

Medical students' career perceptions of radiology

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ABSTRACT

Objective: Understanding and identifying the factors that influence third- and fourth-year medical students' perceptions of radiology at Memorial University of Newfoundland and Labrador (MUN) aims to inform future initiatives in medical education and workforce strategies. Gaining insight into these perceptions is important for informing the direction of the medical school curriculum and identifying necessary changes to enhance students' perception of radiology, ultimately ensuring they develop the knowledge and skills needed for their future clinical practice. Taking the results from this survey to inform targeted curriculum adjustments and educational interventions will help create a more positive and impactful learning experience, fostering greater interest and competence in radiology among medical students.

Methods: Third- and fourth-year medical students at MUN participated in a voluntary and anonymous online survey consisting of 17 questions. The survey was distributed through the Office of Learner Well-Being and Success at the Faculty of Medicine and remained open for three months. It included a mix of closed-ended and open-ended questions, with responses to some of the closed-ended questions provided on a slider scale, where participants rated their answers on a scale from 0 to 10. The aim of the survey was to gather insights into students' perceptions of radiology within the medical school curriculum. Data analysis was conducted using the Qualtrics online survey platform and statistical analyses were performed using Microsoft Excel.

Results: Of the 160 medical students surveyed, 25 responded (15.63%; n= 25). Sixteen percent (n= 4) of the respondents expressed an interest in pursuing radiology. The majority (56.00%; n= 14) found the exposure to radiology from pre-clerkship to clerkship to be inadequate. According to the slider scale data, on average, respondents ranked "quality of family life" highest (8.52 out of 10) in influencing their perception of clinical radiology as a career, followed by "amount of patient contact" (7.83 out of 10) and "suitability to skills/aptitude" (7.33 out of 10). Students recommended interactive radiological lectures and shadowing opportunities to enhance their learning experience.

Conclusion: This survey reveals that factors influencing medical students' views on a career in radiology at MUN are multifactorial. The majority's perception of inadequate exposure to radiology could impact efforts to refine the medical school curriculum and develop broader workforce strategies aimed at attracting more students to the field.

INTRODUCTION

Selecting a residency specialty can be a daunting task for medical students, influenced by various factors that shape their decision-making process.^{1,2} In this intricate process, the importance of exposure to different medical fields and access to comprehensive information cannot be overstated. Radiology emerges as a fundamental discipline within medicine, playing a crucial role in diagnostics and treatment planning.³ Understanding medical students' perceptions of a career in radiology and evaluating their exposure to this field during their pre-clerkship and clerkship years at Memorial University of Newfoundland and Labrador (MUN) is of paramount importance. This survey research study aims to explore students' current perceptions of radiology, while also identifying potential gaps in their exposure and understanding of the field. Such insights offer the potential to inform educational strategies and workforce planning, ensuring that medical students are equipped with the knowledge and exposure necessary to make informed career decisions. Attracting medical students to the field of radiology involves providing them with the knowledge, tools, and experiences needed to develop a deeper understanding of the field.

Discovering the factors that may negatively impact students' career choices is vital for fostering informed decision-making. Research into the factors shaping medical students' perceptions of radiology can help develop strategies to positively influence these perceptions and encourage interest in the field. There is a lack of published data reflecting the perceptions of medical students in the medical program at MUN towards radiology as a career choice. A survey of MUN third- and fourth-year medical students' perceptions of choosing a career in radiology would help to fill this gap in the literature and provide insights into the factors that influence medical students' decisions about radiology careers at this university. This leads to the research question of concern: What are the perceptions of medical students, in their third and fourth year of clerkship at MUN, regarding a career in radiology? This question sets the stage for a comprehensive exploration of the factors influencing medical students' attitudes toward radiology, with implications that extend beyond individual career choices to broader educational and systemic considerations within the medical profession.

