Supply, distribution and characteristics of international medical graduates in family medicine in the United States: a cross-sectional study

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Abstract

Background: To describe the supply, distribution, and characteristics of international medical graduates (IMGs) in family medicine who provide patient care in the U.S.

Methods: A cross-sectional study design, using descriptive statistics on combined data from the Educational Commission for Foreign Medical Graduates and the American Medical Association, including medical school attended, country of medical school, and citizenship when entering medical school.

Results: In total, 118,817 physicians in family medicine were identified, with IMGs representing 23.8% (n = 28,227) of the U.S. patient care workforce. Of all 9579 residents in family medicine, 36.0% (n = 3452) are IMGs. In total, 35.9% of IMGs attended medical school in the Caribbean (n = 10,136); 19.9% in South-Central Asia (n = 5607) and 9.1% in South-Eastern Asia (n = 2565). The most common countries of medical school training were Dominica, Mexico, and Sint Maarten. Of all IMGs in family medicine who attended medical school in the Caribbean, 74.5% were U.S. citizens. In total, 40.5% of all IMGs in family medicine held U.S. citizenship at entry to medical school. IMGs comprise almost 40% of the family medicine workforce in Florida, New Jersey and New York.

Conclusions: IMGs play an important role in the U.S. family medicine workforce. Many IMGs are U.S. citizens who studied abroad and then returned to the U.S. for graduate training. Given the shortage of family physicians, and the large number of IMGs in graduate training programs, IMGs will continue to play a role in the U.S. physician workforce for some time to come. Many factors, including the supply of residency training positions, could eventually restrict the number of IMGs entering the U.S., including those contributing to family practice.

Keywords: Workforce, Family medicine, Primary care, International medical graduates, Medical school

Background

The number of international medical graduates (IMGs) practicing in the United States (U.S.) has steadily increased over the past fifty years, from 10% in 1963 [1] to currently about one-quarter of all physicians in active practice [2]. For decades, there has been a misalignment between the numbers of U.S. medical graduates (US-MGs) and Graduate Medical Education (GME) positions resulting in an excess of GME positions [3–5]. While requirements may vary by jurisdiction, all graduates, regardless of country of medical school training, must complete a minimum of 1 year of GME to obtain an unrestricted license to practice medicine. Given the availability of GME positions, and the need for physicians, the U.S. has historically relied on IMGs to fill residency positions [6, 7]. Recent data indicate that 24.6% of trainees in residency programs are IMGs [8] with even higher representation in the specialties (including subspecialties) of family medicine, internal medicine, neurology, nuclear medicine, pathology, paediatrics, and psychiatry. IMGs are also more

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likely to practice in counties with lower median incomes, to look after underserved populations, and to live and work in rural areas [9–12]. As a result, IMGs have been described as having “both gap-filling and safety-net roles” [13]. This is particularly relevant since US-MGs continue to show an overall preference for subspecialty careers [14–16], and proportionally fewer positions in family medicine are being filled by US-MGs. For example, whilst the total number of family medicine positions being offered has increased every year since 2008, and 10.5% between 2013 and 2017, the proportion of these positions filled by US-MGs stabilised around 44.0–45.3%. A large number of these positions are being filled by IMGs.

Against this background, knowing more about the supply, distribution and characteristics of IMGs in family medicine can help inform speciality-specific workforce policies. Previous research has addressed migration of IMGs in general [17, 18] or from specific regions [19, 20], and has focused on the geographical distribution of IMGs in particular specialties [13, 21, 22]. Few of these studies have focused on describing applicant characteristics by specialty and, more specifically, for family medicine. Morris et al. compared US-MGs to IMGs in family medicine and found significant differences in their professional profiles [23]. However, this study has several limitations, namely the currency and accuracy of the underlying data. To date, comprehensive analyses of the role of IMGs in family medicine in the U.S. have been limited. This study seeks to fill that gap by describing, based on the most current publicly available data, the characteristics of IMGs in family medicine who provide patient care in the U.S. Methods.

Variables

We used the demographic information available in our combined dataset of AMA and ECFMG records. The AMA Masterfile contains details on physicians who currently practice in the U.S., including their specialty, type of practice and major professional activity. With respect to specialty, the AMA Masterfile contains over 200 self-designated practice specialties. We selected only those individuals who indicated a family medicine specialty or subspecialty. This included Family Medicine, Family Practice, Adolescent Medicine for Family Practice, Family Medicine/Psychiatry, General Practice, Sports Medicine (Family Medicine), Emergency Medicine/Family Medicine, Family Medicine/ Preventive Medicine, Geriatric Medicine (Family Medicine), Hospice & Palliative Medicine (Family Medicine), and Internal Medicine/ Family Medicine.

