

Undergraduate surgical training: variations in program objectives and curriculum implementation across Canada

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Background: Although nationally recognized learning objectives for undergraduate surgical education exist, the extent to which Canadian medical schools follow these guidelines has never been established. **Methods:** We distributed a survey to all program directors and clinical-teaching-unit coordinators for undergraduate surgery at Canada's 16 medical schools, and subsequently assessed the perceived emphasis placed on learning objectives and student performance, and the impact of instructional tools and teaching locations. **Results:** Program directors in 15 medical schools responded to the survey. We identified a wide variation in the emphasis placed on basic learning objectives as well as specialty specific learning objectives. The length of rotations, methods of instruction and tools used to grade student performance also varied widely. **Conclusions:** Our findings suggest significant variation in the design and implementation of undergraduate surgical education in Canada. This study may serve as a basis for reassessing learning objectives in Canadian undergraduate surgical education.

Contexte : Même s'il existe des objectifs d'apprentissage nationaux reconnus pour la formation de premier cycle en chirurgie, on n'a jamais établi dans quelle mesure les facultés de médecine du Canada suivent ces lignes directrices. **Méthodes :** Nous avons distribué un sondage à tous les directeurs de programme et coordonnateurs d'unités d'enseignement clinique en chirurgie du premier cycle aux 16 facultés de médecine du Canada et nous avons évalué par la suite l'importance perçue accordée aux objectifs d'apprentissage et aux résultats des étudiants, ainsi qu'à l'impact des moyens et des lieux d'enseignement. **Résultats :** Les directeurs de programme de 15 facultés de médecine ont répondu au sondage. Nous avons déterminé que l'importance accordée aux objectifs d'apprentissage fondamentaux et spécifiques à une spécialité variait énormément. La durée des stages, les méthodes d'enseignement et les outils utilisés pour évaluer le rendement des étudiants ont aussi varié considérablement. **Conclusions :** Nos résultats indiquent une variation importante au niveau de la conception et de la mise en œuvre de la formation en chirurgie de premier cycle au Canada. Cette étude peut servir de base pour réévaluer les objectifs d'apprentissage de la formation en chirurgie de premier cycle au Canada.

Although nationally recognized learning objectives for undergraduate surgical education have been developed by the Canadian Undergraduate Surgical Education Committee (CUSEC) and the Association for Surgical Education (ASE), the extent to which Canadian medical schools follow these guidelines

has never been established.^{1,2} Presumably, all Canadian medical schools deliver a similar educational experience in undergraduate surgery with minor variations in surgical content and methods of instruction. There is little data, however, to confirm that emphasis is placed on the principal learning objectives estab-

lished by the CUSEC and the ASE. Moreover, we do not know whether there is significant variation in curriculum design among Canadian medical schools.

Previous investigators have suggested that the goals of undergraduate surgical education may not coincide with the needs of primary care

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physicians.³ It has been noted that too little time is spent training for the surgical problems most commonly seen in general practice. In particular, some believe that inadequate time is dedicated to surgical specialties and outpatient or ambulatory care experience.⁴

In this paper we present the findings of a study designed to assess the approach to undergraduate surgical education in Canada. The study includes data on program design, emphasis and performance relating to basic surgical principles, and skills and teaching strategies.

Methods

We completed a cross-sectional survey of all program directors and clinical teaching unit (CTU) coordinators (surgeons responsible for the surgery clerkship at individual hospitals or sites within a program) for undergraduate surgery at Canada's 16 medical schools. The survey was modelled on a needs-assessment study conducted by one of the authors (D.W.B.) and his associates (unpublished data). Basic demographic and descriptive information was collected about program design, including the length and structure of the surgery clerkship, mandatory rotations, electives offered and evaluation tools used for student assessment. Respondents' perceptions of the emphasis placed on basic surgical learning objectives, their students' performance (global rating of performance during surgery clerkship) on these objectives and the value of instructional tools and teaching locations was assessed using a 5-point Likert-type scale, highlighted with specific anchors. As no formal list of program directors or site coordinators was available, the undergraduate medicine offices of the nation's medical schools were contacted individually to collect names and contact information. Two mailings were completed 3 weeks apart, with follow-up telephone calls and emails to nonrespondents.

