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Lovemore Simbarashe Kuzomunhu

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Career Interests and Mentorship Experiences of International and Minority  
Medical Students in US Medical Schools

A Thesis Submitted to the Yale

University School of Medicine

in Partial Fulfillment of Requirements for the

Degree of Doctor of Medicine

by

Lovemore Simbarashe Kuzomunhu

2019

## Abstract

**Background:** International medical students (IMS) represent a group of students with unique issues that have largely been ignored in the medical literature. This invisibility is because international students make up a very small percentage of the total number of students matriculating into medical school in the US and because most international students are grouped together with domestic underrepresented minority (URM) students and hence are treated as if they were domestic minority students.

**Aim:** We aim to determine what are the career interests of international and domestic underrepresented minority medical students and what factors influence their choices. We also aim to explore these students' perceptions about their mentoring experiences during medical school. We hypothesize that since international students have different life experiences and unique issues that are separate from URM students there would be differences in career interests, factors influencing their career aspirations and perceived mentorship experiences between these two student groups. Furthermore, for international students, we aim to establish their plans about practicing in their home countries and views about visa requirements for residency training. We hope to help bridge the knowledge gap that currently exists about what exclusively affects international and not domestic URM medical students.

**Methods:** A survey was sent out to US medical schools that matriculate international applicants. We also conducted a convenience sampling at the Latino Medical Students Association (LMSA) National Conference to increase the number of

LatinX participants. Participants ranked 19 items coded on a Likert scale from 1 (not at all important) to 5 (extremely important) about factors influencing their career aspirations. These factors were personal reasons, intellectual challenge, previous clinical experience, lifestyle and work hours during residency and after training, financial rewards after training, job opportunities in that specialty in the US and in their country of origin, mentors in that specialty, mentors that have similar background as the student in that specialty, prestige and specialty reputation, length of residency, ability to obtain a residency position in that specialty, ease of obtaining an employment visa in that specialty, health needs of the community you grow up in, having people you can relate to in that specialty, academic opportunities and patient relationships or interactions. Participants also ranked on 5 point Likert scale from 1 (not at all helpful) to 5 (extremely helpful) how helpful their formal and informal mentors were with the following six topics: academic advice, career planning, professional development, personal issues, research and general guidance. Perceived quality of the students' most influential mentor was measured using a modified Mentorship Effectiveness Scale. Students were also asked to provide demographic data that included gender, age, year in medical school, region of origin for internationals, race or ethnicity for domestic URM and choice of specialty. International participants were also asked about their plans to practice in their home countries and views about visa issues during residency applications.

**Results:** 96 respondents were included in the analysis, 15 (15.7%) were international students and 81 (84.3%) were URM. The most common specialty choices

for internationals were surgery 6 (40.0%) and 3 (20.0%) internal medicine, and for domestic minorities were internal medicine 16 (20.5%) and pediatrics 16 (20.5%).

Among IMS, the top factors influencing career choice were having people you can relate to in that specialty, patient interactions, academic career opportunities, future job opportunities in the US, ability to obtain a residency position and ease of obtaining an employment visa. Among URM students, the top influencing factors were personal reasons, clinical exposure, lifestyle and works hours after training; and like IMS, patient interaction, having people you can relate to and feeling welcome in that specialty. IMS valued financial rewards after training and prestige/specialty reputation as influential factors more significantly positive than URM students ( $p = 0.021$  and  $p = 0.020$  respectively).

Both international and domestic minorities students generally perceived that their informal mentors were more help with academic advice, career planning and professional development than their formal mentors were. The total help that URM students perceive to get from informal mentors ( $19.74 \pm 5.65$ ), on all 6 items ranked, was significantly more than from formal mentors ( $17.02 \pm 6.35$ ),  $p = 0.029$ . In ranking the perceived quality of their most influential mentor IMS scored 'mentors providing useful advice, resources or support to help with unique issues' significantly lower compared to URM students,  $p = 0.012$ .

Majority of IMS express interest in practicing at least part-time in their country of origin and plan to first go back within 10 years of completing postgraduate training. 6

out of 13 (46.2%) IMS reported receiving some form of advice about visa requirements for residency. Every international student that indicated they are currently applying for residency reported they have discussed this topic with program directors during their interview and felt that their immigration status would impact how they are ranked in the National Residency Matching Program.

**Conclusion:** International students choose more competitive specialties and care more about financial rewards and prestige when choosing a career compared with domestic minority medical schools. Internationals are interested in practicing in their home country and they fear that visa requirements for postgraduate training pose a barrier when applying for residency. These findings suggest that IMS choices, influencers and plans are different from domestic URM students. Medical school administrator and educators need to be aware of these differences in order to better address the specific needs of both student communities especially when it comes to advising them about career aspirations and the residency application process.

We also show that both IMS and URM generally perceive informal mentors to be more helpful with advising and professional development. IMS perceive that mentors do poorly with providing them with advice, resources and support for the unique challenges that they face as internationals. This suggest that formal advisors and mentors might benefit from professional development about what international versus domestic URM students perceive to be helpful to them so that formal mentorship programs become as helpful to students as informal mentoring.

## Acknowledgements

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## Introduction

### Health disparities in US and lack of diversity of US physician workforce

The demographics of the United States population is changing, with minority groups being the fastest-growing segments of the population. The U.S. Census Bureau projects that minority groups including African Americans/Black, Hispanic/LatinX, American Indians/Alaskan Natives and Asians, which made up nearly 30% of the US population in 2000, will comprise 47.2% by 2050 and non-Hispanic whites will become a minority<sup>1</sup>. These demographic changes have heightened the discussions about disparities in healthcare that exist among different populations within the US<sup>2,3</sup>. Americans from racial and ethnic minority populations continue to have poorer access to healthcare and worse health outcomes compared to their white counterparts<sup>4</sup>. Multiple studies have demonstrated racial disparities in delivery of care, from minorities having less access to kidney transplant<sup>5</sup> to having worse outcomes from colorectal cancer<sup>6</sup>. Poorer outcomes for cardiovascular diseases in communities of color are well documented<sup>8,1</sup>. There are even studies that documents that there are variations in the surgical procedures and interventions done based on the race of the patient<sup>7,8</sup>. Several solutions have been proposed to address minority health disparities including, increasing funding for public health initiatives, increasing research of minority health-specific issues, training culturally competent healthcare providers and increasing the diversity of the US physician workforce<sup>9,10</sup>.

Diversifying the physician workforce is considered key to delivering quality and competent care to the changing US population<sup>11</sup>. Research has shown that physicians

from racial and ethnic minority groups are more likely than white physicians to practice primary care and practice in improvised and medical underserved communities<sup>12,13</sup>. Furthermore quality of care has been shown to improve when there is a diverse workforce. Patient-physician race concordance results in longer visits and increased patient satisfaction while language concordance is positively associated with adherence to treatment among racial or ethnic groups<sup>14,15,16</sup>. Additional benefits of a diverse workforce include delivering more culturally competent and cost-effective care<sup>17,18</sup>.

