The Effect of a Global Surgery Resident Rotation on Physician Practices Following Residency: The Mount Sinai Experience

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OBJECTIVE: The goal of the study was to evaluate the impact of Mount Sinai's international rotation on physician practices and attitudes following residency.

DESIGN: An anonymous, retrospective study was conducted using an email survey. The initial survey was sent out in July 2015 with a second opportunity in September 2015.

SETTING: Mount Sinai Hospital, New York City.

PARTICIPANTS: All 62 graduates of the Mount Sinai General and Plastic Surgery residencies who participated in the international rotation over the last 10 years.

RESULTS: The primary outcome was level of involvement in service medicine with a secondary outcome examining participants views on the value of international rotations during residency. The response rate for the survey was 71% (44/62). Since leaving residency, 53% have been involved in one or more types of service medicine, 59% have been involved in at least one experience practicing medicine in an underserved area and 45% state that their current practice incorporates global surgery or service. 61% report that the rotation encouraged an interest in practicing in an underserved area and 44% (8/18) of those with no prior interest in global health reported that the rotation encouraged an interest. Respondents generally believe global health work could be rewarding (89%), provide opportunity for professional development (77%), and that residency should include global health electives (93%).

CONCLUSIONS: Our results suggest that a mandatory global health rotation may encourage an interest in service medicine. Thus, program directors should continue to provide and encourage participation in international rotations during surgical residency. (J Surg Ed 76:480–486. © 2018 Association of Program Directors in Surgery. Published by Elsevier Inc. All rights reserved.)

KEY WORDS: Global surgery, International surgery, International rotation

COMPETENCIES: Professionalism, Practice-Based Learning and Improvement, Systems-Based Practice

INTRODUCTION

The Lancet Commission on Global Surgery found that nearly 5 billion people lack access to safe, affordable surgical and anesthesia care and that 9 out of 10 people in low-income and lower-middle income countries lack access to basic surgical care.[1] The WHO recognizes that access to basic surgical care is an increasingly essential priority in addressing global health needs.[2] Academic surgical centers have a critical role to play in addressing these needs.[3] In response to these needs, many general surgery residencies have begun incorporating international rotations into their curriculum. Residents and program directors have also been increasingly interested in electives in global surgery.[4,5] As of April 2015, as many as 86 out of 253 residencies had some form of international experience available to residents.[6] Often cited benefits of such programs include learning in resource poor settings, exposure to diverse pathology, improved history, and physical exam skills with less reliance on technology, improved understanding of systems-level barriers to surgical care, and cross-cultural training.[7-10]

However, little research to date has analyzed the long-term impacts of such programs on the participant's ultimate career choice with only one such

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study in the literature to date. The study examined the impacts of a global surgery elective in a low or middle-income country on residents of Temple University. It found that both residents and graduates strongly agreed on the value of global surgical electives during training, but few were able to incorporate global surgery into their practice.[11]

The Mount Sinai international rotation is a particularly useful example to study. First, the program is one of the largest. One review of general surgery residency programs found that of the 86 programs with international experiences available to residents, 23 met the highest level of participation gauged by the survey with greater than 5 residents having participated by the time of survey.[6] Since the beginning of the Mount Sinai rotation 10 years prior, 62 residents have participated. Second, the international rotation at Mount Sinai is integrated into the curriculum so that all residents are required to participate. Most other international rotations are conducted on an elective basis and thus subject to particular selection bias. To the best of our knowledge, this is the only international rotation with required participation.

A prior study examined the initial process for establishing this rotation and partnership and reports many of details of the Mount Sinai experience. In brief, PGY3 general and plastic surgery residents at Mount Sinai participate in a mandatory 4-week rotation in the town of San Cristobal, Dominican Republic. The Juan Pablo Pina Hospital, located there, is a 250-bed public hospital servicing largely underprivileged patients from both the urban and surrounding rural areas. Residents perform a balance of emergent and elective cases with very limited resources.[12] The study reported positive experiences by the residents who participated in the pilot and demonstrated that while it is resource intensive to establish such a program, it can be accomplished and can be mutually beneficial for the residents and community they serve.

The purpose of the current study is to follow up on the long-term impacts of the rotation on participants. In particular, this study sought to examine the impact of the international surgical rotation on participants' ultimate career choices in service medicine.

