Evaluation of a Pilot Student-run General Surgery Lecture Series at McMaster University

Tiffany Chan, BSc
Azadeh Nikoo Rajaee, BSc
Leighanne Parkes, BHSc
Elena Parvez, BSc, MSc
Jen Hoogenes, BS, MS, PhD(c)
Simran Basi, BSc
Katy Li, BHSc
Mariam Guirguis, BSc
Natasha Gill, BMSc (Hons)
Marcin Kowalczuk, BMSc

ABSTRACT

Current evidence suggests that exposure to general surgery in clerkship can change misconceptions and highlight positive aspects of the field. Yet residency decisions often antedate a medical student’s entry into surgical clerkship. Ways to facilitate earlier exposure in the pre-clerkship period have not been well-studied.

The purpose of this study was to evaluate the effect of a didactic lecture series on student interest in general surgery and to provide guidance for future projects. We hypothesized that a lecture series delivered by medical students, in collaboration with staff surgeons, would increase interest in general surgery amongst pre-clerkship students. Seventy first- and second-year students of the Michael G. DeGroote School of Medicine (McMaster University) attended the six-week series and 34 attendees completed an evaluation form at the final session. Of the respondents, 35% (first year: 54%, n=7; second year: 25%, n=5) indicated that their interest in general surgery increased after this lecture series. First- and second-year students differed in their learning objectives: second-year students desired more in-depth teaching of procedures, while first-year students preferred a broader, simplified approach. Many students requested lengthening and broadening the series in subsequent years to include surgical subspecialties. We conclude that a lecture series is an easily implemented and effective method of providing knowledge, facilitating student-surgeon interaction and generating interest in general surgery in pre-clerkship medical students.

BACKGROUND

Despite significant increases in the number of students admitted to medical schools across Canada each year, general surgery residency programs have not maintained a corresponding increase in their applicant pool. The Canadian Residency Matching Service (CaRMS) reports that, from 1997 to 2010, the percentage of Canadian medical graduates selecting general surgery as their first choice specialty has varied between 3.9-5.6%, with a statistically significant decline between 1996 and 2001. Minor et al. have suggested that this decline has decreased the competitiveness of the specialty as well as the quality of the applicant pool. In 2009, 17 (16.3%) of 104 general surgery residency spots across Canada were left unfilled. There has been a similar decline in interest in general surgery in the United States, with a 6.0% decline in applicants selecting general surgery as first choice specialty between 1984 and 2002. This trend corresponds with a measurable increase in interest in so-called ‘controllable lifestyle’ specialties such as family and internal medicine. A number of studies in Canada and the United States have been sought to identify the reason for these patterns and to test pilot interventions to generate inter-
est in the specialty. Results suggest that the declining interest in general surgery is in part related to the perceived inflexibility of the lifestyle of residents and staff in a demanding specialty. This corresponds with the trend towards putting increasing weight on lifestyle factors when senior medical students are choosing a residency. Yet evidence suggests that surgical mentorship during clerkship has the power to change misconceptions while highlighting positive aspects of the field, such as academic and career opportunities, intellectual challenge, sense of accomplishment and prestige, and financial incentives. Additionally, mounting evidence shows that early preclinical exposure to mentors, skills and cases strongly correlates with student interest in general surgery as a specialty.

NEEDS ASSESSMENT

How does one make the decision to pursue a career in general surgery? Many medical schools, including McMaster University, offer a relatively small focus on general surgery in the pre-clerkship curriculum. Proportionately less time is spent on surgical skill development or surgery-specific learning objectives compared to other specialties. This may be a corollary of the emphasis on primary care. Furthermore, very few general surgeons facilitate problem-based learning (PBL) tutorials or serve as clinical skills preceptors, thereby limiting early exposure to surgical mentors. This fact supports the notion that medical students’ preference towards pursuing non-surgical specialties may be a reflection of their lack of familiarity with surgeons, and of surgery itself. At McMaster University, surgery-specific teaching consists of a brief session in clerkship orientation, with students otherwise able to direct their own learning through electives, external events, and research endeavors.

Currently, 38% of general surgeons in Canada are over 55 years of age. Fostering interest in the field is necessary to attract the workforce that will be required to replace these surgeons as they retire, especially to accommodate the needs of rural communities. In the United States, the number of general surgeons per capita has decreased by more than 25% since 1981, while other surgical subspecialties have not seen the same decline. This has precipitated a need to bolster the workforce by relying on recruitment of international medical graduates. This practice is unsustainable, however, and calls for an increase in the number of surgeons trained locally. In anticipation of a similar shortage in Canada, it is essential to generate interest in those who might pursue general surgery as a career. With growing evidence supporting the effect of early exposure on career selection, and the fact that many residency decisions antedate clerkship, a focus on optimizing surgical curriculum for pre-clerkship students can plausibly increase trainees’ interest in the specialty.

