

# Exploring the Challenges for International Medical Graduates Pursuing Minimally Invasive Surgery Training in the United States and Canada: A Cross-Sectional Analysis

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## ABSTRACT

**Background:** International Medical Graduates (IMGs) are an important component of the US healthcare workforce. Prior studies have investigated bias against IMGs during the general surgery residency application in the United States. Minimally invasive surgery (MIS) is a growing field; The MIS fellowship match was established in 2004 and is a competitive process with a match rate of 47%. Opportunities for applicants who are non-US citizens are limited by a series of factors that are not related to their professional qualifications.

**Objectives:** The aim of the study was to explore the challenges faced by IMG in the MIS fellowship match.

**Methods:** This is a cross-sectional study analyzing the minimally invasive surgery application requirements of all the programs listed in the Fellowship Council. Individual program requirements were collected into a database and a descriptive analysis was performed comparing programs who accept IMGs versus those that do not. Further statistical analysis was performed to explore those differences and associated factors.

**Results:** There were 148 MIS fellowship programs and 187 positions offered during the 2021 match year in the US. Ninety-seven programs (65.5%) were found to accept

graduates of foreign medical schools if they were US-citizens, whereas only 49 programs (33.1%) were found to accept IMG and sponsor a visa for their training. University affiliated programs (88.9% vs 75.0%,  $p=0.04$ ), programs with a general surgery residency (94.4% vs 75.0%,  $p=0.003$ ), and older programs (63.0% vs 45.5%,  $p=0.04$ ) were more likely to accept IMGs requiring visa sponsorship.

**Conclusions:** There is a significant bias against IMGs in the MIS fellowship match, with a reduced number of positions available based on factors not related to their professional performance or qualifications. Well established programs, university, and residency affiliated programs are more likely to consider these physicians for training.

**Key Words:** Minimally invasive surgery, International medical graduates, Fellowship match.

## INTRODUCTION

International medical graduates (IMGs) are physicians who received their medical degree from a school located outside the US.<sup>1</sup> Similar to US medical graduates (USMG), IMGs are required to pass the US medical licensing examinations (USMLE) to be eligible to apply for residency and fellowship training. After completing the USMLE examinations, the Educational Commission for Foreign Medical Graduates (ECFMG), undergoes a thorough review of their credentials and certifies their qualifications for pursuing graduate medical education (GME) in the US.<sup>2</sup> Some of these physicians are not US citizens (non-US IMG) and additionally require visa sponsorship for their training. Conversely, non-US citizens that underwent medical education in the United States (noncitizen USMG) also seem to face restrictions when applying for further GME. Having to overcome several extra challenges to be accepted into the US residency system, IMGs are a crucial component of the US healthcare workforce as they compose 25% of the national physician pool and disproportionately care for underserved populations.<sup>3-6</sup>

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Prior studies have addressed bias against IMG during the residency application process in the US.<sup>7,8</sup> Some of the preconceptions that have been refuted in the past include the alleged substandard education, poor communication skills, and administrative difficulties these physicians entail.<sup>9,10</sup> However, it has also been postulated that this bias comes from protectionism towards USMG, concerns for compromising the reputation of the program, and even xenophobia.<sup>7,11</sup> Similarly, studies in the general surgery residency match have shown that program directors purposefully avoid matching IMG, and that medical school/applicant nationality is one of the first factors considered when reviewing an application.<sup>8</sup>

Minimally invasive surgery (MIS) represents one of the most significant advances in medicine since laparoscopic surgery was introduced in the 1980s.<sup>12</sup> It has become the standard of care for a wide variety of procedures as it has been proven to be safe, effective, and well-tolerated by patients.<sup>13</sup> As any area in medicine, it requires dedicated training and mentoring. It officially became a general surgery subspecialty fellowship with its independent match on 2004.<sup>14,15</sup> The MIS fellowship has become increasingly competitive with a matching rate varying from 8% to 18% for international applicants in the last four years.<sup>16</sup> We sought to determine if there is bias against IMGs and non-citizen USMG in the MIS fellowship selection process and to further explore these differences with information obtained from the Fellowship Council website.

## METHODS

### Study Design

This is a cross-sectional study analyzing the MIS match's individual program application requirements of all the programs listed in the Fellowship Council website. The Fellowship Council website was queried, and a database was created with the bariatric, flexible endoscopy, foregut, hepatopancreatobiliary (HPB), and advanced gastrointestinal minimally invasive programs.<sup>17</sup> Individual programs were assessed, and all available data was collected. Emphasis was placed on characteristics that may influence the acceptance of US-IMGs, non-US IMGs, and noncitizen USMG.

