ORIGINAL INVESTIGATION

A Consortium Approach to Surgical Education in a Developing Country: Educational Needs Assessment

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IMPORTANCE Surgical disease is a global health priority, and improving surgical care requires local capacity building. Single-institution partnerships and surgical missions are logistically limited. The Alliance for Global Clinical Training (hereafter the Alliance) is a consortium of US surgical departments that aims to provide continuous educational support at the Muhimbili University of Health and Allied Sciences, Dar es Salaam, Tanzania (MUHAS). To our knowledge, the Alliance is the first multi-institutional international surgical collaboration to be described in the literature.

OBJECTIVE To assess if the Alliance is effectively responding to the educational needs of MUHAS and Muhimbili National Hospital surgeons.

DESIGN, SETTING, AND PARTICIPANTS During an initial 13-month program (July 1, 2013, to August 31, 2014), faculty and resident teams from 3 US academic surgical programs rotated at MUHAS as physicians and teachers for 1 month each. To assess the value of the project, we administered anonymous surveys.

MAIN OUTCOMES AND MEASURES Anonymous surveys were analyzed on a 5-point Likert-type scale. Free-text answers were analyzed for common themes.

RESULTS During the study period, Alliance members were present at MUHAS for 8 months (1 month each). At the conclusion of the first year of collaboration, 15 MUHAS faculty and 22 MUHAS residents completed the survey. The following 6 areas of educational needs were identified: formal didactics, increased clinical mentorship, longer-term Alliance presence, equitable distribution of teaching time, improved coordination and language skills, and reciprocal exchange rotations at US hospitals. The MUHAS faculty and residents agreed that Alliance members contributed to improved patient care and resident education.

CONCLUSIONS AND RELEVANCE A multi-institutional international surgical partnership is possible and leads to perceived improvements in patient care and resident learning. Alliance surgeons must continue to focus on training Tanzanian surgeons. Improving the volunteer surgeons’ Swahili-language skills would be an asset. Future efforts should provide more teaching coverage, equitably distribute educational support among all MUHAS surgeons, and collaboratively develop a formal surgical curriculum.
Surgical disorders represent a significant proportion of the burden of global disease.1-4 More than 2 billion people worldwide lack access to reliable surgical care.5 Most of them live in low-income and middle-income countries (LMICs), where logistical and financial challenges are compounded by an insufficient surgical workforce.6-8 Increasing the number and quality of local surgeons serving their communities is a critically important element in the global response to health disparities.

In February 2013, the Pacific Coast Surgical Association established a working group to explore a collaborative relationship with an academic department of surgery in an LMIC, with the goal of improving education and patient care. This initiative led to an independent, nonprofit corporation known as the Alliance for Global Clinical Training (hereafter the Alliance). This organization links US academic surgical departments, educators, and residents with the Department of Surgery at the Muhimbili University of Health and Allied Sciences (MUHAS) and the Muhimbili National Hospital (MNH) in Dar es Salaam, Tanzania.

The Alliance aims to establish a collaborative educational relationship between the faculty and residents of MUHAS/MNH and US surgeons visiting on a rotating basis. So as to include anesthesiologists and nursing educators as the program evolves, the word surgery does not appear in the organization’s name. The MUHAS/MNH was chosen as the host institution because of a positive experience with a visiting team from the University of California, San Francisco, before the start of the program.

The rotating US teams usually include a faculty surgical educator and an accompanying surgical resident. They effectively join the Department of Surgery at MUHAS/MNH and participate in morning reports, teaching conferences, ward rounds, preoperative conferences, clinics, emergency night calls, and elective surgical procedures. The faculty educator and resident are usually, but not always, from the same department of surgery. When a resident is unavailable, a surgical faculty member will travel alone, although residents never rotate without a faculty surgeon. Almost all the included US residents have completed 3 clinical years of training in the United States and participate in the Alliance during the dedicated research years of their residency. The out-of-pocket cost of this rotation is generally less than $2500 per person, excluding the airfare.

We had hypothesized that the Alliance is effectively responding to the educational needs of MUHAS/MNH surgeons. Herein, we test this hypothesis in an anonymous survey-based study.

Methods

The pilot collaboration between the Alliance and MUHAS extended from July 1, 2013, to August 31, 2014. This initial experience was designed to assess the feasibility of the collaboration as well as to identify and rectify unanticipated problems. Surgeons and residents from the University of California, San Francisco, University of California, Davis, and Oregon Health & Science University participated in the pilot program. In total, during the first 13 months of the collaboration (July 1, 2013, to August 31, 2014), Alliance surgeons were present at MUHAS/MNH for 8 months (1 month each), as detailed below.