Even though there is a rapid population growth of racial and ethnic minority groups in the US, this trend does not translate to the US physician workforce. Relative to the general population, racial and ethnic minorities remain underrepresented in the medical profession<sup>19,20</sup>. The Federal government has designated underrepresented minorities (URM) to include African Americans, Hispanics and Native Americans<sup>12</sup>. Recognizing the lack of URM in medicine and the importance of a diverse workforce, several national initiatives including the Association of American Medical Colleges (AAMC), National Institute of Health (NIH) and other organizations have established the goal to increase the numbers of URM medical students, residents, and physicians<sup>20,21,22</sup>. Most of these initiatives are based on the Pipeline theory, an understanding that in order to accomplish the outcome of more practicing URM physicians there must be more URM residents in the pipeline, which means that we need to increase URM medical student enrollment<sup>23</sup>. Ultimately, minority undergraduates and high school students who are interested in medicine and science feed this pipeline. Other strategies include academic readiness programs like Summer Medical and Dental Education

Program (SMDEP)<sup>24</sup>, infrastructure building and holistic admissions that takes into account life experiences based on race and ethnicity in the medical school admissions process<sup>23</sup>. From 1995 to 2015 there was a modest increase in the number of African Americans/Black (15.9%) and Hispanics/LatinX (18.2%) applying for medical school<sup>25</sup>. However, the enrollment of URM students still remains disproportionately low and there is still a dearth of minority trainees and physicians. In 2014, out of the total practicing US physicians, 4.1% were Black or African American, 4.4% were Hispanic or LatinX and 0.4% were American Indian or Alaska Native<sup>4</sup>. For comparison 11.7% were Asian, 48.9% were White and 29.8% identified as other race and race unknown<sup>4</sup>. For senior medical students graduating in 2015 only 5.7% identified as Black or African Americans and 4.6% as Hispanic or Latino<sup>25</sup>. Besides domestic URMs two other medical student cohorts are important in diversifying the US physician workforce, these are international medical students (IMS) and international medical graduates (IMGs)<sup>26,27</sup>.

### **International medical student versus international medical graduate**

International medical students (IMS) are non-US citizens enrolled at a US medical school on a student visa. IMS are awarded an Accreditation Council for Graduate Medical Education (ACGME) credentialed degree upon completion of medical school, same as their US peers<sup>27</sup>. In contrast international, medical graduates (IMGs) are physicians who graduate from a medical school outside of the United States or Canada<sup>28</sup>. IMGs include both foreign students and US citizens who complete medical school abroad. IMGs are eligible to enter the US Graduate Medical Education training pool after completing US Medical Licensing Exams (USMLE) Steps 1 & 2 and having their

credentials verified by the Education Commission on Foreign Medical Graduates (ECFMG)<sup>28,29,30</sup>.

Of all the international medical graduates who matched for residency in 2018, 58.2% were non-US citizens<sup>31</sup>. In 2015, 24% of the active practicing physicians in the US were IMGs and 25% of trainee residents were IMGs<sup>32</sup>. Foreign IMGs come from across the globe with the top 4 represented countries being India, Mexico, Pakistan and Dominican Republic<sup>32,33</sup>. IMGs, like underrepresented minorities, tend to practice in primary care and in underserved and rural areas<sup>29,32</sup>. There has been a lot of literature about IMGs' experiences in residency and their contributions to the US healthcare workforce<sup>34-38</sup> but the same cannot be said for IMS.

IMS have remained largely unknown to the medical literature<sup>27</sup>. These students constitute a very small cohort of medical students with unique issues that have rarely been explored. Since 2010, approximately 1500 non-US citizens apply for medical school in the US each year and of these about 200 applicants are accepted<sup>39,40</sup>. This represents a modest increase in the number of foreigners matriculating into medical school compared to 2002 when 82 per year were accepted<sup>27</sup>. However, even with this increase, the acceptance rate of internationals at 13.3% is far below that of US citizens at 42-44% each year<sup>39,40</sup> (Figure1). The numbers of US citizens matriculating into medical school each year (18000-20000) dwarf that of internationals who make up only 1-1.5% of the matriculants<sup>40</sup>. Despite constituting a very small percentage of the total students enrolled in US medical schools, international students face several unique issues and

challenges throughout their medical education that are worth making more visible in the medical literature<sup>27</sup>.

The unique issues encountered by international students begin with the medical school admission process. International students are disadvantaged in the admission process due to finances, immigration-related barriers and high academic standards for admittance<sup>27</sup>. The biggest barrier that international students face when considering going to a US medical school is lack of funding and access to state and federal based financial aid. Most medical schools in the US do not accept international students because the institution does not have financial resources to support these students. State-funded schools rely on state and federal grants and loans to support their students<sup>27</sup>. Non-US citizens are ineligible to apply for these types of financial support; hence most state medical schools won't entertain foreign applicants. Some medical schools, mostly private, offer institutional loans that IMS qualify for; however, these funding streams are very limited and highly competitive to obtain<sup>27</sup>. Private loans usually require students to put up an unattainable amount of escrow or have a US-citizen co-signer and often have very high interest rates<sup>27</sup>. Also, most state-funded US schools have a mission to produce health professionals that will serve the needs of the local population. Hence it is beyond the mission and mandate of some of these schools to accept international students because of their immigration status<sup>27</sup>.

In addition to this financial and immigration-related burden, international students need to meet higher academic standards for admission. It has been shown that the Medical College Admission Test (MCAT) scores, cumulative science and non-

science grade point (GPA) for foreign citizen matriculants are significantly higher compared to the US citizen cohort<sup>27</sup>. Meaning internationals must show that they are exceptionally academically gifted to get into medical school in the United States.

Once in medical school, international students face several additional issues/barriers that can make their experiences in medical school more challenging. Cultural, social and language differences pose as potential barriers in IMS interacting with fellow students, staff, faculty and patients<sup>27</sup>. Several qualitative studies that were done in Europe have explored the cultural and social experiences of foreign medical students in a western medical system. These studies have shown that sometimes international students encounter problems and social exclusion due to language deficits and intercultural differences<sup>41,42</sup>. Students from regions where cultural difference is greatest have been reported to have more difficulties in adjusting to the western medical culture<sup>43</sup>. These studies elucidated the need to better understand the nature of the pressures that International medical students experience to help build systems, structures and initiatives that can support their transition into medical school<sup>42</sup>, foster intercultural relationships<sup>43</sup> and ensure their success while in medical school. However, it must be noted that there is a key difference between international medical students in the US compared to Europe. In the US, most internationals would have completed at least four years of undergraduate education at a US college or university and hence might be culturally and socially more 'assimilated' by the time they matriculate into medical school<sup>27</sup>. On the other hand, in Europe, students enter medical school out of high school, and thus international students are more likely to have recently moved to

Europe and hence are less assimilated to western culture. Despite this difference, cultural, social and language-related issues remain potential inhibitors of success for international students studying in the US.

