Original Research

Self-reported comfort and competencies for pain among undergraduate medical students at Memorial University

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ABSTRACT

Introduction Pain is a unique, multifaceted, and poorly understood topic. Research has found prevalent gaps in knowledge regarding pain management in medicine, partially stemming from inadequate coverage in undergraduate medical education. Pain in Memorial University's curriculum has not been systematically explored and our study sought to examine medical students' perceptions of pain-related curriculum.
Methods: A previously developed survey questionnaire created to examining Canadian undergraduate medical student perspectives on pain was adapted for use at Memorial University. A web-based survey was administered between April – June 2020 to pre-clerkship and clerkship student cohorts using the Dillman Tailored Design Method. The questionnaire comprised a total of 25 items using Likert scale and visual analog scale (VAS) measures.
Results: Forty-seven students (N=47) completed the survey. Respondents reported a median 4 (Interquartile range (IQR)=6.5) total hours of pain instruction. Median perceived importance of pain management was 85 (IQR=25.75) and 80 (IQR=20.25) for pre-clerks and clerks respectively. Prioritization of pain in medical education, was a median 23.5 (IQR=15) and 27.5 (IQR=26) by clerk status, consistent with previous findings suggesting minimal recalled prioritization. Clerks indicated greater comfort with assessing pain (p=0.02), and managing adult pain (p=0.049), while all respondents lacked comfort managing children's pain (VAS<50mm).
Conclusion: Undergraduate medical students at Memorial University view pain management as a significant, yet obscured topic in their medical education. While clerks indicated a greater comfort level, a general consensus noted a lack of designated hours towards pain.

INTRODUCTION

Pain is a unique, individual, and multifaceted experience containing multiple distinctions and subcategorizations that further complicates a topic poorly understood by many healthcare professionals.[1] In Canada, chronic pain accounts for significant economic burden with an estimated CDN $60 billion of expenditure when considering direct and indirect costs.[2,3] There is an approximate 20% of Canadians over the age of eighteen along with an estimated 11% to 38% of adolescents and children that suffer from indiscernible, prolonged chronic pain with no known causes and an ineffective diagnosis.[4–6] Such conditions directly result in reduced quality of life; frequent reports of diminished sleep, along with poorer cognitive function, mood, and mental health.[7]

Recent advancements in science and medicine have resulted in chronic pain being recognized by the World Health Organization (WHO) as an individual, categorical, and multifaceted disease as described in the eleventh and most recent edition of the International Classification of Diseases (ICD) manual.[8] Further, pain medicine has been a distinct and recognized medical fellowship subspecialty with established training methods and standards of care focusing on treatment, management and rehabilitation of individuals suffering from pain since 2010.[9,10] Despite these implementations and recognitions, both treatment and management of pain by care providers remains inadequate with a limited number of clinicians providing effective management.[11] This prevalent lack of knowledge in pain education has been noted for years, stemming from gaps in undergraduate medical education program curriculum.[5,12,13]

Recent studies have found limited or incomplete coverage of materials related to pain in medical school curricula.[5,12,14,15] When content related to pain is presented, it is often integrated within other course materials and non-quantifiable, creating a fragmented learning experience for students.[16] The results of these studies indicate an inadequacy in the content and time devoted to pain education in medical school curricula around the world. As such, ensuring adequate coverage of pain curriculum in the provision of competency-based

education is a growing area of concern in Canada.[17] As with other parts of the world, advancement in undergraduate pain education in Canadian medical programs has been limited, with a continued lack of structure in delivery methods.[1,14] Watt-Watson et al. (2009) examined education in varying health professions at ten universities across seven provinces and found that approximately 70% of programs had no designated hours for pain education.[1] Educational content related to pain has typically lacked an integrated approach through a failure to integrate the biological and psychosocial factors that contribute to pain.[18] Further, Tran et al. (2018) examined medical student's perspectives of pain curriculum at the University of Alberta, reporting limited recall in hours of training for pain management among their cohort, along with frequent discomfort in treating adult and pediatric pain.[19] While the coverage of pain curriculum in medical schools is already limited in scope, pediatric pain is examined to a lesser degree still, further impacting medical student comfort and knowledge surrounding pain.[19,20]

