, only 2 (17%) reported using a programme management model, 3 (25%) used a matrix model, and 7 (58%) used a departmental model.

Models of service delivery

The dominant model of physiotherapy service delivery was 5 days/week with priority weekend coverage (17 centres, 89%). A model of 5 days/week with no weekend coverage was used in one centre; at another, physiotherapists working in the ICU rotated on a 7-day schedule. There were many similarities among sites with respect to criteria for priority weekend coverage. The primary

Figure 1 Organizational structure of Level I trauma centres.

priority was respiratory care, noted by 17 participants (89%), followed by imminent discharges (15, 78%); other criteria mentioned included assessment of new referrals and patients requiring mobilization.

In 17 of 19 trauma facilities (89%), physiotherapists worked on a specific floor or unit; in the remaining 2 (11%), they followed patients from admission through to discharge from acute care.

Staffing

PTAs were employed in 89% of Level I trauma centres (17 of 19), primarily to assist physiotherapists with mobilization and bed mobility of trauma patients. PTAs were used in the ICU in 8 centres (41%). One participant, working at a centre that did not currently have PTAs on the trauma team, did not see a role for PTAs in that centre. Of centres employing PTAs, 8 (47%) reported providing two treatments per patient per day, while 9 (53%) reported providing only one treatment per day. The second treatment was provided by either a PTA or a physiotherapist, depending on the location of the patient (ICU or floor) and the treatment required. The two hospitals that did not employ PTAs did not provide a second treatment.

Of 19 participating physiotherapists, 17 (89%) reported that given the option, they would increase the amount of time spent with each patient; 8 (42%) said they would like to provide more than one treatment per day, time permitting. Conversely, one participant stated that physiotherapists must consider the complexity of patients' injuries, as many patients may be too tired to receive multiple treatments per day.

Most participants (15/19, 79%) stated that the number of physiotherapists employed on the trauma service should increase to provide better patient care. Three participants were satisfied with the care they were able to provide at their current staffing levels, and one participant was unsure whether staffing levels should be changed to provide better patient care.

Table 3 Characteristics of Physiotherapists' Caseloads

	No. (%) of facilities
Typical caseload; no. of patients	
7–9	3 (16)
10–12	11 (58)
13–15	5 (26)
Typical no. of patients seen per day	
7–9	7 (37)
10–12	8 (42)
13–15	4 (21)
No. of treatments each patient typically receives per day	
1	11 (58)
>1	8 (42)
Provider of second treatment	
PT	1 (12.5)
PTA	1 (12.5)
Both or either	6 (75)

PT = physiotherapist; PTA = physiotherapist assistant.

Figure 2 The impact of organizational structures on the number of patients seen per day by a physiotherapist.

Caseload

Caseload characteristics are described in Table 3. The majority of participants (11/19, 58%) carried an average caseload of 10 to 12 patients. Physiotherapists at 5 centres (26%) carried 13 to 15 patients on their caseload, while physiotherapists at 3 centres (16%) had 7 to 9 patients. Figure 2 shows that in centres using the departmental model, there was a trend toward carrying higher caseloads than in centres using the programme management model. Similarly, physiotherapists working in a departmental model tended to see more patients per day than those in programme management. Regardless of the model, however, most physiotherapists (15/19, 79%) treated ≤ 12 patients per day. Some physiotherapists with caseloads ≥ 10 noted that they could not see every patient on their caseload every day. There was a trend for physiotherapists with >10 years' experience to provide

Figure 3 Number of patients seen per day relative to experience as a physiotherapist.

>1 treatment per patient per day, but these physiotherapists also tended to see fewer patients per day than those with <10 years' experience (see Figure 3); 8 of 13 physiotherapists with >10 years' experience (62%) worked in managerial positions (e.g., professional practice leader, coordinator, or supervisor) in conjunction with their clinical role, whereas only 1 of 6 with <10 years' experience (17%) held a management position.

DISCUSSION

We found a great deal of variation in the criteria used to designate a trauma centre across Canada, as well as in the design of the trauma programmes themselves. As a result, terms used in the survey may have been interpreted differently by different centres.

