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PUBLIC HEALTH | RESEARCH ARTICLE

Development of an effective mentorship program for preclinical medical student global health research training: An evaluation of a pilot mentorship program

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Abstract: As medical student interest in global health soars, so too does the desire by students to do research in international settings. However, very few medical students receive formal training in research skills. Mentorship is a key component of any research endeavour by students. The University of Texas Medical Branch focuses preclinical rotations on value-adding, mentored scholarly projects, developed with host site collaborators. The structure of this program allows preclinical students to engage meaningfully with international partners, who serve as research mentors. Mentorship is critical to successful development, implementation, and dissemination of scholarly projects. This paper describes a qualitative evaluation of a pilot mentorship program, which included semi-structured, one-on-one interviews with mentors and students who participated in the 2015 global health preclinical experience. Overall, mentors and students were satisfied with the mentorship experience. Challenges to mentoring were insufficient time and lack of student accountability to

ABOUT THE AUTHORS

Dr Caley A. Satterfield is the Assistant Director for the UTMB Center for Global Health Education and Adjunct Assistant Professor in the Division of General Internal Medicine. Dr Satterfield's specific research interests include global health pre-departure preparation curriculum, research skills training in global health, and mentorship in global health. The current article is an evaluation of the mentorship component of an initiative to provide research skills training to preclinical medical students through global health. This initiative began in an effort to provide host-site collaborators with a research workforce while providing a safe and less host-site burdensome preclinical global health experience to students. The research described in the article is a step towards providing best practices and guidelines for mentorship of global health trainees conducting research. While the mentorship literature is vast, there is scant literature available to guide mentorship in global health settings, which require insight into culture, ethics, and host-site relationships.

PUBLIC INTEREST STATEMENT

International hosts describe preclinical medical students as a burden due to lack of skills and level of supervision required. Host-site driven research projects can benefit hosts and preclinical students. Properly mentored preclinical medical students can serve as a valuable global health research workforce. Lack of mentorship can increase the burden on already vulnerable health systems. This article describes a qualitative evaluation of a mentorship program for preclinical medical students completing scholarly projects during preclinical global health electives. Utmost importance is placed on ethical scholarship, including host-site generated research needs and compliance with ethical review boards. The evaluation revealed satisfaction by both mentors and mentees. Future iterations of the mentorship program will include increased student accountability to deadlines, improved communication, and more clear expectations among all parties. Additional evaluation is needed to develop best practices in global health research mentorship and explore the triad of host mentor, trainee, and sending mentor.

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deadlines. Students reported satisfaction with the mentor relationship. The common theme from student interviews was the importance of communication. The better the communication, the better the experience.

Subjects: Educational Research; Global Health; Medical Education

Keywords: global health research; global health education; mentorship; research training; preclinical medical students

1. Introduction

Medical students are increasingly expected to engage in research during medical school. However, medical school curricula both in the United States and abroad often lack content focused on educating students in the design, implementation, and dissemination of scholarly work. Exposure to research is positively associated with a greater likelihood that students will follow an academic medicine career track, better employment opportunities, advanced critical thinking skills and reasoning, and improved research activity throughout career (Murdoch-Eaton et al., 2010; Weston, Mullan, & McLennan, 2010). Eberli and Atala (2009) emphasized that the teaching of research skills to undergraduate medical students relies almost exclusively on a strong relationship with a quality mentor.

As the interest in global health increases, many students are seeking global health research experiences. While this could create an additional global health research workforce, strong mentorship is needed in order to limit the burden and harm that could be caused by inexperienced and naïve student researchers in limited-resource settings (Bozinoff et al., 2014; Yassi, Breilh, Dharamsi, Lockhart, & Spiegel, 2013).

2. Mentorship

2.1. Defining mentorship

Over 50 definitions for mentoring can be found in the current literature (Eller, Lev, & Feurer, 2014). Ulvik and Sunde (2013) partially defined mentoring as "a broad concept that may include … guiding, advising, educating, nurturing professional growth, and coaching" (p. 755).