METHODS

The research utilized a survey based research design, which facilitated an in-depth investigation of the factors influencing MUN medical students' perceptions on choosing a career in radiology. This design was appropriate given its emphasis on capturing students' firsthand personal experiences and varying levels of exposure to the radiology field. A survey based research study allowed for exploration of the perspectives of third- and fourth-year medical students at MUN regarding a potential career in radiology.

Primary source data collection was conducted to gather firsthand insights from the target participants. A questionnaire-based survey comprising 17 questions was created to collect responses from the target participants. The survey questions were developed by the authors, drawing on existing literature that employed similar survey instruments and addressed comparable research objectives.^{4,5,6,7} These questions were then adapted to align with the specific aims of our study. The survey was developed and administered via the online computerized platform, Qualtrics. Once the participants completed the survey, it was submitted back to Qualtrics. The survey comprised both closed-ended questions and open-ended questions. Some of the closed-ended questions utilized slider scale items, allowing participants to rate their responses on a continuous scale from 0 to 10, while others were structured as simple Yes/No or multiple-choice questions. The open-ended questions allowed participants to provide written responses. Target participants were specifically selected from the cohort of third- and fourth-year medical students at MUN. These students were chosen for their likely deeper understanding of the radiology field, as they are currently in their clerkship years and nearing decisions about specialty selection and applying to residency. The sampling method employed was purposive sampling, as participants were selected based on their year of study. The survey was distributed exclusively to third- and fourth-year medical students at MUN to ensure alignment with the study's objectives. The Faculty of Medicine's Office of Learner Well-Being and Success at MUN oversaw the survey dissemination process, ensuring ethical standards and participant confidentiality were maintained. The survey proposal, along with the survey itself, underwent an ethics review by the Newfoundland and Labrador Health Research Ethics Board and received approval.

While this research offers potential benefits to medical school curricula across institutions, ensuring the integrity of the survey responses was paramount. Participants were encouraged to provide honest and unbiased feedback. Clear communication about the study's objectives, the utilization of gathered data, participants' roles and the voluntary nature of their involvement was provided to all participants. This transparency aimed to facilitate understanding of the study's purpose, encourage meaningful contributions and empower participants to influence potential improvements in medical

school curricula, thereby aiding future students in career decision-making.

During the data collection period from August 28th to December 12th, 2023, reminders were sent periodically (each month) to participants to maximize response rates. The collected numerical data was thoroughly analyzed using Microsoft Excel. Open-ended responses were analyzed by grouping and sorting common themes and patterns, which were then categorized to identify key insights.

The survey aimed to examine various aspects of their attitudes, understanding and experiences with radiology as an academic subject and a potential career path. By thorough analysis of the responses gathered, we aim to provide insights into medical students' prevailing sentiments and perspectives on radiology, highlighting potential areas of interest, concern and improvement within radiology education and training.

RESULTS

In this section, we present the findings from an online survey distributed to medical students to explore their perceptions of radiology. Of the 160 medical students surveyed, 25 responded, constituting a 15.63% (n= 25) response rate. Their responses formed the basis of the analysis conducted. Of the respondents, 44.00% (n = 11) were third-year medical students at MUN, and 56.00% (n = 14) were fourth-year medical students at MUN.

In this results section, the analysis is structured to align with the key questions posed to participants in the online survey. These categories include: Interest in Radiology, Exposure to Radiology, Factors Influencing Choosing a Medical Specialty, Factors Influencing Choosing a Career in Radiology, Work-Life Balance, Perceptions of the Importance of Radiologists in Medicine, Exposure to Radiology in Pre-Clerkship Years (Open-Ended Responses) and Enhancing Radiology Exposure in Pre-Clerkship Years (Open-Ended Responses).

By organizing the analysis according to these distinct categories, the aim is to provide a comprehensive understanding of medical students' perceptions and experiences related to radiology, thereby offering valuable insights that could enhance radiology education and career pathways.

