

# Internal Medicine Enrichment & Development (IMED): early exposure to medicine subspecialties and its influence on students' perceptions of a career in internal medicine

Shaima Kaka (BSc)<sup>1</sup>; Kaitlin Endres (BSc)<sup>1</sup>; Katina Zheng (BHSc)<sup>1</sup>; Sarah Elias (BScPhm)<sup>1</sup>; Mimi Deng (BHSc)<sup>1</sup>; Alexandra Kobza (MD)<sup>2</sup>; Aimee Li (MD)<sup>1,3</sup>

<sup>1</sup>Faculty of Medicine, University of Ottawa, 451 Smyth Road, Ottawa, Ontario, Canada, K1H 8L1

<sup>2</sup>Department of Medicine, McMaster University, 1280 Main Street West, Hamilton, Ontario, Canada, L8S 4K1

<sup>3</sup>Department of Medicine, The Ottawa Hospital, 501 Smyth Road, Ottawa, Ontario, Canada, K1H 8L6

### Abstract

**Introduction:** There are limited opportunities for pre-clerkship medical students to experience the breadth of internal medicine (IM) subspecialties. Previous studies suggest specialty choices are made as early as prior to clerkship. Due to limited exposure, factors influencing students' career decisions may be rooted in bias. Internal Medicine Enrichment & Development (IMED) is a 2-week program of clinical observerships, career talks, and workshops in 9 IM subspecialties. This study aimed to investigate whether IMED would influence students' interest, understanding, and perceptions toward IM.

**Methods:** 16 pre-clerkship students at the University of Ottawa participating in IMED were surveyed at baseline and at program completion on their interest and self-perceived understanding of IM, as well as on negative perceptions about a career in IM. Likert scale survey responses were compared using Wilcoxon signed-rank testing.

**Results:** Comparison of pre-program and post-program surveys revealed an overall significant improvement in student interest in IM and self-perceived understanding of IM physician lifestyle, differences between subspecialties, and between academic and community-based practice. After participating in IMED, 81% of students stated they were more likely to pursue a career in IM. Participants reported changes in perceptions of the work hours, paperwork, and procedural skill required in IM. Career talks were the component of IMED most attributed as being responsible for changes in perception. Despite the self-reported changes in perception, there were no significant differences in the number of negative perceptions about IM held by participants at baseline and program completion.

**Conclusion:** This study demonstrates how a structured, early-exposure program can influence pre-clerkship students' perceptions of a career in IM. Participation in IMED increased students' self-perceived understanding of the career along with interest in IM. Implementing programs such as IMED across Canada can provide increased clinical exposure to IM subspecialties for pre-clerkship students and help inform early career decision making.

### Introduction

Medical students in Canada often have difficulty selecting a residency program as the application deadline predates exposure to all specialties. At many medical schools, including the University of Ottawa, exposure to internal medicine (IM) is limited to the clinical teaching unit (CTU) during the 6-week core rotation in third year. Students therefore do not gain structured clinical exposure to the variety of subspecialties IM has to offer. Surgical programs across the

country also experience a lack of exposure in the medical school curriculum and as a result, many medical schools across Canada have adopted the Surgical Exploration & Discovery (SEAD) summer program first established by the University of Toronto to provide pre-clerkship medical students with early exposure to a variety of surgical subspecialties.<sup>1</sup> However, there is a current and regrettable absence of an equivalent IM summer program. Evidence from studies assessing medical students' decision-making regarding specialties of interest suggest that specialty choices are often made as early as prior to the start of clerkship, and that the majority of students are able to predict their ultimate residency by the end of their second year of medical school.<sup>2,3</sup> These studies highlight the importance of early clinical exposure for students to make an informed decision regarding their specialty of choice.