Upon completion of medical school, international students face another significant challenge- visa requirements for residency training. Despite obtaining ACGME credentialed degree, international students have visa requirements that can make residency application daunting<sup>27</sup>. Non-US citizens must obtain a H-1B temporary employment visa or J-1 educational exchange visa in order to complete residency training in the US<sup>44</sup>. Some start residency training on Optional Practical Training (OPT), which is a temporary employment status that is an extension of their F-1 student visa. The duration of the extension granted depends on the major or field of study. For medicine, OPT can only be used for 12 months at which point one needs to switch over to H or J visa to complete their residency. Approval of any one of these visas is not guaranteed and depends on Federal government decision makers thereby creating uncertainty in the application process. Because of this uncertainty and the institutional effort required in applying to be a H or J visa sponsor, some residency programs refrain from extending interviews to foreign citizen applicants<sup>27</sup> or rank them less competitively in the match. The current political climate in the US with President Trump's administration leaning towards more stringent immigration laws and policies is bound to increase the burden that international students must overcome to get into residency. For these multitudes of reasons applying for residency can be overwhelming for

international students. Non-US citizen IMGs face a similar challenge since they have similar visa requirements<sup>32</sup>.

Despite facing so many challenges, international medical students remain invisible in the medical literature. We suspect this invisibility is because IMS constitute a very small percentage of medical students and are absorbed and treated like domestic underrepresented minorities. For Black students, literature illustrate that in higher education race of Black immigrants is often positioned the same as that of African American due to lack of distinction between Black immigrants and African Americans<sup>45,46</sup>. This leads to Black immigrants being treated as domestic African Americans<sup>45</sup>. The same could be extrapolated for LatinX foreign students whose identity is positioned the same as US citizens of LatinX or Hispanic origin. We have observed that IMS tend to join minority student organization groups like Student National Medical Association (SNMA) and Latino Medical Students Association (LMSA) and not have separate affinity organizations.

In this study, we are interested in exploring whether the different life experiences and unique challenges faced by international students make them different from domestic underrepresented minorities. We want to shed more light on the experiences and career choices of IMS students, and decrease the knowledge gap about this student cohort.

### **Underrepresented minorities experiences in medical school**



Through focus group meetings, one-on-one interviews and surveys, several studies have looked into the experiences of URM students in medical school. A lot of the challenges URM students face are believed to be related to their race and ethnic. URM students report experiencing racial stereotyping, microaggressions, discrimination, mistreatment and harassment<sup>47,48,49</sup>. Due to their race/ethnicity some minority students feel they have to be twice as good to be treated equal to non-minority students<sup>47</sup>. Others suffer from imposed pressure created by themselves and or other people to take on additional responsibilities and hence feel that they carry a disproportionate burden<sup>50</sup>. URM students are reported to experience both a less supportive social and a less positive learning environment<sup>48</sup>. Minority students are more likely to perceive the medical school environment as hostile than their white colleagues<sup>49,51,52</sup>. Other studies have noticed that minority students tend to performance worse on standardized exams, progress slower, have higher attrition,<sup>48,53</sup> lower sense of personal accomplishment and quality of life<sup>54</sup>. The most often cited barrier to success by minority students is the lack of mentors- both URM mentors and non-URM mentors<sup>47,50,55,56</sup>. Mentors are crucial in enhancing the experiences of minority students in medical school and are key to the successful completion of medical school and obtaining a residency position<sup>55</sup>. A study out of a historically black medical school showed that milieu and mentoring, together with monitoring helped improve their student's USMLE step 1 results. Their test result rose from below the national average to be at par with the national average<sup>53</sup>. URM students have been reported to have a difficult time working with professors, attending physicians, residents and colleagues whose cultural backgrounds are different from

theirs<sup>51</sup>. Since there is still a lack of URM faculty to mentor the minority students, a few studies have looked into how to improve cross-cultural mentoring of URM by non-URM mentors<sup>57</sup>. Recommendations proposed include mentoring around scholarly projects, identifying mentorship role, acknowledging personal attributes for mentoring, addressing racism, stereotypes and bias, collaborating with Historically Black Colleges and Universities and being attentive to the unique needs of URM students<sup>57</sup>. Besides having mentors, URM report that collaborative learning environment, formal inclusion of health care disparities in the curriculum and a diverse student body were facilitators of success in medical school<sup>50</sup>.

### **Underrepresented minorities career choices & importance of mentors**

Underrepresented minorities are more likely to practice in primary care than their non-minority counterparts<sup>58,59</sup>. A 2014 study of the practicing physicians in US showed that 46.8% of African American/Black and 45.5% for Hispanic/ LatinX were in primary care, while only 39.3% of white physicians were practicing in primary care<sup>4</sup>. Hence there is a lack of representation of URM in non-primary care specialties especially in general surgery and surgical subspecialties<sup>10,60</sup>. Two of the most cited reasons for the lack of minority surgeons are, lack of exposure to the surgical fields and lack of mentors, especially URM mentors<sup>55,56</sup>. These findings are consistent with the experiences of URM in medical school mentioned above. Mentors advice regarding career choices and academic preparation for the competitive selection process in non-primary care specialties is essential<sup>61</sup>. The path to a surgery career for African-Americans and Latinos is heavy influenced by mentors who facilitate the integration of these

students into surgical culture and help create a feeling of belonging<sup>55</sup>. Students tend to emulate their mentors and there is an association between role models and students' choice of clinical field<sup>61,62</sup>. In response to the lack of URM students in non-primary care specialties, medical schools and hospitals have created specific clinical and research clerkships for URM students with the aim of providing active mentorship and early career exposure to the specialty<sup>9,56,63,64</sup>. Active mentorship of minority students has been shown to increase the likelihood of these students pursuing careers in surgical fields and academic medicine<sup>9,65</sup>. Mentored student clerkships in Otolaryngology and Orthopedics have successfully demonstrated increasing the number of URM students applying for residency in these specialties<sup>9,56</sup>.

Although the lack of mentors as an inhibitor of success and influencer of choosing certain specialties has been well document for URM students, leading to several minority-mentoring initiatives being developed, much less research has been done to understand the perceived value and quality of the mentoring that URM students are currently receiving. There also is limited information about what other factors influence minorities in choosing a specialty. Hence in addition to addressing the knowledge gap that exists about IMS, we are particularly interested in understanding what are the factors influencing career interest of IMS and URM students and what is the perceived value and quality of the mentors they currently have in medical school. Both URM students and IMS are critical if we are going to diversity the US physician workforce and address US health disparities and inequities. It is worthwhile to explore their mentoring experiences and career choices in medical school. This information is vital to understanding what are the

needs of these student cohorts and how faculty mentors and advisors can help the students to be successful in their medical education and beyond.