In terms of the major professional activity, we included all physicians involved in patient care activities whose primary self-designated practice specialty was one of the family medicine designations listed above. We included residents, full-time hospital staff, physicians in office-based practice and locum tenens. We excluded individuals whose self-designated major professional activity was research, administration, medical teaching, or who were listed as inactive. There was no adjustment made for full-time equivalents, since that information is not consistently available.

Other information derived from the AMA Masterfile included the type of employment (solo practice, state hospital, etc.), location of practice (by postal code), and type of physician (IMG, U.S. MD or U.S. DO (osteopathic physician). In the U.S., graduates from an osteopathic medical school can specialize in family medicine and work as family physicians. They have comparable training and certification requirements as MD family physicians. Since they play an important role in the delivery of care in family medicine, we included DOs in our analyses.
For IMGs, we obtained additional information from the ECFMG records. As part of the certification process, ECFMG collects demographic data including citizenship at the time of entry into medical school and country of medical school. In line with common practice [26], an IMG was defined as an individual who graduated from a medical school located outside of Canada or the U.S., regardless of citizenship. We used information about citizenship at the time of entry into medical school to classify IMGs as either U.S. citizens who graduated from a medical school located outside of Canada or the U.S. (US-IMGs), or non-U.S. citizen IMGs (non-US-IMGs).

Analysis
Descriptive statistics were used to show the distribution and characteristics of physicians in family medicine who provide patient care in the U.S. Where appropriate, we made comparisons between IMGs and US-MGs, including both MDs and DOs. We did not apply any inferential statistics since the study group includes the whole population of practicing physicians in family medicine designated specialty categories.

Results
The 2017 AMA Masterfile, which primarily reflects the status of the workforce at the end of 2016, includes 907,731 physicians who are in the U.S. and involved in patient care activities, including full-time hospital staff, individuals in office-based practice, residents, and doctors doing locum tenens. For those physicians involved in patient care for whom a self-designated practice specialty was available (96.1%), including IMGs, MDs and DOs, there are 118,817 in family medicine-designated practice specialties. Overall, physicians in family medicine make up 13.1% of the entire physician workforce. Self-designated practice specialties include Family Medicine (n = 98,929, 83.3%), Family Practice (n = 9095, 7.7%), General Practice (n = 7634, 6.4%), Sports Medicine (Family Medicine)(n = 1849, 1.6%), Geriatric Medicine (Family Medicine) (n = 954, 0.8%), Family Medicine/ Psychiatry (n = 128, 0.1%), Emergency Medicine/ Family Medicine (n = 71, 0.1%), Internal Medicine/ Family Medicine (n = 69, 0.1%), Family Medicine/ Preventive Medicine (n = 51, <.1%), Hospice & Palliative Medicine (Family Medicine)(n = 28, <.1%), Adolescent Medicine for Family Practice (n = 9, <.1%).

Those providing patient care (full-time hospital staff, physicians in office-based practice, residents, and locum tenens) whose self-designated specialty is family medicine, were most commonly in office-based practice (n = 98,233; 82.7%), full-time hospital staff (n = 10,708; 9.0%), residents (n = 9579; 8.1%) and locum tenens (n = 297; 0.2%). A breakdown of the family medicine workforce (i.e. those involved in patient-care activities) is provided in Table 1.

International Medical Graduates (n = 28,227) represent 23.8% of the family medicine workforce who provide patient care. For all other self-designated specialties, excluding physicians not involved in patient care, IMGs (n = 218,059) represent 24.0% of the total (n = 907,731) U.S. patient care workforce. Eliminating the IMGs for whom citizenship information at time of entry to medical school was not available (n = 440), US-IMGs make up 40.5% of the internationally-educated family medicine workforce.

The majority of physicians in family medicine are male (60.3%), with a similar breakdown for IMGs (57.5%) and U.S. MDs and DOs (61.1%). Compared with U.S. MDs and DOs practicing in family medicine (mean age = 50.7 years; standard deviation [SD] = 12.3), practicing IMGs, on average, are a little younger (mean = 49.2 years; SD = 13.7).

