

Identifying Gaps in the Teaching of Medical Literature Critical Appraisal Skills: A Needs Assessment Survey of Medical Students

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ABSTRACT

Objective: Acquisition of critical appraisal skills during medical training is essential for providing high-quality evidence-based patient care. To ensure the effective and durable acquisition and application of these skills, within an overcrowded undergraduate curriculum, the learning needs of medical students must be better understood. The objective of this survey was to explore medical students' medical literature critical appraisal skills and determine their educational needs.

Methods: A web-based survey was administered to University of Ottawa medical students over a 2-month period. The survey captured demographic information, educational experiences, the perceived value of critical appraisal skills, and learning preferences for the development of these skills. Proportions were reported for both categorical and ordinal variables.

Results: Fifty-nine students completed the survey. The majority of respondents reported that they were lacking both competence (57%) and confidence (75%) in critical appraisal. The most common content delivery methods for teaching critical appraisal skills were lectures and seminars. However, journal club, case-based learning, and journal articles were perceived by respondents as being more effective content delivery methods.

Conclusion: Most students recognize the clinical practice value of critical appraisal but report lacking competence and/or confidence for successfully employing these skills for patient care. Interestingly, students' preferred content delivery methods differed from those most commonly utilized in our undergraduate medical curricula, highlighting a shortcoming in the teaching of evidence-based medicine.

RÉSUMÉ

Objectif : L'acquisition de compétences d'évaluation critique au cours de la formation médicale est essentielle pour fournir aux patients des soins de qualité fondés sur des données probantes. Pour garantir une acquisition et une application efficace et durable de ces compétences, dans le cadre d'un programme d'études de premier cycle surchargé, les besoins d'apprentissage des étudiants en médecine doivent être mieux compris. L'objectif de ce sondage était d'explorer les compétences des étudiants en médecine en matière d'évaluation critique de la littérature médicale et de déterminer leurs besoins en matière d'éducation.

Méthodes : Un sondage en ligne a été administré aux étudiants en médecine de l'Université d'Ottawa sur une période de deux mois. L'enquête a recueilli des informations démographiques, des expériences éducatives, la valeur perçue des compétences d'évaluation critique et les préférences d'apprentissage pour le développement de ces compétences. Les proportions ont été rapportées pour les variables catégorielles et ordinales.

Résultats : Cinquante-neuf étudiants ont répondu à l'enquête. La majorité des répondants ont indiqué qu'ils manquaient à la fois de compétences (57%) et de confiance (75%) en matière d'évaluation critique. Les méthodes les plus courantes pour enseigner les compétences en matière d'évaluation critique sont les cours magistraux et les séminaires. Cependant, les clubs de lecture, l'apprentissage basé sur des cas et les articles de journaux ont été perçus par les répondants comme étant des méthodes de transmission de contenu plus efficaces.

Conclusion : La plupart des étudiants reconnaissent la valeur de l'évaluation critique dans la pratique clinique, mais déclarent manquer de compétences et/ou de confiance pour utiliser avec succès ces compétences dans les soins aux patients. Il est intéressant de noter que les méthodes d'enseignement préférées des étudiants diffèrent de celles qui sont le plus souvent utilisées dans nos programmes d'études médicales de premier cycle, ce qui met en évidence une lacune dans l'enseignement de la médecine fondée sur des données probantes.

INTRODUCTION

The plethora of published medical literature, coupled with rapidly evolving clinical knowledge and practice, demands that physicians are competent in critically appraising medical literature to ensure the delivery of safe, timely, and cost-effective care, in accordance with their patients' preferences.¹⁻⁶ For instance, a scoping review of 636 articles found that implementation of evidence-based practices resulted in widespread improvement in patient outcomes (including but not limited to infection, length of stay, and mortality) as well as healthcare savings.⁷ Despite long-standing advocacy for teaching evidence-based medicine (EBM) principles within undergraduate medical curricula, Canadian medical schools struggle to provide their students with the training necessary to critically appraise medical literature with competence and confidence.⁸ A survey of physicians in Ontario, Canada showed that nearly half of respondents had less than satisfactory knowledge of basic EBM principles; a finding that was attributed to the inadequacy of their training.⁸ Interestingly, younger physicians (who were more likely to have received formal training in critical appraisal) had better knowledge of EBM principles, suggesting that these skills can be successfully acquired and maintained when they are incorporated in undergraduate medical curricula.⁹

Research determining the educational needs of medical students' for acquiring critical appraisal skills is lacking. Previous studies attempted to identify challenges in the implementation of EBM curricula by surveying faculty members and healthcare providers.^{8,10-13} While these studies identified potential challenges (such as inadequate resources, students' perceptions, time constraints), it is unclear whether the concerns perceived by administrators, faculty members, and practicing physicians are representative of those experienced by medical students.^{8,10-14} Optimizing the teaching of critical appraisal skills in undergraduate medical curricula requires a better understanding of students' learning preferences. The objective of this survey was to 1) explore medical students' current medical literature critical appraisal skills and 2) determine their educational needs to help establish a durable foundation for the acquisition of these skills. We hypothesized that most medical students would report that they lacked competence and confidence in their critical appraisal skills.

