Undergraduate Plastic Surgery Education: A National Survey of Clerkship Directors

L'enseignement de la chirurgie plastique au premier cycle : sondage
national auprès des directeurs de stages

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Abstract

Background: The delivery of medical education has received increased attention in recent years due to ongoing time and financial constraints faced by medical educators. Given the recent calls to action by the Carnegie Foundation and Health Canada, an evaluation of the specialty education sector is warranted. To our knowledge, this is the first assessment of the Canadian plastic surgery undergraduate clerkship curriculum. **Method:** An anonymous electronic survey was distributed to the plastic surgery clerkship directors of all Canadian medical schools (N = 17). The survey consisted of Likert scales and open-ended short answer questions. Themes included general clerkship information, exposure characteristics, teaching characteristics, resource characteristics, and challenges and barriers faced by clerkship directors. **Results:** Survey response rate was 88%. All responding schools offered a clerkship rotation of varying length in time (1-4 weeks). Students had the most exposure to breast surgery (100%) and general plastic surgery (100%) and the least exposure to aesthetic surgery (40%). Sixty percent of schools indicated the use of modern educational methods. Resources available for teaching students varied. Rotations received excellent feedback from medical students (67%). More than half of respondents would like to see a universal, nationally formulated plastic surgery clerkship curriculum. **Conclusion:** There is significant heterogeneity in the delivery of plastic surgery clerkship in Canada. A number of areas for improvement have been identified. We hope to establish a national plastic surgery clerkship task force to address the concerns raised here and improve the delivery of undergraduate medical education. Assessment of students based on a national curriculum may help in decision-making regarding plastic surgery program admissions by introducing an element of standardization to clerkship exposure.

Résumé

Historique : L'enseignement de la médecine retient davantage l'attention ces dernières années en raison des contraintes de temps et d'argent qu'affrontent les professeurs. Dans la foulée des récents appels à l'action lancés par la Fondation Carnegie et Santé Canada, une évaluation de l'enseignement des spécialités s'impose. En autant que les auteurs le sachent, il s'agit de la première évaluation du programme canadien de stages de premier cycle en chirurgie plastique. **Méthodologie :** Les directeurs de stage en chirurgie plastique (n=17) de toutes les écoles de médecine du Canada ont reçu un sondage électronique anonyme, formé d'échelles de Likert et de questions ouvertes aux réponses courtes. Les questions traitaient des renseignements généraux sur le stage, des volets auxquels les étudiants étaient exposés, des caractéristiques de l'enseignement, des caractéristiques des ressources et des difficultés et obstacles qu'affrontaient les directeurs de stage. **Résultats :** Le taux de réponse au sondage s'élevait à 88 %. Toutes les écoles répondantes offraient des stages de durées variées (de une à quatre semaines). Les étudiants étaient plus exposés à la chirurgie mammaire (100 %) et à la chirurgie plastique générale (100 %) et moins exposés à la chirurgie esthétique (40 %), et 60 % des écoles indiquaient utiliser des modes d'enseignement modernes. Les ressources offertes pour l'enseignement variaient. Les

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étudiants en médecine donnaient d'excellents commentaires sur les stages (67 %). Plus de la moitié des répondants aimeraient disposer d'un programme de stage national et universel en chirurgie plastique. **Conclusions :** Au Canada, les stages en chirurgie plastique sont très hétérogènes. Plusieurs secteurs à améliorer sont ressortis. Les auteurs espèrent créer un groupe de travail national sur les stages en chirurgie plastique pour étudier les préoccupations soulevées et améliorer l'enseignement de la médecine au premier cycle. L'évaluation des étudiants d'après un programme national pourrait contribuer à la prise de décision lors des admissions en chirurgie plastique, car elle ajouterait une certaine standardisation des stages.