Based on employment data from the AMA Physician Masterfile, IMGs practicing in family medicine are less likely to work in a group practice (n = 9261; 32.8%) than U.S. MDs or DOs (n = 44,003; 48.6%). IMGs in family medicine are more likely to be in self-employed solo practice (n = 4644; 16.5%) than U.S. MDs or DOs (n = 12,006; 13.3%).

**IMGs in family medicine**
Of the 28,227 IMGs in family medicine, 3452 are residents (36.0% of all 9579 residents in family medicine); 22,361 are in office-based practice (22.8% of all 98,233 physicians in family medicine in office-based practice); and 2344 are full-time hospital staff (21.9% of all 10,708 physicians in family medicine who were full-time hospital staff).

Country of medical school training was available for 28,104 (99.6%) of all IMGs currently providing patient care as family medicine practitioners. The top 20 (of 150) countries are shown in Table 2. More than one-third of IMGs attended medical school in the Caribbean (n = 10,136; 35.9%), with over one quarter graduating from a medical school in Canada.

Table 1  Family Medicine Workforce (in Patient-Care Activities) in 2017

| Type                                      | N    | %    |
|-------------------------------------------|------|------|
| U.S. Citizen IMG (US-IMGs)                | 11,259 | 9.5 |
| Non-U.S. Citizen IMG (non-US-IMG)         | 16,528 | 13.9|
| Unknown IMG                               | 440   | 0.4 |
| All IMG                                   | 28,227 | 23.8|
| U.S. MD                                   | 71,473 | 60.2|
| U.S. DO                                   | 19,117 | 16.1|
| All Family Medicine (in patient care)     | 118,817 |      |
school in South-Central Asia (n = 5607; 19.9%) or South-Eastern Asia (n = 2565; 9.1%).

Citizenship at time of medical school was available for 27,769 (98.4%) of the IMGs in family medicine. The countries with more than 100 citizens (at entry to medical school) in the IMG cohort are presented in Table 3.

Analysis at country level showed that for the 11,241 US-IMGs in our dataset (39.8% of all IMGs in family medicine), the most common countries of medical school training were Dominica (n = 2213; 19.7%), followed by Mexico (n = 1682; 15.0%) and Sint Maarten (n = 1397; 12.4%). Of all the practicing IMGs in family medicine who attended medical school in the Caribbean (n = 10,316), 7569 (74.5%) were U.S. citizens at time of entry into medical school. A large number of IMG family practitioners who attended Caribbean medical schools were Canadian citizens (n = 919, 9.1%). Even for other countries in the top 20 (based on country of medical school), many students were U.S. citizens. For example, of the 3867 IMG family physicians who attended medical school in India, 157 (4.1%) were U.S. citizens at entry to medical school.

Information on the medical school of primary medical degree was available for 27,845 (98.6%) of all IMGs in family medicine. Table 4 provides the top 15 provider schools for IMGs in family medicine. Of these, 9 are located in the Caribbean, 3 in the Philippines, 2 in Mexico and one in Pakistan. Together, they account for just over 40% of all IMGs in family medicine.

International medical graduates are practicing family medicine in all 50 States. Table 5 shows the number of IMGs in family medicine by state (top 10). Many of these states have large proportions of IMGs across all specialties (right-hand column, for reference), although in some states IMGs in family medicine are practicing in even greater proportions. In Florida, New Jersey and New York, IMGs comprise almost 40% of the family medicine workforce.

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**Table 2** Medical School Country for IMGs in Patient Care Activities in Family Medicine (top 20) in 2017

| Medical School Country | N   | %   |
|------------------------|-----|-----|
| India                  | 3867| 13.76|
| Dominica               | 2623| 9.33 |
| Mexico                 | 2302| 8.19 |
| Philippines            | 2198| 7.82 |
| Sint Maarten           | 1600| 5.69 |
| Grenada                | 1589| 5.65 |
| Dominican Republic     | 1414| 5.03 |
| Pakistan               | 1049| 3.73 |
| Saint Kitts and Nevis  | 575 | 2.05 |
| Poland                 | 510 | 1.81 |
| Cuba                   | 506 | 1.80 |
| Antigua and Barbuda    | 480 | 1.71 |
| saba                   | 475 | 1.69 |
| Cayman Islands         | 448 | 1.59 |
| Nigeria                | 434 | 1.54 |
| Egypt                  | 424 | 1.51 |
| Spain                  | 376 | 1.34 |
| China                  | 372 | 1.32 |
| Iran                   | 325 | 1.16 |
| Colombia               | 312 | 1.11 |