The 4 broad educational areas as-

essed in the survey were basic surgical knowledge, surgical skills, surgical educators and methods of instruction. The section on surgical knowledge comprised basic surgical principles (i.e., wound healing, fluids and electrolytes) and specialty specific topics (i.e., general surgery — bowel obstruction, urology — scrotal masses). These key topic areas were derived from several sources including the guidelines produced by the CUSEC (1991), the ASE (1998), a literature review, current surgical textbooks and expert opinion. An appropriate list of key surgical skills was similarly derived. The perceived value of the various surgical educators (residents, surgeons and nurses) was assessed, as were the most common methods of instruction. This included an assessment of time allocation in the surgical specialties, the effectiveness of various sites for learning (operating room, emergency department and inpatient wards) and resources that are used for instruction and logistical issues. For each educational topic the respondents were asked to rate their program's emphasis on this topic during their clerkship and the perceived performance of their students in the surgical clerkship (global rating). Topics were scored using a 5-point Likert-type rating system. Before the study, the questionnaire was reviewed and revised by selected surgeon-

educators to establish content validity and assure clarity.

The data were summarized with descriptive statistics by ranking topics according to response or by means.

Results

Program demographics

Fifteen of Canada's 16 medical schools are represented in this study: 15 of 16 program directors and 18 of 29 CTU coordinators. The average number of sites or hospitals involved in surgical education at Canadian medical schools is 3.7 (range from 2–10). Medical students experience an average of 9.3 weeks of undergraduate surgery (range from 7–12 wk). On average, 3.8 weeks are taken up by surgical electives (range from 0–12 wk). Some programs allowed no elective time during the surgical rotation, whereas other programs set no prerequisites in their curriculum. Table 1 indicates the surgical rotations that are mandatory at the responding schools. General surgery forms the basis for the surgical clerkship in most programs in Canada. All schools with a mandatory component in their clerkship require a general surgery rotation.

On average, Canadian medical schools use 3 different evaluation tools (Table 2). The most frequently used of these are multiple choice ex-

Table 1

Number of medical schools with mandatory surgical rotation by specialty

Surgical specialty	No. of medical schools (n = 15)
General	13
Orthopedic	6
Urology	6
Otolaryngology	4
Ophthalmology	4
Plastic	2
Vascular	1
Trauma	1

Table 2

Program evaluation tools used by responding medical schools

Evaluation tool	No. of medical schools (n = 15)
Multiple choice questions	11
Objective structured clinical examination	10
Exit survey	10
Oral examination	7
Written examination	6
Logbook	5
Encounter card	2

aminations (11 schools), objective structured clinical examinations (OSCEs) (10 schools) and oral examinations (7 schools). Exit surveys are used as a program evaluation tool by 9 of 15 schools.

Learning objectives: principles of surgery and surgical skills

The perceived emphasis placed by programs on the basic principles of surgery as measured by a Likert-type scale (1 — no emphasis, 3 — moderate emphasis, 5 — large emphasis) showed that, overall, most emphasis was placed on complications, sepsis, and shock and trauma and least emphasis was placed on burns and transplantation (Fig. 1). The perceived performance for Canadian medical students with respect to learning objectives (1 — do poorly, 3 — become proficient, 5 — excel) was highest for complications, and shock and trauma and lowest for burns and transplantation (Fig. 1). Likewise, with respect to the perceived level of emphasis placed on several basic surgical skills most emphasis was placed on insertion of nasogastric tubes and Foley catheters, and suturing and the highest perceived level of performance was insertion of tubes and catheters (Fig. 2).

Methods of instruction: teaching tools and locations

Informal methods of instruction from residents and attending surgeons were rated the most effective in teaching (Fig. 3). Formal methods (grand rounds or surgical conferences) were rated lower. Technologically advanced tools such as Web-based learning were used the least frequently and perceived by respondents to be one of the least effective methods of teaching (Fig. 3). Informal locations, such as the emergency department and surgical clinics were rated the highest in terms of frequency of use and usefulness in teaching. The operating room, despite being used quite frequently,

was perceived to be the least effective location for teaching medical students (Fig. 4).

