



# LITHOS

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*The Memorial University  
Medical Journal*



# LITHOS

## The Memorial University Medical Journal

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# Land Acknowledgement

A land acknowledgement is offered to recognize Indigenous peoples' enduring connection to their traditional territories, to recognize the history of the land that is currently shared by many peoples, and to recognize stewardship as a shared commitment of all those who reside in a territory. The practice of territory acknowledgement is itself a replication of an Indigenous practice which predates European contact.

## St. John's Campus

We respectfully acknowledge the territory in which we gather as the ancestral homelands of the Beothuk, and the island of Newfoundland as the ancestral homelands of the Mi'kmaq and Beothuk. We would also like to recognize the Inuit of Nunatsiavut and NunatuKavut and the Innu of Nitassinan, and their ancestors, as the original people of Labrador. We strive for respectful relationships with all the peoples of this province as we search for collective healing and true reconciliation and honour this beautiful land together.



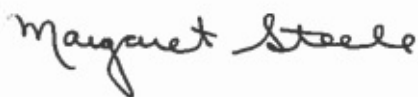
# Letter from the Dean of Medicine

At the Faculty of Medicine, we recognize the importance of conducting research that focuses on pressing and emerging needs of local, provincial, regional, and global populations. I am delighted to welcome you to the first issue of *Lithos – The Memorial University Medical Journal*. In addition to highlighting important research happening right here, this journal fosters a collaborative environment for our learners in undergraduate medical education, postgraduate medical education, and graduate education.

On behalf of Memorial University's Faculty of Medicine, I would like to congratulate Ian Janes, a third-year medical student, whose idea it was to create a journal for the Faculty of Medicine. Ian has worked tirelessly to make this new journal a reality. I would also like to thank the learners who have contributed by being members of the editorial team, submitting articles and raising the excitement about this new journal. You are all setting the standard for us to have a reputable publication we can be proud to have here at our university. I would also like to thank the faculty and staff members who are providing guidance, advice, support, and their expertise to this significant initiative.

To our learners: during this time while you further your education, you are gaining valuable knowledge and discovering areas of interest. Now is an opportunity for you to explore research areas that resonate with you. I encourage all learners as well as faculty to submit their scholarly works to this journal. We have so many important areas of research being explored here from basic medical science, humanities and social sciences, to clinical research and medical education. *Lithos* will show how we are advancing health care for the communities we serve.

Congratulations and I look forward to reading future issues!



**PROFESSOR MARGARET STEELE / DEAN OF MEDICINE**  
MD, FRCPC, M.ED, DF CPA, CCPE, FCAHS

# Letter from the Editors

## Lithos: A journal for students – run by students

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Peer-reviewed medical journals are essential to the dissemination of literature upon which the current and future understanding of medical practice is founded. These journals present an important, established, credible means of communicating the findings of clinical trials and other relevant information with the medical community.<sup>1,2</sup> Pertaining to medical education, there is an emphasis placed on learners in today's curriculum which promotes the development of competencies required not only of skilled clinicians, but that of clinician researchers and health scientists as well.<sup>3,4</sup> Consistent with these expanding expectations, there has been a global increase in the presence of student-run medical journals as a component of medical schools over the past thirty years.<sup>5</sup> In Canada, student medical journals present with diverse scopes, structures and policies while operating in a dynamic setting that facilitates rapid staff turnover. However, these journals constitute an important training and mentoring opportunity for students not provided in other extracurricular activities.<sup>6</sup> The presence of student-run medical journals at several Canadian institutions has served as an outlet for students to foster creativity and develop original ideas individually or in collaboration with peers and supervisors. These established journals have shown significant benefit for medical student development as well as medical research and practice.

Our editorial team is thrilled to be able to bring you the inaugural issue of Canada's newest student-managed medical journal: *Lithos* – The Memorial University Medical Journal. First and foremost, a thank you to our editorial team, reviewers, and supporters along with the numerous staff and faculty at Memorial University who have been instrumental in bringing this project to life. The journal name, *Lithos*, is a Greek word which translates to "stone", *Lithos*, and was chosen to represent the island of Newfoundland (colloquially referred to as "The Rock") where our medical school is located, while also providing implications to various stone-forming medical conditions. *Lithos* will feature a variety of health-related disciplines including clinical medicine, biomedical sciences, medical humanities,

community health and medical education. Although the primary focus is publishing work submitted by students, residents, and faculty within our medical school; submissions from any related discipline will also be considered with preference given to student authors. Consideration is also given to works from individuals affiliated with institutions outside of Memorial and appraised relative to the quality of the work and consistency with the ideals of our publication. We are committed to the dissemination of high-quality work which significantly contributes to current scholarly knowledge and debate.

The primary aim of *Lithos* is to stimulate the participation of students within our medical school in research, formal scholarly writing, and editing while also promoting the intellectual work of Memorial faculty and students. We view this as a means to augment training in expected competencies for future medical practitioners and researchers. Research skills are more important than ever given the blistering pace at which scholarly medical research is being generated across the globe. Since the onset of the COVID-19 pandemic this pace has only quickened, with one paper stating that submissions to Elsevier's suite of journals was up 58% in 2020 compared with the same period in 2019; the increase was even more pronounced in the health and medical sciences with a whopping 92% increase.<sup>7</sup> While a significant proportion of this increase can be attributed to pandemic related research, the pattern reflects an overall trend of increasing publication rates year-over-year.