For the purpose of this study, the term mentor will refer to any faculty or staff member at UTMB who guides student projects in global health and any field site partner serving as an advisor to rotating students.

2.2. Mentorship in academic medicine

Despite a large quantity of mentoring-related literature, mentorship remains a relatively unheralded aspect of academia. Quality mentor training, as well as formal rewards and incentives, are needed to sustain the positive morale and momentum required to train the next generation of physician-scientists (Eagan, Sharkness, Hurtado, Mosqueda, & Chang, 2011; Heale, Mossey, Lafoley, & Gorham, 2009; Shea et al., 2011).

2.3. Best practices in mentorship

The literature on mentorship is saturated with studies offering best practice guidelines for mentors and to a lesser extent mentees. The sections below summarize the best practices in mentorship that should be emulated in a global health research training program.

2.3.1. Communication

Communication and contact are important foundations of a successful mentor-mentee relationship (Moore & Teter, 2014; Pfund et al., 2013; Williams & Grant, 2012). Mentors and mentees in frequent contact are able to adjust projects to student abilities and make necessary changes if the need arises (Moore & Teter, 2014). This may be even more important in international settings where research project problems may be more difficult to manage.

2.3.2. Expectations

Alignment of expectations is crucial to successful mentoring relationships (Anderson, Silet, & Fleming, 2012; Eller et al., 2014; Huskins et al., 2011; Iversen, Eady, & Wessely, 2014). Conversations to clarify expectations should occur early on in the mentor-mentee relationship (Huskins et al., 2011). Mentors should push mentees to excel but their job is to make sure the goals and expectations of the mentee are realistic and feasible (Eller et al., 2014). Huskins et al. (2011) discussed another aspect of mentoring relationships that should be discussed upfront, which relates to ownership of data, credit and authorship on projects, and differentiating the mentee's work from the mentor's work. This aspect of student training is often the most difficult to communicate. Mentors who are long established in research often overlook this, and students often believe their short-term efforts on projects are far greater than they are.

2.4. Mentees actions and attitudes

Although more focus in the literature is on characteristics of mentors in successful mentoring relationships, the mentee's actions and attitude play an important part in a successful relationship. Mentees should be prepared for meetings, have outlines of activities, be prepared to discuss activities, and have completed tasks assigned previously (Sambunjak, Straus, & Marusic, 2009). The more independence and leadership abilities demonstrated by a mentee the more likely the mentorship relationship will be successful.

One way to improve mentor and mentee satisfaction is to provide formal training to the mentees (Kasprisin, Single, Single, Ferrier, & Muller, 2008). Kasprisin et al. (2008) suggested that for adult-age mentoring relationships, mandatory mentee training outside of the mentor relationship demonstrates a certain level of commitment by the mentee and may increase the likelihood of successful mentor-mentee relationships. This model is similar to the Academic Skills Building through Global Health (ASB) project mentor program. Students receive independent training on fundamental research and dissemination skills so that mentors can focus more fully on project-related training.

2.5. Mentorship in international limited-resource settings

Shah, Nodell, Montano, Behrens, and Zunt (2011) explored mentorship of healthcare students in global health settings. Shah et al. (2011) conceded that formal mentor training opportunities are limited in high-resource settings such as the United States and even further limited at most international field sites in low/limited-resource settings. It can be difficult align expectations and needs between home institution and field site. UTMB first-year medical students traveling on preclinical preceptorships face this conundrum. The students are assigned a faculty or staff mentor from UTMB; although no formal mentor training is in place, these mentors have mentored previous successful student projects. The students then arrive at the field site and may be working on a daily basis with someone with less or no mentor experience. Shah et al. (2011) believed that a crucial indicator of trainee success in research at international sites was the presence of effective mentors both at the home institution and the field site.