Interest in Radiology

Figure 1 represents interest (ever or currently) in pursuing a career in radiology. When asked if they **ever** had an interest in pursuing radiology, 48.00% (n= 12) of medical students responded "Yes" as is depicted in the figure. However, in the follow-up question, when asked if they **currently** have an interest in pursuing radiology, 16.00% (n= 4) of medical students responded "Yes", indicating a 3-fold decrease in interest.

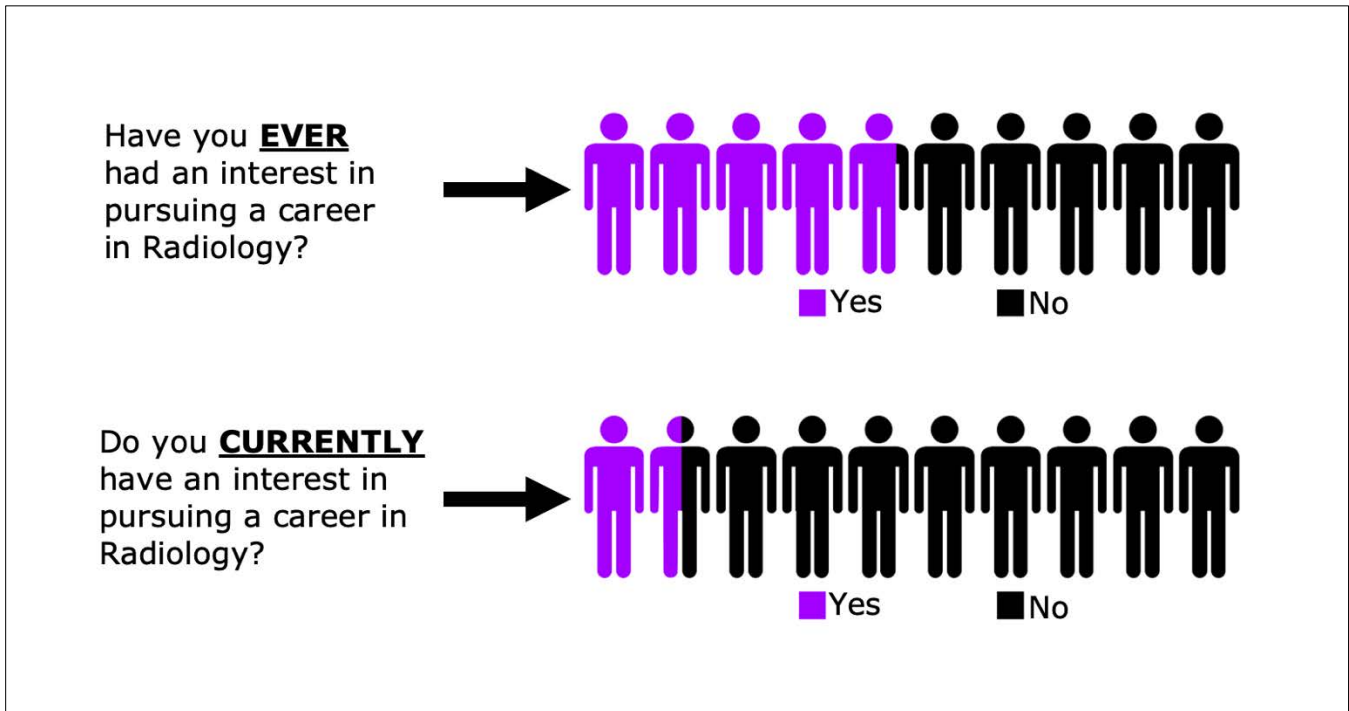


Figure 1. Representation of interest (ever or currently) in pursuing a career in radiology.

Exposure to Radiology

All surveyed students (100.00%; n= 25) confirmed having exposure to radiology in the MUN Medical School curriculum, as depicted in Figure 2. However, when asked about clinical exposure (i.e.: shadowing, clerkship, etc.), only 36.00% (n= 9) responded “Yes”. Furthermore, only 44.00% (n= 11) believed they had adequate exposure to radiology during pre-clerkship and clerkship years.