Corresponding Author:  
Shaima Kaka  
skaka055@uottawa.ca

Internal Medicine Enrichment & Development (IMED) is an initiative established at the University of Ottawa that offers an early introduction to IM and its subspecialties for pre-clerkship medical students. IMED is a 2-week summer immersion program involving morning clinical observerships, lunchtime career talks delivered by staff, and afternoon hands-on workshops led by staff and residents. As such, IMED provides a comprehensive overview of IM subspecialties, allowing pre-clerkship medical students to gain an appreciation for the breadth of the discipline, explore their interests within the specialty, and network with IM staff and residents.

As a result of limited exposure to IM subspecialties in the undergraduate medical curriculum, many factors negatively influencing students' decisions to pursue a specialty may be rooted in bias.<sup>4-7</sup> Therefore, the aim of this study was to investigate whether early exposure to IM and its subspecialties through the IMED program would affect students' interest in and understanding of the specialty. This study also aimed to identify whether students' perceptions of IM – particularly negative perceptions about the career – would be altered through the first-hand, early exposure offered by the IMED program.

## Methods

### Internal Medicine Enrichment & Development (IMED) Program

IMED is a 2-week summer program developed by 2 medical students at the University of Ottawa with a keen interest in IM. It is currently organized annually by the Internal Medicine Interest Group, a medical student-run initiative at the University of Ottawa. The IMED program consists of 3 main components: (1) morning observerships, (2) lunchtime career talks, and (3) afternoon hands-on workshops. For each day of the program, participants spend the morning in a clinical setting observing a different IM subspecialty at 1 of 3 sites of The Ottawa Hospital with 1-on-1 assignment to a staff physician. All participants convene at lunchtime for a career talk delivered by a staff physician from a different subspecialty each day. The career talk involves discussions around scope of practice, decision to pursue the specialty, lifestyle and work-life balance, along with addressing any questions students may have about the specialty. Students then participate in hands-on workshops pertinent to the specialty involving case-based learning, interactive discussions, and procedural skills/simulation-based training such as central line insertion, code blue/ACLS simulation, bedside echocardiography, and ultrasound workshops.

In 2019, IMED provided 16 pre-clerkship medical students at the University of Ottawa with the opportunity to gain exposure to 9 IM subspecialties – general internal medicine, endocrinology, rheumatology, hematology, medical oncology, nephrology, cardiology, infectious diseases, and critical care medicine.

### Participants & Study Design

Pre-clerkship medical students at the University of Ottawa were invited to apply to the IMED program for the summer of 2019. The program was advertised by email via class presidents' listserv announcement received by all pre-clerkship medical students, by email to members of the Internal Medicine Interest Group, and by live announcement at Internal Medicine Interest Group events.

A total of 70 applications were received, from which 16 program participants were selected via a randomized lottery of applicants. Student interest in IM was not a prerequisite for application and had no bearing on the selection process.

IMED program participants were asked to complete a survey prior to the start of the program and at program completion. This prospective cohort study aimed to investigate whether structured, early exposure to IM and its subspecialties through the IMED program would affect pre-clerkship medical students' interest in and understanding of the specialty. This study also aimed to identify whether students' perceptions of IM – particularly negative perceptions about the career – would be altered through such exposure, as well as evaluate what specific components of the 2-week program were most responsible for changing students' perceptions.

### Survey Design

A survey addressing students' understanding of the career of an IM physician, interest in the specialty, and specific negative perceptions about a career in IM was developed (Appendix). The survey was reviewed by an IM faculty physician prior to administration.

Three questions in the survey were designed to assess students' exposure and interest in IM. Students were asked if they had previous opportunities to connect with IM staff and residents, if they knew how to how conduct research in IM, and if they would rank IM as their first-choice residency. An additional 3 questions were designed to assess students' self-perceived understanding of the specialty. Students were asked if they felt they understood what the career of an IM physician looks like, which specialties were more procedural-based, and the differences between community and academic practice. Students were also asked in the post-program survey if they were more likely to pursue a career in IM following the completion of IMED.