METHODS

Study Population

All general and plastic surgery residency graduates (n = 62) of the Mount Sinai Health System who participated in the international rotation in the Dominican Republic over the last 10 years were included in the study. A list of past residents was obtained from the Departments of General and Plastic Surgery. After approval from Mount Sinai Hospital's Institutional Review Board, the survey was emailed and anonymously completed by participants.

Survey Design

This retrospective study was conducted using an anonymous email survey. The survey instrument consisted of 21 items. At the time of survey creation, there were no other surveys examining long-term outcomes after an international surgical rotation in the literature. However, there have been surveys examining long-term outcomes after an international rotation in Internal Medicine. One such study from Yale was used as a basis for several of the questions.[13] Basic demographic data were collected. Questions were multiple choice, long answer format, or based on a 5-point Likert scale. Practice setting (urban or rural), degree of involvement with underserved populations, as well as attitudes about global health rotations were assessed. The responses were collected via Google forms into a spreadsheet on Google documents. The initial survey was sent out in July 2015 with a second opportunity to complete the survey again in September 2015.

Statistical Analysis

Descriptive statistics to characterize the study population and their answers were completed. All statistical analyses were completed in Microsoft Excel.

RESULTS

Demographics

The response rate was 77% (n = 44). Respondents were predominantly male (n = 25, 57%) and white (n = 24, 55%) (Table 1). The mean (SD) age of respondents was 37 (3.66). Eighty-one percent (n = 36) were general surgery residents, and 16% (n = 7) were plastic surgery residents. The most popular fellowships were pediatric surgery (n = 7) or no fellowship (n = 7) (Table 1).

Practice Characteristics

The majority of residents practiced in urban environments (n = 40, 91%) and in academic medical centers (n = 33, 75%). Seventy-three percent (n = 32) of respondents had greater than 20% of patients on public assistance. Eight percent (n = 18) had greater than 20% of patients who were substance abusers (Table 2). The most common activities engaged in were charity medicine (n = 14, 32%) and outreach or advocacy (n = 11, 25%). Forty-eight percent (n = 21) of former residents were not involved in any service medicine activities. Before residency, 66% (n = 29) of respondents had 1 or more experiences practicing medicine in an

TABLE 1. Demographics

Characteristic	n (%)
Gender	
Male	25 (57)
Female	18 (41)
Unspecified	1 (2)
Self-identified race	
White	24 (54)
Asian	12 (27)
Black or African American	3 (7)
Middle Eastern/Egyptian	2 (5)
Hispanic or Latino	1 (2)
Mixed race	1 (2)
Blank	1 (2)
Residency training	
General surgery	36 (81)
Plastic surgery	7 (16)
Both	1 (2)
Fellowship	
Pediatric surgery	7 (16)
None	7 (16)
Colon and rectal surgery	5 (11)
Bariatric surgery	5 (11)
Endocrine surgery	4 (9)
Surgical critical care	4 (9)
Thoracic surgery	2 (5)
Craniofacial surgery	2 (5)
Hand surgery	2 (5)
Plastic and reconstructive microsurgery	2 (5)
Transplant surgery	1 (2)
Breast surgery	1 (2)
Complex general surgical oncology	1 (2)
Hepatobiliary surgery	1 (2)

underserved area; after residency, 59% (n = 26) of respondents had 1 or more experiences (Table 2).

Involvement in Service Medicine

Over half of respondents are or have been involved in some type of service medicine. Specifically, 45% (n = 20) of respondents incorporated global surgery or service into their practice (Table 2) and 53% (n = 23) of respondents are involved in 1 or more types of service medicine. Additionally, 59% (n = 26) have been involved in at least 1 experience practicing medicine in an underserved area. The results also show a wide range of involvement from no incorporation of global surgery or service medicine in their practice to engagement in multiple different types of service medicine (Table 2).

Fifty-nine percent (n = 26) of respondents stated that they had an interest in practicing medicine in an underserved area (Table 3). Sixty-one percent (n = 27) of respondents also stated that the program encouraged an interest, and even 44% (n = 8) of those without any prior interest stated that the program encouraged an interest in such practice. If traveling to the Dominican Republic with the Mount Sinai Residency encouraged an interest, those respondents were significantly more likely to incorporate global surgery or service into their practice and vice versa (Table 3). Of note, 6 out of the 8 or 75% of those without a prior interest for whom the program encouraged an interest went on to incorporate global surgery or service.