METHODS

Survey design

We conducted a survey-based study of medical students at the University of Ottawa. We used a cross-sectional design with a convenience sampling technique. The survey (available in English and French) consisted of 12 questions that collected information on demographics, previous educational experiences, learning preferences, self-perceived competence, and confidence in critical appraisal skills.

Definitions

In our study, we refer to different components of the undergraduate medical curriculum at the University of Ottawa. Society, Individual, and Medicine (SIM) addresses population & public health, vulnerable populations, health services, and research methods through a series of lectures, panel discussions and small group workshops.¹⁵ Case-based learning (CBL) and Team-based learning (TBL) involve the application of theoretical knowledge to clinical scenarios in small group settings. Physician Skills Development (PSD) aims to prepare students for clinical practice through lectures, simulations, and workshops.

Participants

All medical students enrolled at University of Ottawa were eligible to participate in the study. All respondents had to provide electronic consent to participate. There were no exclusion criteria.

Data collection and analysis

Invitations to participate were sent by e-mail to all eligible participants and further advertised through social media accounts restricted to medical students at the University of Ottawa. Data was collected using Google Forms for a 2-month period from February 2020 to April 2020. Proportions were reported for both categorical and ordinal variables.

Ethics

Ethics exception was provided by the Ottawa Health Science Network Research Ethics Board. The survey was registered with The Ottawa Hospital's quality improvement projects initiative. No personal identifying information was collected.

RESULTS

Fifty-nine students completed the survey; the majority (78.0%) were in second or third years of medical school. An overwhelming majority of respondents appreciated that critical appraisal skills would benefit their practice as residents (93.2%) and as independent practitioners (93.2%). However, more than half reported that they lacked competence (57.6%) and confidence (74.6%) in their critical appraisal skills. The majority (55.9%) reported that their education and training experiences for conducting a critical appraisal of the medical literature were insufficient.

Regarding the various content delivery methods in the undergraduate medical curriculum, respondents reported that lectures/seminars (67.8%), self-learning modules (SLMs) (40.7%), and SIM (35.6%) were used to teach critical appraisal. Only a minority reported that they were taught critical appraisal through CBL (20.3%), TBL (5.1%), and PSD (3.4%) (Figure 1).

Students reported that the following content delivery methods would be more effective at helping them develop competence and confidence in medical literature critical appraisal: 1) group journal club sessions (57.6%), 2) CBL (54.2%), 3) journal articles review (37.3%), 4) lectures/seminars (32.2%), 5) informal discussions with mentors (30.5%). With the exception of lectures/seminars (Figure 2), their preferred content delivery methods are underrepresented in the undergraduate medical curriculum. Fewer than 25% reported that podcasts, textbooks, videos, web-based modules, or websites would be effective tools to help them acquire critical appraisal skills. Furthermore, the majority reported that SLMs, TBL, PSD, and SIM would not be effective methods for teaching these skills.

DISCUSSION

In this survey, we explored University of Ottawa medical students' perception of medical literature critical appraisal skills and determined their educational preferences for acquiring these lifelong learning skills. The results indicate that medical students recognize the importance of critical appraisal skills but lack the proficiency required to apply these skills clinically.

Less than half of the respondents had independently sought additional learning experiences (e.g. journal clubs, journal articles, videos) to develop their critical appraisal

skills. While we did not ask respondents to provide their reason(s) for not seeking additional learning experiences, our hypothesis is that this finding is likely due to severe time constraints in medical school. Canadian medical students can work up to 70 to 85 hours per week,¹⁶ which leaves little time for extra-curricular activities including professional skills development. However, interventions as short as 2 hours in duration have demonstrated that they improve medical students' attitudes, knowledge, and skills pertaining to EBM.^{17,18} Furthermore, studies have generally shown that the teaching of critical appraisal skills results in larger gains in knowledge when provided to medical students rather than residents.¹⁹ These data support the importance of incorporating EBM teaching in undergraduate medical curricula, such that medical graduates can continue to build on these foundational skills during residency, and ultimately implement evidence-based practices which have been shown to improve patient outcomes.⁷

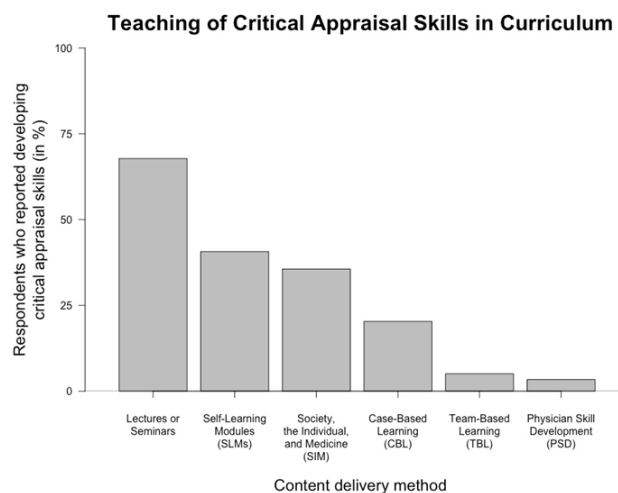


Figure 1. Essential components of undergraduate medical curriculum.