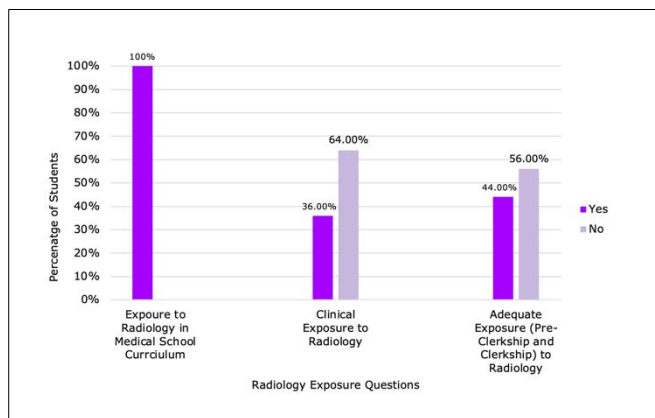


Figure 2. Bar graph depicting medical students' responses regarding radiology exposure in the curriculum and clinical settings.

Factors Influencing Choosing a Medical Speciality

Figure 3 displays the scores captured on a slider scale ranging from 0 (not important at all) to 10 (extremely important) regarding the impact of various factors on the selection of a medical speciality. The most important factor medical students indicated when choosing a medical speciality was “quality of family life”, with an average score of 9.04 out of 10. “Artificial intelligence (AI)” received a score of 2.48 out of 10 for its impact on students' decisions in selecting a medical speciality, making it the least influential factor in their choice.

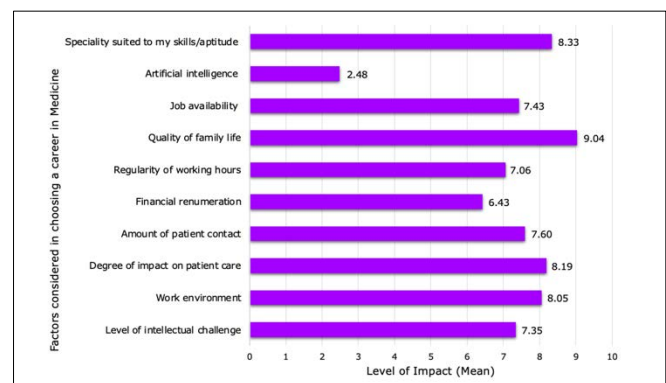


Figure 3. Bar graph illustrating the level of impact, as indicated by mean scores, assigned by medical students evaluating factors influencing their decision in choosing a Medical Speciality.

Factors Influencing Choosing a Career in Radiology

Figure 4 displays the scores captured on a slider scale ranging from 0 (no impact) to 10 (extreme impact) regarding the impact of various factors on choosing a career in radiology specifically. The most important factors influencing students' perceptions of radiology were "quality of family life" with an average score of 8.52 out of 10 and "amount of patient contact" with an average score of 7.83 out of 10. "AI" received a score of 4.94 out of 10 for its influence on students' decisions in choosing a career in radiology, making it the least significant factor in their decision-making process.

Work-Life Balance

Figure 5 depicts medical students' perceptions of 11 different specialties' work-life balance, where a score of "0" signifies worst and "10" best. Radiology ranked second among the 11 specialties in terms of work-life balance, with an overall score of 7.58 out of 10. It was surpassed only by Psychiatry, which scored the highest at 8.77 out of 10.

Perceptions of the Importance of Radiologists in Medicine

In Figure 6, medical students' perceptions of radiologists' roles in specific areas of medicine were measured on a scale of 0 to 10, with 0 representing "not important at all" and 10 signifying "extremely important". Students' perceived radiologists as most essential in "interpreting and reporting scans", which scored 9.15 out of 10. Radiologists were also seen as important in "establishing the correct diagnosis for a patient" and "discussing scan results with other specialties", both of which scored 7.45 out of 10.