Qualitative Analysis

Respondents gave varied responses describing how and why Mount Sinai's rotation did or did not encourage an interest with several remarks categorized in Figure 1. Some of the comments from residents for whom the rotation increased an interest centered on how the rotation increased their awareness of the immense need in underserved areas and the scarcity of resources. Others focused on how the rotation reinforced notations of humanism and service. Some of the comments from those for whom the program did not encourage an interest demonstrate some of the challenges of international electives and the need for further development and improvement.

Attitudes

Ninty-three percent (n = 40) felt that residencies should include global health electives and 87% (n = 38) believed global health work could be rewarding. Seventy-seven percent (n = 61) felt that practicing in a developing country provides the opportunity for professional development. Sixty-one percent (n = 27) of residents felt the rotation encouraged interest in practicing in an underserved area. Forty-four (n = 8) of residents who had no prior interest in practicing in an underserved area reported that the rotation encouraged an interest and 55% (n = 10) eventually incorporated global surgery, or service into their practice.

DISCUSSION

Many residency programs and medical schools offer international rotations in low- and middle-income countries. These rotations often provide educational benefits such as diverse pathology, development of clinical reasoning skills in resource poor settings, and cross-cultural training.[7-10] However, very few studies of examined the impact of these rotations on ultimate career choices. The Mount Sinai program provides a unique example study as it has one of the largest sample sizes with 62 graduates and to our knowledge is the only international rotation required for all residents, thus mitigating the selection bias inherent to voluntary electives.

Based on our survey results, over half of respondents are involved in some type of service medicine (n = 23,

TABLE 2. Engagement in Service Medicine

Survey Item	n (%)
Practice location	
Urban	40 (91)
Both	3 (7)
Rural	1 (2)
In what setting do you practice?*	
Academic medical center	33 (75)
Private practice/HMO	8 (18)
Community cancer center	1 (2)
Public health	1 (2)
City hospital	2 (5)
Fellowship	2 (5)
Do a significant portion of your patients (greater than 20%) have the following characteristics?*	
Patients on public assistance (e.g. Medicaid)	32 (73)
None of these characteristics	12 (27)
Patients who are substance abusers	8 (18)
Patients infected with HIV	3 (7)
Does your practice incorporate global surgery or service?	
Yes	20 (45)
No	24 (55)
Since leaving residency have you been involved in the following?*	
None	21 (48)
Charity medicine	14 (32)
Outreach or advocacy	11 (25)
Practicing medicine in a developing country	9 (20)
International public health work	6 (14)
Research on health disparities or public health	5 (11)
NGO work	2 (5)
Before entering residency at Mount Sinai did you participate in 1, 2, 3, or more than 3 experiences that involved practicing medicine in an underserved area?	10 (23)
3 or more	3 (7)
2	16 (36)
1	15 (34)
0	
Since you left Mount Sinai did you participate in 1, 2, 3, or more than 3 experiences that involved practicing medicine in an underserved area?	
3 or more	7 (16)
2	1 (2)
1	18 (41)
0	18 (41)

*Multiple answers possible.

52%), have participated in at least 1 experience practicing medicine in an underserved area (n = 29, 66%), and close to half (n = 20, 45%) have specifically incorporated global surgery or service into their practice. The majority of respondents (n = 27, 61%) also reported that participating in Mount Sinai's global health rotation encouraged an interest in practicing medicine in underserved areas. The study even seems to suggest that such a rotation can not only provide exposure for those interested in service medicine but can also encourage an

TABLE 3. Attitudes About Service Medicine

Survey Item	n (%) Agree	Neutral	Disagree
Practicing in a developing country could be a rewarding experience	39 (89)	2 (5)	3 (7)
Practicing in a developing country provides the opportunity for professional development	34 (77)	4 (9)	6 (14)
Medical school training should include exposure to health care in developing countries	32 (73)	7 (16)	5 (11)
Residency training should include voluntary electives in developing countries	41 (93)	2 (5)	1 (2)