Within Canada, 42% of Level I trauma centres operated with a departmental model; this percentage was higher than we expected, given that the purportedly more cost-effective programme management model may lend itself well to the hospital funding constraints currently imposed by governments.^{6,7} We do not know whether hospitals currently using a departmental model will reorganize to adopt a programme management model in an effort to manage funding constraints. Two participants working in a programme management context believed that physiotherapists were used inefficiently at their centres and that a departmental model would enable more focus on patient care; with a departmental model, it may be easier for physiotherapists to redistribute patients when necessary to ensure regular provision of care. We found that the matrix model was not common in Canada's Level I trauma centres, perhaps because this organizational structure is more complex, with multiple levels of accountability.⁹ The majority of the centres using a programme management or matrix model were located in Ontario, while centres elsewhere in Canada primarily used a departmental model. This difference may be due to differences in provincial regulations, health care resources, and funds available to trauma centres in different provinces.

We initially hypothesized that physiotherapists working in a departmental model would have smaller caseloads, as patients could be distributed among all physiotherapists, not just those working on a particular service. In fact, however, we found that participants working in a departmental model tended to report both higher caseloads and higher numbers of patients seen per day. The programme management model may require physiotherapists to be involved in more non-patient-care activities, such as advocating for the profession,^{6,8} which could reduce the amount of time spent providing patient care; this might be one reason for the lower caseload numbers. Similarly, physiotherapists working in a matrix model may be required to participate in more non-patient-care activities for both the physiotherapy department and for their particular unit, which could also lead to smaller caseloads.

Most hospitals (17, 89%) provided physiotherapy services 5 days/week with additional priority weekend coverage. As we expected based on the lack of consensus in the literature,^{10,20} patients were prioritized for weekend care based on criteria established by individual hospitals. Generally, study participants reported priority weekend care for patients with severe respiratory issues as well as those with imminent discharge dates. According to McAuley, patients treated on the weekend were “better” on Monday than those not treated on the weekend, as reported by physiotherapists.²¹ However, McAuley’s descriptive study did not include objective outcome measures; therefore, while the results suggest that patients appear to benefit from the provision of weekend physiotherapy, which patients to treat and which treatments to use remain unclear.²¹

As of the time of our survey, none of the 19 Level I trauma centres in Canada had implemented 7-day-per-week physiotherapy services with no change on the weekends. A systematic review of hospitals in Canada, Australia, the Netherlands, the United States, and the United Kingdom by Brusco and Paratz²² has suggested that providing physiotherapy services 7 days/week would decrease the LOS of acute neurological patients, but the financial impact of such a change was not investigated.

At the time of our survey, the majority of Level I trauma centres employed PTAs, who tended to work across the continuum of care in some centres, from the ICUs to the trauma unit. Budgetary constraints create a need to provide quality patient care at low cost,⁶ and one result is that some hospitals employ less expensive PTAs as adjuncts to or replacements for physiotherapists.²² However, PTAs cannot assess patients, progress exercise programmes, or perform nasal/tracheal suctioning;²³ they are employed primarily to assist with transfers and mobilizations. PTAs are likely an important adjunct in providing quality patient care, but they cannot replace physiotherapists, as their skill set is more limited and their scope of practice narrower. In addition, the long-

term financial effects of employing PTAs to work with or to replace physiotherapists are unknown, as is the impact on patient care. Our results demonstrate that centres where PTAs work on the trauma service may be more likely to provide patients with 2 treatments per day; of 17 centres with PTAs, 9 (53%) provided a second treatment, while of the 2 hospitals (11%) that did not employ PTAs, neither gave patients a second treatment in the same day. Given their acuity, patients on the trauma service would seem likely to benefit from at least one treatment per day, if not more, to facilitate recovery. For example, for patients with neurological conditions, early and more frequent treatments improve recovery.^{24,25} There is also evidence to suggest the efficacy of multiple physiotherapy treatments per day in preventing respirator-induced pneumonia.²⁶ One participant commented that trauma patients would be too tired to participate in multiple treatment sessions; if this is the case, perhaps shorter but more frequent treatments would improve recovery while conserving patients’ energy. Employing more physiotherapists and/or PTAs could thus be highly beneficial in potentially increasing the number of treatments a trauma patient receives.

Our study participants had multiple administrative roles in addition to providing patient care. This may partly explain why physiotherapists with >10 years’ experience treated fewer patients per day than those with less experience; physiotherapists with more experience may also have been better able to prioritize patient care and to delegate when necessary. Taking on multiple roles, such as patient-care coordinator, professional practice leader, and senior or supervisory roles, requires more time for organizational and management duties and leaves less time available for direct patient care. Furthermore, trauma physiotherapy is physically demanding work that physiotherapists may not be able to continue for many years; they may seek other positions within the hospital to prevent injury.