Undergraduate medicine programs require greater educational initiatives aimed at guiding curricular topics ranging from physiological mechanisms to differentiation between acute and chronic pain, as well as prevention and management strategies for adult and pediatric pain.[21] The inclusion of greater pre-licensure curricula examining pain in medical schools will significantly improve knowledge and beliefs regarding the prevention and treatment of pain among future physicians.[1] To date, there have been no studies or assessments conducted regarding student opinions on the competency or completeness of pain curriculum in undergraduate medical education at Memorial University. Given the lack of existing reports assessing the pain medicine curriculum, the aim of the present project is to examine the views of currently enrolled medical students regarding their self-determined competencies and comfort with pain assessment and management. Based on the findings of studies conducted at other Canadian universities, it is hypothesized that students of Memorial University's undergraduate medicine program will have limited recall of curriculum dedicated to pain and a further lack of comfort and competency in the management and assessment of pain.

METHODOLOGY

A survey tool previously developed and distributed by Tran et al. (2018) to examine University of Alberta medical students' perspectives of their clinical comfort and curriculum for pain management was adapted for undergraduate medical studies at Memorial University.[19] The original tool was developed in accordance with published guidelines and current International Association for the Study of Pain (IASP) recommendations regarding curriculum relevant to pre-licensure medicine students.[10,19] Survey adaptation and validation was completed with input from a medical education professor, an assistant clinical professor specializing in anesthesia and chronic pain, as well as the undergraduate medical curriculum lead to ensure content relevance at Memorial University. The employed survey contained 25 items across four major themes which included: medical student demographic characteristics (i.e., age, sex, year of study), recall of curricular allotment to pain education, assessment of student knowledge and beliefs surrounding pain topics as well as comfort levels in assessing and managing acute and chronic pain.

The section on education recall examined the provided curriculum, including hours of instruction on pain received, opinions regarding most effective educational delivery practices, as well as the provision of pain education resources and elective opportunities. Student knowledge and beliefs were examined using multiple visual analog scales (VAS) as well as measures that sought to explore student comprehension regarding pain topics through various self-directed inquiries. Additionally, a five-point Likert scale ranging from "1 = strongly disagree" to "5 = strongly agree" was used to assess student's agreement with several statements and myths regarding pain. Assessment of comfort was conducted using multiple VAS that sought to gain understanding of student confidence in assessing adult and pediatric pain.

Piloting of the adapted survey was conducted with four current undergraduate medicine students, one in each year of the program, to ensure question coherence, face validity and time commitment. The finalized tool was uploaded to Qualtrics^{XM} survey software, a secure enterprise survey solution used by Memorial University to conduct surveys for research and administrative purposes. Following validation, all currently registered undergraduate medicine students (n=320) at Memorial University (St. John's, Canada) were identified and distributed the survey though the undergraduate office's electronic mailing listserv. The Dillman Tailored Design Method was employed over a 60-day study period that took place between early April and June of 2020.[22] The initial electronic communication was sent on day 0 and included a brief synopsis of the study along with a link inviting students to the survey with consent implied upon completion. The ability to skip questions was allowed at

respondent's discretion. Follow-up reminders to complete were sent on days 7, 21 and 49 before survey closure with study conclusion on day 60. Ethics review by Memorial University's Health Ethics Research Board was deemed unnecessary given the project nature as a program evaluation.

Quantitative data analysis was conducted using the Statistical Package for the Social Sciences software (SPSS). Survey responses were compiled and stratified by clerkship status; students in years 1 and 2 were pre-clerks, while year 3 and 4 respondents were labelled as clerks. Continuous variables were reported as median scores and interquartile ranges (IQR). Educational recall and other descriptive variables were summarized as frequency distributions. Comparative analysis of beliefs and competencies between clerks and pre-clerks was conducted using Mann-Whitney tests for independent comparisons with statistical significance determined using an alpha level of 0.05. Comfort levels were also explored across sex.