Keywords

clerkship, undergraduate medical education, adult learner, plastic surgery education

Canada is a world leader in medical education and often sees its teaching platforms adopted by other nations.¹ Nevertheless, the field of medical education has evolved relatively slowly over the last 100 years, which contrasts the growth seen by other disciplines.¹ The Carnegie Foundation for Knowledge Advancement, which released its seminal report on the state of medical education in 2010, called for 4 areas of reform: (1) standardizing learning outcomes and individualizing the learning process,² promoting multiple forms of integration, incorporating habits of inquiry and improvement, and focusing on the progressive formation of the physician's professional identity.² In addition, a Health Canada assessment of medical education published in 2010 accompanied a series of 10 recommendations and 5 enabling recommendations, which mirrored those of the Carnegie report.³ Given the ever-changing climate of medicine and these recent calls to action, an assessment of the Canadian specialty education sector is warranted.

As a specialty, plastic surgery provides students exposure to a number of common disease processes. Many of these compose a significant proportion of visits to the emergency department and general practice clinics. However, given the increasing desire to improve the efficiency of medical education, students now have less exposure to specialty practices, such as plastic surgery, during medical school. Such shifts have necessitated change in the methods by which specialties deliver their instruction. Plastic surgery must similarly adapt to the evolving medical education climate.

To our knowledge, this is the first assessment of the Canadian plastic surgery undergraduate clerkship curriculum. We hope this article serves as a foundation for evidence-based undergraduate medical education reform in Canada and abroad.

Materials and Methods

An anonymous on-line survey was distributed via Opinio software (ObjectPlant, Inc, Oslo, Norway) to the plastic surgery clerkship directors of all 17 medical schools in Canada. The mixed method survey was developed de novo following extensive literature review and discussion with staff plastic surgeons at Dalhousie University. A previous survey distributed by otolaryngologists served as a foundation for our study.¹

The survey went through a series of revisions and was piloted before dissemination. A cover letter included details concerning the survey, informed consent, and eligibility. A quality improvement ethics application (A pProject Ethics

Community Consensus Initiative) was completed before commencing this study.

For the quantitative component, only descriptive statistics were calculated. For the qualitative component, thematic analyses of open-ended responses were independently coded by the primary author (A.M.).

Results

General Characteristics

A total of 15 (88%) institutions responded to our survey. The majority (73%) of schools offered a plastic surgery selective rotation, with some medical students rotating through as part of their core surgical rotations. Three (20%) schools offered only elective rotations and 1 (7%) university had a mandatory plastic surgery rotation. Rotation lengths ranged from 1 to 4 weeks but varied depending on rotation type. All medical schools that responded had formal clerkship objectives. Approximately half (47%) of rotating medical students spent the majority of their time with 1 to 2 staff plastic surgeons, whereas the other half (53%) spent their rotation working with more than 2 surgeons. In 80% of cases, 5 to 10 staff surgeons were involved in clinical teaching. Medical students were expected to attend plastic surgery grand rounds or other departmental rounds 80% of the time. Only one-third of students had the opportunity to present a case they encountered or research they conducted on their rotation. Seventy-three percent of rotating students had the opportunity to discuss plastic surgery as a career with their staff.

Exposure Characteristics

Students participating in clerkship plastic surgery electives are exposed to a wide variety of cases (Figure 1). Students have the least exposure to aesthetic surgery (40%) and the most exposure to breast and general plastic surgery (100%). Thirty-three percent of students spent time outside of the tertiary centre where they were training. Rotating medical students at all schools had exposure to the operating room (OR), ambulatory clinic, and minor procedures clinic. Eighty-seven percent of students had experience taking call.

Teaching Characteristics

Nine (60%) schools indicated that they use modern educational methods (eg, e-learning resources). Plastic surgery was most

Figure 1. Domains of plastic surgery that students are exposed to while on rotation.