Our study found that physiotherapists in Level I trauma units appeared to carry 10–12 patients on their caseload and to see 10–12 patients per day regardless of caseload. This means that at some centres, trauma patients were not seen daily by a physiotherapist. It is not surprising, therefore, that most participants reported a desire to increase the number of physiotherapists employed at their trauma centre to provide better patient care.

LIMITATIONS

Our study had several limitations. Because only one physiotherapist was interviewed at each site, interviews recorded a single perspective and interpretation of the questions that may not have reflected the opinions of the majority of physiotherapists at each centre. Although we attempted to interview a floor physiotherapist at each site, physiotherapists’ availability was limited, which

ultimately affected who was interviewed. Therefore, the responses we obtained differed based on whether the participant worked on the floor or in the ICU. Furthermore, participants may have given inaccurate responses to certain items on the questionnaire. Results of pilot-testing revealed different responses from participants at the same site to one item, which led us to develop verbal prompts for this item; despite the prompts, however, the distinction between programme management and matrix models may not have been universally understood, which potentially compromises the validity of responses to the organizational structure question. Caseload numbers may have been underestimated, since the interviews were conducted in winter/spring 2009, whereas 2008–2009 totals from the National Trauma Registry indicate that the majority of trauma cases occur in either summer or fall (only Newfoundland and Labrador, Prince Edward Island, and Nova Scotia have more incidents during the winter months).²⁷ Correlation coefficients were not calculated because of the small population size ($n = 19$); only observed trends and descriptive analyses were reported. Finally, we were unable to establish trends between the number of beds and associated physiotherapy FTEs, because it appeared that many centres do not have assigned beds for trauma patients. This may be related to specific hospitals' protocols for categorizing trauma patients.

Future research should continue to explore the roles of physiotherapists within Level I trauma centres using the results reported here. In future studies, more than one physiotherapist should be interviewed at each centre, and the number of centres surveyed should be increased by including trauma centres of all levels as well as those that are primarily paediatric. The impact of organizational structures on LOS, caseload, and financial cost should also be examined to help determine the optimal organizational model. Further investigations into caseload management, whether using PTAs or physiotherapists, are also needed to improve patient care and physiotherapist efficiency. In addition, studies determining the benefits of treating trauma patients multiple times per day should be conducted.

CONCLUSION

This was the first study to examine models of service delivery, staffing, and caseloads in Level I trauma centres across Canada. While there appears to be much variation across the country, we did observe certain trends. The most prevalent organizational structure of Level I trauma centres in Canada was the departmental model, which was an unexpected finding, since at the time of the study most centres in central Ontario, the context with which we were familiar, operated with a programme management model. Physiotherapist participants told us that a departmental model is more desirable, despite its potentially higher costs, because, in their experience, it enhances efficiency and improves patient care. While nearly

all hospitals provided physiotherapy services 5 days/week with priority weekend coverage, we do not know whether this model is best in terms of reducing patients' LOS and decreasing overall hospital costs. Future research should focus on comparing the current model to a 7 days/week model. Employment of PTAs in trauma centres was common, and these individuals assisted with patient care in ICUs and on trauma units. Centres employing PTAs were more likely to provide a second treatment to patients in the same day, which may facilitate patient recovery and earlier discharge; however, more studies are needed to determine PTAs' impact on patient care. On average, physiotherapists tended to see 10–12 patients per day, regardless of their total caseload; those carrying a higher caseload may thus not be treating all their patients daily, but we do not know whether these patients received adjunct therapy from other health care professionals (e.g., occupational therapists, nursing staff). Canadian Level I trauma centres can use the data presented here to determine how they compare to the rest of Canada with respect to models of service delivery, staffing, and caseloads. Future research can build on the trends established by this study to determine optimal models of service delivery, staffing, and caseloads to enhance patient care and lower health care costs.

KEY MESSAGES

What is already known on this topic

There are currently no established guidelines for optimal models of service delivery, staffing, or caseloads in Canadian Level I trauma centres. Departmental models of organization tend to be less cost-effective than programme management and matrix models. Caseloads in most hospitals are based on traditional staffing levels and budgetary concerns.