Discussion

The findings of this study suggest that there is important variation in the design and implementation of undergraduate surgical education in

Canada. We identified a wide variation in the emphasis placed on basic learning objectives (principles of surgery and basic surgical skills) as well as specialty specific learning objectives. We noted interesting trends in all of these areas in terms of perceived student performance. The length of rotations, methods of instruction and tools used to grade stu-

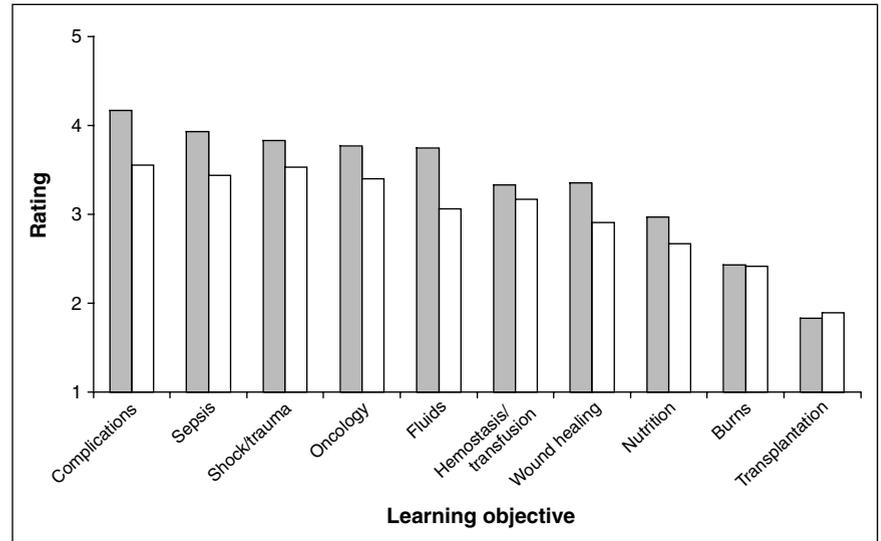


FIG. 1. Perceived program emphasis (shaded columns) and student performance (white columns) on the principles of surgery taught in Canadian surgery clerkships (Likert scale anchors: for emphasis: 1 — no emphasis, 3 — moderate emphasis, 5 — large emphasis; for student performance: 1 — do poorly, 3 — become proficient, 5 — excel).

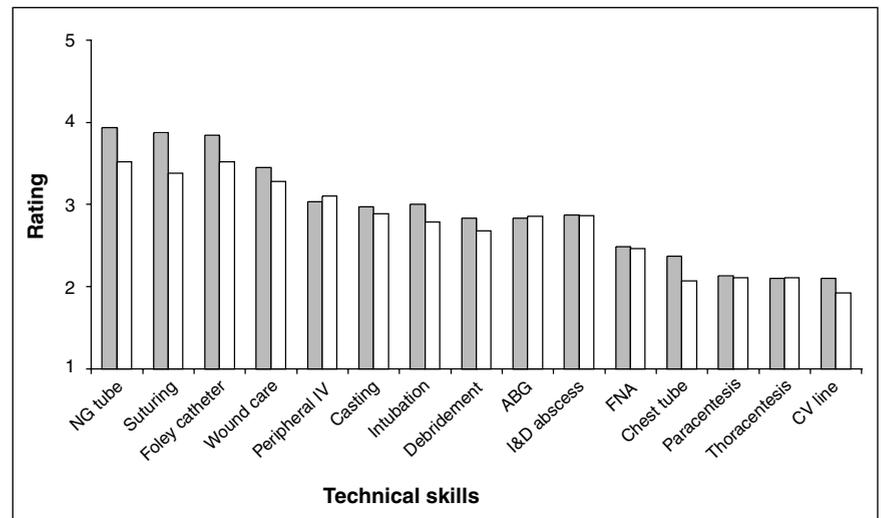


FIG. 2. Perceived program emphasis (shaded columns) and student performance (white columns) on the basic surgical skills taught in Canadian surgery clerkships (Likert scale anchors for emphasis: 1 — no emphasis, 3 — moderate emphasis, 5 — large emphasis; for student performance: 1 — do poorly, 3 — become proficient, 5 — excel). ABG = arterial blood gas measurement, CV = central venous, FNA = fine needle aspiration, I&D = incision and drainage, IV = intravenous, NG = nasogastric.

dent performance also varied widely across Canadian programs. We have also found that surgical educators believe medical students can be educated in undergraduate surgery using a variety of surgical specialty experiences.