To assess the educational value of the pilot project, we administered 2 surveys. The initial survey was distributed in November 2013 after 4 months of collaboration that included 3 US surgeons (one surgeon performed 2 rotations) and 3 US residents. The follow-up survey was distributed in August 2014 after 4 additional months of collaboration between the Alliance and MUHAS/MNH that included 3 surgeons, 2 residents, and a gastroenterologist.

Survey respondents were faculty or staff at MUHAS/MNH or surgical residents. A structured questionnaire, created for this study, was developed with the input of several researchers with experience (M.C., B.M.H., A.Y., D.G., and P.B.H.) in qualitative research and global surgery. Input from MUHAS/MNH research collaborators (A.E. and O.M.) was sought to assure a culturally and linguistically appropriate survey. This work was exempted from institutional review board approval.

The initial and follow-up surveys included a series of closed-ended questions that were answered on a 5-point Likert-type scale, as well as a series of open-ended questions designed to assess the educational needs of our MUHAS/MNH partners. Similar surveys were distributed to residents and attending surgeons, but the wording was changed slightly to focus on their respective level of training. All responses were anonymous, and no demographic information beyond the level of surgical training was collected. These surveys for attending surgeons and residents are presented in the eAppendix in the Supplement.

Quantitative results were analyzed with univariate comparisons using Fisher exact test and Mann-Whitney test. Data are presented as medians with 25th and 75th percentiles, with significance set at \( P < .05 \). Data were gathered and analyzed using software programs (Microsoft Excel; Microsoft Corporation and SPSS, version 19.0; IBM Corp). Free-text responses to the surveys were analyzed using a constant comparative method based on grounded theory. The analysis was completed with multiple iterations, as is standard for this approach. The first phase consisted of independent researchers (M.C., B.M.H., and A.M.M.) reviewing comments, with the goal of dividing text into distinct ideas or concepts. Themes were developed and proposed by each reviewer. Comparisons were then made between each researcher’s themes, and a basic framework of overarching ideas was designed using a combination of inductive and deductive reasoning. Central themes were finalized and refined through iteration to eliminate unnecessary redundancy. This approach has been shown to increase the reliability of qualitative data analysis.9

Results

US surgeons and residents were present in Dar es Salaam for 8 of 13 months of the initial collaboration. Initial surveys
were distributed to 15 MUHAS/MNH faculty and were completed by 7, a 47% response rate. They were similarly distributed to 15 MUHAS/MNH residents and were completed by 5, a 33% response rate. With this limited response rate, we believed that an in-depth analysis of perceptions of clinical care at MUHAS/MNH was not likely to be representative. However, we analyzed selected questions pertinent to the educational environment (Table 1). Most important, when asked “What would be the ideal role of members of the [Alliance] to take while at MUHAS?”, 7 of 7 attending surgeons and 4 of 5 residents identified training as the most important role. The following selected answers to this question are organized by respondent type. An attending surgeon wrote: “Supervising and teaching…to residents and specialist surgeons.” Another attending surgeon wrote: “Training of residents…participation in surgery [when] necessary.” A resident wrote: “Give advice on management.” Another resident wrote: “Help in teaching residents…the concept of evidence-based practice.”

The follow-up survey of educational needs assessment had an improved response rate. Faculty surveys were distributed to 22 MUHAS/MNH surgeons and were returned by 15, a 68% response rate, while resident surveys were distributed to 26 MUHAS/MNH residents and returned by 22, an 85% response rate. The higher response rates may have been related to improved interpersonal relationships and research collaborations between the Alliance and MUHAS/MNH personnel.

Quantitative results of follow-up surveys are summarized in Table 2. When analyzed overall, these data suggest that residents and faculty at MUHAS/MNH agree that Alliance surgeon involvement has improved patient care and resident education. However, the heterogeneity of responses suggests that this opinion is not universally shared.

### Table 1. Selected MUHAS Faculty and Resident Answers to Anonymous Survey Questions on the Initial Survey

<table>
<thead>
<tr>
<th>Paraphrased Survey Question</th>
<th>Response, Median (25th to 75th Percentiles)*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Faculty</td>
<td>Resident</td>
</tr>
<tr>
<td>The partnership with the Alliance has the potential to positively impact my residents’ ability to grow and develop as surgeons</td>
<td>4.0 (4.0-4.3)</td>
</tr>
<tr>
<td>Faculty spend sufficient time teaching in the operating theater</td>
<td>3.0 (2.3-3.0)</td>
</tr>
<tr>
<td>Faculty spend sufficient time teaching in the clinical ward</td>
<td>4.0 (3.3-4.0)</td>
</tr>
<tr>
<td>Residents have increasing responsibility in the operating theater</td>
<td>3.0 (3.0-4.0)</td>
</tr>
<tr>
<td>Senior surgeons allow residents to operate when appropriate</td>
<td>4.0 (4.0-4.0)</td>
</tr>
<tr>
<td>My residents need more instruction in the operating room</td>
<td>4.0 (4.0-5.0)</td>
</tr>
<tr>
<td>My residents need to do more operative cases</td>
<td>5.0 (4.8-5.0)</td>
</tr>
</tbody>
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Abbreviation: MUHAS, Muhimbili University of Health and Allied Sciences.
* Responses are on a 5-point Likert-type scale ranging from 1 (strongly disagree) to 5 (strongly agree).