## Statement of purpose

International medical students represent a group of medical students with unique issues but have been largely ignored in medical literature. We speculate that their invisibility is because they are grouped together with domestic underrepresented minority medical students and not viewed as a distinctive cohort. Medical schools might be treating these two cohorts of students as one and hence may not be meeting the unique needs of the distinctive groups. In this study, we are particularly interested in exploring the career interests and mentorship experiences of both international and domestic underrepresented minority medical students. Our aims include: 1. Determine which medical specialties the two student cohorts are interested in pursuing. 2. Determine what factors are influencing their career aspirations. 3. Explore the formal and informal mentorship experiences of both international and domestic URM students in medical school.

Our goal is to establish which factors are similar and which are different when internationals and URM medical students make decisions about which medical specialties they are interested in going into and which residency programs they should apply to. We also want to establish if there are any differences in the perceived mentoring and advising experiences between these two student groups during medical school. We hypothesize that due to difference in life experiences and different challenges faced in their medical education there would be differences in career interests, factors influencing career choices and mentorship experiences between internationals and URM medical students. We hope that by exploring these issues we

can 1-increase the awareness that international medical students are a distinct group of students with unique issues and 2- bring to light what factors matter most to IMS and domestic URM students when they are choosing their medical specialty and 3-how they perceive their mentoring and advising during medical school. With this information, we hope to develop recommendations for mentors, offices of diversity and inclusion and student affairs and medical school leadership on how to more effectively meet the needs of and serve these two distinct student communities in future.

## Methods

### Survey Development and Procedures

We developed a 42-question online survey based on previous studies that have explored the topics of career choices and mentoring in the field of medicine. The survey used mixed methods to obtain both quantitative and qualitative data.

Participants were asked to provide demographic data that included gender, age, year in medical school, region of origin for internationals, race or ethnicity for domestic URM and specialty of choice. Participants were also asked whether they had changed their choice of specialty since being in medical school and to provide free text responses of why they had changed their choice. Additionally, students were asked if there are currently applying for residency.

To determine the factors influencing career choices of IMS and URM we designed 19 items coded on a Likert scale from 1 (not at all important) to 5 (extremely important). The majority of these items were adopted from previously used survey tools designed to study factors influencing career choice among medical students, residents and physicians<sup>66,67</sup>. The specific factors that we examined were personal reasons, intellectual challenge, previous clinical experience, lifestyle and work hours after training and during residency, financial rewards after training, job opportunities in that specialty in the US and in the country of origin, mentors in that specialty, mentors that have similar background as the participant in that specialty, prestige and specialty reputation, length of residency, ability to obtain a residency

position in that specialty, ease of obtaining an employment visa in that specialty, health needs of the community that the participant grew up in, people the participant can relate to in that specialty, academic opportunities and patient relationships or interactions.

We adopted questions asking the student's perspective on the value and quality of their mentors and mentoring experiences based on studies that have previously studied this topic. Participants were asked if there have formal and informal mentors in medical school and to rate on a 5-point Likert scale from 1 (not at all helpful) to 5 (extremely helpful) how helpful these mentors were in the following six aspects: academic advice, career planning, professional development, personal issues, research and general guidance<sup>68</sup>. Formal mentors included assigned academic advisor, assigned clerkship advisor, clerkship directors and research principal investigator. Informal mentors were defined as mentors that are not formally assigned to participant including attending and/or residents meet during clerkships, physicians in the community or at other academic institutions. Perceived quality of the students' most influential mentor was measured using a modified version of the previously validated Mentorship Effectiveness Scale<sup>69,70</sup>. We asked the students to rate on a 5-point Likert scale from 1 (strongly disagree) to 5 (strongly agree) 11 items about their mentor's characteristics and attributes. We assessed if the students agreed that their most influential mentor was accessible, approachable, had similar career interests, acknowledged student's unique experiences, and challenges, provided useful advice, resources and or support for their unique challenges, understood student's professional, and personal goals and



interests, acknowledged student's achievements and success, challenged student to extend their abilities and encouraged student to consider doing residency at programs affiliated with their medical school<sup>69,70</sup>.

International students answered an extra set of questions about their future plans of where they would want to practice. Additionally, we asked about their perception of the role that their visa requirement would play in the residency application process and ultimately securing a spot in their chosen specialty. We designed questions to ask international students if they plan on practicing medicine in their country or region of origin in the future; if yes, when would they first go back. We also ask international students if they have had opportunities to experience healthcare delivery in a setting like what they would see in their country origin and if yes, how satisfied they were with these opportunities.

Concerning the issue of visa requirements for post graduate training, we ask international students if they receive any advice about residency employment visa requirements from their medical schools and in what type of setting- formal or informal. Formal settings included lecture, conference or meeting with school counselor or international student advisor. International medical students that are currently applying into residency were asked if they had talked about visa requirements during their residency interviews, how satisfied are they with the knowledge program directors or administrators have on this topic and whether they felt needing visa sponsorship would affect how they are ranked in the residency match. To assess the validity of these questions and how applicable they are to international students, we piloted them with a

few international students at our medical school. We updated the questions based on the pilot students' feedback before sending out the survey.

The survey was developed using the institutional Yale Qualtrics Survey Tool. The institutional review board determined that the study was exempt from human subject research regulations.

In February of 2019, an email with the survey link was sent out to 31 medical schools' student affairs and diversity and inclusion departments asking school deans, administrators and officers to extend an invitation to their students to complete the survey. These schools were selected because the AAMC's Medical School Admissions Requirements database indicated that they have international matriculates currently enrolled<sup>71</sup>. The majority of schools declined to extend the invitations citing institutional regulations that prevent circulation of external surveys. In March 2019, the author attended the Latino Medical Students Association (LMSA) National Conference, in Lubbock Texas and invited medical students attending the conference to complete the survey using a QR code link.

Participation in the survey was completely voluntary and participants were informed that their responses would be completely anonymous. Consent was obtained on the first page of the online survey. Only those giving consent could proceed to complete the survey.

### **Study Population**

We defined international students as medical students enrolled for a doctor of medicine degree at a US medical school on an F or J student visa. Underrepresented minority students are US citizens enrolled in medical school who identify as one of the racial or ethnic group that are considered underrepresented in medicine, these include African American/Black, LatinX/Hispanic and Native Americans. The study population included medical students enrolled in US medical schools across the nation. However, because of sampling convenience, the majority of the respondents are from the author's home institution and LMSA National conference, which included students from across the country. The survey respondents were divided into two groups, international medical students (IMS) and underrepresented minority (URM) medical students.