RESULTS

Demographics

A total of 47/320 (14.6%) medical students responded to the survey between April and June of 2020, however, one participant failed to report any of the demographic variables and was subsequently excluded from the data analysis, resulting in 46 analyzed surveys. The total analyzed sample was comprised of 26 (56.5%) clerks and 20 (43.5%) pre-clerks with average age of participants being 26.19 ± 2.93 years and the majority female (64.4%). Demographic information for participants is presented for the total sample and by clerk status in Table 1.

Education on Pain Management

Respondents reported a median 4 (IQR = 6.5) total hours of instruction related to topics in pain across all years, the difference between clerkship and pre-clerkship students was not significant (p=0.06). Of these respondents, 25 (54.3%) indicated no examination of pediatric pain, while the remaining 21 (45.7%) recalled a maximum of 25% of allotted hours of pain education focusing on children. Lecture was the most frequently cited delivery method for pain curriculum in n=32 (69.6%) cases and small group was the preferred method for this topic (37.0%). The majority of the sample (n=42) also recalled being taught at least one pain scale; the Numeric Rating Scale (85%) and the Faces Pain Scale (61%) were most frequently recalled. The sole additional pain scale implicated by one respondent, was the Critical Care Pain Observation Tool. A full breakdown of educational recall by clerk status is provided in Table 2.

Table 1. Demographic characteristics for respondent students enrolled in the undergraduate medicine program at Memorial University (n= 46).

Demographic Variables	Pre-Clerkship (Years 1 & 2, n=20)	Clerkship (Years 3 & 4, n=26)	Total n = 46
Age (years), mean ± SD	25.35 ± 2.77	26.91 ± 2.97	26.19 ± 2.93
19 – 25	14 (70.0)	8 (34.8)	22 (47.8)
26 – 30	4 (20.0)	13 (50.0)	17 (37.0)
>30	2 (10.0)	2 (8.6)	4 (8.7)
Missing Responses		3 (11.5)	3 (6.5)
Sex			
Male	8 (40.0)	8 (30.8)	16 (34.8)
Female	12 (60.0)	17 (65.4)	29 (63.0)
Missing Responses	0 (0.0)	1 (3.8)	1 (2.3)
Children			
Yes, n (%)	1 (5.0)	2 (24.3)	3 (6.5)
No, n (%)	19 (95.0)	24 (92.3)	43 (93.5)
Pain medication usage (personal or close contact) in the past month for >7 days?			
Yes, n (%)	4 (20.0)	4 (15.4)	8 (17.4)
No, n (%)	16 (80.0)	22 (84.6)	38 (82.6)

Table 2. Educational recall for pain curriculum as reported by respondent students enrolled in Memorial University's undergraduate medicine program organized by clerk status (n= 46).