Moving forward, we intend for this journal to become a fixture of Memorial University's Faculty of Medicine as we expand in both reputation and readerships while providing another tool to promote student success. However, we cannot achieve this alone. We need you, the health research community at Memorial University, to help us nurture and grow this publication to achieve these goals. We are calling on this community to help this journal become the best it can be through the submission of appropriate scholarly works for consideration and simply reading/enjoying the

publication while spreading the word to others you think may also enjoy our content.

For more information on these topics please visit our website ([journals.library.mun.ca/ojs/index.php/MUNMJ](http://journals.library.mun.ca/ojs/index.php/MUNMJ)) or contact us directly at [munmedjournal@mun.ca](mailto:munmedjournal@mun.ca).

Thank you for taking the time to take in our inaugural issue and we hope you will continue to enjoy this publication for years to come!

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# 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 ( $VAS<50\text{mm}$ ).

**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.

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### 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.<sup>1</sup> In Canada, chronic pain accounts for significant economic burden with an estimated CDN \$60 billion of expenditure when considering direct and indirect costs.<sup>2,3</sup> 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.<sup>4-6</sup> Such conditions directly result in reduced quality of life; frequent reports of diminished sleep, along with poorer cognitive function, mood, and mental health.<sup>7</sup>

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.<sup>8</sup> 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.<sup>9,10</sup> 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.<sup>11</sup> This prevalent lack of knowledge in pain education has been noted for years, stemming from gaps in undergraduate medical education program curriculum.<sup>5,12,13</sup>

Recent studies have found limited or incomplete coverage of materials related to pain in medical school curricula.<sup>5,12,14,15</sup> 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.<sup>16</sup> 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.<sup>17</sup> 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.<sup>1,14</sup> 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.<sup>1</sup> 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.<sup>18</sup> 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.<sup>19</sup> 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.<sup>19,20</sup>

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.<sup>21</sup> 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.<sup>1</sup> 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.<sup>19</sup> 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.<sup>10,19</sup> 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<sup>XM</sup> 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 through 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.<sup>22</sup> 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  $26.19 \pm 2.93$  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 $\pm$ SD	$25.35 \pm 2.77$	$26.91 \pm 2.97$	$26.19 \pm 2.93$
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)
<b>Hours of instruction in pain management</b>		
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)
<b>Delivery method(s) of instruction*</b>	$n$ (%), $n=20$	$n$ (%), $n=26$
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)
<b>Percentage of hours focused on pediatric pain</b>	$n$ (%), $n=20$	$n$ (%), $n=26$
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)
<b>Preferred delivery method for pain management</b>	$n$ (%), $n=20$	$n$ (%), $n=26$
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)
<b>Pain Scales Recalled</b>	$n$ (%), $n=20$	$n$ (%), $n=26$
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).

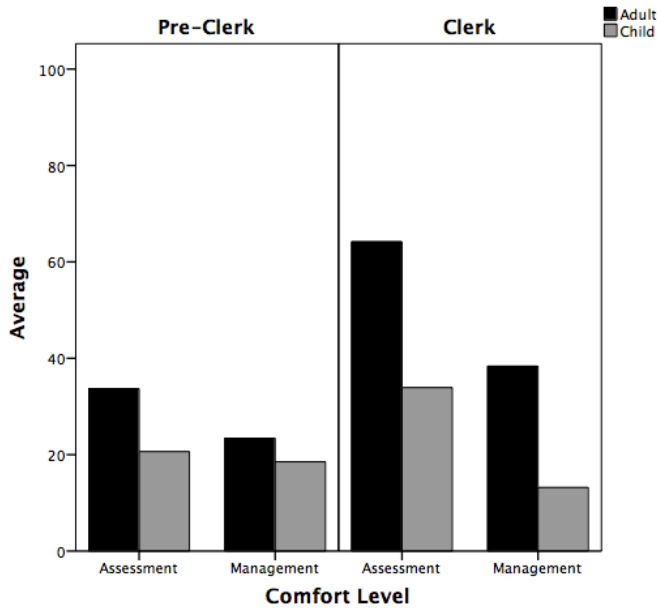
Statement	Pre-Clerkship (Years 1 & 2) n = 20 (43.5%)		Clerkship (Years 3 & 4) n = 26 (56.5%)	
	Agree	Disagree	Agree	Disagree
Children require less analgesia than adults because of their immature neurologic systems	3 (15.0)	7 (35.0)	3 (11.5)	15 (57.7)
Children require less analgesia than adults as they 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.<sup>1</sup> 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.<sup>19</sup> 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.<sup>19</sup> 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.<sup>10,18</sup> The importance that medical students be exposed to interprofessional education early in their medical schooling cannot be overstated.<sup>23</sup> 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.<sup>1,10</sup> 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.<sup>1,14,16,19</sup> 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.<sup>24</sup> 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.<sup>22</sup> 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.<sup>19</sup> 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.