### **Statistical Analysis**

Frequency count variables like demographics were reported with percentages of the total respondents. Chi-squared analysis and Fischer exact method were used to test differences of frequency count variables between the two subgroups. Fischer exact analysis was used because the sample size of IMS is very small. For questions asking participants to rank using the Likert scale, data obtained is nonparametric hence Mann-Whitney U-tests were used to test differences in item value central tendency between international and domestic URM students. All computations were performed using STATA/MP 13.0 (© 2013 StataCorp LP). Tables and figures were constructed in Microsoft Excel (© 2010 Microsoft Corporation).

For the free text response question, thematic analysis was used to identify the themes. Dr. Latimore and I independently analyzed and coded the data, then compared, discussed and agreed on the themes.

### **Contributions**

The design and development of survey was done in collaboration with Dr. Darin Latimore, my thesis advisor. I conducted the literature review, developed the survey questions and built an online survey. Dr. Latimore helped to refine the questionnaire. I was responsible for survey distribution, data collection and statistical analysis. Statistical analysis was done with the help of Yale Statlab consultants. Dr. Latimore and I discussed the findings of the survey and appropriate interpretation of the data.

## Results

### Demographics

131 students responded to the survey, after excluding respondents identifying as Caucasian or white 96 participants were included in the analysis. The respondents' demographic characteristics are summarized in Table 1. 15 (15.7%) self-identified as international students and 81 (84.3%) as URM students. With respect to variables such as gender, age, year in school, currently applying for residency, there was no significant difference between the internationals and domestic URM students. Africans were the predominant subgroup of IMS with 9 (60.0%) respondents. For URM students, the largest subgroups were LatinX/Hispanic and African America/Black with 34 (42.0%) and 21 (25.95%) respondents respectively.

### Career interests and factors influencing specialty choice

The specialty choices of the respondents are displayed in Figure 2. The top three specialty choices for international students were surgery/surgical subspecialties 6 (40.0%), internal medicine 3 (20.0%) and obstetrics and gynecology 2 (13.3%). For URM students, the top three specialties identified were internal medicine 16 (20.5%), pediatrics 16 (20.5%) and surgery/surgical subspecialties 14 (18%). 33.3% of IMS were interested in primary care compared to 60.5% of URM, though there was no statistically significant difference in the choice of specialty between the two groups  $p = 0.051$ .

Table 2 shows the factors influencing specialty choices among IMS and URM medical students. Among international students, the top factors influencing career

choice were having people you can relate to in that specialty ( $4.25 \pm 1.22$ ), patient interactions ( $4.25 \pm 0.97$ ), academic career opportunities ( $4.17 \pm 1.03$ ), future job opportunities in the US ( $4.17 \pm 0.94$ ), ability to obtain a residency position ( $4.08 \pm 0.79$ ) and ease of obtaining an employment visa ( $4.00 \pm 1.35$ ). Among domestic minorities the top influencers were personal reasons ( $4.30 \pm 0.70$ ), clinical exposure ( $3.83 \pm 0.74$ ), lifestyle and works hours after training ( $3.82 \pm 0.86$ ), and like IMS, patient interaction ( $4.29 \pm 0.78$ ), having people you can relate to ( $3.97 \pm 1.05$ ) and feeling welcome in that specialty ( $3.94 \pm 0.97$ ). Only two factors were significantly different between the two student groups, financial rewards after training and prestige/specialty reputation. International students rated both financial rewards after training ( $3.67 \pm 1.15$  vs  $2.88 \pm 1.09$ ,  $p = 0.021$ ) and prestige/specialty ( $3.09 \pm 1.14$  vs  $2.26 \pm 1.01$ ,  $p = 0.021$ ) as more important influencers to choosing a specialty than domestic minority students.

11 (73.3%) international students reported that they had changed their specialty of interest since starting medical school compared to 36 (44.4%) URMs. However, this difference was not statistically significant  $p = 0.089$ . Of the students who report that they have changed their specialty choice, the most popular reasons why international students changed their choice were financial rewards (40.0%) and exposure to the specialty (40.0%), while for URMs exposure to specialty (55.2%) and mentors (17.2%) were the most popular reasons. The reasons for switching specialty of choice are summarized in Table 3.

### **Mentorship experiences**

For international medical students, 10 (66.7%) reported that they had formal mentors and 9 (60.0%) had informal mentors. For URMs these numbers were 57 (70.4%) and 56 (69.1%) respectively. The perceived benefit of advice from formal and informal mentors on six topics of academic advice, career planning, professional development, personal issues, research and general guidance are summarized in Table 4. International students ranked personal issues ( $3.44 \pm 0.88$ ) and general guidance ( $3.44 \pm 1.01$ ) as topics that formal mentors are most helpful with and ranked research ( $2.67 \pm 1.58$ ) as the area they were least helpful with. IMS perceived informal mentors to be most helpful with professional development ( $4.00 \pm 1.07$ ) and least helpful with academic advice ( $3.25 \pm 1.28$ ). URMs perceive both formal and informal mentors to be most helpful with general guidance ( $3.24 \pm 1.25$  and  $3.68 \pm 1.02$ , respectively) and professional development ( $2.94 \pm 1.27$  and  $3.45 \pm 1.14$ , respectively). For URMs, formal mentors are least helpful with personal issues ( $2.53 \pm 1.42$ ) and informal mentors are least helpful with academic advice ( $3.13 \pm 1.24$ ). There was no significant difference in the ranking of perceived benefit for each individual topic between the two groups for both informal and formal mentorship. However, for URMs, the perceived total benefit of mentoring on these six topics was significantly higher from informal mentorship ( $19.74 \pm 5.65$ ) compared to formal mentorship ( $17.02 \pm 6.35$ ),  $p = 0.029$ . IMS also perceived to get more total help from informal than formal factors ( $21.63 \pm 4.44$  vs  $18.89 \pm 5.60$ ) but the difference did not achieve statistical significance.

The students' perceived quality of their most influential mentor's characteristics and attributes are summarized in Table 5. IMS gave the highest scores to mentors'

accessibility ( $4.38 \pm 0.52$ ) and approachability ( $4.25 \pm 0.71$ ), while the lowest score was given to providing useful advice, resources and support to help with unique challenges ( $2.50 \pm 1.07$ ). URM students gave the highest score to mentors' approachability ( $4.54 \pm 0.75$ ) and understanding professional/academic goals and interests ( $4.30 \pm 0.95$ ), and the lowest score to encourage me to consider doing my residency at the home institution ( $3.27 \pm 1.19$ ). International students scored mentor provides useful advice, resources or support to help with unique issues significantly lower compared to URM ( $2.50 \pm 1.07$  vs  $3.64 \pm 1.21$ ,  $p = 0.012$ ).

### **International students' future plans and visa issues**

For the international students who completed this section 7 out of 13 (53.9%) were interested in practicing medicine at least part-time in their country or region of origin in the future. Of these seven students, 4 (57.1%) plan to first go back to practice in their country of origin within 10 years of completing their post-graduate training. 8 out of 13 (61.5%) international students report that they have had opportunities in medical school that exposed them to healthcare practice in an environment similar to their home country. The mean satisfaction rating, on 5-point Likert scale, that these opportunities helped the student stay connected with healthcare in their home country was  $3.50 \pm 0.93$ .