A need to provide early exposure to surgical topics had been previously identified on an informal basis by staff, students, and residents. As well, a qualitative study done at McMaster University suggested a lecture series as a method of early exposure. To address the identified gap in preclinical education at McMaster University, the student-run Surgery Interest Group (SIG), with financial support from the McMaster Department of Surgery, organized and implemented a didactic lecture series. The series covered topics in general surgery while offering the opportunity for interactions with surgical mentors.

GOALS

The three main goals of this lecture series were:

- Provision of knowledge
- Fostering of staff-student interaction and mentorship opportunities
- Increasing interest in surgical topics and general surgery residency

EDUCATIONAL STRATEGIES

Empowerment and involvement of senior medical students

- Peer-to-peer teaching environment
- Interactive, practical, approach-based didactic lectures
- Delivery of expert opinion from staff surgeons of various subspecialties
- Exposure to surgeon role models

METHODS

This exploratory study was designed as a pilot project to inform future educational activities in general surgery. We conducted a series of didactic lectures designed for pre-clerkship students that ran for six consecutive weeks during September and October of 2010. Lecture topic selection was performed via a survey in July 2010 of 57 third-year students (Michael G. DeGroote School of Medicine Class of 2011) who had completed their general surgery clerkship rotation. These students were asked to select the topics they felt would have been most beneficial to learn prior to the rotation. The suggested topic list was generated from headings in Lawrence’s Essentials of General Surgery, a textbook written in accordance with the learning objectives developed by the Canadian Undergraduate Surgical Education Committee. Topics were finalized with further input from two surgical faculty members. The lecture topics were: 1) Perioperative care, 2) Gastrointestinal (GI) bleed, 3) Small and large bowel obstruction, 4) Biliary tract disease, 5) Breast masses, and 6) Hernias.

Lecturers and Surgeons

Presenters were selected from a group of third-year medical students with an interest in general surgery. Lecturers were paired with a staff general surgeon and were encouraged to collaborate in reviewing the presentations to ensure
content accuracy and coverage of important points. Surgeons were all McMaster faculty members, each with a clinical practice in the given topic. They were selected based on expressed interest in the lecture series and prior involvement in educational events. Surgeons were invited to provide expert opinion, share professional and personal aspects of being a general surgeon and address questions from attendees.

**Participant Recruitment**

Participants were recruited using McMaster’s online medical school community, Medportal. The lecture series was offered to all McMaster medical students, and attendance was on an elective basis. There were no exclusion criteria. Participants were requested to sign up via email in order to anticipate the number of participants as well as collate contact information for follow-up. A convenience sample was used for data collection as this was exploratory research, intended to test-run ways to recruit, retain, and evaluate participants.

**Lectures**

Lectures had the following general outline: clinical case presentation, review of relevant anatomy, differential diagnoses, etiology and pathophysiology, history-taking, physical findings, investigations, and surgical and non-surgical management of the example patient. The topic list was posted on Medportal forums before commencement of the series, with weekly reminders of the topics to be covered in subsequent sessions. Students were encouraged to familiarize themselves with the topics beforehand, though there were no specific assigned readings. All lectures were presented using PowerPoint, and were made available online for downloading after each session. The incorporation of videos and graphics as teaching aids varied between individual lectures and was at the discretion of the presenter. Each lecture was approximately one hour in length, followed by a question-and-answer period with the surgeon. A general surgery trivia question was posted each week to encourage students to read about other topics, with the incentive of a clerkship surgery textbook as a prize.

**Evaluation**

Attendance was taken at each session, and feedback data were gathered via an anonymous written survey at the end of the sixth session. The surveys consisted of participants’ background information (year of medical school, reason for attending the series, specialty they intend on pursuing, number of weeks of surgical electives completed) and evaluations of individual sessions. Participants were asked to evaluate the series as a whole and each individual lecture separately in three domains: 1) characteristics of the lecturer, 2) lecture content and 3) the surgeon. A 4-point Likert scale was used, where 1=”poor” and 4=”excellent”, and space was provided for additional participant comments. Attendees were followed up with via email two months after series completion to comment on a voluntary basis on three components: 1) whether they had since organized surgical electives (or intended to), 2) if they had sought out surgeons for mentorship/research projects, or 3) if they noted application of their new knowledge in both surgical and non-surgical clinical rotations or PBL cases.