To assess students' negative perceptions towards a career in IM, students were asked for their level of agreement towards 5 negatively biased statements about the work hours, the work-life balance, the work brought home, the time spent on paperwork, and the limited job opportunities in IM. The negative perceptions assessed in the survey were obtained by consulting the existing literature.<sup>6,8,9</sup> The post-program survey additionally asked students to report any self-perceived changes in their perceptions towards IM upon completion of the IMED program in 6 different areas: the works hours of an IM staff, the amount of work brought home, the amount of paperwork compared to patient contact, the requirement of working in an academic hospital, the job prospects of the specialty, and the level of procedural skill required in the specialty. Students were subsequently asked to identify which component of IMED they felt was most responsible for the change in their perception, if applicable, in each of the 6 areas.

Responses were rated on a 5-point Likert scale with 1 being "Strongly Disagree" and 5 being "Strongly Agree". Surveys were administered online and responses were collected anonymously for analysis.

### Data Analysis

Differences between pre-program and post-program survey data from students who participated in IMED were analyzed

# Primary Research

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using the one-tailed Wilcoxon signed-rank test, a non-parametric test comparing paired data. An alpha of 0.05 was considered statistically significant.

## Ethics Approval

Ethics exemption for this study was obtained from the Ottawa Health Science Network Research Ethics Board. This quality improvement study is registered with the IQ@TOH Project Registry.

## Results

A total of 16 pre-clerkship medical students at the University of Ottawa participated in the IMED program in 2019 and completed both pre-program and post-program surveys (Table 1).

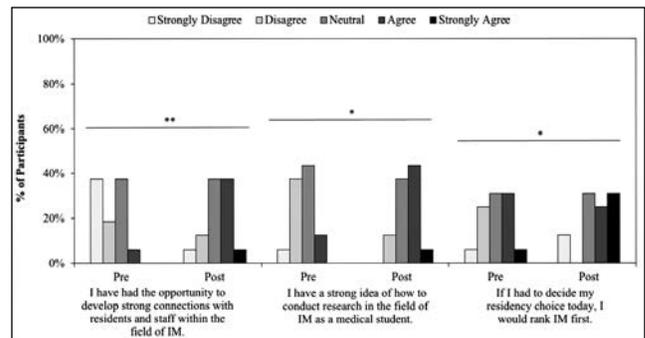
**Table 1. Demographics of IMED 2019 program participants at the University of Ottawa**

	Program Participants n (%)
Total no. of participants	
Sex	16 (100)
Male	8 (50)
Female	8 (50)
Pre-clerkship year	
MS1	15 (94)
MS2	1 (6)
Language stream	
English	9 (56)
French	7 (44)
Internal medicine as preferred residency	
Disagree/strongly disagree	5 (31)
Neutral	5 (31)
Agree/strongly agree	6 (38)

## Exposure and Interest in Internal Medicine

At baseline, prior to the start of the IMED program, 57% of participants reported not having had opportunities to develop connections with IM residents and staff (indicating either “Disagree” or “Strongly Disagree” with the statement) while a minority of 6% of participants responded with “Agree” or “Strongly Agree” (Figure 1). At program completion, the number of students who reported having had opportunities to connect with IM residents and staff increased to 44%. The percentage of participants who reported having a strong idea of how to conduct research in IM also increased from 13% at baseline to 60% at program completion.

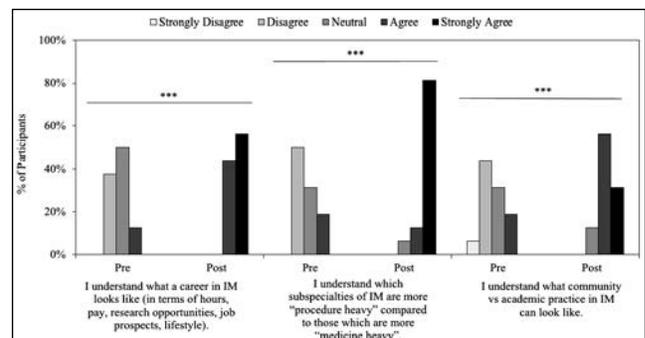
With respect to baseline interest in IM, 38% of participants were considering IM as their residency program of choice (indicating either “Agree” or “Strongly Agree” in agreement to this statement) while 31% reported the opposite (indicating either “Disagree” or “Strongly Disagree”). At program completion, the number of students considering IM as their residency of choice increased to 56% while the number of students in disagreement decreased to 13%. When asked specifically if participation in IMED influenced their interest in IM, 81% of participants responded that they were more likely to pursue a career in IM following the completion of IMED.



