

## Affecting the Global Burden of Surgical Disease: Incorporating Surgical Training into International Missions: A Systematic Review

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### Abstract

The global burden of surgical disease is immense. Increasingly in the past several decades, international humanitarian medical missions have become more popular as a method of managing the sheer volume of patients requiring medical care worldwide. Medical education programmes have also had an increase in interest amongst medical students and surgical residents to participate in missions during training. The current review was planned to present the current body of literature on international experiences in residency training programmes. It comprised relevant literature obtained from Medline (PubMed) using Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. A total of 15 publications were reviewed with each falling into one of the three identified categories: programme design (goals/objectives), ethics, and post-experience analysis. The benefits of providing international missions opportunities for surgical trainees cannot be understated.

**Keywords:** Global surgery, Surgical training, International missions, International electives.

### Introduction

There is an immense global burden of surgical disease that, with medical advancements, improvements in travel, and globalisation, can no longer be ignored. Research suggests that surgical disease represents 11% of the global burden of disease, with an estimate that nearly 70% of the world does not have access to safe, affordable surgical care.<sup>1</sup> Therefore, there is a great need for surgeons worldwide to provide this highly trained skill to millions who would otherwise have no access to surgical care.

In 2010, 16.9 million people died from conditions requiring surgical care, which is more than the number who succumbed to human immunodeficiency virus/acquired immune deficiency virus (HIV/AIDS),

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tuberculosis (TB) and malaria combined.<sup>2</sup> Much of the global burden of surgical disease does not require multi-disciplinary management, such as is necessary for malignant states. For this reason, short-term mission opportunities have the ability to provide considerable medical services to resource-limited populations worldwide. These disease states are where international missions' endeavours have made the largest impact. International mission is not a new concept for this generation, although there has been a significant amount of literature published in the last decade where prior to this time, there was very little. There has, in the past two decades, been a shift in interest to addressing the needs of the underserved worldwide, which has largely driven the growing body of literature published on global health topics. Whether from the perspective of epidemiologic and public health topics or education and training, there is a developing interest in researching the globally underserved. Using international mission opportunities to enrich medical and surgical education, especially in an organised training setting, is a relatively new concept and one that is gaining steam throughout the developed world.

There has been an interest in exposing medical professionals in training to humanitarian missions for several reasons. The most notable motives include cultural competency, expansion of exposure to certain medical conditions, and less celebrated experience with autonomy. Cultural competency is a topic of great concern due to the globalisation of all the developed countries.<sup>3</sup> The "melting pot" descriptor historically used to describe the United States of America is now true for every major country. For this reason, medical professionals must be exposed to cultural and ethnic norms which are completely foreign to their reality. Additionally, there are many medical conditions and surgical experiences which are common in other parts of the world, but may be relatively rare at the student's home institution. Hence, international experiences can be used to supplement training experiences.

Interestingly, there is also a considerable amount of interest amongst trainees. A survey of 724 American College of Surgeons (ACS) resident members demonstrated that 92% of respondents were interested in an international elective and that 73% would be willing to use vacation time to participate in such experiences even if the operative cases did not contribute to their graduation requirements.<sup>4</sup>

There have been no prior reviews of published literature related to the topic of incorporating international mission into surgical training at level of a medical student or residency training. This review was planned to present an overview of the array of published literature on the topic in order to assess goals and objectives for an international elective with programme design, evaluation of ethical responsibilities, and post-experience survey results. Through analysis of previously published data, a more informed perspective on where to proceed next in the evaluation of surgical training and international missions can be ascertained.

## Material and Methods

The systematic review of literature pertaining to international missions and surgical training was performed. Exemption from ethical permission for the institutional review board was obtained through Medical City Healthcare (Dallas, Texas, USA). This study did not qualify for registration with International prospective register of systematic reviews (PROSPERO) as the data did not have a direct link to human health. The search was conducted on the Medline (PubMed) database using the following key terms: "international missions", "surgical residency training" and the combination of the two terms. There was no language restriction or filter. A single reviewer retrieved and analysed each selected study.

The studies included were published in or after 1988, and were available in full text form. Those excluded were presentations of personal experiences with international missions only; had no element of surgical training in study design or execution; involved military or dental training programmes; and pertained to education of local host-institution surgeons.