Exposure to Radiology in Pre-Clerkship Years (Open-Ended Responses)

In this section, we explored participants' experiences and exposure to radiology during the early years of their medical education, emphasizing their open-ended question responses. In response to the open-ended question, "What aspect of the program in your pre-clerkship years offered exposure to the field of radiology?" participants shared varied insights about their initial experiences with radiology. Commonly cited aspects included: lectures/didactic teaching, shadowing experiences, Radiology Interest Group events, anatomy labs, and POCUS (Point-of-Care Ultrasound) sessions.

Enhancing Radiology Exposure in Pre-Clerkship Years (Open-Ended Responses)

Lastly, we examined participants' suggestions and insights on how to enhance radiology exposure during the pre-clerkship years, based on their responses to the open-ended question. In response to the open-ended question "What type of radiological exposure, do you feel, would provide the best experience to the field of radiology in your pre-clerkship years?" participants offered a variety of suggestions. Frequently mentioned ideas included more shadowing opportunities, hands-on learning experiences, clinical skills sessions for radiology, making radiology a mandatory part of

clerkship, radiology learning modules and more lectures dedicated to radiology.

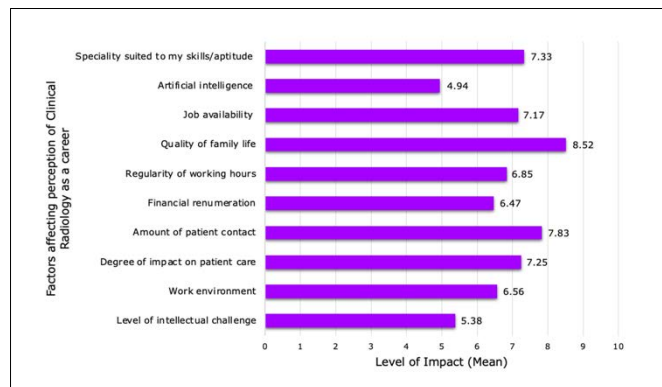


Figure 4. Bar graph illustrating the level of impact, as indicated by mean scores, assigned by medical students evaluating factors influencing their perception of Clinical Radiology as a career.

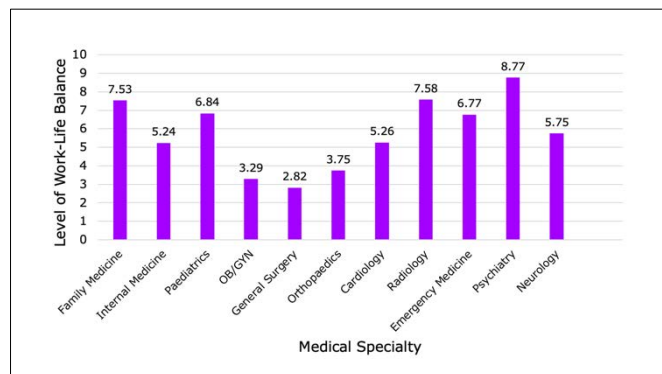


Figure 5. Work-Life Balance perceptions of medical students across 11 specialties.

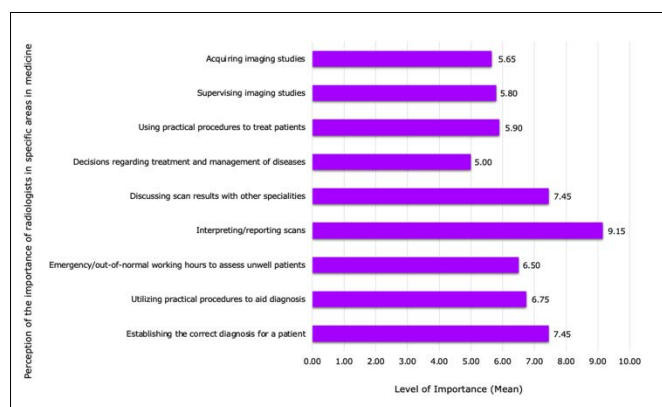


Figure 6. Medical students' perceptions of the importance of radiologists in specific areas in medicine.