**Figure 1.** IMED program participants' agreement with statements assessing their exposure and interest to internal medicine (IM) at baseline (“Pre”) and upon completion of the two-week program (“Post”). “\*\*” and “\*” indicate a Wilcoxon signed-rank test significance  $p \leq 0.01$  and  $p \leq 0.05$  respectively.

## Understanding of Internal Medicine

Wilcoxon signed-rank testing revealed that students' level of agreement with statements surrounding their understanding of IM was greater after participation in IMED compared to baseline (Figure 2). More students responded “Agree” or “Strongly Agree” to understanding what the career of an IM physician looks like ( $p \leq 0.001$ ), understanding which subspecialties of IM are more “procedure-heavy” compared to those that are more “medicine-heavy” ( $p \leq 0.001$ ), and understanding the differences between academic vs. community IM ( $p \leq 0.001$ ) upon completion of the program.



**Figure 2.** IMED program participants' agreement with statements assessing their understanding of internal medicine (IM) at baseline (“Pre”) and upon completion of the two-week program (“Post”). “\*\*\*” indicates a Wilcoxon signed-rank test significance  $p \leq 0.001$  between results.

## Negative Perceptions About Internal Medicine

Participants in the IMED program self-reported changes in their perceptions of IM upon completion of the IMED program (Figure 3). At the end of the 2-week program, 56% of participants reported perceiving the work hours of an IM staff to be more than they had previously believed and 44% reported perceiving IM staff spending more time on paperwork compared to patient contact than previously believed. In addition, 44% of participants acknowledged that IM required more procedural skill than previously believed.

IMED participants attributed lunchtime talks as most responsible for all changes in their perceptions of IM, with the exception of perception changes regarding the amount of

paperwork staff complete, for which 100% of students attributed morning observerships as most responsible. Of the students who reported a change in their perceived level of procedural skill required in IM, 30% stated the afternoon workshops were most responsible for this change.

However, despite these self-reported changes in perceptions, there were no significant differences in the number of negative perceptions about IM held by students at baseline and at program completion (Table 2). The most prevalent negative perception held by 88% of participants at the start of the program was that IM physicians spend more time on paperwork than communicating with patients, and this remained the most prevalent perception held by 75% of participants in the post-program survey.

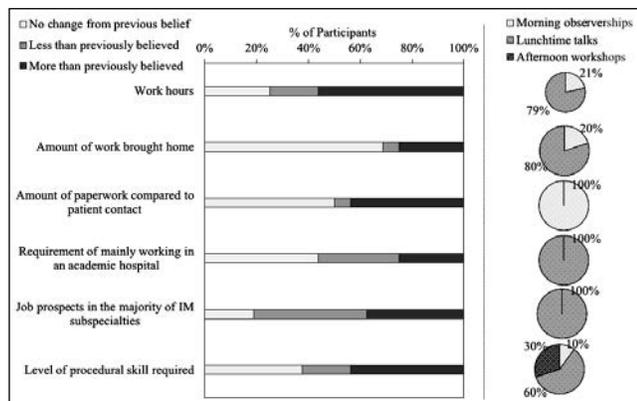


Figure 3. IMED program participants' self-reported changes in their perception of internal medicine (IM) upon completion of the program. Students were asked "Did your perception about the \_\_\_\_\_ for an internal medicine staff change?" Pie charts indicate specific component of IMED which students attributed to being the most responsible for the change in their perception.