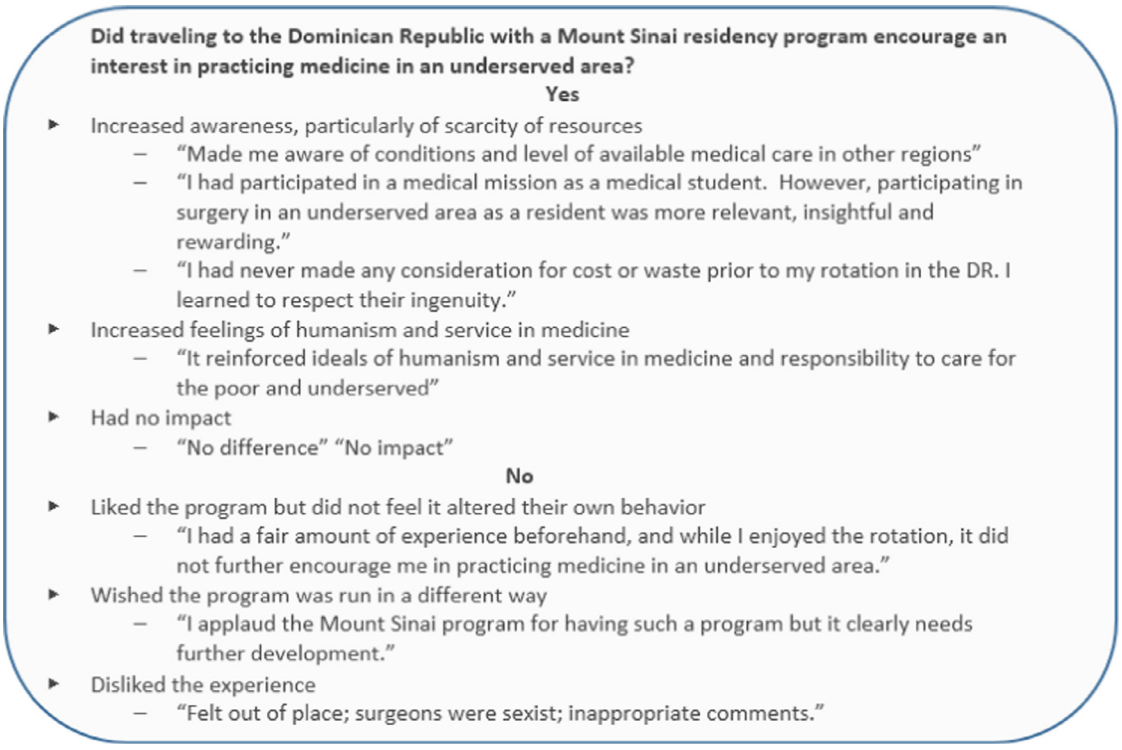

FIGURE 1. Qualitative assessment of why or how the program did or did not encourage an interest in practicing medicine in an underserved area.

interest in service medicine. In those with no prior interest, 44% (n = 8) reported that the trip encouraged an interest and of those 8, 6 went on to incorporate global surgery or service into their practice (Table 3). Many reported qualitatively that the trip increased their awareness of medical need in these countries and that the trip increased their sense of humanism and responsibility to care for those in need. It is important to note that several residents felt the program did not encourage an interest and even noted potential challenges of such a program such as sexism or wishing the program were structured differently (Fig. 1).

Even so, the large majority of participants viewed the experience positively and felt that such opportunities should be available to residents (Table 4). Specifically, 93% (n = 41) felt that residencies should include voluntary electives in developing countries. This suggests a strong interest in global surgery experiences among residents.

In comparing our study results to the existing literature, it is important to note that to our knowledge there is only one other such study examining the long-term impact of an international rotation on participants. The study of Temple University graduates found that 17% of graduates provide surgical care internationally.[11] Our study found a significantly higher percentage with 44% of respondents incorporating global surgery or service into their practice. However, comparisons are somewhat limited as our questionnaire did not explicitly differentiate between surgical care and general global health service which could explain the difference. There are also key differences in the nature of the rotation as voluntary versus mandatory and number of participants among other potential cofounders.

TABLE 4. Perceived Impact of Global Health Rotation

Survey Item	n (%) Yes	No
Did traveling to the Dominican Republic with a Mount Sinai residency program encourage an interest in practicing medicine in an underserved area?	27 (61)	17 (39)
Did you have an interest in practicing medicine in an underserved area before traveling to the Dominican Republic?	26 (59)	18 (41)

The major limitation of this study is a lack of a comparison group, making it difficult to assess the impact of this program on practice choices. Furthermore, the majority of the respondents (n = 26, 59%) report being interested in practicing in underserved areas before their global health experience with Mount Sinai. Thus, while the rotation is mandatory and avoids some of the selection bias of voluntary electives, there is the potential for selection bias in that having such a rotation available may be more likely to attract residency applicants who are interested in global health. The study is also retrospectively assessing attitudes before and after the global health experience, rather than prospectively collecting surveys before and after residents participated in the global health experience. As is the case with many surveys, the data collected are also subject to respondent recall bias. Lastly, in retrospect, further questions assessing the challenges or negative aspects of the rotation would have been useful. Further research across other institutions and data collected prospectively would be valuable.