Figure 2. Frequency of clerkship plastic surgery teaching by staff surgeons, fellows, and residents, divided into 4 categories of percentage of time. "Other" included hand therapists, nurses, physiotherapists, occupational therapists, nursing staff, and other students.

frequently taught by one-on-one instruction in the clinical setting (87%), followed by didactic lectures (53%) and simulation (40%), respectively. Other teaching methods indicated were surgical skills labs and podcasts. Residents and staff surgeons performed most of the teaching (Figure 2). Residents most often taught via one-on-one instruction (73%). Electronic sources and specially designed handbooks were the most frequently provided educational resources (Figure 3). Students most often received summative evaluations (87%), with no medical students undergoing an oral exam at the end of their rotation (0%). Nonmedical expert roles integrated into the clerkship plastic surgery curriculum included collaborator (100%), communicator (93%), professional (93%), manager (80%), health advocate (80%), and scholar (73%).

Figure 3. Frequency of plastic surgery learning resources provided for clerkship students.

Resource Characteristics

Nine (60%) of the 15 responding schools indicated that there was plenty of space in their ambulatory clinics for teaching. Forty-seven percent of programs said that they "sometimes" have sufficient space in their ORs, whereas another 47% said that there was plenty of space. One (7%) program indicated that there was no space for teaching in the OR as there were far too many learners. At any given time, there were clerks from the home institution (80%), visiting elective students (93%), and preclerkship students (60%) on the plastic surgery service. Major themes from open-ended questions concerning resource characteristics are summarized in Tables 1 and 2.

Clerkship Challenges / Other Questions

Major challenges faced by plastic surgery clerkship directors are summarized in Table 3. Generally, rotations received excellent feedback from medical students (67%). Most clerkship directors (60%) believed they had adequate support from their colleagues. Approximately half (47%) of clerkship directors had access to continuing education courses.

When asked if they would like to see a universal, nationally formulated plastic surgery clerkship curriculum, 53% of clerkship directors responded yes, 27% said they were unsure, and 20% said no.

Discussion

This survey both illustrates the landscape of undergraduate plastic surgery teaching in Canada and, more importantly, highlights a number of areas for potential improvement.

Table 1. Thematic Analysis of Responses When Plastic Surgery Clerkship Directors Were Asked What They Would Add if They Had Unlimited Resources.

Resources	N = 20
Add simulation / skills teaching	8
Increase length of rotation	3
Increase time spent teaching	1
Increase time spent operating	1
Add e-learning modules	1
Expose students to PRS grand rounds	1
Expose students to multidisciplinary interaction / collaboration	1
More staff	1
More formal teaching sessions	1
Increase textbook availability	1
Increase one-on-one instruction	1

Abbreviation: PRS, Plastic and reconstructive surgery.

Table 2. Thematic Analysis of Responses When Plastic Surgery Clerkship Directors Were Asked Which Areas of the Clerkship Curriculum Needed Improvement.

Rotation characteristics	N = 14
Formal lectures	3
Support from the Royal College	1
Greater student independence	1
Greater exposure in OR	1
"Hands on" time limited to OR	1
Length of rotation	1
Cosmetic surgery exposure	1
Variability between sites	1
Staff engagement	1
Number of students	1
Objectives	1
Feedback	1

Abbreviation: OR, operating room.

General Characteristics

Well-known plastic surgery leader Dr Rod Rohrich wrote, "Mentoring is the least expensive and most powerful way to change the world."⁴ It plays an important role in medical training and is highly valued among medical students.⁵ In the plastic surgery literature, the importance of mentorship has been well-documented.⁶ As indicated by our survey results, students generally spent their rotations with more than 1 to 2 staff surgeons. It thus may be important for programs to designate a single faculty member as a "go-to", or mentor, to help facilitate learning in the clinical environment. Although we suspect this job often falls into the hands of the clerkship director, any faculty member can be involved. One of the obstacles faced by such initiatives is shortage of suitable, willing mentors.^{7,8} Similar barriers were identified in our survey as clerkship directors at times lacked support from their colleagues. Future initiatives to improve student mentorship and its impact on clinical learning may wish to address these concerns. We hope that by recognizing this universal problem, programs can identify this as an area to intervene and implement improvements.