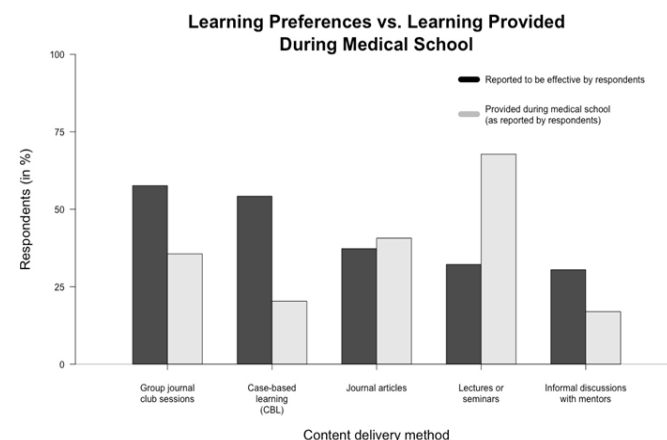


Figure 2. Content delivery methods deemed to be effective compared those used during medical school.

Our study identified an important discordance between medical students' preferred methods of developing critical appraisal skills and those methods commonly used. Respondents rated group journal club sessions, CBL, and journal articles as more effective content delivery methods for their development of these skills. However, only a minority of respondents reported that they had been provided one of these preferred methods to learn critical appraisal as part of their medical education to date. Two systematic reviews evaluating the effectiveness of EBM teaching have shown that the students' preferred methods generally help medical students improve their critical appraisal skills. Content delivery methods which were evaluated in these systematic reviews included lectures (both in-person and online), seminars, and small group workshops (including problem-based and team-based learning). However, there was insufficient evidence in either systematic review to make conclusions about the superiority of any single teaching method.^{17,18} Curiously, studies have provided conflicting evidence for the effectiveness of problem-based and team-based learning, when compared to traditional didactic teaching.²⁰⁻²² The studies included in these systematic reviews generally compared two different content delivery methods and found that students who received formal EBM teaching, regardless of the content delivery method, had greater competency and/or skills in EBM, thereby making it difficult to identify significant differences across teaching methods. This finding may be explained, at least in part, by bias inherent to before-after studies, such as the Hawthorne effect or repeat testing bias.²³ Furthermore, the effectiveness of these non-traditional teaching methods likely depends on prior knowledge of foundational concepts, which is required for application of critical appraisal to real-world patient problems. Thus, we suggest that undergraduate medical curricula should offer both traditional teaching methods, which assume no prior knowledge of EBM, alongside integrated problem-based and team-based learning, which are generally preferred by students. In practice, this could be accomplished via group journal club sessions, with articles selected to complement the clinical or medical content being taught in didactic teaching sessions. Alternatively, existing case-based learning modules could be updated to include additional sections on critical appraisal skills.

This study has several limitations. First, our survey was limited to medical students at the University of Ottawa. Thus, our findings may not be completely generalizable to other students or schools. However, most Canadian medical

schools have similar undergraduate curricula, which generally consists of 1 or 2 years of foundational learning (offered through a combination of group learning, independent learning, and lectures/seminars combined with intermittent clinical exposure) followed by 18 to 24 months of clinical rotations. As such, we suggest that our survey's results will help inform medical educators who face a similar challenge of successfully incorporating the teaching of EBM in an efficient, effective, and durable manner. Second, our survey was made available to all medical students at the University of Ottawa and only 59 out of 656 enrolled students responded (9.0%). Thus, our study likely suffered from selection bias, whereby students who participated in our study may have had a greater interest in EBM than those who did not. As a result, we may have over-estimated the tendency of students to seek opportunities to develop or further refine their critical appraisal skills and/or their willingness to engage in problem-based or team-based learning of these skills. Finally, data collection took place prior to and during the start of the COVID-19 pandemic, which may have affected both response rate as well as students' perception of the undergraduate medical curriculum (which was temporarily suspended as of March 15, 2020). However, of the 59 respondents, only 10 (16.9%) completed the survey after March 15, 2020; therefore, we feel it is unlikely that the conclusions of our study were significantly impacted by the effects of the COVID-19 pandemic.

CONCLUSION

In conclusion, our survey reveals that University of Ottawa medical students recognize the importance of critical appraisal skills but struggle to practice them with competence and confidence. Our findings highlight an important discordance between the content delivery methods currently used to teach these skills in our undergraduate medical curricula and students' learning preferences. This gap may contribute to the difficulties encountered by medical students in the acquisition and application of their critical appraisal skills. Given the clinical practice importance of critical appraisal skills, medical educators must incorporate the learning of these skills in an efficient, effective, and durable manner in spite of an overcrowded undergraduate medical curriculum and the time constraints on medical students.

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Conflicts of Interest Disclosure

There are no conflicts of interest to declare.