**Analysis**

The data were analyzed using descriptive statistics in Excel. For qualitative comments, two reviewers transcribed the comments from surveys and analyzed them for common themes.

**Ethics**

This was a quality improvement project that did not require Research Ethics Board approval. All participants were informed that this lecture series was a pilot project, during which data would be gathered and summarized into a report to guide future research and curriculum planning. All names and contact information gathered through attendance and email sign-up were kept anonymous unless express written consent was obtained to use participants as references.

**RESULTS**

**Participants**

A total of 70 medical students participated in the lecture series, 40% (n=28) were in first year, 57% (n=40) were in second year, and 3% (n=2) were in third year of medical school. On average, there were 38 attendees per session. Of the 34 participants who attended the final session and thus completed the evaluation forms, 35.5% (n=13) were in their first year of medical school, 58.8% (n=20) were in second year, and one participant did not indicate year of study (Table 1).

Of the respondents, 62% (n=21) of students were considering pursuing general surgery in residency; a larger proportion of second-year students (91%, n=19) listing clerkship and electives as the reason for attending, in comparison to the first-year students (31%, n=4).

Those who had attended three lectures or less cited other commitments (overall: 12%, n=4; first year: 15%, n=2; second year: 10%, n=2) or finding out late (overall: 9%, n=3; first year: 8%, n=1; second year: 10% n=2), while one first-year student specifically commented that they attended fewer lectures because they found the material too difficult to follow. None of the students sampled chose a loss of interest as the reason for attending fewer than three sessions.

Of the respondents, 62% (n=21) of students were considering pursuing general surgery in residency; a larger proportion of second-year students (70%, n=14) versus first-year students (54%, n=7) agreed with this statement. Interestingly, 35% of respondents (first year: 54%, n=7; second year 25%, n=5) indicated that their interest in general surgery increased...
after this lecture series. Three first-year students (8.8%, n=3) who had declared interest in pursuing non-surgical specialties such as pediatrics, internal medicine, and family medicine stated that, following this series, they were interested to learn more about general surgery (n=1) and other surgical fields (n=1), and were considering pursuing general surgery in residency (n=1).

**Evaluations**

Students rated lecturers, lecture content and surgeons on a 4-point Likert scale where 1=“poor” and 4=“excellent” (Table 2). Lecturers were rated based on 1) knowledge (3.3-3.9, mean=3.7), 2) preparation (3.5-3.9, mean=3.7), 3) ability to answer questions (3.2-3.8, mean=3.6), 4) presentation style and format (3.4-3.8, mean=3.6), and 5) quality of slides (3.5-3.8, mean=3.7). Lecture content was rated based on 1) appropriate depth and difficulty (3.5-3.8, mean=3.7), 2) appropriate breadth (3.4-3.8, mean=3.7), and 3) whether it provided a useful approach to the clinical problem (3.4-3.8, mean=3.7). Surgeons were rated based on 1) insight into field (3.2-3.9, mean=3.7), 2) knowledge (3.3-4.0, mean=3.8), and 3) being personable and approachable (3.7-4.0, mean=3.9). Overall, the lecture ratings ranged between 3.6-3.9 (mean=3.8). Lecturers scored 3.7 when averaged across all domains, and surgeons received overall scores ranging between 3.3-3.9 (mean=3.8).

**Qualitative Feedback**

Students were satisfied with the knowledge gained from the lecture series, and made comments such as, “Very relevant and practical”, “The approach that was taught was extremely useful” and “Very helpful for clerkship.” Students also had positive comments regarding the format of the series including, “Great job at promoting participation” and “Enjoyed the question and answer period, and extremely interactive lecture style.” However, 38.5% (n=5) of first-year students felt the information presented was sometimes difficult to understand, and specifically commented that they would have appreciated having medical acronyms defined.

Students commented on their appreciation for surgeons who were friendly, engaging, approachable, involved in the content of the lecture being delivered, and willing to stay behind to provide insight about career choices. In contrast, surgeons who were perceived as having a “big ego” or who seemed rushed or disinterested were less well-received; a student commented that one such surgeon “put [him] off surgery a little bit.”