## ACKNOWLEDGEMENTS

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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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# Being Human in Medicine

## How lifestyle medicine drove me to the hospital

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Getting into medical school is an exciting time. It is “it”: the achievement so many of us have worked years, if not our entire lives, for. You would think after stressing about getting in, you’d relax once you’ve been accepted, but that’s not always the case. There’s so much paperwork to do before starting, housing to figure out, banking, the anxiety of making friends, finding new hobbies, and of course getting through the actual schoolwork.

I knew nobody in Newfoundland when I moved there from Prince Edward Island (PEI) in September 2020. It wasn’t the happy experience I was expecting it to be. I felt like I had lost part of my identity on the voyage over. I didn’t have my summer job anymore, my routine with sports and volunteering, or my close friends. But as with everyone during the pandemic, the feeling of being lost and isolated was something I had grown to be familiar with.

Growing up with Juvenile Arthritis, I always wanted to prove myself to people by showing them I was able to excel physically over my peers despite having a joint and mobility disease. Athletics had always been such an integral part of my life, so in times of stress, such as starting medicine, I turned to it as a comfort. Because school was online, the friends I met were all from our class’s trail running group and like-minded about fitness.

The stress relief that running gave me was euphoric, so I ran almost every day of the week to keep my mind clear. As with most people with autoimmune diseases, I had more than one. Crohn’s disease is often treated with diet modification, so I had tried every diet under the sun. I became hyper-focused on the types of food I was consuming and was convinced that I could control my Crohn’s and arthritis purely by putting all my efforts into lifestyle modification.

The more fixated I became, the more my life was taken away from me. I went home to PEI for a week in November to visit my family. I was so terrified they would find out about my exercise and eating habits that I treated them with a cold heart. I ran in the small hours of the morning and claimed shorter distances and higher

caloric intake than reality. My brother, always straight to the point, told me I looked like a skeletal anatomy specimen. My father later confessed that he thought he’d lost his little girl. My friend, a dietitian, told me he thought I had an element of orthorexia or disordered eating. Once the initial denial wore off, I began to realize what was happening.

Because of the pandemic, I had to stay in Newfoundland without my family for Christmas. Despite my roommates’ wonderful family taking me under their wing and treating me like one of their own, I became the most depressed I have ever been in my life. I spent upwards of three hours swimming, running, or weightlifting every day. I had a compulsion to only eat at certain times, meticulously weigh my food, and count calories to ensure I had burned more according to my fitness watch. I rapidly lost a significant amount of weight. I thought I would never be good enough until my body dissolved into itself.

One bleak and foggy day I went for a run on one of the east coast trail segments. I stood at the edge of a cliff and desperately wished for someone to appear and throw me off. I did think about my family, but mostly I kept thinking about how I had spent my entire life focused on getting to medical school and how it would be such a waste to throw away all the hard work I had done to get there. I drove to the Waterford Hospital psychiatric assessment unit (PAU) and spent an hour in my car trying to work up the nerve to get out. Walking into that emergency room was the hardest thing I have ever done.

Despite knowing all the pathology of anorexia nervosa, I didn’t believe it would happen to me. I spent two months attempting outpatient treatment, but my pediatrician sent me to the emergency room to be admitted because I was medically unstable. I spent 11 hours in the waiting room, which isn’t uncommon. I wasn’t about to die immediately, but I was there because I was starving myself. Despite that, I wasn’t asked what I had eaten that day, and I wasn’t given any food until I was going on my 27th hour without. If someone presents with anorexia nervosa because their

heart is about to give out, I think it's imperative to make sure they get their calories from somewhere other than their myocardium. I spent a week on the cardiology floor, then eight weeks in the Eating Disorder Inpatient Program.

One of the few things that kept me going was my drive to not let my life's work of getting to medical school go to waste. I had a meeting with some professors, and because everything was online, I was able to continue school from my little room in the psychiatry unit while restoring my weight and receiving intense therapy. My mind underwent a complete transformation. I was able to see that there are so many other things to enjoy in life outside of medicine. Yes, I should work hard at my schooling, but I also needed to work hard on my wellbeing. I wouldn't be able to take care of my patients if I didn't take the time to take care of myself. I found

new hobbies to pursue, and I was brought closer to my family than I ever was before. Being immersed in the patient experience opened my eyes to another side of empathy I didn't know I had. Everyone has their story, and everyone has something they are willing to fight for. Ironically, medicine was what pushed me to the point of hospitalization, but it is also what continues to drive me to get better.

#### **NOTE FROM THE EDITORS**

The Faculty of Medicine recognizes the importance of learner mental health and well-being. If learners feel they are experiencing mental health problems, it is encouraged that they reach out to the Office of Learner Well-Being and Success and/or their primary care provider.

# Opinion

## We are the scars we bear

Gerard Farrell, MD<sup>1</sup>

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*"Oh Lord, your sea is so great, and my boat is so small." – Breton Fisherman's Prayer*

Every journey starts the same way, you push off from shore. It doesn't matter how far you are going, across the cove or across the ocean. You might have been preparing for ages or not prepared at all. The journey might have been your idea or imposed on you by someone else. At some point, ready or not, you have to push off.