What this study adds

Across Canada, the majority of Level I trauma centres use a departmental model of organization. Most centres provide physiotherapy services to patients 5 days per week with priority care on weekends; criteria for priority care are determined by individual hospitals. Employing physiotherapist assistants tends to allow for patients to be treated more than once per day. Physiotherapists working in a departmental model tend to carry larger caseloads and to treat more patients per day than those working in programme management and matrix models.

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APPENDIX: LEVEL I TRAUMA CENTRE PHYSIOTHERAPY SERVICE QUESTIONNAIRE

1. What is your position at the hospital?

2. How long have you been a physiotherapist? (years/ months)

3. How long have you held your current position at the hospital? (years/months)

MODELS OF PHYSIOTHERAPY SERVICE DELIVERY

4. Describe the geographical area of your catchment area for the trauma centre?

5. What is the model of physiotherapy service delivery in your Trauma Centre?
☐ Departmental
☐ Program Management
☐ Matrix
☐ Other (please describe) _____
6. Which of the following divisions does your Trauma Centre have? Please include the number of beds in each area and the number of physiotherapy full time equivalencies (FTE) that are employed in each area.
☐ Level I ICU (pt:RN is 1:1, critical care ICU)
Number of beds: ____ FTE: ____
☐ Level II ICU (pt:RN is 2:1) Number of
beds: ____ FTE: ____
☐ Level III ICU (pt:RN is 3:1) Number of
beds: ____ FTE: ____
☐ Floor/Ward Number of beds: ____ FTE: ____
☐ Other Number of beds: ____ FTE: ____
Please describe: _____
(for hospitals that follow through) Total FTE: ____
7. Which of the following describes the physiotherapy services in your trauma facility?
☐ One physiotherapist follows patients from admission to discharge
☐ Physiotherapists each work on a specific floor/unit
☐ Other
Please describe: _____
8. How do you receive your referrals?
☐ Standing Orders
☐ Physician
☐ Other (Please describe): _____

STAFFING/MODELS OF CARE

9. A. How many patients do you carry on your caseload?

- B. How many patients do you typically see a day?

- C. Does your hospital currently employ physiotherapist assistants to assist physiotherapists working with trauma patients?

If Yes

- i) How many physiotherapy assistants work with the trauma patients?

- ii) In what area do the physiotherapy assistants work?

- iii) What is the physiotherapy assistant to patient ratio?

If No:

- i) Do you think physiotherapist assistants could be used in the trauma service?

10. What is the current model used at your centre to provide physiotherapy services?

- ☐ Five days/week with no weekend coverage
☐ Five days/week with priority weekend coverage
☐ Seven days/week
☐ Other (Please explain): _____

If PRIORITY coverage on weekends:

- i) What are the criteria regarding which patients are seen by a physiotherapist?

- ii) How many trauma patients are seen on an average weekend day by 1 physiotherapist?

If NO weekend coverage:

- i) Do you think your patients benefit/would benefit from physiotherapy coverage on weekends?

CASELOAD

11. A. Is your hospital affiliated with a university?
 - i) If yes, is there a physiotherapy program at the affiliated university?

- B. The following question deals with what percentage of your time is spent performing patient care, teaching and research.
 - i) Patient care? (%) _____
 - ii) Teaching? (%) _____
 - iii) Research? (%) _____
- C. What is the expected division between patient care activities and non-patient care activities at your hospital?

12. How many trauma patients are admitted to your centre each year?

13. How do you measure the severity of injury for patients admitted to your hospital?

- ☐ Injury Severity Score
☐ New injury severity scale
☐ Trauma injury severity scale
☐ Other

Please specify: _____

14. What type and number of cases are admitted (Please consider only the last 7 days)?

Injury (Use most severe injury to classify patient)	Number of cases/ week	Typical length of stay in hospital (days) ICU-discharge	Number of new referrals/ week	Typical time spent with patient per session (min)
Traumatic brain injury				
Spinal cord injury				
Internal injuries / chest trauma				
Multiple limb fractures				
TBI + other				
Other (clarify)				

15. A. Do your patients routinely receive treatment more than once per day?

i) If yes, are they given the same or different treatment on the same day?

ii) If yes, who provides the second treatment?

- ☐ Physiotherapist
☐ Physiotherapist Assistant
☐ Other (Please describe) _____

16. A. Given the option, would you change the amount of time you could spend with each patient?

B. Do you think the number of physiotherapists employed on the trauma service should change to provide better patient care?

OTHER

17. Do you have any other relevant information about physiotherapy staffing, caseload or models of care that you would like to express?