### Data Collection

General information included location of the program as either in Canada or USA, affiliation to a university, presence of a general surgery residency at the primary institution, and start year of the program. Eligibility information

included citizenship, visa requirements, and medical school requirements. Fellowship characteristics included the number of positions offered, the type of fellowship, and salary requirements.

### Definitions

"IMG accepting programs" were defined as the ones that stated: "We accept graduates of Foreign Medical Schools if ECFMG Certified" or "We accept graduates of U.S. or Canadian Medical Schools and Foreign Medical Schools". Programs which stated, "We ONLY accept graduates of U.S. or Canadian Medical Schools" were defined as "Not IMG accepting". Programs that accepted IMGs and sponsored a Visa for training were defined as "IMG Friendly". Programs were also defined as either "Visa Sponsoring" or "Not Visa Sponsoring" regardless of IMG acceptance.

	n (%)
Canadian Program	15 (10.1%)
University Affiliated	118 (79.7%)
General Surgery Residency	121 (81.8%)
Established years*	15.6 ± 7.9
Established > 15 years	76 (51.4%)
Established < 15 years	72 (48.6%)
Advanced GI	71 (48%)
Bariatric	71 (48%)
HPB	15 (10.1%)
Foregut	14 (9.5%)
Flexible Endoscopy	4 (2.7%)
Funding dependent on fellow's billing	
Yes	4 (2.7%)
No	120 (81.1%)
Not specified	24 (16.2%)
Acceptance of IMG	97 (65.5%)
Canadian Citizen	76 (51.4%)
Visa	54 (36.5%)
H1	37 (25.0%)
J1	26 (17.6%)
O1	18 (12.2%)

GI, gastrointestinal; HPB, hepatopancreatobiliary; IMG, international medical graduate.  
\*Mean ± Standard Deviation.

**Methodology**

We performed descriptive statistics on our data and performed a comparison in program eligibility and fellowship characteristics between IMG accepting and Not IMG accepting programs. We then compared program characteristics between visa sponsoring and not visa sponsoring programs. Lastly, we conducted a comparison between IMG friendly vs not IMG friendly programs.

**Statistical Analysis**

Statistical analysis was performed using SPSS Statistics 22.0 (IBM Corp., Armonk, NY, USA). Data was presented as frequencies and percentages for categorical variables and means ± standard deviation for continuous variables.  $\chi^2$ , Fischer’s exact test and student’s T-test were used accordingly for the comparison. Statistical significance was considered at  $P < .05$ .

**RESULTS**

There were 148 MIS fellowship programs for a total of 187 positions offered during the 2021 match year in the US. Fifteen programs (10.1%) were located in Canada and 133 (89.9%) were located in the US. The oldest program was

established in 1983 and the newest in 2021. On average programs had been established for  $15.6 \pm 7.9$  years. Based on the year of establishment, programs were sub classified as senior programs ( $> 15$  years) and junior programs ( $< 15$  years) (**Table 1**).

Most the programs were affiliated with a university (79.7%) and had a general surgery residency at their primary institution (81.8%). The preponderance of the programs were advertised as advanced gastrointestinal (48%) and bariatric (48%) with the minority of the programs being classified as HPB (10.1%), foregut (9.4%), and flexible endoscopy (2.7%).

Sixty-one of 133 U.S. programs (45.9%) were found to accept Canadian citizens. Ninety-seven programs (65.5%) were found to be “IMG accepting”, and 49 programs (33.1%) were found to be “IMG friendly”. Noncitizen USMG were eligible to apply to 54 (36.5%) of the programs only due to “Visa sponsoring” status. The percentage of programs accepting H1, J1, and O1 visas are 25%, 17.6%, and 12.2%, respectively.

Regarding funding, the predominance of the programs (81.1%) state that the fellow salary was not linked to billing from acute care calls. One hundred eight (57.7%) of the positions were advertised as independently funded by a grant from the Foundation for Surgical Fellowships.