6 out of 13 (46.2%) international students reported that they had received some form of advice about residency visa requirements. Of these six, 4 (80.0%) had received the advice in a formal setting. Only 3 international students who completed this section were



currently applying for residency, all of them report that they had talked about visa issues with program directors during interviews and all three feared that visa issues might affected how they are ranked for the residency match.

## Discussion

### Career interests and factors influencing specialty choice

The results of this study suggest that most international students are interested in pursuing a career in non-primary care specialties especially surgery and surgical subspecialties, whereas the majority of URM students are interested in primary care. The study results also illuminate some key factors that influence these students' career interests. Both IMS and URM value 'having people they can relate to in that specialty' and 'patient relationship/interaction' as important factors when selecting a specialty. International students also care about choosing a career that will give them academic career opportunities and future job opportunities in the US. IMS are also faced with considering how their immigration status will affect their ability to obtain a residency position and ease of obtaining an employment visa in their chosen specialty. Meanwhile URM students value 'personal reasons', 'clinical exposure', 'lifestyle and work hours after training' and 'feeling welcome in that specialty'. None of these factors were statistically different between the two student cohorts. Surprisingly in our study, both IMS and URM did not rank mentors as a top factor influencing their career decisions. Previous studies have reported that role models or mentors are important factors for medical student's selecting which residency to apply into<sup>72,73,79</sup>. Future studies on this topic will be important to determine if role models and or mentors are really playing less of a role in URM's specialty decision making.

The only two factors that were statistically significantly different between IMS and URM medical students were financial rewards and prestige/specialty reputation. IMS valued the financial rewards and prestige/specialty reputation as important influencers in choosing a specialty more than URM students. This is consistent with international students in our study choosing more competitive specialties that offer higher salaries and are viewed as prestigious, more than URM students. Similar results have been published showing that prestige and income were positively associated with choosing non-primary care specialties like surgery<sup>66,78</sup>. IMS also reported financial rewards as one of the top reasons for changing their specialty choice during medical school. The high financial burden that international students face when matriculating into medical school<sup>27</sup> could explain their choices and values. International medical students may be choosing specialties with higher salaries to repay the debt acquired during medical school. Previous studies have shown that the odds of selecting a non-primary care residency increased as the concern about student indebtedness increased<sup>74,75</sup>. An alternative explanation could be because the majority of international students come from regions of lower socioeconomic status like Africa, specialties with higher income may be attractive to international students since it gives them financial resources to send back home as remittances. It is worthwhile for future research to look into whether the socioeconomic status of IMS and the amount of debt they have upon graduation compared to their US citizens peers are factors associated with international students choosing non-primary care specialties. Our findings that IMS value prestige/specialty reputation significantly more than URM are consistent with a recently

published meta-analysis that showed that medical student from developing nations place a higher value on prestige when choosing a specialty compared to students from developed nations<sup>76</sup>. Again, given that most of the international students in our study come from developing regions, it is not surprising that their values are similar to those of medical students in developing nations.

URM medical students' strong interest in primary care is consistent with what's previously known, minorities are more likely to practice in primary care<sup>4,58,59</sup>. Our study also suggests that domestic minorities students care less about financial rewards and prestige/specialty reputation when it comes to choosing a specialty. This is consistent with previous studies that have shown an association between choosing primary care and caring less about financial reward and prestige of specialty<sup>80</sup>. The majority of URMs mentioned 'exposure to specialty' as the reason for switching their specialty choice, reinforcing the importance of early exposure of students to increasing their interest in a specialty. This justifies the numerous underrepresented minority focused clerkship initiatives that aim to increase URMs in non-primary care specialties like Otolaryngology<sup>9</sup>, Orthopedics<sup>8</sup> or Emergency medicine<sup>77</sup>.

### **Mentorship experiences**

This study also shows that both international and domestic minorities students perceive that their informal mentors are generally more helpful with academic advice, career planning and professional development than their formal mentors. Overall mentoring benefit from informal mentors is significantly higher than from formal

mentors for URMs. Previous studies have reported similar findings that minority students generally perceived informal mentors more positively than their assigned faculty mentors<sup>68</sup>. This could be because when students seek out informal mentors they are more likely to look for people who understand them, have similar life experiences or share similar interests hence students are more likely to have a positive perception of their interactions with informal mentors compared to formal mentors who tend to be assigned. It's been shown that career intentions of URMs are associated with the discipline of their informal mentors<sup>68</sup>.

Our study also indicates that IMS perceived that their mentors do not provide adequate advice, resources and/or support to help them with their unique challenges. This was significantly different from URMs. This finding suggests that mentors might not be adequately equipped to help internationals with issues that are more unique and specific to that population like visa issues. It may be beneficial for medical schools that matriculate international students to educate their faculty about the unique issues IMS face, which would facilitate their ability to serve as better advisors and mentors.

### **International students' future plans and visa issues**

Half of the international students surveyed expressed interest in practicing medicine at least part-time in their country of origin, with plans of first going back within the first decade of completing their postgraduate training. Medical schools in the US need to be aware of this desire of international students to practice back in their country of origin. There clearly is a need to provide opportunities that expose these

medical students to healthcare in an environment similar what they would experience in their country of origin in order to better prepared them to practice in such environments. The international respondents also report talking about visa issues with program directors during residency interviews and being concerned about how their visa status will affect their ranking in the match. Increasing formal advice on residency visa requirements can help international medical students adequately prepare and plan for residency.

## Conclusion

International students choose more competitive specialties and care more about financial rewards and prestige when choosing a career compared with domestic underrepresented in medicine medical students We also show that internationals are interested in practicing at least part-time in their home country and they feel that visa issue matter when they are applying for residency. These findings suggest that IMS choices, influencers and plans might be are different from URM students. Medical schools need to pay attention to these differences in order to better address the specific needs of both student communities especially when it comes to advising them about career decisions and residency applications.

We also show that both IMS and URM students generally perceive informal mentors to be more helpful with advising and professional development. IMS perceive that mentors do poorly with providing them with advice, resources and support for the unique challenges they face as internationals. Hence there might be a potential benefit in educating formal advisors and mentors about what IMS and URM students perceive to be helpful to them so that formal mentorship programs become as helpful to these student populations as informal mentoring.