Pain Education	Pre-Clerkship (Years 1 & 2)	Clerkship (Years 3 & 4)
Hours of instruction in pain management		
Year 1 (n=10)	0.25 (IQR = 4.5)	
Year 2 (n=10)	4 (IQR = 6)	
Year 3 (n=14)		4 (IQR = 4)
Year 4 (n=12)		9 (IQR = 19.75)
Delivery method(s) of instruction*	n (%), n=20	n (%), n=26
Lecture	16 (80.0)	16 (61.5)
Small group	2 (10.0)	9 (34.6)
Online module	6 (30.0)	5 (19.2)
Bedside teaching	2 (10.0)	12 (46.2)
Other	2 (10.0)	5 (19.2)
Percentage of hours focused on pediatric pain	n (%), n=20	n (%), n=26
0%	12 (60.0)	13 (50.0)
1 – 25%	8 (40.0)	13 (50.0)
26 – 50%	0 (0.0)	0 (0.0)
51 – 75%	0 (0.0)	0 (0.0)
76 – 100%	0 (0.0)	0 (0.0)
Preferred delivery method for pain management	n (%), n=20	n (%), n=26
Lecture	6 (30.0)	10 (38.5)
Small group	8 (40.0)	9 (34.6)
Online module	0 (0.0)	1 (3.8)
Bedside teaching	1 (5.0)	0 (0.0)
Other	2 (10.0)	6 (23.1)
N/A	3 (17.6)	0 (0.0)
Pain Scales Recalled	n (%), n=20	n (%), n=26
Numerical Rating Scale	17 (85.0)	23 (88.5)
Visual Analog Scale	3 (15.0)	6 (23.1)
Faces Pain Scale (Original or Revised)	9 (45.0)	19 (73.1)
Faces, Legs, Activity, Cry, Consolability Scale	0 (0.0)	3 (11.5)
None	1 (5.0)	0 (0.0)
Other	0 (0.0)	1 (3.8)

*Delivery method(s) percentage is listed as percentage of total response as multiple responses could be selected.

A wide array of responses were returned for opinion on the subject block or clinical rotation that provided the best teaching on chronic pain management. The palliative care and anesthesia block or rotations were most prominent, while several other responses appeared less frequently. In examining the additional training students would like to see included in chronic pain, the most common answer were more lecture hours (10/46),

increased hours focusing on pediatric pain (6/46), and greater case-based learning (6/46). All pre-clerks in the sample (n=20) indicated no experience with prescription of common pain medications, while clerks (n=26) indicated varying levels of experience detailed in Table 3.

Table 3. Experience prescribing common medications used in the treatment of pain conditions by clerkship status (n=46).

	Pre-Clerkship (Years 1 & 2) n (%)		Clerkship (Years 3 & 4) n (%)	
	Adult	Child	Adult	Child
Acetaminophen	0 (0.0)	0 (0.0)	25 (96.2)	21 (80.8)
Ibuprofen	0 (0.0)	0 (0.0)	24 (92.3)	16 (61.5)
Morphine	0 (0.0)	0 (0.0)	21 (80.8)	5 (19.2)
Oxycodone	0 (0.0)	0 (0.0)	8 (30.8)	0 (0.0)
Codeine	0 (0.0)	0 (0.0)	7 (26.9)	0 (0.0)
Hydromorphone	0 (0.0)	0 (0.0)	17 (65.4)	1 (3.8)

Knowledge and Beliefs

Using a visual analog scale (VAS) ranging from "0 = very unimportant" to "100 = very important", students were asked to indicate their perceived importance of chronic pain management, with a median response of 85mm (IQR = 25.75) and 80mm (IQR = 20.25) for pre-clerks and clerks, respectively. Pre-clerks also indicated a belief in the importance of reassessing pain relief after intervention as 91.0mm (IQR = 8.0) while clerks had a median 99.5mm (IQR = 20.0). Additionally, when asked to indicate prioritization of pain in their medical education, pre-clerkship students indicated a median 23.5mm (IQR = 15) while clerkship students reported a rating of 27.5mm (IQR = 26).

Students were asked to outline up to five physical or psychological adjuncts to pain management of which they are aware. A total of 22 adjuncts were provided; the five most common responses were massage (17), exercise (15), physiotherapy (14), meditation/mindfulness (13), and cognitive behavioural therapy (12). Respondents were also asked to indicate their agreement with various statements regarding pain on a 5-point Likert scale. While responses were similar between groups, pre-clerks indicated uncertainty or a neutral response more often than clerks as well as more frequent belief that opioid dependency was a reason to discourage analgesia prescription in children. A full breakdown by clerk status is provided in Table 4.