This certainly is an interesting time to be starting anything. The world is trying to emerge from the largest health emergency in living memory. The health turmoils are only one aspect of that story. Millions dead, long COVID still an entity for study. Mourning and grieving alone because of lockdowns. Isolation, separation, children learning from screens. If the notion of humans as social beings was questioned prior to the pandemic, it will not be again any time soon.

The societal impacts of COVID are actually just beginning to be documented, though it feels like we have been doing this far longer than we have. As historians have noted after other health crises like this one, society's basic conventions have been thrown into flux. The Great Resignation might yet prove to be a media phenomenon more than a sociologic one but if you aren't considering your life options you are the exception. The strata of society on which we depend were in stark highlight during the last two years; they were the ones not working from home. They worked to make sure those of us with options could still live and many of them are our least reimbursed workers, or, at least, they have been until now. Employers were forced to do things they wouldn't have done otherwise and now they are having trouble forcing workers to "go back" to the circumstances that benefit the employer. Unions are coming to Starbucks and Amazon.

Medicine is an interesting business. We see people at their most vulnerable, they will bare their bodies and their souls to their physician in the hope that we will provide them with the relief they seek. In a recent column by Ed Hollett, he talked about transactional

versus relational care.<sup>1</sup> Transactional care is one off; a person breaks their arm, shows up in emergency, x-rays are done, casts are applied and the patient leaves with a note with respect to follow up care. No emotional investment, keep the line moving.

Relational care is when that patient shows up at their family doctor's office (the family doctor is the one who has to mop up everyone else's leavings). They know the patient as a person, know what else is going on in the person's life and can put this episode into the person's life perspective. They have a connection with the patients that translates into care. Today's problem (the transaction for today) is put in a context and the patient is better for it. People want this kind of care, they just like the speed of the transactional model better.

Want a practical demonstration of how our society is moving from a relational to a transactional basis? Drive by a Tim Hortons and count the number of people in the drive through versus the number in the store.

Into this societal change dropped COVID. In February 2020, the Canadian Medical Association (CMA), the Royal College of Physicians and Surgeons of Canada (RCPSC), and the College of Family Physicians of Canada (CFPC) published 19 key recommendations that were intended to outline how Canada needed to prepare for the adoption of virtual care.<sup>2</sup> One month later, virtual care became the way all non-essential medical care would be delivered. It was like determining the depth of the water by jumping in feet first; at least we didn't all break our necks. What we provided was not virtual care, it was the best we could do in the circumstances. The care at a distance we provided virtually (as opposed to virtual care) lent itself to a transactional mindset; most of it was accomplished by phone, which is implicitly distancing. Many – most – people didn't want to be seen in person even when it was wiser to do so. Government spun up an 811 line, initially to provide COVID information but then morphed it into a virtual walk-in clinic; it survives in that

manifestation to this day. Primary Care trivialized to a three-digit number. Family Medicine devalued and marginalized.

For the last two years, much of the care has been forced to be transactional and virtual because of the distances imposed by the pandemic and its restrictions; must it remain so?

Disruption drives change and, as mentioned, technology has also been part of that change in the two years. New technologies come along every day, so what differentiates the tech that lasts from the tech most never hear about? There were MP3 players before the iPod, phones before the iPhone. Neither, as examples, invented the genre in which they found themselves, but each so changed the way people thought about their categories that, disrupted, there was no going back. Veil lifted, eyes wide, disruptive technologies change the way we do things, forever. Disruption, like revolution, is painful in itself but can be an opportunity if recognized. The history of surgery shows that a great deal of progress in surgical technique happens in wartime. Presented with large numbers of patients suffering from injury, sometimes of a kind not encountered before (each war brings new weapons that damage differently), surgeons must adapt. This is not to say war is welcome, just that even in the face of that evil, opportunity presents itself.

Dovetailing with societal disruption are technologies set to cause further havoc in many aspects of life but especially our profession. Payers seem intent on replacing our profession with ... anything. Other professions, computers, care virtually or otherwise. Artificial Intelligence is already very good at reading pictures. Pathology slides can be treated like pictures. Radiology is basically reading pictures. Dermatology diagnosis can be done using well taken pictures. How many robots does it take to replace a surgeon? When diagnosis and treatment are defined algorithmically, where does the human fit in the equation? Dr. Google is the bane of many a physician's busy day. Not enough doctors to keep the emergency room open? Hire a nurse practitioner and make it a "virtual emergency room." Not enough Family Doctors? Let's expand the seat availability ... in the School of Nursing for more Nurse Practitioners. Not enough Cardiac Surgeons (because the two MUN grads who came back to practice here

left)? I don't even want to go there (did we just jump the shark?).