DISCUSSION

Radiology has a crucial role in modern medicine, integrating knowledge of anatomy, pathology and clinical medicine to contribute substantially to accurate diagnoses and effective patient treatment.¹ Therefore, it is important to acknowledge the necessity of incorporating radiology education in the curriculum for all prospective medical doctors.

The data reveals a significant decline in interest among medical students in pursuing radiology, with 48.00% (n= 12) initially interested but only 16.00% (n= 4) currently interested, pointing to a notable shift in preferences over time (Figure 1). This trend prompts questions about the factors affecting medical students' changing attitudes toward pursuing radiology.^{8,9} Identifying and understanding the reasons for this decline in interest is important for medical education and career counseling.

All surveyed students reported exposure to radiology as part of the curriculum (100.00%; n= 25), highlighting the integration of radiology teachings within the academic program. However, when evaluating clinical exposure to radiology through activities such as shadowing or clerkships, the response rate decreased to 36.00% (n= 9) (Figure 2). This suggests a disparity between theoretical classroom learning and practical clinical exposure, potentially indicating a need for increased opportunities for students to engage with radiology in clinical settings. Furthermore, when assessing the students' perception of the adequacy of their exposure during pre-clerkship and clerkship years, only 44.00% (n= 11) believed they had adequate exposure. This aligns with prior research that reported 87% of Canadian medical students from 17 medical schools expressed a lack of adequate exposure to radiology.¹⁰ This implies that students may feel their exposure to radiology in these critical stages of medical education is insufficient. Addressing this perception is vital to ensuring that medical students feel adequately prepared and informed about the field of radiology as they progress in their training. While there is theoretical exposure to radiology in the MUN medical school curriculum, the lower rates of clinical exposure and the mixed perception of adequacy emphasize the importance of refining the integration of radiology in both classroom and clinical settings to better align with students' educational needs and expectations.^{1,11} A prior study examined the effect of a 2-week course entitled "Foundations of Diagnostics and Therapeutics" that included introduction to radiology through small group seminars. The study demonstrated that with an early introduction to the field of radiology, students' academic interest in the field and their understanding of the significant impact imaging has on patient care was enhanced.¹²

Survey participants placed the highest importance on quality of family life when choosing a medical specialty, with suitability to skills/aptitude and the degree of impact on patient care following close behind (Figure 3). The challenge of balancing work and family responsibilities is a key

consideration for individuals when deciding on a career path. Medical students place great importance on lifestyle as a factor influencing their choice of specialty, favoring fields that offer a favorable work-life balance.¹³ These factors not only influence the trajectory of a healthcare provider's career but also profoundly impact their overall well-being and satisfaction in their chosen field. AI was found to be the least influential factor overall in students' selection of a medical specialty. This suggests that advancements in AI may have minimal impact on students' decisions regarding specialty choices. A previous study stated that it has been shown that AI has been part of imaging technology for decades, and its potential role in radiology is growing, especially in helping radiologists with reporting and backlog issues.¹⁴

When focusing specifically on clinical radiology as a career choice, respondents reiterated the importance of quality of family life as the most influential factor (Figure 4). This aligns with the overall appeal of radiology in "Medical Students' Perceptions of Work/Life Balance", where it ranked second with a score of 7.58 out of 10 (Figure 5). This suggests that clinical radiology is viewed as a field conducive to a balanced family life, consistent with a prior study where 92% of students viewed radiology to be conducive to a good family life.¹⁵ The second most important factor for choosing clinical radiology was the amount of patient contact, indicating that even in a specialized field like radiology, patient interaction remains a significant consideration. This challenges stereotypes about certain specialties having minimal patient interaction.² The third-ranking factor, suitability to skills and aptitude, emphasizes the ongoing importance of aligning one's abilities with the demands of the chosen specialty. In contrast, AI was deemed the least influential factor in students' decision to pursue a career in radiology, suggesting that advancements in this area may not significantly sway students' specialty choices at this stage in their education. This finding aligns with a prior study where an electronic survey of undergraduate medical students at German universities showed that 82.9% disagreed with the notion that radiologists could be replaced by AI in the future.¹⁶ This finding that AI is the least likely factor influencing students' choice of a career in radiology also aligns with its minimal impact on their decisions when selecting a medical specialty overall.