**Table 2.**  
Program Characteristics by Group

Program Characteristics	IMG Accepting n = 97 n (%)	No IMG Accepting n = 51 n (%)	<i>p</i>
Canadian Program	10 (10.3%)	5 (10.0%)	0.95
University Affiliated	79 (81.4%)	38 (76.0%)	0.44
General Surgery Residency	79 (81.4%)	42 (84.0%)	0.70
Established years*	15.3 ± 7.7	16.5 ± 8.2	0.38
Established > 15 years	49 (50.5%)	27 (54.0%)	0.69
Positions per year*	1.2 ± 0.5	1.4 ± 0.6	0.11
Advanced GI	44 (45.4%)	27 (54.0%)	0.32
Bariatric	42 (43.3%)	28 (56.0%)	0.14
Foregut	9 (9.3%)	5 (10.0%)	0.55
Flexible Endoscopy	3 (3.1%)	1 (2.0%)	0.58
HPB	15 (15.5%)	0 (0%)	0.003
Funding dependent on fellow’s billing	17 (17.5%)	10 (20.0%)	0.71
Canadian Citizen	56 (58.3%)	20 (40.8%)	0.05
Visa Sponsorship	49 (52.7%)	5 (10.2%)	< 0.001

GI, gastrointestinal; HPB, hepatopancreatobiliary; IMG, international medical graduate.

\*Mean ± Standard Deviation.

When comparing IMG-accepting vs not-IMG accepting programs (**Table 2**), there was no statistically significant difference in the rate of Canadian programs (10.3% vs 10.0%,  $P = .95$ ), university affiliated programs (81.4% vs 76.0%,  $P = .44$ ), programs with a general surgery residency (81.4% vs 84.0%,  $P = .70$ ), or salary being dependent on the fellows billing (17.5% vs 20.0%,  $P = .71$ ). There was a higher percentage of HPB programs in IMG-accepting group (15.5% vs 0%,  $P = .003$ ). As expected, IMG-accepting programs were more likely to sponsor visas (52.7% vs 10.2%,  $P < .001$ ) and accept Canadian citizens (58.3% vs 40.8%,  $P = .05$ ).

When comparing programs that sponsor visa versus those that do not (**Table 3**), there was a statistically significant difference in the following program characteristics: 1) being university affiliated (88.9% vs 75.0%,  $P = .04$ ), 2) having a general surgery residency program at the primary institution (94.4% vs 75.0%,  $P = .003$ ), and 3) and being a senior program (63.0% vs 45.5%,  $P = .04$ ). There was also a significant difference in the percentage of bariatric programs by visa sponsoring group (37.0% vs 54.5%,  $P = .04$ ). As expected, programs that sponsor visas would consider IMGs (90.7% vs 50.0%,  $P < .001$ ) and accept Canadian citizens more often (94.4% vs 25.0%,  $P < .001$ ) than those that do not.

Finally, programs that were considered IMG friendly were compared to those that were not (**Table 4**). IMG friendly programs were more likely to have a general surgery residency as well (93.9% vs 75.8%,  $P = .007$ ) and be senior programs (65.3% vs 44.4%,  $P = .02$ ). There was no statistically significant difference in terms of the program being Canadian (12.2% vs 9.1%,  $P = .55$ ), or university affiliated (87.8% vs 75.8%,  $P = .09$ ).

## DISCUSSION

IMGs are an important component of the US healthcare workforce at large and within the field of gastrointestinal surgery.<sup>18</sup> Prior studies have shown bias against this group of physicians while applying for GME programs.<sup>7,8</sup> To this date, there is very limited data exploring the challenges that this under represented group faces when pursuing subspecialized training in the US, and the factors that explain the restrictions in their opportunities.<sup>6,18,19</sup> In our study, we queried the Fellowship Council website to assess if IMGs had the same training opportunities in the MIS field as USMG and found that overall only 65.5% of the positions were open to these physicians, of which only 33.1% were willing to consider an applicant requiring visa sponsorship.

**Table 3.**  
Programs by Acceptance of Visas

	Sponsor Visa n = 54 n (%)	No Sponsor Visa n = 94 n (%)	<i>p</i>
Canadian Program	7 (13.0%)	7 (8.0%)	0.33
University Affiliated	48 (88.9%)	66 (75.0%)	0.04
General Surgery Residency	51 (94.4%)	66 (75.0%)	0.003
Established years*	17.7 ± 7.3	14.6 ± 7.8	0.02
Established > 15 years	34 (63.0%)	40 (45.5%)	0.04
Positions per year*	1.2 ± 0.5	1.3 ± 0.5	0.73
Advanced GI	29 (53.7%)	42 (47.7%)	0.49
Bariatric	20 (37.0%)	48 (54.5%)	0.04
Foregut	5 (10.6%)	9 (11.1%)	0.85
Flexible Endoscopy	2 (3.7%)	2 (2.3%)	0.63
HPB	8 (14.8%)	4 (4.5%)	0.06
Funding dependent on fellow's billing	10 (18.5%)	16 (18.2%)	0.97
Canadian Citizen	51 (94.4%)	22 (25.0%)	< 0.001
Acceptance of IMG	49 (90.7%)	44 (50%)	< 0.001

GI, gastrointestinal; HPB, hepatopancreatobiliary; IMG, international medical graduate.