Data included both qualitative and quantitative information. All qualitative findings were directly presented. No additional analysis was performed.

Publication bias is a legitimate possibility in these studies, as institutions with international elective experiences that failed soon after its initiation are unlikely to be published. Additionally, those studies where larger numbers of respondents reported negative experiences would be less likely to be submitted for publication.

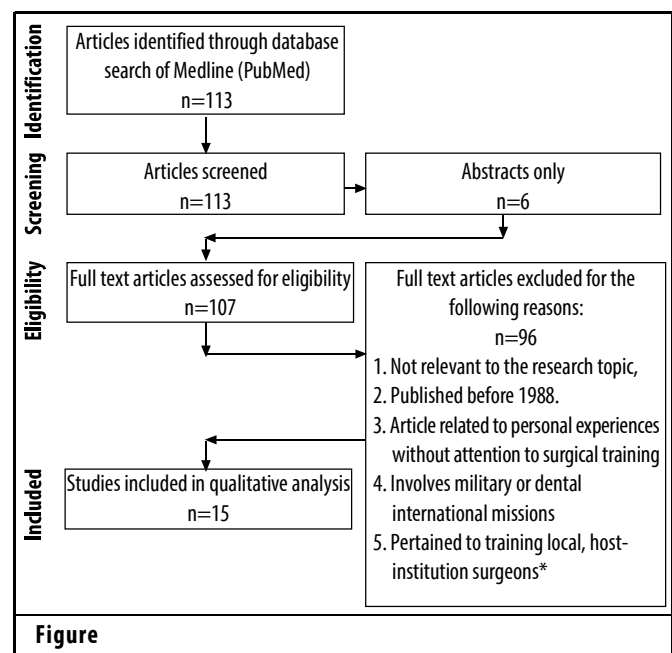
## Results

A total of 114 articles were initially found. After exclusion on various counts, 15(13.2%) articles were selected for detailed review (Figure).

Of the 15 studies, 6(40%) focussed on the course design, including goals and objectives; 2(13.3%) addressed ethical considerations; 1(6.6%) evaluated the implications of case volume; and 6(40%) presented post-experience analysis through surveys of surgical subspecialty programme directors and surveys of participants in international experiences (Table 1).

## Course Design

As a true "international elective", it is important to evaluate design of the programme along with its goals and objectives. Toole et al.<sup>5</sup> from Wake Forest University describe their experience with international electives for medical students presenting the vast opportunities they provide their students. There are fifty host nations for these electives, along with 112 active international missionaries who have been trained at Wake Forest



University. Electives are available for senior medical students for a maximum of 8 weeks. There are various

funding sources which have been developed over the nearly 8 decades of the University's involvement in