Table 2. IMED program participants' perceptions about internal medicine at the start of the IMED program and upon completion of the program. "\*" indicates a negative perception about internal medicine

	Pre-Program n (%)	Post-Program n (%)
<b>Longer work hours vs. other specialties</b>		
Disagree/strongly disagree	1 (6)	1 (6)
Neutral	8 (50)	5 (31)
Agree/strongly agree*	7 (44)	10 (63)
<b>Work-life balance</b>		
Somewhat unbalanced/unbalanced*	5 (31)	2 (13)
Neutral	1 (6)	10 (63)
Somewhat balanced/balanced	10 (63)	4 (25)
<b>Work brought home each night vs. other specialties</b>		
Less work/significantly less work	0 (0)	0 (0)
Average	9 (56)	8 (50)
More work/significantly more work*	7 (44)	8 (50)
<b>Time spent on paperwork vs. communicating with patients</b>		
Somewhat less/less	1 (6)	1 (6)
Equal	1 (6)	3 (19)
Somewhat more/more*	14 (88)	12 (75)
<b>Limited jobs in internal medicine</b>		
Disagree/strongly disagree	5 (31)	8 (50)
Neutral	6 (38)	3 (19)
Agree/strongly agree*	5 (31)	5 (31)

## Discussion

Overall, student interest in IM increased after participation in IMED. Program participants were not selected based on degree of interest in IM, and indeed many participants reported neutral or unfavourable responses to choosing IM as their first-choice residency at baseline. Nevertheless, the majority of participants reported an equivalent or increased level of agreement by the end of the program. Two students who responded with a "Strongly Disagree" at program completion had initially responded with "Disagree" at baseline, suggesting that IMED may have also been helpful for students looking to rule out their interest in IM.

It is well known that medical students' career choices are heavily influenced by their interactions with physicians, particularly with preceptors who are positive role models and enthusiastic about their careers.<sup>10</sup> Participation in the IMED program provided students with the opportunity to build connections with IM residents and staff, an opportunity which can be difficult to attain in the pre-clinical years of medical school. IMED was also successful in improving students' self-perceived understanding of the lifestyle and career of IM physicians. Moreover, it was interesting to note that despite the fact that all morning observerships were arranged in academic hospital settings, students still reported a significant improvement in their agreement with understanding the differences between community and academic practice. This could perhaps be explained by the program providing students with a greater understanding of the demands of an academic career relative to any prior exposure to community-based practice students may have had. As students were surveyed for their level of agreement with statements describing their understanding of IM as a specialty, this study is limited in its ability to evaluate students' knowledge. Future studies making use of pre-program and post-program testing may be useful to assess the utility of IMED in improving students' medical content knowledge and/or knowledge of IM as a specialty.

Studies have demonstrated that when making career decisions, medical students are influenced by the expected work hours, lifestyle, and work-life balance of a specialty.<sup>5,10</sup> Many participants of IMED reported the work hours and amount of paperwork completed by IM physicians to be more than they had initially believed prior to the program. Lunchtime talks were the component of IMED most often responsible for changes in students' perceptions with the exception of student perception of the amount of paperwork completed by IM staff, for which morning observerships were attributed as being responsible for the change. The influence of IMED workshops came into play in changing students' perceptions of the level of procedural skill required of an IM staff.

When students were asked to rate their level of agreement with negatively biased statements about IM, no significant differences between baseline and post-program responses were revealed. The most prevalent negative perception amongst participants was that IM physicians spend more time on paperwork than communicating with patients, and this remained the most prevalent perception at program completion. While not included in this study, it would be interesting to therefore explore whether participants in this program viewed these perceptions as a deterrent to the specialty, which would offer a possible explanation for the discrepancy between the increase in interest in IM despite the unchanged prevalence of negative perceptions. Further studies on IMED