Suggestions for improvement included providing slides prior to the session, having third-year medical students describe their experience with the CaRMS process as it relates to general surgery, and providing evaluation forms at the end of each session for more accurate reflection of opinions. Topics that participants would like to see covered in future years include trauma surgery and colorectal cancer. Participants

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**Table 1. Demographic and Background Information of Survey Respondents by Year of Medical School**

<table>
<thead>
<tr>
<th></th>
<th>Total</th>
<th>First Year</th>
<th>Second Year</th>
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<tbody>
<tr>
<td></td>
<td>%</td>
<td>n</td>
<td>%</td>
</tr>
<tr>
<td>Number of Survey Respondents</td>
<td>34</td>
<td>35.3%</td>
<td>13</td>
</tr>
<tr>
<td>Mean Number of Sessions Attended</td>
<td>4.6</td>
<td>4.2</td>
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<tr>
<td>Number of Participants who attended ≤3</td>
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<td>6</td>
<td>23%</td>
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<tr>
<td>Reason for Attending ≤3*</td>
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<tr>
<td>Lost interest</td>
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<td>0</td>
<td>0%</td>
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<tr>
<td>Other commitments</td>
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<td>4</td>
<td>15%</td>
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<td>Found out late</td>
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<td>8%</td>
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<tr>
<td>Other</td>
<td>3%</td>
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<tr>
<td>Reasons for Attending Lecture Series*</td>
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<tr>
<td>General interest in topics</td>
<td>74%</td>
<td>25</td>
<td>85%</td>
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<tr>
<td>Meeting surgeons</td>
<td>29%</td>
<td>10</td>
<td>46%</td>
</tr>
<tr>
<td>Guide career decisions</td>
<td>44%</td>
<td>15</td>
<td>69%</td>
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<tr>
<td>Preparation for clerkship or electives</td>
<td>68%</td>
<td>23</td>
<td>31%</td>
</tr>
<tr>
<td>Participants Considering General Surgery Prior to Lecture Series</td>
<td>62%</td>
<td>21</td>
<td>54%</td>
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<tr>
<td>Participants with Changed Interest</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Increased</td>
<td>38%</td>
<td>13</td>
<td>54%</td>
</tr>
<tr>
<td>Decreased</td>
<td>35%</td>
<td>12</td>
<td>54%</td>
</tr>
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<td>Mean Overall Rating of Series (4-point Likert scale)</td>
<td>3.7</td>
<td>3.6</td>
<td>3.7</td>
</tr>
</tbody>
</table>

¶ One person did not indicate year
* Participants could indicate more than one reason
also expressed the wish to have the series lengthened and broadened to cover other surgical sub-specialties including otorhinolaryngology, neurosurgery, orthopedic surgery and cardiaс surgery.

**Follow-up Data**

Of the 70 participants contacted via email two months after the completion of the series, only 8.5% (n=6) responded. Of these respondents, 83.3% (n=5) were in second year, and 16.7% (n=1) were in first year. In terms of electives, 66.6% (n=4) of the students (first year n=1, second year n=3) had just completed electives in general surgery, urology, and trauma surgery. Notably, the first-year student was in the midst of doing multiple horizontal electives with three of the staff surgeons who participated in the series. The respondents also had plans to pursue other surgical electives, including neurosurgery, urology, and acute care surgery in various academic centers across Canada.

Only two second-year students (33.3% of respondents) commented specifically on their new motivation to seek out mentorship and research projects. One student had organized an enrichment year to complete research in plastic surgery, while another had sought out advice from “numerous residents” regarding elective choices.

Five (83.3%) students commented on the utility of the knowledge gained from the series. Students found the information “tremendously helpful” while on a general surgery rotation in clerkship and remarked that this would have been very beneficial in their first year. Students who had not yet entered a surgical rotation anticipated that they would be using the posted slides as a resource to review material beforehand. Furthermore, one student had uploaded the PowerPoint slides on perioperative fluid management onto a personal electronic device, and has used it multiple times on a surgical rotation.

**DISCUSSION**

A pre-clerkship didactic lecture series dedicated solely to topics in general surgery has not been previously implemented at McMaster University. The goal in delivering such a lecture series was three-fold: to fill an identified gap in pre-clerkship education, to foster positive student-staff surgeon partnerships, and to garner interest in the specialty. Overall, students described it as a positive experience that inspired or affirmed their interest in general surgery.