The role of our profession in the delivery of health care is being challenged. As has been already mentioned, technologies change over time as newer, better ones come along. We have a challenge: prove our worth or step aside. Blackberry did not fall from grace just because the iPhone came along. Once the iPhone came along, Blackberry did not react to the new reality. Blackberry allowed itself to be left behind. Microsoft almost did the same thing when the internet as a consumer commodity was just emerging; they almost missed it. When the penny finally dropped in Bill Gates' head that this internet thing was going to be big, Microsoft pivoted to an Embrace and Extend approach that saved the company from becoming Sinclair Computing.<sup>3</sup>

For your consideration: the medical profession needs to embrace the challenges of our current circumstances and show the value of what we bring to providing care and do it humbly. The reason there are different professional health schools (ex., Nursing and Pharmacy) is because the education is expected, indeed, designed, to produce different outcomes. Please note, not better or worse, just different. Our challenge is to remind and reinforce with our patients what our differences are and what they add to their care. If we don't, the fear is that we will be marginalized for at least the foreseeable future.

Or become Blackberry.

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# Patient Encounters

## Career advice, of sorts.

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Not everyone can point to the exact moment when their career became crystal clear, and they knew exactly what they were going to do with their life. But I can.

I was an intern. Just a couple of months into my first rotation on Internal Medicine. I was on call and paged to the ER. A frail, unconscious woman lay on a gurney. She was so tiny I could barely see her under the mound of blankets. Her daughters flanked the bed. Their mother was in her eighties and had lived a long and productive life. Her last several years had been plagued with Parkinson's disease and today she'd had the third major stroke. She was unconscious and waiting for the end. Her daughters wished a peaceful death.

It sounded reasonable to me. I wrote orders for comfort and arranged a quiet room upstairs, and without another thought headed to the next clinical situation.

The next morning on rounds I presented the case to my Attending Physician. He thumbed through the chart as I spoke, not meeting my eyes. When I finished and had summarized my plan of care, he looked up at me and spoke. "She has an elevated potassium."

Well, yes, I'd noted her abnormal bloodwork in the ER but there was nothing there I thought worth treating. The woman was dying. How would further tests and treatments help? So, I explained my rationale.

"No patient dies with an elevated potassium on my service." His words were final. He pulled rank.

Those were the words that changed my life.

Because, it meant, after a frustrating argument, that I had to change the orders for my patient. That I had to assault her with medicated enemas and frequent stabs for blood until her potassium came down to normal levels. Then, and only then, could I let her die.

I felt bitter and angry and impotent. I felt that I had betrayed that woman and her daughters. And I swore I would never do that again.

As I went through medical school and my residency, I loved every rotation (except for NICU) and could picture myself working happily in almost every field I tried. But it wasn't until that moment on rounds when the fire inside started burning. I had cared for dying patients before and while I felt comfortable doing it, it hadn't inflamed me. But the sheer indignity and brutality and stupidity of that comment, did.

It's been my life's work to prevent that scenario from happening again. My work to learn enough so that I had facts and science behind my decisions. My work to teach everyone how to care for the dying.

My work to advocate for those who have no voice.

All medical students enter medicine to help people. Some end up doing that by working clinically, day to day, in a variety of fields. Whether it's surgery or medicine, lab based or imbedded in conversation, it's taking care of those who need us. Most of us will never receive public recognition for the hard work we do. There won't be awards or media attention; we will quietly go about our daily work, making a difference in people's lives, sometimes without ever knowing just how much we affected someone. Some of you will divert to research and discover treatments that change lives in a myriad of ways. Others will mentor the next generation, either officially through teaching and supervision or informally, by coaching and supporting. It's all important and it's all valuable. Each is a small part of a much greater whole.

I encourage every student to find the flame that burns inside you. Let it be your guide to choosing what field you go into, what type of practice you have, and the mission of your medical life. Money, lifestyle, prestige are all nice, and naturally we all want them, but they cannot replace the sense of true accomplishment and satisfaction when you follow your heart. When all is said and done, remember the reason you fought so hard to get into medicine. To help people. Find the flame that lets you truly do that in the way that is right for you.

# Patient Encounters

## Walk briskly. Never run.

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*“STAT PAGE: E. N. T. “*

Few things in life make someone drop everything and run faster than this overhead message in a hospital. Especially the someone responsible to respond.

STAT pages overhead are frequently heard in the hospital, and they never represent something going well. But when this message specifically is played for the whole hospital to hear, it typically means one thing - a patient with severe and immediate airway trouble.

Typically, the progression of events is as follows:

*“STAT PAGE: RESPIRATORY THERAPY”*

At this point, my ears as an Otolaryngology - Head and Neck Surgery resident start to perk up. I look around the room and lock eyes with co-residents or staff members - an unspoken, but universally understood warning signal.

*“STAT PAGE: ANESTHESIA”*

I know there's a concern that very likely might need my attention. If this patient can't be intubated, I'm next on the roll call. I slow my current duties and start thinking about where emergency equipment lies in proximity to me.