## Limitations

There are several limitations to this study. We acknowledge that this is a pilot study with a very small sample size. In particular, the number of international respondents is very low, hence our study does not fully represent the diversity of countries of origin that international students come from. Due to the low numbers, we cannot determine if the experiences and choices of international students differ according to country of origin. The small numbers also limited our ability to do multivariate regression analysis to determine if factors influencing career choices can predict which specialty the students choose. We also could not determine an accurate response rate since the survey only recorded the participants who gave consent and initiated the survey. Our study sample was drawn mostly from a single institution and was also affected by convenience sampling done at the Latino Medical Students Association National Conference which is dominated by one racial-ethnic group, hence the findings may not be generalizable to the experiences of IMS and URM medical students across the entire US nation. As a cross sectional study, we are only capturing the opinions of medical students at a point in time. Medical student opinions and views may evolve as they progress through medical school and these changes or trends are not captured by our study. Lastly another limitation of our study is that we are only capturing the perspective of students, it is important to see if the perspective of faculty mentors and advisors match with our findings. Nonetheless our findings clearly shed light that IMS values and needs are different from domestic URM students and it is important to look at these two medical student populations separately.



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## Figure Legends

### Figure 1.

**Title:** Acceptance rates of US citizens and non-US citizens into medical school

**Caption:** Acceptance rates of US citizens and non-US citizens applying to US medical schools from 2009-2018

### Figure 2.

**Title:** Specialty choice of respondents

**Caption:** Specialty choice of International and Underrepresented Minority medical students responding to the survey.

## Figures

Figure 1. Acceptance rates of US citizens vs Non-US citizens into medical school

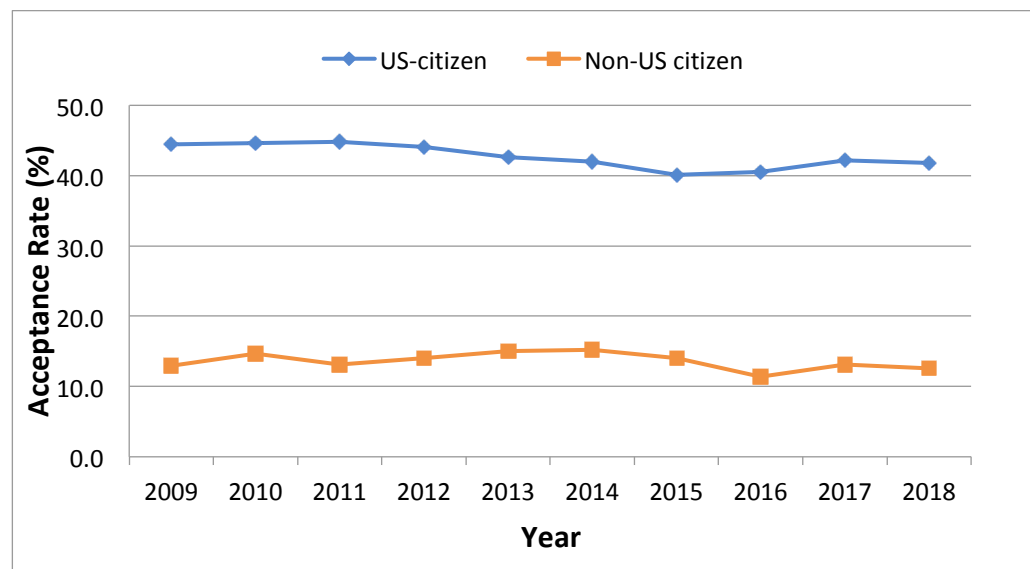
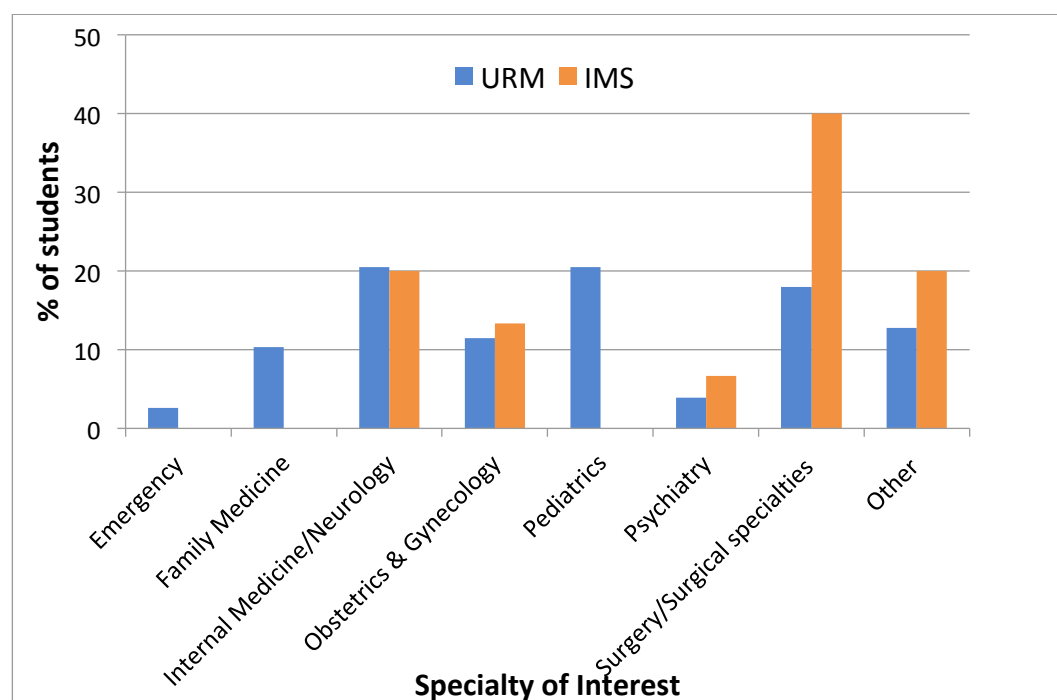


Figure 2. Specialty choice of the respondents





## Tables

**Table 1. Demographic characteristics of 96 respondents**

	IMS (N=15) n (%)	URM (N=81) n (%)	p-value
<b>Gender</b>			
Female	9 (60.0%)	57 (70.37%)	0.545
Male	6 (40.0%)	24 (29.63%)	
<b>Age</b>			
20-24	4 (26.7%)	20 (24.7%)	0.894
25-29	10 (66.7%)	50 (61.7%)	
30-34	1 (6.7%)	10 (12.4%)	
35-39		1 (1.23%)	
<b>Year</b>			
Pre-clerkship	3 (21.4%)	25 (30.9%)	0.72
Clerkship	5 (35.7%)	28 (34.6%)	
Post-clerkship	6 (42.9%)	28 (34.6%)	
<b>Currently applying for residency</b>			
Yes	6 (40.0%)	16 (19.8%)	0.102
No	9 (60.0%)	65 (80.3%)	
<b>Region of Origin</b>			
Africa	9 (60.0%)		n/a
Asia	2 (13.3%)		
Latin America	1 (6.7%)		
Middle East	1 (6.7%)		
Other	2 (13.3%)		
<b>Race or Ethnicity</b>			
African American/Black		21 (25.9%)	n/a
Asian American/Asian		11 (13.58%)	
American Indian/Native American		1 (1.23%)	
Latinx/Hispanic		34 (42.0%)	
Multiracial/multiethnic		14 (17.28%)	

IMS = International Medical Students, URM = Underrepresented Minority, n/a = Not applicable  
p-values were calculated using Chi-square or Fischer exact test.