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**Table 3** Citizenship at Entry to Medical School for IMGs in Patient Care Activities in Family Medicine in 2017

| Country of citizenship | Frequency | Percent |
|------------------------|-----------|---------|
| United States of America | 11,241 | 40.48  |
| India                  | 3855     | 13.88   |
| Philippines            | 1806     | 6.50    |
| Canada                 | 1107     | 3.99    |
| Pakistan               | 1046     | 3.77    |
| Cuba                   | 513      | 1.85    |
| Nigeria                | 500      | 1.80    |
| Iran                   | 432      | 1.56    |
| China                  | 417      | 1.50    |
| Egypt                  | 403      | 1.45    |
| Mexico                 | 348      | 1.25    |
| Colombia               | 304      | 1.09    |
| United Kingdom         | 279      | 1.00    |
| USSR                   | 276      | 0.99    |
| Vietnam                | 234      | 0.84    |
| Poland                 | 222      | 0.80    |
| Korea                  | 210      | 0.76    |
| Syria                  | 185      | 0.67    |
| Haiti                  | 164      | 0.59    |
| Iraq                   | 164      | 0.59    |
| Dominican Republic     | 162      | 0.58    |
| Peru                   | 161      | 0.58    |
| Romania                | 159      | 0.57    |
| Bangladesh             | 148      | 0.53    |
| Russia                 | 135      | 0.49    |
| Taiwan                 | 127      | 0.46    |
| Nicaragua              | 124      | 0.45    |
| South Africa           | 111      | 0.40    |
| Germany                | 107      | 0.39    |
| Myanmar (Burma)        | 106      | 0.38    |
| Argentina              | 103      | 0.37    |
International medical graduates play an important role in the U.S. family medicine workforce. Our analysis shows that IMGs account for 23.8% of the family medicine workforce, in line with earlier published work in other specialties (e.g. 13). Many states are highly reliant on IMGs to fill their workforce needs. Our detailed analysis of the IMG family medicine workforce indicates great diversity with respect to citizenship, country of medical school training, and various practice-based demographics. One-third of IMGs attended medical school in the Caribbean confirming that this region has, at least historically, been a major supplier of physicians to the U.S. [27]. Over one quarter graduated from medical school in South-Central/South-Eastern Asia, which is a reflection of the wider migration of IMGs from this region to the U.S. [28]. More importantly, over one-third of family medicine residents are IMGs. Provided that they complete training and eventually practice in the U.S., the contribution of IMGs to the practicing FM workforce is likely to increase, at least in the short-term.

We further established that the country of medical degree is not a good proxy for, or indication of, IMG nationality; 40.5% of IMGs in family medicine held US

| Medical School                                      | Country             | Number | Percent | Aggregate Percentage of all IMGs in Family Medicine |
|-----------------------------------------------------|---------------------|--------|---------|-----------------------------------------------------|
| Ross University School of Medicine                  | Dominica            | 2611   | 9.38    |                                                     |
| St. George’s University School of Medicine          | Grenada             | 1584   | 5.69    | 15.07                                               |
| Universidad Autónoma de Guadalajara Facultad de Medicina Guadalajara | Mexico             | 1410   | 5.06    | 20.13                                               |
| American University of the Caribbean School of Medicine | Sint Maarten       | 1388   | 4.98    | 25.11                                               |
| University of Santo Tomás Faculty of Medicine and Surgery | Philippines        | 706    | 2.54    | 27.65                                               |
| Universidad Central del Este (UCE) Facultad de Medicina | Dominican Republic | 563    | 2.02    | 29.67                                               |
| Saba University School of Medicine                  | Saba                | 475    | 1.71    | 31.38                                               |
| St. Matthew’s University School of Medicine (Grand Cayman) | Cayman Islands      | 448    | 1.61    | 32.99                                               |
| American University of Antigua College of Medicine  | Antigua and Barbuda | 436    | 1.57    | 34.56                                               |
| University of the East/Ramon Magsaysay Memorial Medical Center College of Medicine | Philippines          | 357    | 1.28    | 35.84                                               |
| Universidad de Ciencias Médicas de la Habana        | Cuba                | 314    | 1.13    | 36.97                                               |
| Far Eastern University Institute of Medicine, Nicanor Reyes Medical Foundation | Philippines | 289 | 1.04 | 38.01 |
| Medical University of the Americas (Nevis)          | Saint Kitts and Nevis | 272 | 0.98 | 38.99 |
| Dow Medical College                                 | Pakistan            | 266    | 0.96    | 39.95                                               |
| American University of Integrative Sciences, St. Maarten School of Medicine | Barbados          | 212    | 0.76    | 40.71                                               |
| **Total**                                           |                     |        |         | 40.71                                               |