**Table-1**

ID	Author	Topic of Study	
1	Butler, M et al. <sup>6</sup>	Program/Training Protocol	Mission Volunteer Guidelines <ul style="list-style-type: none"> <li>Clarify roles of all participants – for trainees, their abilities should be assessed prior to the trip and appropriately utilized to provide the best care for patients and the best experience for the trainee</li> <li>Pre-departure preparation should include cultural sensitivity and ethics emphasis and consider professional conduct agreement for all volunteers</li> </ul>
2	Taro, T et al. <sup>7</sup>	Program/Training Protocol	International experience for Tsao Fellowship in Global Health includes elements of a) education (international missions), b) research, and c) service.
3	Howe, KL et al. <sup>11</sup>	Ethics	Ethical Checklist for International Surgery
4	Chin-Quee, A et al. <sup>8</sup>	Program/Training Protocol	Learning Objectives include: <ul style="list-style-type: none"> <li>Medical knowledge and patient care</li> <li>Interpersonal and communication skills</li> <li>Professionalism</li> <li>Practice-based learning and improvement</li> <li>Systems-based practice</li> </ul>
5	Toole, JF et al. <sup>4</sup>	Program/Training Protocol	Various available rotation sites throughout the world; Electives for a) senior medical students, b) for at least 8 weeks, and c) are closely supervised; Funding sources were identified and secured from various sources
6	Brown, HS et al. <sup>9</sup>	Program/Training Protocol	Clearly defined goals/objectives are imperative, a 'frank self-assessment' is critical.
7	Melby, MK et al. <sup>12</sup>	Ethics	Four core principles to guide ethics in STEGHs: <ul style="list-style-type: none"> <li>Skills building in cross-cultural effectiveness and cultural humility</li> <li>Bidirectional participatory relationships</li> <li>Local capacity building</li> <li>Long-term sustainability</li> </ul>
8	Campbell, A et al. <sup>18</sup>	Post-Experience Survey	100% resident physicians report positive impact of international surgical mission; 94.7% reported marked personal growth
9	Yao, CA et al. <sup>17</sup>	Post-Experience Survey	55% of surveyed surgeons currently participate in medical missions
10	Tannan, SC et al. <sup>16</sup>	Post-Experience Survey	60% of graduates who participated in international mission training continued on to participate after completion of training (compared to 5.9% who did not participate in missions during training)
11	Boyd, NH et al. <sup>14</sup>	Survey	93% of medical student respondents had a 'strong' desire to participate in an international elective during residency
12	Ho, T et al. <sup>15</sup>	Training Survey	23/31 program sponsor international mission trips, however there is a need for uniformity in program design, goals, and objectives
13	Cook, M et al. <sup>20</sup>	Post-Experience Survey	Identified Educational Needs while on mission <ul style="list-style-type: none"> <li>Formal didactics</li> <li>Increased clinical mentorship</li> <li>Longer-term presences</li> <li>Equitable distribution of teaching time</li> <li>Improved coordination and language skills</li> <li>Reciprocal exchange rotation at US hospitals</li> </ul>
14	White, CP et al. <sup>10</sup>	Program/Training Protocol	Adaptation of the CanMEDS Competencies in international training experiences including: <ul style="list-style-type: none"> <li>Communication</li> <li>Collaboration</li> <li>Health Advocacy</li> <li>Scholarship</li> <li>Professionalism</li> <li>Management</li> <li>Medical Expertise</li> </ul>
15	Bale, AG et al. <sup>13</sup>	Case Volume Review	Residents participated in an average of 25 major cases per 5-7 day mission trip. Sixty-five (65) percent operations were representative of index cases in categories where the study program fell below national averages.

**Table-2****Ethical Checklist for International Surgery****Before Mission**

- Has a needs assessment been done? (e.g. location, services, barriers, applicability)
- Has there been communication with the host country to discuss feasibility?
- Should there be a site visit to determine individual/community/institutional commitment?
- Has there been a comprehensive discussion regarding expectations, goals, and objectives?
- Has an appropriate team been selected and prepared?
- Is there support for the mission from colleagues/institutions/family?
- Has sponsorship been declared by both parties?

**During Mission**

- Is there an ongoing needs assessment?
- Is there open communication about objectives and sustainability?
- Is there an open dialogue about case selection, consent, operation room arrangements, etc.?
- Is there knowledge/skills translation? (e.g. direct involvement of host staff in performing procedure)
- If we are leaving equipment behind, is there adequate technical support?

**After Mission**

- Is there ongoing communication? (e.g. patient outcomes, pathology, complications)
- Is there evidence of sustainability?
- Is everyone satisfied that the goals and objectives have been met?
- Is there a plan to return?

Adapted from Howe, et al.<sup>11</sup>

international missions.

Butler et al.<sup>6</sup> has given a comprehensive analysis of the process by which a university programme would take to establish, prepare and execute a successful paediatric surgery programme at an international medical centre. Of any publication on the topic, Butler's is the most comprehensive analysis of this process, offering pre-trip considerations, a rather detailed checklist of necessities at the visiting institution, and a mention of post-experience evaluation needs.

Taro et al.<sup>7</sup> presented their experience with establishing Tsao Fellowship in Global Health, a programme designed for plastic surgery residents. This fellowship is designed as a two-year curriculum which includes the completion of a Master of Science degree in clinical and biochemical investigations, research involvements, and international operative training through surgical missions and hospital exchanges. Although no evaluation of this programme has been published, the authors recognised the necessity of evaluation to identify areas of success and improvement.