### Table 2. Selected MUHAS Faculty and Resident Answers to Anonymous Survey Questions on the Follow-up Survey

<table>
<thead>
<tr>
<th>Paraphrased Survey Question</th>
<th>Response, Median (25th to 75th Percentiles)*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Faculty</td>
<td>Resident</td>
</tr>
<tr>
<td>The partnership with the Alliance has improved patient care</td>
<td>4.0 (2.5-4.0)</td>
</tr>
<tr>
<td>The partnership with the Alliance has improved residents’ ability to learn</td>
<td>3.5 (3.0-4.0)</td>
</tr>
<tr>
<td>Alliance surgeons/residents took cases I otherwise would have done</td>
<td>3.0 (2.5-3.5)</td>
</tr>
<tr>
<td>I have an established relationship/mentorship relationship with at least 1 of the Alliance surgeons</td>
<td>4.0 (1.5-5.0)</td>
</tr>
</tbody>
</table>

Abbreviation: MUHAS, Muhimbili University of Health and Allied Sciences.
* Responses are on a 5-point Likert-type scale ranging from 1 (strongly disagree) to 5 (strongly agree).

Free-text comments analyzed on the follow-up survey were richer and more nuanced than the comments on the initial survey, possibly because of a longer and more sustained relationship with Alliance faculty. On qualitative analysis, 6 areas of educational needs emerged from the comments. They are listed below, together with illustrative quotes:

1. Desire for Alliance surgeons to provide formal didactics. An attending surgeon wrote: “Giving lectures on some medical conditions that need special attention.” A resident wrote: “Teach residents and supervise their research.”
2. Desire for increased clinical mentorship. An attending surgeon wrote: “Select major/difficult cases for surgery.” A resident wrote: “More theater/elective time for residents with visiting doctors.”
3. Desire for a longer-term Alliance presence. An attending surgeon wrote: “Send more residents and surgeons…spend more time.” A resident wrote: “We need more time with the visiting surgeons.”
4. Desire for a more equitable distribution of teaching time among all MUHAS faculty and staff. An attending surgeon wrote: “Help everyone equally.” A resident wrote: “[There is] no coordination with residents’ schedules.”
5. Desire for improved logistical and scheduling coordination and improved language skills. An attending surgeon wrote: “Most of them cannot speak Kiswahili…cannot work alone.” A resident wrote: “Poor coordination of Alliance/MUHAS…activities.”

### Discussion

Multiple universities and organizations have established international surgical partnerships, with favorable experiences.6,10–18 However, many of these initiatives are focused on the training of US residents in LMIC hospitals or the
direct provision of medical care by US surgeons. Some are limited by the vagaries of grant funding and thus cannot commit to a consistent presence. The Alliance was formed as a multi-institutional international collaboration to foster long-term professional and personal relationships based on the belief that teaching and role modeling are critical components of surgical education.13

A major impediment to academic collaboration in global surgery is the burden that international trips place on US surgeons’ clinical, research, administrative, and home-based educational responsibilities. This drawback limits the ability of a single surgeon, or even a single department, to provide a year-round presence at an LMIC instruction. In addition, when these collaborations are funded by extramural grants, the initiatives are jeopardized when the funding expires. The multi-center, rotating surgeon approach of the Alliance permits a long-term, reliable presence at the host institution without unduly burdening a single department and without subjecting the collaboration to a variable funding cycle.

Surgical training in Tanzania has several critical differences from US surgical training. After 5 years of medical school, young physicians complete a rotating 1-year internship. There is little technical training during this year, although interns gain experience in preoperative assessment and postoperative care. Following this internship, they may be posted as a medical officer at a government-run health clinic. Many of these clinics are underresourced, and oversight is variable, although much of the surgical care in Tanzania is actually provided by these medical officers.19 After this 3-year position, physicians are eligible to apply for 3-year surgical residencies and earn a master of medicine degree in surgery. Training slots are limited, and most residents pay the required tuition out of pocket. The 3-year training program focuses on preparing residents for a series of written and oral examinations. There is less emphasis on clinical decision making and technical surgery. A dissertation is required before completion of the residency.