Table 5 Top 10 States with Practicing IMGs in Family Medicine in 2017

| State         | N IMGs in FM | % of all IMGs in FM | All IMGs in Patient Care | All Physicians in Patient Care | All IMGs in Patient Care | % IMGs in Patient Care |
|---------------|--------------|---------------------|--------------------------|-------------------------------|--------------------------|------------------------|
| CALIFORNIA    | 3930         | 13.97               | 13,590                   | 104,996                       | 26,808                   | 25.5                   |
| FLORIDA       | 2685         | 9.55                | 6731                     | 53,953                        | 19,005                   | 35.2                   |
| TEXAS         | 2299         | 8.17                | 8725                     | 62,622                        | 15,346                   | 24.5                   |
| NEW YORK      | 1886         | 6.71                | 4810                     | 73,724                        | 26,808                   | 36.4                   |
| ILLINOIS      | 1753         | 6.23                | 4802                     | 37,062                        | 11,000                   | 29.7                   |
| MICHIGAN      | 1232         | 4.38                | 4228                     | 30,324                        | 8728                     | 28.8                   |
| PENNSYLVANIA  | 1045         | 3.72                | 5294                     | 41,927                        | 9731                     | 23.2                   |
| GEORGIA       | 862          | 3.07                | 2978                     | 23,078                        | 5041                     | 21.8                   |
| NEW JERSEY    | 836          | 2.97                | 2184                     | 28,262                        | 11,264                   | 39.8                   |
| OHIO          | 814          | 2.89                | 4335                     | 34,999                        | 8201                     | 23.4                   |
citizenship at entry to medical school. These US-IMGs most frequently attended medical school in Mexico and the Caribbean. Nearly three-quarters of all physicians in family medicine who graduated from a Caribbean medical school were US citizens with a further 9.1% being Canadian. These results resonate with a pattern of migration that was identified in a different population, namely African-trained IMGs [20]. The authors found that there are a number of US citizens who had moved away from the U.S. to pursue a medical degree in an African country, only to return after graduation for U.S.-based GME. While the IMGs entering family medicine residencies and practicing in the US are a diverse group with many, by virtue of being U.S. citizens and, likely having been raised in the U.S., already being acculturated to the U.S. healthcare system. This can be beneficial in that resources required to orient these individuals to the idiosyncrasies of patient care in the U.S. are reduced. However, from a patient care perspective, a more diverse pool of physicians in terms of ethnicity and languages spoken may better align with the needs of the U.S. patient population [18].

Our findings have a number of workforce implications. While U.S. citizens studying medicine abroad are classified as IMGs, from a workforce planning perspective, they are typically counted in estimates of "brain drain". However, most U.S. citizens who leave the U.S. for medical education have no intention of staying abroad. Therefore, their contribution to international health workforce disparities, or U.S. debt attributable to the subsidy of public education, is minimal. The workforce disparity issue is particularly relevant for countries with a disproportionate number of medical schools compared to the local labour market, as is true in the Caribbean [28–30]. Although many of the medical schools in the Caribbean are for-profit, and cater to IMGs, the sustainability of "offshore" education of U.S. citizens, could be questioned given the increase in U.S. MD and DO enrolment and the lack of additional public funding for U.S. GME positions. Furthermore, countries where supplier schools are located might provide public funding to train doctors who are subsequently moving to the U.S. We acknowledge the debate around 'poaching' of physicians by several countries, including the US [31, 32]. However, U.S. citizens who go abroad for medical education do not contribute to "brain drain".