These findings raise questions regarding the true impact of learning objectives on individual programs and

national curriculum design. Although CUSEC and ASE objectives currently exist, our data indicate that they have a limited impact on the structure of individual undergraduate surgery curricula.^{1,2} This may be owing to the significant variation in internal restrictions placed by institutions on training programs. These restrictions may be related to overall design of the

medical school curriculum, structure and logistical issues, teaching site variations, specialty programs available and the pool of dedicated surgeon-educators available for teaching. Despite this national variation each program is largely successful at providing an appropriate undergraduate surgical education. Therefore, the role of national learning objectives needs to be clearly defined.

Intuitively, national learning objectives act as guidelines and serve as references for individual programs when reviewing or restructuring their surgery clerkships. This implies that some variation will occur between programs based on the issues we have detailed. However, the variation identified among Canadian surgery clerkships is greater than anticipated. It is not possible to determine whether this variation has always existed or if individual programs have been gradually modified out of necessity or local preferences, creating the variation described by our data.

We believe that many issues act to create a character or “flavour” of individual training programs and perhaps these variations should be encouraged. However, it is important to evaluate whether the teaching of basic surgical principles and skills is maintained in these varied settings. DaRosa and associates⁵ have discussed the importance of evaluation of the undergraduate surgery curriculum in assessing whether the needs of the learner are being met. We believe it is important for programs to evaluate their own performance to ensure that basic principles are emphasized and learned in their curricula. Further, Spratt and colleagues⁴ have emphasized the importance of basic surgical concepts and skills for primary care physicians. Our study may indicate a trend toward de-emphasizing important surgical principles in current Canadian curricula. Our data do not permit an analysis of the reasons for these findings. A trend toward greater surgical specialization or more complex inpa-

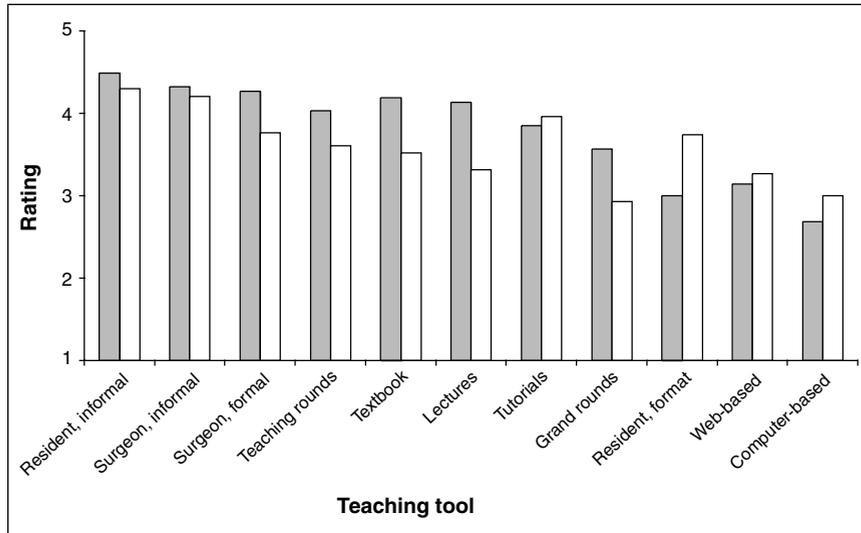


FIG. 3. The perceived utilization (shaded columns) and effectiveness (white columns) of various methods of instruction for undergraduate surgery in Canadian surgery clerkships (Likert scale anchors for emphasis: 1 — never, 3 — occasionally, 5 — often; for student performance: 1 — do not learn, 3 — usually effective, 5 — extremely effective).