*“STAT PAGE: E. N. T.”*

Jump up. Grab the emergency equipment near me. Call my senior resident and attending staff on the way. Walk briskly. *Never run.*

The first time this happened to me, admittedly, I was scared. Thankfully, I was not alone. The situation involved an elderly gentleman with a history of oropharyngeal cancer for which he had received radiation. Earlier in the day, he experienced hemoptysis and was transferred to our service from a peripheral hospital for evaluation. He was stable on transfer, but this hemoptysis very quickly became a sign of worse things to come - *a sentinel bleed*. Unfortunately, this

gentleman experienced a massive bleeding episode and suffered a code blue. My senior resident and I arrived at the scene and began chest compressions with the assistance of the emergency department team. When roles became firmly established and an airway was not able to be obtained safely via intubation because of the bleeding, we elected to perform a slash tracheostomy. This was completed successfully, and spontaneous circulation was briefly achieved. Sadly, the patient eventually died after discussing goals of care further with the family. It was later determined that he had suffered a fatal diagnosis - a carotid blowout.

After nearly three years of residency, I've heard this STAT page my fair share of times. The situations don't get easier to deal with medically, but experience has helped how I approach the situation before I get there, while I am there, and how I cope afterward. That being considered, I still have much to learn.

Each situation presents its own challenges, but they are typically chaotic. Having a clear and focussed mind when you enter the room is of vital importance for patient and provider safety, as well as for your own well-being. Of course, getting there quickly during a STAT page is critical, but if you physically run to the call, room for error may be introduced. Hospital hallways are busy, and the safety of others may be endangered. An underlying sense of worry may also be permeated to patients and hospital staff as you race by. When you get to the patient, your sympathetic response will be in overdrive - you may be sweaty, your heart may be racing, and you may be out of breath. Your judgment may be clouded when you need to make potentially life-saving decisions. These situations will introduce enough adrenaline, there is no need to introduce more. Walking briskly instead of running could help to mitigate these error-prone conditions.

When in the emergency situation, rarely will you be alone. Communication with team members is paramount. Introducing yourself and your role in the team will ensure the team leader (maybe this is you) can delegate tasks appropriately. Make sure to speak loudly so that everyone in the room can hear you - if you have

something to say, it probably needs to be heard. Not being heard can lead to downstream confusion. Additionally, tell yourself to be the calmest person in the room. Though you'll be screaming internally, and your chest will be thumping, a calm face in the face of calamity can instill a sense of trust and focus in the rest of the team, especially if you need to perform a major intervention or take on a leadership role. Finally, make sure to think outside the box - important details critical to patient care may be missed in the momentum of the emergency. Has the patient's family been called? What are their goals of care? This may change the course of the situation in a dramatic fashion.

After the situation (and yes, it will end!), your emotions may feel overwhelming - especially if it does not end well. Take time to relax and reflect on how things went. It is normal to experience guilt and self-doubt, even if no guilt is founded and you did everything by-the-book. Even if things ended well, reflect on what you learned or how things could have gone even better - this is a moment of power in your learning. I am lucky in my training in that I am surrounded by supportive mentors

who ensure we debrief such situations. If a debrief is not offered, seek one out, as it can be important for not only your learning, but your well-being in the short and long term. Discussing distressing situations with colleagues can help to ease any burden you may bear. When you are ready, document the events as they transpired in a matter-of-fact fashion.

Such situations are not unique to my training. A multitude of disciplines will face emergency situations, many more often than my own. These lessons I have learned are anecdotal only and are by no measure comprehensive in how to handle medical emergencies. But maybe this reflection of my own experience will enter the mind of somebody as they hear their own name called overhead; and as they start to run - they stop and walk briskly. Maybe then they'll remain calm and make the right decision to save a life. Maybe then they'll go the extra mile to debrief, and their mentor will make sure their conscience is clear. Maybe then they'll share their experience and the lessons they've learned.

We are a community built on shared experiences.



# Interview

## Rheumatology, collaboration, and modern-day research: An interview with Dr. Proton Rahman

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### ABSTRACT

An interview with Dr. Proton Rahman, a rheumatologist, genetic epidemiologist, and professor at Memorial University. Dr. Rahman has been working in the province for the past 24 years and in addition to his clinical work, has done an extensive amount of research with an interest in the genetics of spondyloarthropathies. He has received numerous awards in the field, including the Canadian Rheumatology Association (CRA) Young Investigator and CRA Distinguished Investigator awards. In addition to this, Dr. Rahman has made significant contributions in the development of the Newfoundland Genealogy Database (providing extended pedigree information for over 550,000 Newfoundlanders) and has led a COVID-19 pandemic analytics team for the Government of Newfoundland and Labrador. In this interview Dr. Rahman discusses his background, the clinician-scientist balance, and tips for learners interested in a career in research.

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### Could you tell us a little about yourself and your background in research?

I did most things here at Memorial University (MUN), I went through MUN medical school then did a rotating internship. I did my residency at Memorial and my subspecialty in Toronto in rheumatology. While in Toronto, I did genetic epidemiology (a combination of genetics and clinical epidemiology). I have been back since 1999, just working away in clinical rheumatology. I find the trainees nowadays are so much further ahead than we were, way back when. Research was certainly encouraged but now I think it is thought of more by the residents; it allows you to be more competitive for a residency position, faculty position, or to continue on with research. It adds a lot of flavour to clinical medicine if you do research along with it.