The current U.S. family physician workforce is highly dependent on IMGs. This may change in the future. Although projections by the Association for American Medical Colleges suggest physician shortages in the upcoming decades, there is a downward trend in the number of IMGs applying for the residency Match in recent years [33]. More important, the number of graduates from U.S. medical schools may eventually surpass the number of available residency positions [34, 35]. The total number of US-MGs has been increasing as class sizes of existing medical programs have expanded [36, 37]. Moreover, new medical schools will begin to graduate their incoming classes; almost all of these graduates will be competing for GME positions. With 18 new U.S. medical schools established over the last 10 years and 9 in the last 5 years [38], there will be approximately 7000 additional US-MGs every year [39]. If these individuals seek GME positions, the availability of graduate training slots for IMGs is likely to decrease. In the U.S., the number of residency positions has remained relatively unchanged, increasing by approximately 1.6% per year [40]. This is largely the result of the "cap" on federal financing of GME positions through Medicare, or "slots" [34]. Although there are still far more positions available than US-MGs, competition for these positions is increasing [41, 42]. Because US-MGs tend to remain in their home country for specialty training, and many programs will continue to give priority to US-MGs over IMGs, the number of IMGs who will be able to pursue specialty training in the U.S. is expected to decrease [4, 5, 35]. Furthermore, recent U.S. immigration policy changes may make it more difficult, at least for non-U.S. citizen IMGs, to obtain visas to travel to, or to work in the U.S., thus making them less likely to be selected into residency training programs [43, 44]. Given these issues, the U.S. dependency on IMGs, including family physicians, is likely to decrease. However, based on current licensure rules, the estimated shortage in primary care physicians of 7300 to 43,100 by 2030 [45] will require additional GME positions. Barring an influx of US-MDs or DOs seeking primary care specialties, at least some internationally-trained physicians will still be needed to fill the workforce gap [40].

The prevalence of US-IMGs in family medicine may raise concerns regarding the quality of primary care. Although there are many factors that determine the quality of a physician, including undergraduate medical education, it is unclear whether current certification and licensure requirements provide sufficient safeguards to ensure that IMGs deliver high-quality care. There is a growing body of literature suggesting that the quality of care provided by US-IMGs may be inferior to that of US-MGs and indeed other IMGs. The available studies show that US-IMG scores on United States Medical Licensing Examinations vary considerably [46], they are less likely to be specialty Board certified [47, 48] and, at least for some patient conditions, provide less adequate care [49–51]. If these findings amongst all US-IMGs generalize to Family Medicine, and there are more US-IMGs going into the specialty, the overall quality of patient care could suffer. This is particularly relevant given the number of ~US-IMGs in Family Medicine, many of whom graduated from medical schools in the
Caribbean where, historically, there has been considerable variability in performance [27, 46, 47]. Finally, given that IMGs are less likely to work in group practices, and fewer family physicians overall are working as solo practitioners [52], access to, and quality of care, could be impacted.

Limitations
There are a number of limitations of our study. First, the underlying data set, the AMA Masterfile, has been reported to under/over-represent different specialties and practice settings [53, 54]. Second, some of the variables used in the analyses were self-reported (e.g., primary self-designated specialty, citizenship) and may be subject to error. It seems unlikely, however, that individuals would purposefully distort their responses. Third, our study results were based on a cross-sectional analysis of physician practice data. While beyond the scope of this investigation, the longitudinal analysis of ECFMG application trends and IMG contributions to family medicine would clearly improve any projections concerning the future composition of the US workforce.

Conclusion
Our study offers a closer look at the characteristics of IMGs in the family medicine workforce. We have discussed the implications of our findings in the context of current conditions, namely that the future workforce physician shortages are unlikely to be alleviated entirely by domestically educated physicians.

Endnotes
1Anguilla, Antigua and Barbuda, Aruba, Bahamas, Barbados, Bonaire, Sint Eustatius, Saba, British Virgin Islands, Cayman Islands, Cuba, Curacao, Dominica, Dominican Republic, Grenada, Guadeloupe, Haiti, Jamaica, Martinique, Montserrat, Puerto Rico, Saint-Barthelemy, Saint Kitts and Nevis, Saint Lucia, Saint Martin (French part), Saint Vincent and the Grenadines, Sint Maarten (Dutch part), Trinidad and Tobago, Turks and Caicos Islands, United States Virgin Islands.
2Afghanistan, Bangladesh, Bhutan, India, Nepal, Maldives, Pakistan and Sri Lanka.
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Availability of data and materials
The data that support the findings of this study are available from Educational Council for Foreign Medical Graduates (ECFMG) and the American Medical Association (AMA) but restrictions apply to the availability of these data, which were used under license for the current study, and so are not publicly available. Data are however available from the authors upon reasonable request and with permission of ECFMG and AMA.

Authors’ contributions
RD and JB designed the study, JB collected the data and RD and JB analyzed and interpreted the data. RD drafted the paper, with substantial input from JB and EW. All authors approved the final version of the manuscript.

Ethics approval and consent to participate
No ethics approval was required given the nature of the data.

Consent for publication
Not applicable.

Competing interests
The authors declare that they have no competing interests.

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