Table 3. Significant Challenges Identified by Plastic Surgery Clerkship Directors.

Limited time students spend on rotation	13
Limited prior knowledge of PRS	8
Limited teaching resources	8
Lack of mandatory rotation	7
Limited recognition for faculty who participated in teaching	6
Financial barriers	5
Perceptions that the faculty of medicine doesn't value the rotation	5
Too many learners	4
Limited hospital infrastructure (eg., clinic space, OR time)	4
Limited faculty involvement	3
Lack of formal training in medical education among staff	3

Abbreviations: OR, operating room; PRS, Plastic and reconstructive surgery.

The amount of time spent on rotation is among the biggest barriers identified in our study. Unfortunately, this is something that is unlikely to change and often varies between institutions. Making the best use of a short plastic surgery rotation is the challenge and the potential solution. By applying Bloom's hierarchy of learning⁹ to the undergraduate plastic surgery education, as proposed elsewhere,¹ we may be able to increase the effectiveness of a short rotation. This theory postulates that focusing on the higher order domains of learning (ie, analysis, synthesis, and evaluation) may shorten the duration for knowledge acquisition. Analogously, this may mean providing medical students in advance with adequate reading materials, e-learning resources, and/ or podcasts, which they can evaluate on their own time and subsequently apply clinically. By stressing the importance of advance preparation to students, they can make the most effective use of their short rotations. This can take the form of an e-mail prior to the beginning of their clerkship rotation on the plastic surgery service. Strikingly, the majority of students only received their schedules on the first day of their rotation. Only 2 schools provided their students with a schedule either before the beginning of each week of their rotation or before the beginning of their rotation. Although there are many logistical concerns to scheduling students, we believe that by providing a tentative schedule in advance of an upcoming rotation, and adequate preparatory resources, students will be better equipped for their short rotations.

Ideally, medical students as adult learners will seek knowledge intrinsically. In reality, and with multiple conflicting demands for time, this does not always occur. Thus, in order to increase the uptake of resources, we suggest the implementation of a mandatory self-reflection, submitted to the clerkship director or supervising mentor during the rotation. Additionally, providing students with an end-of-rotation quiz or examination will provide further motivation and encouragement for the use to available resources.

Exposure Characteristics

Deciding what cases students are exposed to is challenging and requires input from a variety of backgrounds.¹⁰ Generally, rotating medical students were exposed to a multitude of domains.

However, despite cosmetic surgery comprising some of the key Royal College of Physicians and Surgeons of Canada objectives for plastic surgery training, and being represented on exams for certification in plastic surgery,¹¹ medical students were least likely to be exposed to cosmetic practice. This is likely a multifactorial phenomenon, partially the result of availability, institutional constraints, and the goal of training generalists.¹² However, given the importance of cosmetics in plastic surgery practice, it may be important to expose rotating medical students to its principles. This may be in the form of physical handout and/or e-learning resources. Direct exposure to cosmetic practice, however, should be based on exhausted reconstructive opportunities in the hospital setting, as to first and foremost maximize exposure to general plastic surgery principles.

Students' exposure to the OR was uniformly high. Many clerkship directors even indicated their wish to increase OR exposure among rotating medical students. In recent years, however, the role of the OR in teaching core clerkship objectives has been questioned.¹³⁻¹⁶ Irani et al, for example, showed that the majority of the time that students spent in the OR was dedicated to teaching a resident the technical aspects of the operation. Although this is often a dilemma faced by academic institutions, when possible, reorienting the clinical situation in the OR to better address clerkship goals may be beneficial. Additionally, identifying the medical student as a key member of the surgical team, as opposed to only an observer, may further facilitate learning in the OR.¹⁵ Unfortunately, these may not always be realistic goals. Further studies may wish to specifically address the educational value of increased OR exposure in the clerkship curriculum. This may be particularly important when assessing the role of longer, more complex plastic surgery procedures where students may not play a substantial role in the operation.