Chin-Quee et al.<sup>8</sup> presented their experience with the surgical elective sponsored by their institution to rural Haiti. They presented learning objectives, including medical knowledge and patient care, interpersonal and communication skills, professionalism, practice-based

learning, and improvement, and systems-based practice. To bolster the medical education and patient care element, medical students are required to attend suture labs and familiarise themselves with relevant surgical anatomy and common surgical procedures prior to departure. Students were expected to adhere to the Emory School of Medicine Code of Conduct to meet the requirement of professionalism while in Haiti. Finally, students were expected to participate actively in the surgical team, including obtaining an adequate history and physical examination, presenting this information to surgeon preceptors with a well-thought-out differential diagnosis, and plan of care.

Brown et al.<sup>9</sup> presented their experience with Surgical Eye Expeditions International with 20 years' experience performing more than 260 eye surgeries annually. In establishing a programme, the authors expressed the significance of clearly defined objectives, specifically ensuring personal needs match professional goals. Additionally, post-trip evaluations are essential to improve subsequent experiences.

White et al.<sup>10</sup> presented their framework for international plastic surgery missions using the Canadian Medical Education Directions for Specialists (CanMEDS) competencies. CanMEDS is a format of medical education that has become standard for Canadian institutions and a Royal College accreditation requirement for all specialty training programmes. The competency elements include medical expert, communicator, collaborator, manager, health advocate, scholar and professional. Incorporating these competencies led to the authors' belief that international rotations provide a valuable resource for teaching and learning. These experiences allowed learning of medical expert knowledge and technical skill, as well as providing a setting for instilling less tangible competencies that are often challenging to teach at home.

### Ethical Considerations

Howe et al.<sup>11</sup> presented a rather comprehensive overview of ethical considerations related to international surgical education. Venue-related issues include surgical versus primary care, location, sustainability, misrepresentation, informed consent, unfair expectations, operating room circus, misapplication of teachings, and determining the end-point. Visitor-related issues include team selection, the 'white knight' syndrome, unmet needs at home, roles

of sponsors and funding, expired equipment, taxing of local resources, bidirectional sensitivity, doing second best, and personal gain. Through these identified issues an ethical checklist of various questions is presented (Table 2) The authors suggested that this ethical checklist can be used as a paradigm for planning, executing, and providing ongoing support for international surgical education missions.

In the same vein, Melby et al.<sup>12</sup> presented a similar overview of four core principles to guide ethical development of short-term experiences in global health: 1) skills building in cross-cultural effectiveness and cultural humility; 2) bidirectional participatory relationships; 3) local capacity buildings; and 4) long-term sustainability. Due to growing interest in short-term experiences, these programmes should refocus on impact on host communities as well as limitations of short-term trainee activities and longitudinal institutional-level engagement.

### Case Volume Implications

A single paper presented information on case volume of resident participants. Bale, et al.<sup>13</sup> evaluated their resident participation in international missions provided through the programme with trips to Philippines and Sierra Leone. A total of seven residents participated in three missions. These residents participated in a total of 181 operations during their trips collectively. They argued that resident participation in international missions had the potential to be used as a supplement for low case volumes as 65% of the total cases represented index cases in categories in which their programme fell below the national averages.

### Pre- and Post-Experience Analysis

Boyd et al.<sup>14</sup> presented the results of their study of 55 of the 307 otolaryngology residency applicants. Of them, 55% respondents completed an international elective during or prior to medical school and 93% had a 'strong' or 'very strong' desire to participate in an international elective during residency. They concluded that an international surgery elective is an important option within their subset of applicants though it did not appear to affect residency programme selection.

Ho et al.<sup>15</sup> presented findings from 31 plastic surgery programme directors which included 13 programmes where a formal international elective is offered. All these

experiences are supervised by faculty. Only 35% of these programmes meet Residency Review Committee (RRC) requirements so that cases count for resident procedure requirements. They concluded that many programmes were offering these electives, although there appears to be a lack of uniformity and administrative support. They recommended a dynamic, centralised database where interested residents and programmes can seek out surgical experiences in a standardised fashion.