When evaluating medical students' perspectives on the importance of radiologists in specific medical domains, it is clear that students regard radiologists as essential in interpreting and reporting scans, which underscores their ability to provide precise and thorough interpretations of medical imaging. Furthermore, students acknowledge radiologists' role in establishing the correct diagnosis for a patient and discussing scan results with other specialties, emphasizing their critical involvement in assisting clinicians with accurate diagnostic processes based on imaging findings (Figure 6).

The analysis of open-ended questions reveals a consensus among respondents on the importance of increasing exposure to radiology. Notably, participants reported varied experiences concerning their exposure during pre-clerkship years, with some citing specific radiology lectures integrated into various courses, while others noted participation in Radiology Interest Group activities, shadowing opportunities and clerkship preparation sessions. However, many participants noted minimal exposure to radiology clinically, which aligns with the findings depicted in Figure 2. These findings highlight the need for a more consistent and structured incorporation of radiology components in the pre-clerkship curriculum to provide well-rounded early education in the field. Additionally, the responses reveal a preference for practical experiences such as shadowing, hands-on learning sessions and dedicated workshops, suggesting a desire for an experiential approach to complement traditional lectures and enhance understanding and engagement in radiology. Overall, the findings emphasize the importance of a multifaceted approach that combines theoretical knowledge with practical skills in radiological education during the early stages of medical training.

A limitation of this study is the short data collection timeline, which may have contributed to a low response rate among participants. This can affect the reliability and generalizability of the findings, as the low response rate may suggest a smaller and potentially less representative sample. Consequently, capturing the views or experiences of the broader population may be challenging, which could limit the applicability of the results to other medical programs and institutions. Future research should aim to extend the data collection period to gather more responses and improve the overall reliability of the findings. Additionally, due to the limited number of responses, the data were analyzed as a whole, rather than being separated by year of study. Stratifying the data between third- and fourth-year students would have provided further insights and strengthened the analysis.

CONCLUSION

This survey reveals that factors influencing medical students' views on a career in radiology at MUN are multifactorial.^{1,10,17} The prevalent perception of insufficient exposure to radiology among the majority of students surveyed suggests an opportunity for refining the medical school curriculum and implementing broader workforce strategies to attract more students to this field. The study's practical implications extend to both medical students and medical programs across universities, providing valuable insights into the factors influencing students' career decision-making, particularly in relation to choosing a career in radiology. The findings support the need to enhance the level of exposure provided to medical students from pre-clerkship through clerkship years to equip them with the necessary resources to develop a deeper understanding of the radiology profession. These practical measures will be instrumental in orchestrating a shift in students' perceptions toward a career in radiology.

By identifying the factors that shape students' views on choosing a career in radiology, initiatives can be focused on enhancing the overall perception of the radiology profession among students. This study lays the groundwork for subsequent surveys of medical students over a quantified period, which could facilitate the assessment of perceptual changes. Additionally, it underscores the potential for future research endeavors, including the exploration of conducting focus groups with medical students to gain deeper insights into their thoughts and concerns. It also encourages collaboration between medical schools and radiology professionals to develop engaging and informative materials aimed at promoting the field. In essence, this study serves as a catalyst for ongoing research and collaboration to enhance the appeal and understanding of a career in radiology among medical students at MUN.

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