**Table 2. Factors influencing specialty choice among IMS and URM medical students**

Factor	Mean $\pm$ SD		p-value
	IMS	URM	
Personal reasons	3.75 $\pm$ 1.22	4.30 $\pm$ 0.70	0.161
Intellectual challenge	3.50 $\pm$ 0.90	3.64 $\pm$ 0.89	0.394
Clinical/clerkship exposure	3.67 $\pm$ 1.37	3.83 $\pm$ 0.74	0.742
Lifestyle and work hours after residency	3.92 $\pm$ 1.16	3.82 $\pm$ 0.86	0.473
Financial rewards after training*	3.67 $\pm$ 1.15	2.88 $\pm$ 1.09	0.021
Future job opportunities in US	4.17 $\pm$ 0.94	3.71 $\pm$ 1.00	0.119
Future job opportunities in country of origin <sup>ξ</sup>	3.42 $\pm$ 1.62		n/a
Mentor in that specialty	2.83 $\pm$ 1.34	3.65 $\pm$ 1.06	0.054
Mentor with similar background	2.75 $\pm$ 1.54	3.41 $\pm$ 1.26	0.157
Ability to obtain a residency position	4.08 $\pm$ 0.79	3.71 $\pm$ 1.13	0.367
Ease of obtaining an employment visa <sup>ξ</sup>	4.00 $\pm$ 1.35		n/a
Prestige or specialty reputation*	3.09 $\pm$ 1.14	2.26 $\pm$ 1.01	0.020
Lifestyle and work hours during residency	3.00 $\pm$ 1.13	3.20 $\pm$ 1.04	0.719
Length of residency	2.92 $\pm$ 1.08	2.89 $\pm$ 1.12	0.954
Health needs of the community I grew up	3.17 $\pm$ 1.27	3.63 $\pm$ 1.31	0.210
Feeling welcome in that specialty	4.08 $\pm$ 1.08	3.94 $\pm$ 0.97	0.499
Having people I can relate to in that specialty	4.25 $\pm$ 1.22	3.97 $\pm$ 1.05	0.227
Academic career opportunities	4.17 $\pm$ 1.03	3.45 $\pm$ 1.30	0.071
Patient relationships/interaction	4.25 $\pm$ 0.97	4.29 $\pm$ 0.78	0.934

SD = Standard Deviation, IMS = International Medical Students, URM = Underrepresented Minority.

p-value were calculated using Mann Whitney test.

\*Denote variables with p-value < 0.05.

<sup>ξ</sup> Denotes variables that were only asked to international students.

**Table 3. Themes about why students changed specialty**

	Number of times mentioned (n)	Percentage of respondents (%)
<b>IMS (N=10)</b>		
Financial reward	4	40.0%
Exposure to specialty	4	40.0%
Mentors	2	20.0%
Lifestyle	2	20.0%
<b>URM (N=29)</b>		
Exposure to specialty	16	55.2%
Mentors	5	17.2%
Research	3	10.3%
Lifestyle	3	10.3%
Diversity	2	6.9%
Board Exams	2	6.9%

**Table 4. Perceived value of formal and informal mentors**

		Mean $\pm$ SD		p-value
		IMS	URM	
<b>Formal</b>	Academic advice	3.22 $\pm$ 1.09	2.82 $\pm$ 1.25	0.295
	Career planning	3.00 $\pm$ 1.22	2.76 $\pm$ 1.27	0.412
	Professional Development	3.11 $\pm$ 1.36	2.94 $\pm$ 1.27	0.626
	Personal Issues	3.44 $\pm$ 0.88	2.53 $\pm$ 1.42	0.051
	Research	2.67 $\pm$ 1.58	2.73 $\pm$ 1.41	0.878
	General guidance	3.44 $\pm$ 1.01	3.24 $\pm$ 1.25	0.664
	Total score	18.89 $\pm$ 5.60	17.02 $\pm$ 6.35	0.408
<b>Informal</b>	Academic advice	3.25 $\pm$ 1.28	3.13 $\pm$ 1.24	0.769
	Career planning	3.63 $\pm$ 0.92	3.40 $\pm$ 1.15	0.663
	Professional Development	4.00 $\pm$ 1.07	3.45 $\pm$ 1.14	0.190
	Personal Issues	3.38 $\pm$ 1.41	3.17 $\pm$ 1.39	0.704
	Research	3.50 $\pm$ 1.41	2.91 $\pm$ 1.38	0.283
	General guidance	3.88 $\pm$ 0.99	3.68 $\pm$ 1.02	0.773
	Total score	21.63 $\pm$ 4.44	19.74 $\pm$ 5.65	0.363

SD = Standard Deviation, IMS = International Medical Students, URM = Underrepresented Minority. p-value were calculated using Mann Whitney test.

**Table 5. Perceived quality of the most influential mentor**

Variable	Mean $\pm$ SD		p-value
	IMS	URM	
My mentor is accessible	4.38 $\pm$ 0.52	4.19 $\pm$ 0.85	0.736
My mentor is approachable	4.25 $\pm$ 0.71	4.54 $\pm$ 0.75	0.161
My mentor has similar career interests	3.50 $\pm$ 0.53	3.69 $\pm$ 1.18	0.407
My mentor acknowledges my unique experiences	3.50 $\pm$ 0.76	3.81 $\pm$ 1.27	0.263
My mentor acknowledges my unique challenges	3.50 $\pm$ 1.31	3.76 $\pm$ 1.26	0.554
My mentor provides useful advice, resources and support to help me with my unique challenges*	2.50 $\pm$ 1.07	3.64 $\pm$ 1.21	0.012
My mentor understands my professional and academic goals	4.00 $\pm$ 0.76	4.30 $\pm$ 0.95	0.160
My mentor understands my personal goals and interests	3.50 $\pm$ 1.20	4.08 $\pm$ 1.04	0.116
My mentor acknowledges my achievements and success	3.50 $\pm$ 0.53	3.83 $\pm$ 1.12	0.179
My mentor challenges me to extend my abilities	4.00 $\pm$ 0.53	4.21 $\pm$ 0.91	0.269
My mentor encourages me to consider doing my residency at my home institution	3.50 $\pm$ 1.31	3.27 $\pm$ 1.19	0.544
<b>Total Score</b>	<b>40.13 <math>\pm</math> 5.49</b>	<b>43.31 <math>\pm</math> 7.71</b>	<b>0.273</b>

SD = Standard Deviation, IMS = International Medical Students, URM = Underrepresented Minority.

p-values were calculated using Mann Whitney test

\* Denotes variable with  $p < 0.05$