So, the benefit of clinical medicine is that you get to help people right away and that is a great feeling and privilege. Especially if you specialize, after a while you see similar things over and over again. The variety added by being able to answer your own questions that you actually see is really rewarding. To present to your peers, get feedback, then work at it again is quite good. I have a soft spot for researchers that are clinician scientists. I think that is something, respectfully, we are lacking a little bit in our university.

You can do clinical research or bench research as a clinician. Both are really important. The transition from being a clinician to a clinical researcher in, say,

clinical epidemiology, health economics, or qualitative studies is easier because it is more of a natural extension of what is being done in the clinic. It is highly relevant and adds a lot of value. Biomedical research is a more difficult transition, particularly if you are planning to be an independent investigator running a laboratory. When I went through, a master's degree was probably sufficient. Now, if you wanted to do any molecular investigative work, it would be tough for a lab to be funded unless you had a Ph.D. The first thing when I mentor someone, if they are looking towards a clinician scientist route, is to make sure they take the time to train appropriately. Otherwise, they would collaborate on studies but not independently lead them from their laboratories. To a certain extent, you must have a fire in your belly to do that because it takes a little bit longer, and, in some ways, it doesn't fit as well with your clinical work. You spend extra time learning to do things.

Having a molecular understanding has helped me tremendously in clinic, oddly enough. I got into genetics because I thought it would be neat to look at the genetic basis of rheumatic disease as they are highly familial. What I didn't realize when I got into it is how much my research would help me in the clinical realm. What happens when you take the time to understand disease pathogenesis, when it comes to choosing therapeutics, or trying to determine disease prognosis, having a deeper understanding of pathogenesis helps you make clinical decisions—translating to better care for the patients. Research doesn't necessarily have to be just

something that is only in the lab or only something that you publish but is something you can bring back to the clinic. It goes both ways.

The kind of work that I do fits into translational genetics. I got interested in that when I realized I was going to come back to work in Newfoundland and Labrador (NL). We have a higher prevalence of psoriasis, due to something called the founder effect. I thought it was very strategic to understand the genetic basis of why we have this founder effect. The extension of psoriasis for rheumatologists is psoriatic arthritis. I put some thought into what it was I wanted to get an expertise in, to a certain extent took advantage of the natural history or genetic history of our province.

My main interest is identifying different genes related to psoriatic arthritis. I've had a lab for about 20 years that have identified several genetic variants associated with psoriasis and a few with response to biologics in patients with psoriasis. Along with doing genetic studies, I also got into clinical trials. Not so much participating in clinical trials, which I have as well, but helping pharmaceutical companies think about post-hoc analysis, and secondary predictive analysis, searching for super-responders and those resistant to therapy. That itself has been very rewarding as it gives you insight into the steps from early product development to completion of phase 3 registrations studies— you then are aware of what it entails to get a drug to market and the rigor that is needed from the FDA and others to approve a drug.

The other thing with research is that every 4-5 years, you may need to re-invent or transform yourself so that your ideas or approach does not become stale. Obtaining funding is very competitive, so you need to develop new ideas rather than merely an extension of previous methods. My recent focus has been on working out of the lab and in real-world studies for various reasons. Much of this has been due to the availability of multiple sources of extensive data, such as the EMRs, along with advances in our ability to interrogate big data using artificial intelligence. The lesson I've learned here is not to get stuck with the same technique repeatedly for many years but instead strategically think about shifting focus. Once you have mastered certain key principles related to research, it is not as challenging to make these changes.

### **How do you find time to integrate your clinical and academic work on a daily basis?**

It is a great question, and it is very challenging. The issue with doing rheumatology is that we have an

exceptionally long waitlist, so there is invariably pressure regarding seeing new patients follow ups, handling emergency cases, and doing call. For me, the patients always come first, so sometimes, despite my best efforts, it is difficult to secure research time as clinical duty can be disruptive. You have to be flexible and organized. The way I've survived securing grants and publishing manuscripts at a decent rate is to bring the research work home and spend time at night doing these tasks. If you were in a discipline with less clinical pressure, you might be able secure more protected research time. If you are committed to doing research exclusively as a clinician, there are research-intensive universities that may support you in this endeavor. However, this type of support is not necessarily available in all universities. Despite my keen research interest, just doing research without a clinical focus does not appeal to me. Seeing patients can be instantly gratifying, whereas, in research, there are very few 'Eureka' moments. So a combination of clinical and research duties is ideal, but finding the balance can be difficult.

### **Could you describe how a curious clinical finding, trend, or need you notice in clinic goes from an idea to a published paper?**

Unmet needs are relatively easy to identify in the clinic, as you are faced with multiple questions when you are unsure about the next steps in managing patients. Once you have formulated a question, the most important thing is to see if someone else has answered it. So often, you get so excited about something, then you look deeply into it, and it has been adequately addressed. It is a good use of time to explore these ideas. You always want to be inquisitive; you always want to learn; you always want to follow best practices, which means going to the literature all the time. If your question has not been previously addressed, the next thing you have to do is explore the feasibility: can you answer this by asking yourself if you have the patients, resources, and funding? If you cannot answer this on your own, then seeking collaborators that are mutually interested in your question is important. This is the usual process that I run through. Once you are actively engaged in research areas, finding collaborators is not as difficult as you think, as the research community for a dedicated area of research is generally relatively small.