Comfort

Significant differences were noted by student status for comfort with assessment of pediatric pain (p=0.022), assessment of adult pain (p=0.002) and management of adult pain (p=0.049) with clerks indicating greater comfort in all variables. In 100% of cases students indicated that they did not feel they would be comfortable in managing children's pain (VAS<50mm). The average comfort level for assessment and management of adult and pediatric pain are expressed by student status in Figure 1. There were no significant differences in comfort levels across sex.

Table 4. Participant agreement with several statements and myths regarding pain organized by clerk status (n= 46).

Statement	Pre-Clerkship (Years 1 & 2) n = 20 (43.5%)		Clerkship (Years 3 & 4) n = 26 (56.5%)	
	Agree	Disagree	Agree	Disagree
Children require less analgesia than adults because of their immature neurologic systems	3 (15.0)	7 (35.0)	3 (11.5)	15 (57.7)
Children require less analgesia than adults as they will not remember the pain	0 (0.0)	18 (90.0)	0 (0.0)	21 (77.8)
A concern for opioid dependency is a reason not to prescribe analgesia to children	8 (40.0)	7 (35.0)	5 (19.2)	16 (61.5)
Children are at high risk of over-sedation from analgesia	11 (55.0)	1 (5.0)	22 (84.6)	3 (11.5)
Pain scores can help measure pain for children	7 (35.0)	4 (20.0)	22 (84.6)	0 (0.0)
Pain scores of 4 or more (out of 10) should be treated	7 (35.0)	2 (10.0)	8 (30.8)	2 (7.7)
Pain medications can mask underlying problems or "true diagnosis"	12 (60.0)	1 (5.0)	10 (38.5)	7 (26.9)
Using pain medications after painful injuries can help get children back to normal activities quicker	11 (55.0)	2 (10.0)	23 (88.5)	0 (0.0)
Pain medications help children heal better	6 (30.0)	4 (20.0)	14 (53.8)	3 (11.5)
Pain medications are the only way to effectively treat pain	1 (5.0)	17 (85.0)	0 (0.0)	25 (96.2)

Notes: 5-point Likert scale with responses of: strongly disagree, disagree, neutral, agree strongly agree grouped into three categories of agreement, disagreement and neutral (neutral not displayed).

DISCUSSION

Our results indicated that undergraduate medicine students at Memorial University view pain management as a significant topic that has seen limited examination in their medical education. Clerks indicated a greater allotment of hours for pain education, likely from clinical experiences, which would provide explanation for the significant difference on comfort levels regarding assessing and treating pain. Despite these findings, a consensus was noted in a lack of designated hours towards topics regarding the assessment and management of pain. These observations directly correlate with the findings of Watt-Watson et al. (2009) from over a decade ago which indicated an absence of pain education in greater than two-thirds of professional health education programs in Canada.[1] Evidently, a need remains for greater implementation of educational strategies aimed at improving competency in pain

management and assessment among undergraduate medical students. Further, many students indicated an absence of topics related to pediatric pain and all respondents displayed discomfort with treating pain in children. These findings mirror that of Tran et al. (2018) and indicate the need for greater provision of curriculum at Memorial University relevant to the assessment and treatment of pain as well as additional curriculum focusing on pediatric pain.[19] Respondents indicated a desire for more lecture hours and case-based learning related to pain and specifically, a greater allotment of hours to pediatric pain, recommended inclusions to undergraduate medicine curriculum. These results are contrasting to Tran et al., (2018) who recommended the greater provision of pain education via online modules and bedside teaching.[19] This discrepancy may be attributable to inherent differences in curriculum across institutions or a variation in the learning styles of respondents.