participants in future iterations of the program could employ qualitative grounded-theory methodology to capture the impact of students' perceptions on individualized career decision making. The negative perceptions about IM that were examined in this study have been studied in previous surveys of medical students, where workload, paperwork demands, and lifestyle were common deterrents from IM.<sup>6,8</sup> In one study of graduating medical students, IM and its subspecialties was listed as one of the top specialties in which students changed their career plans due to "badmouthing" (negative comments students hear about potential career choices). What is more interesting is that students were a common source of badmouthing, and that the majority of badmouthing took place in the first 2 pre-clinical years of medical school.<sup>7</sup> Moreover, multiple studies assessing medical students' decision-making regarding specialties of interest suggest that specialty choices are often made as early as prior to the start of clerkship, and that the majority of students are able to predict their ultimate residency by the end of their second year of medical school.<sup>2,3</sup> These studies highlight the importance of early clinical exposure for students to make an informed decision in deciding on their specialties of choice. As the IMED program takes place in the summer after students' first or second year of medical school, it is ideally situated to provide students with first-hand exposure to explore their own biases and perceptions of a career in IM.

This study is not the first to demonstrate that early exposure for pre-clerkship students can influence career interest and understanding of specialties.<sup>2,3,11,12</sup> Rather this study contributes to the existing body of knowledge surrounding the value of pre-clerkship exposure to IM through structured programs.<sup>13-15</sup> The IMED program is also not unique as a student-run initiative, with programs such as the SEAD program developed at the University of Toronto<sup>1</sup> and the Pre-Clerkship Residency Exploration Program (PREP) at Dalhousie University<sup>16</sup> accomplishing similar results. The unique advantage of IMED over informal observerships available to all University of Ottawa pre-clerkship students is its structured 2-week curriculum. While students may pursue observerships for a number of reasons, students may be drawn to arrange observerships with specific specialties that pique their interest. Rotating through each of the 9 subspecialties of IM is mandatory in the IMED program, which provides students with exposure to subspecialties they might not have otherwise explored. While the number of IM subspecialties included in the IMED program was constrained due to financial and scheduling barriers, the IMED program could be expanded in future iterations to encompass more subspecialties – including those which pre-clerkship medical students are not often exposed to such as medical biochemistry, pain medicine, and clinical pharmacology. This expansion is facilitated by the growing interest from divisions within The Ottawa Hospital Department of Medicine to get involved in showcasing their specialty. Subspecialty-specific exposure and interest was not captured in this study and may have contributed to the increase in student interest in IM as a whole despite the persistence of negative perceptions about the specialty. This is an area for potential further research into whether medical students who participate in IMED have changed perceptions of specific subspecialties within IM, particularly for those subspecialties which are not as accessible or visible within the undergraduate medical curriculum.

Limitations of this study included the potential variability of experiences between students who participate in the program. As morning observerships were designed to be 1-on-1 with a preceptor, participants completed their clinical observerships at different hospital campuses with different preceptors. While the 2-week IMED program exposed students to a wide number of IM physicians overall, the number of physician interactions within each subspecialty of IM remained limited. It is known that individual physician personality traits influence student experiences in clinical settings.<sup>17</sup> This is further emphasized by the fact that less than half of all participants reported having had an opportunity to connect with an IM resident or staff upon completion of the program. In addition, despite the fact that an interest in IM was not a prerequisite for participating in the IMED program, this study may have been affected by sample bias, as students who applied to participate in the program likely had a greater baseline interest in IM than the general medical student population. The lack of long-term follow up of participants in the IMED program also prevents any conclusions from being made about whether involvement in the program ultimately influences residency selection and career decisions. These limitations highlight future directions of research surrounding the IMED program which may be studied in subsequent iterations of the program. Further studies employing a longitudinal approach may aid in the exploration of the impact of IMED on career decision making and the choices students make during the CaRMS process. Moreover, although this present study did not explore the role of preceptor attitudes, or gender representation within subspecialties, the systematic exposure to a variety of physicians and subspecialties within IM offered by the IMED program provides valuable opportunities for future research in these areas.