Overall, it is noteworthy that the majority of graduates from Mount Sinai's surgical residency programs are involved in service medicine or global surgery, believe that participating in a mandatory global health elective in the Dominican Republic encouraged this interest and the overwhelming majority of residents feel that rotations in developing countries should be available. These results should encourage program directors to continue to provide and encourage participation in international rotations both for the more immediate educational benefits and for the potential long-term impacts such rotations may have on participants.

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REFERENCES

1. Meara JG, Greenberg SL. The Lancet Commission on Global Surgery Global surgery 2030: evidence and solutions for achieving health, welfare and economic development. *Surgery*. 2015;157:834–835. https://doi.org/10.1016/j.surg.2015.02.009.

2. Debas HT, Gosselin R, McCord C, et al. Surgery. In: Jamison DT, Breman JG, Measham AR, et al., editors. Disease Control Priorities in Developing Countries. 2nd edition. Washington (DC): The International Bank for Reconstruction and Development / The World Bank; 2006. Chapter 67. Available from: https://www.ncbi.nlm.nih.gov/books/NBK11719/Co-published by Oxford University Press, New York

3. Raghavendran K, Misra MC, Mulholland MW. The role of academic institutions in global health. *JAMA Surg*. 2017;152:123. https://doi.org/10.1001/jamasurg.2016.3107.

4. Powell AC, Mueller C, Kingham P, Berman R, Pachter HL, Hopkins MA. International experience, electives, and volunteerism in surgical training: a survey of resident interest. *J Am Coll Surg*. 2007;205:162–168. https://doi.org/10.1016/j.jamcollsurg.2007.02.049.

5. Mitchell KB, Tarpley MJ, Tarpley JL, Casey KM. Elective global surgery rotations for residents: a call for cooperation and consortium. *World J Surg*. 2011;35(12):2617–2624. https://doi.org/10.1007/s00268-011-1311-4.

6. Sobral FA, Bowder AN, Smith L, Ravipati A, Suh MK, Are C. Current status of international experiences in general surgery residency programs in the United States. *SpringerPlus*. 2016;5. https://doi.org/10.1186/s40064-016-2270-x.

7. Cintolo-Gonzalez JA, Bedada AG, Morris J, Azzie G. An international surgical rotation as a systems-based elective: the Botswana-University of Pennsylvania surgical experience. *J Surg Educ*. 2016;73:355–359. https://doi.org/10.1016/j.jsurg.2015.09.019.

8. Ozgediz D. Surgical training and global health. *Arch. Surg*. 2008;143:860. https://doi.org/10.1001/archsurg.143.9.860.

9. Ozgediz D, Roayaie K, Debas H, Schecter W, Farmer D. Surgery in developing countries. *Arch Surg*. 2005;140:795. https://doi.org/10.1001/archsurg.140.8.795.

10. Thompson MJ, Huntington MK, Hunt DD, Pinsky LE, Brodie JJ. Educational effects of international health electives on U.S. and Canadian medical students and residents. *Acad Med*. 2003;78:342–347. https://doi.org/10.1097/00001888-200303000-00023.

11. Harfouche M, Maher Z, Krowsoski L, Goldberg A. Global surgical electives in residency: the impact on training and future practice at Temple University

Hospital. *Ann Global Health*. 2016;82:421. https://doi.org/10.1016/j.aogh.2016.04.172.

12. Silverberg D, Wellner R, Arora S, et al. Establishing an international training program for surgical residents. *J Surg Educ*. 2007;64:143–149. https://doi.org/10.1016/j.jsurg.2006.12.002.

13. Gupta A, Bia F, Horwitz R, Barry M, Well C. The international health program: the fifteen-year experience with Yale University's Internal Medicine Residency Program. *Am J Trop Med Hyg*. 1999;61:1019–2023. https://doi.org/10.4269/ajtmh.1999.61.1019.

SUPPLEMENTARY INFORMATION

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