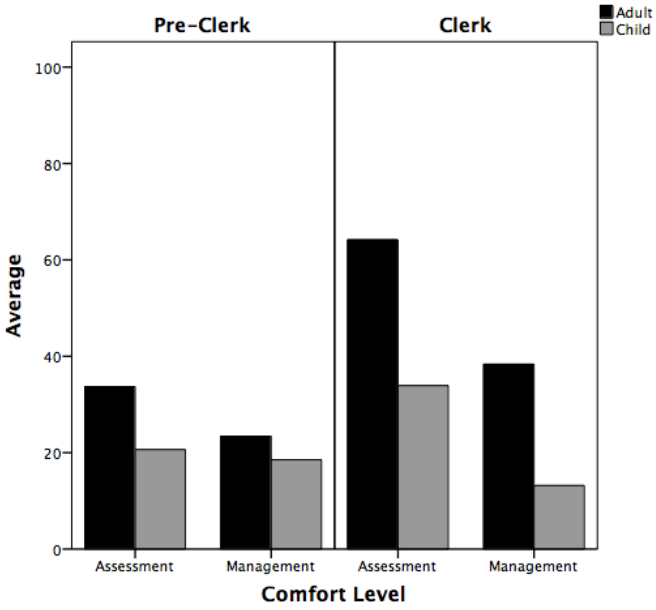

Figure 1. Average participant comfort with assessment and management of adult and pediatric pain as rated on a VAS (0 as "very uncomfortable" and 100 as "very comfortable").

Current guidelines indicate best-practice, client-centred care requires treatment by multiple healthcare practitioners in following a biopsychosocial model of care.[10,18] The importance that medical students be exposed to interprofessional education early in their medical schooling cannot be overstated.[23] It is recommended that health sciences education curriculum implement greater interprofessional initiatives aimed at collaborative cooperation in the navigation of complex pain conditions in providing applicable, real-world scenarios.[1,10] The findings of the present study support the results of those in other Canadian jurisdictions and presents the need to strengthen pain-specific knowledge and clinical competencies that all graduating medical students be required to demonstrate.[1,14,16,19] In response to this prevalent national underrepresentation of pain education, the Association of Faculties of Medicine of Canada (AFMC) have released a series of educational modules for undergraduate medical students across the country. These modules are intended to mitigate the gaps in current educational offerings and ensure future physicians are sufficiently equipped to navigate the complexities of pain management and addiction medicine.[24] Through focus on undergraduate medical training, it is predicted that future research will be able to demonstrate a larger impact on first-line implementation of prevention and management of pain of physicians entering practice.

LIMITATIONS

It is important to consider limitations of the present study such as non-response error, recall bias and geographical limitations. The present study may have been subject to bias via Nonresponse Error which is a result of survey respondents having different views from sampled individuals who did not respond, in a way relevant to the study.[22] This error is impacted by the small number of respondents to the present survey. In turn, the small sample size with the geographical limitation of the results coming from a single location and from a single program may limit applicability to other institutions and programs. However, the findings of the present study mirror the results of those conducted at several other Canadian institutions, including Tran et al., (2018) who also examined student opinions of their curriculum at the University of Alberta.[19] There is an implicit potential for systematic error through recall bias in any study that invites participants to complete retrospective recall. Inaccuracy in the events recalled by study participants relative to events and experiences that occurred throughout their medical degrees is possible, however, given the consistency of findings among students and relative to other studies this limitation appears negligible.

CONCLUSION

Pain is a multifaceted, individual experience requiring ongoing comprehensive management and assessment. Physicians play an essential role in the prevention, diagnosis, and management of all clinical presentations of pain. Undergraduate medical students at Memorial University indicated pain management is a significant, yet obscured topic in their medical education, with a

noted lack of designated curricular hours for pain concepts. While there has been a greater focus nationally on improving pre-licensure pain education, further educational initiatives are required at an institutional level in ensuring future medical professionals receive adequate training in pain management. Future research should aim to assess the impacts of the recently developed AFMC modules on medical learner comfort and competencies in the assessment and management of pain.

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DISCLOSURES

Although all authors completed the disclosure declaration, the following author(s) indicated interests, financial or otherwise, pertaining to the publication of this article or its subject matter: Ian Janes disclosed their position as the founder and current editor-in-chief of Lithos – The Memorial University Medical Journal.

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