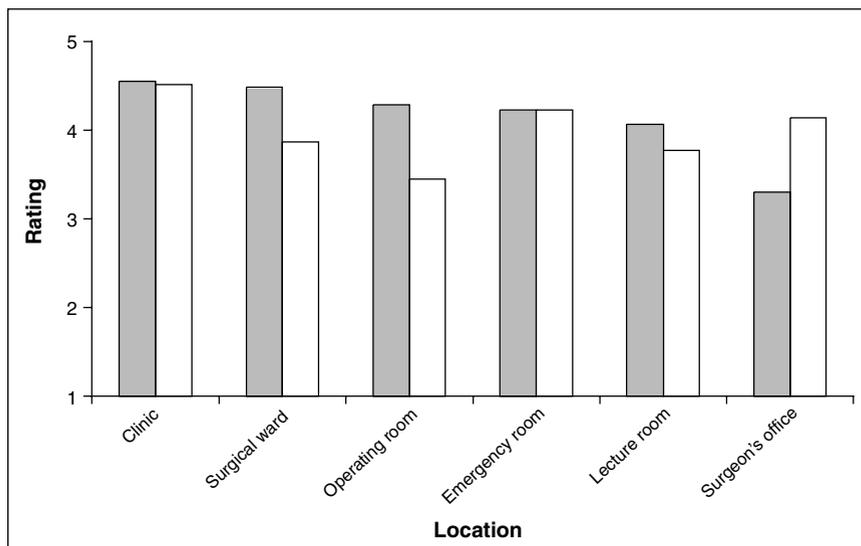


FIG. 4. The perceived utilization (shaded columns) and effectiveness (white columns) of various teaching locations for undergraduate surgery in Canadian surgery clerkships (Likert scale anchors for emphasis: 1 — never, 3 — occasionally, 5 — often; for student performance: 1 — do not learn, 3 — usually effective, 5 — extremely effective).

tient cases that serve as teaching cases may be implicated. However, in this study, program directors have indicated that basic surgical education can be offered on most surgical specialty rotations. Poenaru and colleagues⁶ questioned whether a general surgery rotation was even mandatory within a surgery clerkship. Our data show that general surgery still remains the most widely used service in the surgery clerkship. The issue of where students receive their education in the principles of surgery should remain in the hands of the program director and may be based on the human resources available. There is no literature to suggest that a medical student must be on a general surgery service to learn basic surgical principles. The surgical specialty services should serve as essential components of a curriculum; allowing medical students to choose between various approved electives in surgery will add interest to an undergraduate surgery curriculum.

It may not be necessary to expose medical students to large volumes of patients for effective learning; rather a mix of informal clinical teaching interactions may be an effective approach. Others have shown that a student's patient load or volume of patients seen while in a surgery clerkship correlate poorly with final clerkship grades and clinical skills evaluation scores.^{7,8} This should be reassuring if program directors are concerned about time restrictions within the clerkship. Modifying the medical students' experience with an emphasis on the most efficient and effective teaching interventions may also be a solution. Canadian program directors seem to indicate that informal teaching, especially by residents,

either in surgical clinics, offices or the emergency department may provide some of the most useful teaching for medical students (Fig. 3, Fig. 4).

The impact of surgery residents on the experience of medical students in a surgery clerkship has been discussed in the past, but may need re-emphasis.⁹ With concerns over declining interest in surgery as a career, it is important to recognize the contributions of a surgery resident and the effectiveness of the resident as a teacher (Fig. 3). Remarkably, surgery residents are ill prepared for the unique challenge of surgical training and planning of their own career while playing a major teaching role in the surgery clerkship. Rotenberg and colleagues¹⁰ have provided some suggestions for improving and reinforcing the surgery resident in this role, including access to clerkship learning objectives, providing guidelines on effective teaching practices and increasing feedback from staff supervisors.

Conclusions

We believe this study may serve as a basis for reassessing learning objectives in undergraduate surgical education in Canada. These data should encourage educators in undergraduate surgery to assess whether the needs of the contemporary medical student are being met within Canadian undergraduate surgery curricula. The program variations identified in this study will present certain challenges if new national learning objectives are to be established.

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