A primary goal of the series was to supplement the pre-clerkship curriculum by providing the opportunity to learn about general surgery-specific topics. Students felt the lectures provided knowledge that would be useful for upcoming clinical rotations, which was consistent with the most commonly cited reasons for attending (general interest, 25/34, 73.5%; preparation for clerkship, 23/34, 67.6%). A unique aspect of this initiative was the recruitment of senior medical students to deliver the lectures. This approach not only fostered leadership amongst senior medical students, but also allowed knowledge to be delivered at a level geared specifically towards the learning needs of the attendees. The peer-to-peer format created a comfortable and safe learning environment that encouraged open discussion.

There was a notable difference between the learning objectives of first- and second-year students. While both groups suggested increasing the length of the series, first-year students requested more superficial exposure to a broader range of topics and specialties and sometimes felt as though they had insufficient baseline knowledge to keep up with the pace of the lectures. In contrast, second-year students wanted to delve deeper into surgical procedures and management of clinical problems in preparation for clerkship rotations and electives, and receive practical advice about the CaRMS application process. In the future, material should be tailored to

| Table 2. Mean Ratings of Lectures Based on 4-point Likert Scale (1=“poor”, 4=“excellent”) |
|-----------------------------------------------|-----------------------------------------------|-----------------------------------------------|-----------------------------------------------|-----------------------------------------------|-----------------------------------------------|-----------------------------------------------|-----------------------------------------------|
| Overall rating                                | Perioperative Care | GI Bleeds | Bowel Obstruction | Biliary Tract | Hernia | Breast Mass | MEAN |
| Lecturer                                     | 3.8               | 3.6       | 3.7               | 3.9           | 3.8    | 3.7          | 3.8  |
| Knowledge                                    | 3.8               | 3.7       | 3.6               | 3.8           | 3.9    | 3.3          | 3.7  |
| Preparation                                  | 3.8               | 3.7       | 3.6               | 3.8           | 3.9    | 3.5          | 3.7  |
| Ability to answer questions                   | 3.8               | 3.7       | 3.7               | 3.6           | 3.8    | 3.2          | 3.6  |
| Presentation style and format                | 3.7               | 3.6       | 3.4               | 3.8           | 3.7    | 3.5          | 3.6  |
| Slides                                       | 3.7               | 3.7       | 3.8               | 3.8           | 3.7    | 3.5          | 3.7  |
| Content                                      | 3.6               | 3.7       | 3.7               | 3.8           | 3.7    | 3.5          | 3.7  |
| Appropriate depth and difficulty             | 3.6               | 3.7       | 3.7               | 3.8           | 3.8    | 3.4          | 3.7  |
| Appropriate breadth                          | 3.6               | 3.7       | 3.7               | 3.8           | 3.8    | 3.4          | 3.7  |
| Provided useful approach to clinical problem | 3.7               | 3.7       | 3.8               | 3.8           | 3.8    | 3.4          | 3.7  |
| Surgeon overall                              | 3.8               | 3.3       | 3.9               | 3.8           | 3.9    | 3.9          | 3.8  |
| Insight                                      | 3.6               | 3.2       | 3.8               | 3.9           | 3.9    | 3.9          | 3.7  |
| Knowledgeable                                | 3.8               | 3.3       | 3.8               | 3.9           | 3.9    | 3.9          | 3.7  |
| Personable and approachable                  | 3.7               | 3.9       | 3.8               | 3.9           | 3.9    | 4            | 3.8  |
address these unique learning needs, for example, by offering separate lectures or making it more exclusive to a particular group. Lengthening the series would allow for coverage of a greater breadth of topics including those relevant to other surgical subspecialties.

Another goal of this series was to provide positive surgeon role-models and to foster mentorship opportunities between students and staff surgeons—a process that can be intimidating for junior students to initiate independently. This series provided a glimpse into the professional and personal lives of staff surgeons who were eager to share their passion for general surgery. One of the participants had set up horizontal electives with three of the six staff surgeons who were involved in this series, suggesting that this experience had facilitated some positive interactions that may otherwise not have occurred. In contrast, one surgeon’s perceived distant demeanor actually made surgery less appealing for one participant, which affirms the need to provide students with positive role models. By fostering such familiarity and collegiality, we hope to equip medical students with the resources and confidence to enter core surgery rotations in clerkship and to pursue electives, research, and ultimately residency in this field. Additionally, incorporating more general surgeons into the heart of the curriculum as clinical skills preceptors and facilitators of large group sessions or tutorials would ensure that students are exposed to surgical role models.