### **Do you have any advice for medical students or residents that are trying to get into research or who want to integrate medical research into their future careers?**

Everyone should have a general idea of how evidence is generated and appreciate that research is essential in improving patient care. Only some people have to do research, but everyone should be "research friendly" in understanding how the data is generated. This will help you understand how to interpret studies that you are reading. Please be open to entertaining requests from researchers seeking patients for their studies.

As you progress in your clinical training, I encourage you to align your clinical and research interests. In other words, ideally, you should not have a research interest entirely unrelated to your clinical interest. You can get those aligned and bring the things you see in the clinic back to your research program and vice versa. It doesn't matter what comes first. Suppose you have extensive research experience in neurosciences. In that case, you may want to think about if you want to meld the two together by doing neurology or rehab medicine. Things are so competitive in terms of grants that a cohesive clinical and research package makes you a more attractive commodity to get funded. You would be surprised how people's research interests sometimes differ from what they do daily. Try and link them as much as you can.

The other thing is always to collaborate; if you want to do something quickly, you can do it yourself, but if you're going to do it for a long time, you have to do it with others. What you want to do if you want to do research is to work with a large group, sometimes, they will carry you, whether it is in regards ideas or funding, and sometimes you are the primary contributor to the group. Research is also quite multifaceted and having investigators with a slightly different perspective will only strengthen your program.

**Can you describe the watershed moments of a career in research? What are the highlights and what are some of the downsides?**

The highlight of any research is when you have conceived an original idea and your paper has been accepted. It is not so much about publication or subsequent citation. The concept of peer review is fundamentally important to me. This is why I am an Associate Editor for the Journal of Rheumatology. Completing a study and not sending it out for peer review does not sit well with me. You need to communicate your results and have your peers (experts in the field) say that your completed work contributes to the literature. This is the purpose behind peer review. So, the work being done with the MUN medical journal is very important – as the authors' will get their work appraised. Once your article has been peer-reviewed

and published, you feel you have contributed positively to the scientific process. Then if that study contributes directly or indirectly to improved patient care, that is the watershed moment for me. We have been fortunate in developing tests or identifying genes that have had a clinical impact; however, most of our research does not lead to that clinical translation that quickly.

The downside of research is when you think you have a good/great idea, but you can't get that idea off the ground because you can't convince your peers to fund that project. It is easy to get frustrated at this point, but you have to believe in what you are doing; please stay with it and find a way to address it.

**In terms of doing research in NL, can you speak to doing research in a more remote centre with a more rural population?**

You can get your research aligned with your population, but it depends on the research you want to do. There are certainly challenges to doing research when there is not a critical mass of investigators with similar or complementary interests to ours. For instance, more research-intensive universities will have shared laboratory space with state-of-the-art equipment and support staff to help with the analysis. So, when researching in NL, and if these resources do not exist, you need to seek out colleagues doing similar work outside your institution. You can overcome some challenges by strategically partnering with others outside Memorial. The more significant challenge to overcome is the need for adequate protected time compared to peers from larger centers. Working in smaller jurisdictions does have its benefits as well. As there are fewer researchers, you can expand your scope of research without interfering with other ongoing initiatives.

**If you had a magic wand—are there two things you would like to change about medical research, either in the province or in the country?**

I would revisit how research is funded and how researchers are acknowledged for their efforts. The success rate for a substantive research grant is quite dismal. We either need to increase the total research funding or be committed to funding researchers with an established track record for an extended period. Many good ideas are abandoned when funding an ongoing study or program is terminated. We need to have greater faith that a well-trained, motivated, and accomplished researcher will do meaningful research. In the present system, we are just cycling through the

researchers, deterring physicians from research training.

As research is more collaborative, multiple investigators are contributing substantively to completing a research project. Crediting only one host institution with the funds or just the first or senior authors for the manuscript does not seem fair to me. We need to think more carefully about how to acknowledge the actual contribution to a project. The present system fosters research silos than genuine collaborative efforts.

**Can you please describe a ‘day in the life’ of a rheumatologist/clinical geneticist and any advice you might have for students interested in the field of rheumatology?**

I am happy to chat with any medical student who wants to do research. Regarding advice for those interested in rheumatology research or, in fact, any research - identify a research mentor who has been able to navigate the system successfully.

Mentors help and will accelerate your progress. Mentors will guide you on how best to align your clinical work with research and maintain work-life balance. They will also

facilitate connections to their broader research network and work with you to identify optimal places to train if necessary. If you can get involved with some aspect of the research your mentor is doing, that would be ideal, as you can benefit from a somewhat mature project.

It would be best to be patient as you develop your research expertise. Everything moves slowly at the start, from getting ethics, patient recruitment, or laboratory setup. You need to be realistic regarding your expectations and not get too frustrated. Everyone has a different step up, so resist the urge to compare your progress with others. Finally, enjoy the process and believe that these extra efforts in research will pay off in a more rewarding medical career and improved patient outcomes.

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