This study demonstrates that the Alliance is responding to a perceived need in surgical clinical education by the faculty and residents at MUHAS/MNH. The survey respondents herein indicated that they wanted increased didactic teaching, more mentorship, and greater clinical exposure to Alliance surgeons. In response to this request, we organized a suturing skills laboratory. We plan to expand the variety of clinical skills laboratories in the coming years. In addition, we are working to improve coordination between the MUHAS curriculum and the clinical expertise of Alliance surgeons.

In addition, survey respondents express the desire for Alliance surgeons who are fluent in Swahili. While a fair comment, this request is logistically challenging from an Alliance recruitment perspective. It seems unlikely that most Alliance volunteers would be willing to learn Swahili. As the Alliance grows, translators may become an important addition to the collaboration. While many MUHAS/MNH physicians and residents are fluent in English, communication among nurses, patients, and Alliance surgeons could be improved with translators.

The desire to have reciprocal visits to US surgical programs represents valid and provocative feedback. However, the Alliance lacks funds to support an exchange program. All the travel costs are borne by the volunteers themselves or their departments. The success of future fund-raising efforts will dictate our ability to incorporate and support a reciprocal exchange program.

The widespread responses to the question about Alliance involvement improving resident education were a notable finding (Table 2). The nature of the experience driving these answers is unclear. It may be related to the logistics of a growing program because Alliance surgeons initially opted to focus their efforts on engaging 1 of the 2 general surgical teams. This emphasis was an intentional choice to allow a more rapid development of rapport with those surgeons but may have left others feeling uninvolved. It is also possible that these responses reflect a true difference of opinion among MUHAS/MNH surgeons and residents with equal Alliance experience. This interpretation would suggest that the Alliance needs to focus on identifying and engaging these surgeons and residents to address their needs, which is the focus of ongoing process improvement at the Alliance.

The wide diversity of responses about Alliance surgeons and residents “stealing” cases is, in some ways, more concerning (Table 2). Given that the goal of this collaboration is training, we firmly believe and work to highlight that the objective for US surgeons and residents is to support, train, and assist our hosts. We aim not to be the primary operating surgeons. Since receiving the feedback presented in this study, we have restructured some of the Alliance resident experience in Tanzania. As opposed to being the primary resident on elective cases, the Alliance resident now has a larger role in emergency cases. These cases are often at night, and frequently the on-call Tanzanian resident is operating with limited faculty support. Alliance and Tanzanian residents operating together at night, with appropriate US faculty oversight, have anecdotally reported educational benefits for both groups. This structure will need to be assessed in future evaluations of the collaboration.

Although the objective of this study was to ascertain if Alliance surgeons were responding to the educational needs of MUHAS/MNH, the Alliance also provides a rich educational and clinical opportunity for US participants. Anecdotally, Alliance faculty and resident members report their experience to be extremely valuable professionally and personally. Some US residents commented that their time at MUHAS/MNH was “life changing” and “fundamentally changed [their] perspective.” Several participants also noted that their second and third trips to MUHAS/MNH would likely be more successful because they could “hit the ground running” and not have to spend as much time building relationships. The number of Alliance surgeons and residents is very small, and a large proportion are authors of this article (M.C., B.M.H., D.G., J.P., and W.P.S.). It is impossible to provide a valid, unbiased evaluation of the educational and personal benefit to Alliance members at this time. This focus is a critical component of the program evaluation, and we anticipate that such an assessment will be possible as the program grows.
There are several limitations to this study. Although MUHAS/MNH faculty and residents are fluent in English and the study design incorporated suggestions from Tanzanian investigators, a potential for response bias exists based on cultural and linguistic misunderstandings. In addition, Swahili culture is characterized by a strong age-based hierarchy. It is possible that challenges identified by our MUHAS/MNH hosts were underreported because of a desire to avoid criticism of the international guests, many of whom are senior surgeons. The accuracy of the initial survey may be questioned because of the low response rate. The response rate to the second survey improved, most likely owing to enhanced interpersonal relationships between Alliance and MUHAS/MNH surgeons. Because the surveys were anonymous, it is unclear how many MUHAS faculty and residents answered both surveys. Repeated measures of educational efficacy will be necessary as our collaboration grows.

The first survey was not truly a precollaboration needs assessment, which would have been ideal from a research perspective. We structured the study in this way because of the history of international visitors at MUHAS/MNH. Many of these visitors arrive, distribute surveys, and leave after a limited collaboration, with little benefit to the local surgeons. We wanted to focus on building a long-term relationship clearly beneficial to our hosts.

Conclusions
A multi-institutional international partnership between the Alliance and MUHAS is logistically feasible and leads to perceived improvements in patient care and resident education. The preliminary results of our experience have positive implications for exploring further refinement as well as potential replication of this partnership model in other LMICs. Alliance surgeons should continue to focus on training Tanzanian surgeons and building durable professional and personal relationships.