Teaching Characteristics

There has been a paradigm shift in the way medical education is delivered. Teaching in the form of didactic lectures and cadaver labs has made way for e-learning resources and other modern knowledge dissemination methods.¹² This is partially the result of changing learning styles.¹² Currently, the plastic surgery clerkship curriculum is most commonly delivered by one-on-one instruction in the clinical setting and didactic lectures. The least likely method of delivery was identified as simulation, an expected result of resource limitations.

Despite a number of studies showing the usefulness of simulation for medical students,¹⁷ and that plastic surgery remains a pioneer in the development of simulation methods for teaching,¹⁸ few easily accessible simulation courses are available. As many schools have indicted the need for simulation, particularly in the context of suturing, it may be important as a profession to identify a few evidence-based simulation courses that can be easily and cost-effectively integrated into the plastic surgery clerkship curricula.

The use of e-learning resources has increased universally. Not only do they provide a tailored learning experience, they

have the ability to provide students with immediate feedback. E-learning resources may also be able to teach students critical thinking, self-reflection, multiculturalism, teamwork, and interprofessionalism.² In our survey, the use of e-learning materials was not uniform across institutions. Once again, this is likely due to a number of factors including financial pressures and the time it takes to develop such resources. Working in collaboration on the development of a series of universally accessible web-based learning modules or podcasts, as 1 respondent indicated, may help supplement traditional teaching methods across the country and abroad. These would best be applied to high-yield topics such as hand fractures, common infections, craniofacial trauma, and more. These resources may also find use among emergency department physicians and general practitioners.¹⁹

Resource Characteristics / Clerkship Challenges

Many of the themes that surfaced when clerkship directors were asked what they would add with unlimited resources are undoubtedly difficult to implement. These included increasing the length of rotations, increasing staff involvement, increasing time spent teaching, increasing exposure to multidisciplinary interaction / collaboration, and adding simulation / skill teaching. Although simulation has been addressed elsewhere in this article, developing cost-effective simulation/skills teaching for undergraduate plastic surgery is imperative as it was one of the most common recurring themes identified.

When asked which areas of their clerkship curriculum needed improvement, the most frequently emerging theme among clerkship director responses was the addition of formal didactic lectures. Considering that this is an older method of knowledge dissemination, it may be possible to address these concerns with the addition of e-based learning sessions or on-line lectures. Once again, having a series of evidence-based, short, informative e-learning sessions readily available to schools may have a positive impact on the delivery of undergraduate plastic surgery education. This is one area that is amenable to national coordination, with standardized resources being developed and made available to programs.

Limitations

This study should be viewed in the context of several limitations. Firstly, there are inherent imperfections with all survey-based studies, such as recall bias. Yet, other studies of this nature have successfully employed equivalent methodology.^{1,20} Secondly, learners were not surveyed, as this was considered beyond the scope of the study's primary objectives and had been previously addressed at the time of study design and execution.²¹⁻²³ Furthermore, program directors were not included. Although clerkship directors are not solely responsible for undergraduate teaching, they serve as the primary undergraduate reference at Canadian institutions and would ultimately comprise the proposed task force. Nevertheless, such a task force would undeniably benefit from the expertise of program directors once established.

Conclusion

The majority of respondents said they hoped to see a universally formulated and delivered plastic surgery clerkship curriculum. There are a number of benefits to such a program including the potential for universally available e-learning resources, medical education collaboration among institutions, and a standardized clerkship curriculum. In addition, the assessment of students based on a national curriculum may help in decision-making regarding plastic surgery program admissions by introducing an element of standardization to clerkship exposure. We hope this study provides adequate foundation and framework for such a project. Our proposed next steps are to (1) establish a task force to develop and implement a national clerkship initiative, (2) address the deficiencies highlighted here, and (3) develop a nationally standardized series of plastic surgery learning objectives and electronic resource repository. If successful, we can greatly improve the delivery of undergraduate plastic surgery education in Canada.

Declaration of Conflicting Interests

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