\*Mean ± Standard Deviation.

**Table 4.**  
Programs that are International Medical Graduate Friendly or Not Friendly

	IMG Friendly n = 49 n (%)	No IMG Friendly n = 99 n (%)	<i>p</i>
Canadian Program	6 (12.2%)	9 (9.1%)	0.55
University Affiliated	43 (87.8%)	75 (75.8%)	0.09
General Surgery Residency	46 (93.9%)	75 (75.8%)	0.007
Established years*	17.6 ± 7.5	14.6 ± 7.9	0.03
Established > 15 years	32 (65.3%)	44 (44.4%)	0.02
Positions per year*	1.2 ± 0.5	1.2 ± 0.5	0.53
Advanced GI	24 (49.0%)	47 (47.5%)	0.86
Bariatric	20 (40.8%)	51 (51.5%)	0.22
Foregut	5 (10.2%)	9 (9.1%)	0.52
Flexible Endoscopy	2 (4.1%)	2 (2.0%)	0.60
HPB	8 (16.3%)	7 (7.1%)	0.09
Funding dependent on fellow's billing	7 (14.3%)	21 (21.2%)	0.31
Canadian Citizen	46 (93.9%)	30 (31.3%)	< 0.001
Visa Sponsorship	49 (100%)	5 (5.4%)	< 0.001

GI, gastrointestinal; HPB, hepatopancreatobiliary; IMG, international medical graduate.

\*Mean ± Standard Deviation.

Moreover, 34% of the programs were found to restrict fellowship positions even to US-IMG, which raises the question of the nature of this bias being solely based on immigration status or on concerns for the quality of this group's qualifications. Interestingly, there is no data to suggest that this "preference" for selecting USMG is driven by worse performance or lesser professional qualifications on the IMG group, but rather seems to be based on several logistic and administrative limitations that programs face during the matching process; such as developing strategic plans to avoid going unmatched, struggling by selecting an international applicant who won't be able to start in time due to visa issues, and being unable to give "attending" privileges to an IMG on a visa to help fund the fellowship salary. This last point is likely related to ECFMG regulations regarding J1 visa and is expected to worsen given recent US Immigration and Customs Enforcement policy change.<sup>20,21</sup> Additionally, J1 holders are not financially allowed to have independent practice or bill to support their salary.<sup>22</sup>

Regardless of the reason, the data presented is clear evidence that this underrepresented group of physicians has fewer opportunities to pursue subspecialized training, even after completing residency in the US, which would assume that at this point both IMGs and USMG are at the

same level of training. In order to fight these systematic disparities, two important components are necessary. First, the existence and source of the problem needs to be identified and acknowledged. Second, in order to address it and eliminate it, proper education to all programs about the due process of sponsoring visas and promote discussions about inclusion of all groups is needed. Exclusion of this and other groups has such a significant impact in the health-care system in the US, as this problem certainly has the potential of truncating their education and ultimately preventing underserved populations from receiving advanced quality care.

Thirty-six percent of the MIS programs are willing to sponsor a visa, demonstrating that the sponsorship is feasible. Well-established programs, university affiliated programs, and residency affiliated programs were more likely to sponsor visas which is likely due to familiarity with visa regulations and administrative understanding and competency in the visa application process. Along with the administrative difficulties of the visa application, licensing might contribute to the equation. Considering that MIS fellowship programs are found in 35 of 50 states, and that the requirements and time needed to obtain a license differ by state, there is a possibility that certain programs influence their decisions based on these specific requirements.

According to the Fellowship Council, more than half of the programs are sponsored by a grant from the Foundation for Surgical Fellowships; however, this only covers for 20,000 US dollars per year, which is not enough to cover all the fellows salary pointing to the need to find additional sources to complete the funding for these positions to help making the selection process even and based on the applicants qualifications only.

Our study has the limitations inherent to cross-sectional studies. The program websites' information might not reflect the actual programs' interests, and might be prone to misclassification bias. We did not assess the acceptance rate of IMG in the applications process as the data provided is generated from the fellowship program's application requirements only. Also, this paper evaluates disparities in the MIS fellowship match in the 2021 application cycle given program reported requirements; thus, it is not possible to determine from previous years if there has been a change over time towards opportunities for IMGs. Nevertheless, our study is the first to our knowledge to address disparities in GME opportunities against IMG in the field of surgery after having completed accredited training in the US. We hope that this manuscript helps to bring attention to this important situation and that these surgeons will face better opportunities in the future.

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