The pilot initiative has received a positive response from students who have self-declared interest in pursuing both surgical and non-surgical specialties. Multiple staff participants have noted an influx of elective requests this past fall/winter semester (Dath D, Bailey K, Marcaccio M, Personal communication, December 15-16, 2010), and ongoing feedback from participants has affirmed the utility of the material covered with respect to clinical rotations (Knapp G, Chesney T, Li J, Personal communication, December 20-21, 2010). A cohort of students has expressed interest in continuing and expanding on this project in the following year (Li J, Personal communication, December 21, 2010). The multi-factorial nature of generating interest in a specialty prohibits us from delineating cause and effect based on this lecture series. Yet this project has highlighted the importance of providing early exposure to surgical topics and surgeon role models, not only to fill a perceived knowledge gap, but also to generate enthusiasm and interest in a field that is otherwise afforded little attention in the pre-clerkship curriculum.

The collection of data during the final session of the series is a major limitation of this study. The data pool is biased in favour of students who may have attended more lectures due to greater initial interest in general surgery, which persisted for the whole series. Ideally, for a more accurate evaluation of student feedback, surveys should be administered following each individual session. This would have captured initial impressions, tracked feedback from respondents subsequently lost to follow-up, and perhaps provided further insight into the learning needs of undifferentiated students. Students not present at the final session were followed up with via email and were asked to fill out the survey, but the response rate was extremely low. Since many of the students not present in the final session attended relatively few lectures, it would have been valuable to gain insight into reasons for their absences—for example, lack of interest, conflicting commitments, or finding that the concepts were inappropriate for their level of training. Additionally, it would have been ideal to obtain more follow-up data at the two-month mark regarding students’ pursuits since the completion of the series. This information would allow us to more accurately gauge whether didactic teaching and surgeon interaction translated into knowledge application and seeking out of mentorship or elective opportunities.

While the positive feedback is encouraging, it suggests the need for an integrative assessment of the current surgical education opportunities offered at McMaster University, specifically as they relate to students’ interest in general surgery. Future research should incorporate other existing educational events, such as the pre-clerkship ‘Surgical Skills Half-Day’, with centralized leadership in order to provide a more holistic evaluation. In order to promote continuity and permanence in the undergraduate curriculum, efforts should be made to establish this lecture series as an official horizontal elective, recognized by the undergraduate curriculum committee. An integrative approach with support from the McMaster medical program will help facilitate informed career choices, debunk misconceptions about surgery and surgeons, and increase excitement for learning about surgery regardless of career aspiration. As the evidence suggests early exposure is the first step in generating interest in general surgery, perhaps these pre-clerkship experiences will be the igniting spark for a budding surgeon.

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REFERENCES

Author Biographies

Tiffany Chan completed her Bachelor of Science at the University of Western Ontario in 2008. She is currently a third-year student at the Michael G. DeGroote School of Medicine, McMaster University.

Nikoo Rajaee completed her Bachelor of Science at Carleton University in 2008. She is currently a third-year student at the Michael G. DeGroote School of Medicine, McMaster University.

Leighanne Parkes completed her Bachelor of Health Sciences at McMaster University in 2006 and subsequently pursued a Master of Arts in Religious Studies. She is currently a third-year student at the Michael G. DeGroote School of Medicine, McMaster University.

Elena Parvez completed her Bachelor of Science in Physiology at McGill University in 2007. She subsequently completed a Master of Science in Pharmaceutical Science at the University of Toronto. She is currently a third-year student at the Michael G. DeGroote School of Medicine, McMaster University.

Jen Hoogenes is currently pursuing her PhD in Health Research Methodology at McMaster University.

Katy Li completed her Bachelor of Health Sciences at McMaster University in 2008. She is currently a third-year student at the Michael G. DeGroote School of Medicine, McMaster University.

Simran Basi completed his Bachelor of Science at the University of Western Ontario in 2008. He is currently a third-year student at the Michael G. DeGroote School of Medicine, McMaster University.

Mariam Guirguis completed her Bachelor of Science in Integrative Biology at the University of Toronto in 2008. She is currently a third-year student at the Michael G. DeGroote School of Medicine, McMaster University.

Natasha Gill completed her Honours Bachelor of Medical Sciences with a specialization in Physiology at the University of Western Ontario in 2006. She is currently a third-year student at the Michael G. DeGroote School of Medicine at McMaster University.

Marcin Kowalczyk completed his Bachelor of Medical Sciences degree at the University of Western Ontario in 2008. He is currently a third-year student at the Michael G. DeGroote School of Medicine at McMaster University.