Tannan, et al.<sup>16</sup> surveyed their residency graduates from 1990 to 2011 with a total of 44 graduate respondents (95.7% response rate). They found that participation in international missions during residency significantly increased the likelihood of participation while in practice, with 60% of respondents who participated in international missions while in residency also undertaking a trip or trips once in practice for more than five years. This is compared to 7.41% of graduates who did not participate in international missions during residency but later participated after more than five years of practice.

Yao, et al.<sup>17</sup> surveyed Plastic Surgery fellows with an overall response rate of 79.3%. Of the 165 respondents, 100% reported a positive experience in that they would volunteer again. Additionally, the vast majority of respondents reported that it positively impacted their core competences in patient care, medical knowledge, practice-based learning and improvement, interpersonal and communication skills, professionalism and system-based practice.

Campbell, et al.<sup>4,18</sup> postulated that participants in volunteerism endeavours would develop a unique understanding of the global burden of surgical disease, a deeper appreciation for global public health issues, and increased cultural sensitivity. Through their involvement with Operation Smile, 19 participants completed surveys, with 100% respondents reporting an overall positive impact on their lives. Additionally, 94.7% respondents replied that international surgical mission experiences should be available to all plastic surgery residents.

### Discussion

International surgical missions are an important component in efforts to reduce global health disparities.<sup>14</sup> As the world's population grows, so will the incidence of disease, both medical and surgical. For many locations in

the world, access to adequate, safe medical care is not available, not to mention access to adequate surgical care. Surgical missionaries have, in the past, and increasingly in the present, have had a positive impact on the severe global surgery disparities.

The impact of international missions on the professional development of surgeons in training cannot be understated. Several prior studies have presented the benefits of such endeavours on medical students and residents, including improved cultural competency and sensitivity, increased career interest in public health and volunteerism in the surgeons' own communities and improved clinical and surgical skills.<sup>16</sup> In conjunction with these benefits, other organisations also focus on providing trainees an understanding of complex medical logistics and planning in humanitarian missions and different health systems that will help them to gain an altruistic view in caring for patients in constrained environments.<sup>15</sup>

The growing body of literature on the topic of global surgery, as well as international missions experiences as an adjunct to surgical training, suggest that there will be considerable discussion in the future on these topics. As more training programmes adopt international elective opportunities for their residents, it will become more important to establish guidelines for these endeavours; guidelines which are best developed from the governing body level than non-standardised at the institution level. Six core principles for effective and ethical short-term medical missions developed by Lasker, et al. which should be considered when establishing the aforementioned guidelines include: a) appropriate recruitment, preparation and supervision b) a host partner that defines the programme, c) sustainability and continuity of programme, d) respect for governance, legal, and ethical standards, and e) regular evaluation of programmes.<sup>19</sup>

There are considerable misconceptions regarding the participation of medical residents in international missions. An overarching misconception relates to resident autonomy during these experiences and subsequent harm this could cause patients. It cannot be understated that underserved patients should not receive sub-par quality of care, and it appears from the multiple published works that residents are well supervised during these experiences - in similar fashion to their supervision at their home institution. These concerns underscore the need for ethical standards when students or residents participate in international short-term experiences.

Additionally, there are concerns that these experiences take the surgeon in-training away from their home institution, particularly in the light of work-hour restrictions, or that this can be viewed as a 'vacation' of sorts.<sup>10</sup> It appears, however, that the case volumes that are published in relation to the amount of time these residents spend at the international location suggests they actually work harder during these short experiences than they work in the same period at their home institution.

There are considerable limitations to the current review, particularly as the studies included are all individual programme experiences and not multi-institutional in nature. There are very few studies published related to this topic, therefore, the volume of information presented is sparse. There is a significant need for further publications of other programme experiences, which would be expected in the future due to the increased interest in international surgical electives at the medical school level and the residency training level.

## Conclusion

International missions provide a much-needed relief to surgical diseases worldwide. Introducing a training element into international missions has not been shown to negatively impact the care patients receive, but has been proven by several studies to positively impact the surgeon in training, and results in a higher likelihood of lifelong volunteerism, thereby feeding the growing pool of international medical missionaries. In the coming years, there is considerable need for further published studies, including those related to resident perceptions, patient perceptions and quality of care improvements.

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