### Conclusion

This study demonstrates how a structured, early-exposure IM summer program can influence pre-clerkship medical students' perceptions of a career in IM. Overall, participation in IMED increased students' self-perceived understanding of IM as well as interest in the career. Students also self-reported changes in previously held beliefs about a career in IM upon completion of the program. However, despite these self-reported changes in perceptions, there were no significant differences in the number of negative perceptions about IM held by students at baseline and at program completion. Implementing programs such as IMED across Canada can increase clinical exposure to IM subspecialties for pre-clerkship medical students and help inform early career decision making.

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4. I understand what a career in IM looks like (in terms of hours, pay, research opportunities, job prospects, lifestyle).
5. I understand which subspecialties of IM are more "procedure heavy" compared to those which are more "medicine heavy".
6. I understand what community vs. academic practice in IM can look like.
7. To what extent do you feel that the hours of an internal medicine staff are longer than other physicians?
8. How do you think internists across all sub-specialties would describe their work-life balance?
9. To what extent do you think internists bring home work in terms of patient duties/administrative work with them each night compared to the average physician?
10. To what extent do you think internists spend time writing paperwork for patients compared to communicating with patients face-to-face?
11. To what extent do you think there are limited jobs in internal medicine?
12. Did your perception about the work hours for an internal medicine staff change?
  - a. If your perception changed, were the work hours shorter or longer than you had previously believed?
  - b. Which activity was most responsible for changing your perception?
13. Did your perception about the amount of work brought home as an internal medicine staff change?
  - a. If your perception changed, was the amount of work brought home less or more than you had previously believed?
  - b. Which activity was most responsible for changing your perception?
14. Did your perception about the amount of paperwork compared to patient contact for an internal medicine staff change?
  - a. If your perception changed, was the amount of paperwork compared to patient contact less or more than you had previously believed?
  - b. Which activity was most responsible for changing your perception?
15. Did your perception about the requirements for mainly working in an academic hospital for an internal medicine staff change?
  - a. If your perception changed, do you now think it's less or more of a requirement to mainly work in an academic hospital as an internist compared to what you previously believed?
  - b. Which activity was most responsible for changing your perception?
16. Did your perception about the job prospects in the majority of internal subspecialties for an internal medicine staff change?
  - a. If your perception changed, do you now think the job prospects in the majority of internal subspecialties are more or less favourable compared to what you previously believed?
  - b. Which activity was most responsible for changing your perception?
17. Did your perception about the level of procedural skill required for an internal medicine staff change?
  - a. If your perception changed, do you now think the level of procedural skill required to be an internist is more or less compared to what you previously believed?
  - b. Which activity was most responsible for changing your perception?
18. Following IMED, are you more or less likely to pursue internal medicine as a career?

## APPENDIX

### Pre-Program Survey Questions

1. I have had the opportunity to develop strong connections with residents and staff within the field of IM.
2. I have a strong idea of how to conduct research in the field of IM as a medical student.
3. If I had to decide my residency choice today, I would rank internal medicine first.
4. I understand what a career in IM looks like (in terms of hours, pay, research opportunities, job prospects, lifestyle).
5. I understand which subspecialties of IM are more "procedure heavy" compared to those which are more "medicine heavy".
6. I understand what community vs. academic practice in IM can look like.
7. To what extent do you feel that the hours of an internal medicine staff are longer than other physicians?
8. How do you think internists across all sub-specialties would describe their work-life balance?
9. To what extent do you think internists bring home work in terms of patient duties/administrative work with them each night compared to the average physician?
10. To what extent do you think internists spend time writing paperwork for patients compared to communicating with patients face-to-face?
11. To what extent do you think there are limited jobs in internal medicine?

### Post-Program Survey Questions

1. I have had the opportunity to develop strong connections with residents and staff within the field of IM.
2. I have a strong idea of how to conduct research in the field of IM as a medical student.
3. If I had to decide my residency choice today, I would rank internal medicine first.