Trainees may find that they have far more autonomy on the research project when entering an international setting, but this can be isolating (Shah et al., 2011). Trainees who typically self-select for international research experiences are often high-achieving academically and may encounter increased stress levels and even depression when research projects do not go as planned. High-achieving students may measure success based on successful grades or rank, and research in an international setting often fails or has significant setbacks, which are unrelated to trainee aptitude (Shah et al., 2011). Trainees and mentors who develop strong relationships can navigate these challenges more easily than mentees who are apprehensive approaching a mentor (Shah et al., 2011).

Mentors at international sites may have a different approach to mentoring or training than students are used to, especially if they have not had training outside their home country. There will likely be differences in financial and physical resources needed for research along with cultural differences between the home institution and the international site which in some cases may pose a

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difficult dynamic for trainees to navigate (Shah et al., 2011). It is important to discuss these inequities with trainees before they arrive at the international field site and help students navigate these relationships appropriately with respect for the international site. Cultural competency is necessary for positive interactions at the international site and the home institution mentor should help prepare the trainee on cultural issues that may arise (Anderson, Friedemann, Bűscher, Sansoni, & Hodnicki, 2012; Shah et al., 2011).

Pre-departure preparation and research training by mentors is vital. Student interest in global health is on the rise; however, faculty and staff with experience and designated time are not concurrently growing with student interest (Nelson, Kasper, Hibberd, Thea, & Herlihy, 2012).

Monetary compensation for international partners may not always be possible. In these situations it is important to promote non-monetary incentives including research assistance with projects, publications, and presentations (Anderson et al., 2012).

3. Academic skills building through global health project at UTMB

The ASB project is a short-term (6 months or less), mentored, scholarly project. First-year medical students enrolled in global health preclinical preceptorships at the University of Texas Medical Branch at Galveston (UTMB) are required to complete a scholarly project as part of their preceptorship. The ASB project was developed by faculty and staff in the Center for Global Health Education (CGHE) at UTMB to train first-year medical students on how to develop, implement, and disseminate a scholarly project. Table 1 outlines the full scope of the ASB project.

The CGHE sends approximately 50 first-year medical students on international rotations every year. Preclinical students do not have the skills necessary to provide clinical care to patients and require increased supervision. This lack of skill and need for increased supervision can place a large burden on already constrained field sites (Dacso, Chandra, & Friedman, 2013). Time and energy spent supervising medical students abroad detract from patient care and other responsibilities of the hosts (Crump & Sugarman, 2008). Generally, US-based medical students gain far more from international rotations than the receiving partner (Nelson et al., 2012). Nelson et al. (2012) stated that preclinical students should focus on "programmatic and research efforts" to ease the burden on the host-site and ensure students are participating in appropriate activities for their skill level (p. 302).

Table 1. Academic skills building through global health project at UTMB					
Academic year	**Before 2012**	**2011–2012**	**2012–2013**	**2013–2014**	**2014–2015**
Rotation activities	• Clinical shadowing or bench research	• Scholarly project • Clinical shadowing or bench research • Poster presentation	• Scholarly project • Clinical shadowing or bench research • Poster presentation	• Scholarly project • Mentor meetings • Clinical shadowing or bench research • Poster presentation	• Scholarly project • Mentor meetings • Clinical shadowing or bench research • Poster presentation
Training	• Global health lectures (pre-travel)	• Preparation modules (pre-travel) • One hour lecture on developing an abstract and poster (post-travel) • One Hour demonstration on using stata (post-travel)	• Preparation modules (pre-travel) • One hour workshop on scholarly project development (pre-travel) • One hour workshop on abstract and poster design (pre-travel) • One hour refresher workshop on abstract/poster development (post-travel)	• Preparation modules (pre-travel) • Mentorship meetings (pre- and post-travel) • ASB module series	• Preparation modules (pre-travel) • Mentorship meetings (pre- and post-travel) • ASB module series

Further, trainee activities should align with the host community's needs and priorities (Nelson et al., 2012). The ASB project aims to bring first-year students, UTMB mentors, and host-site mentors together for collaboration on mutually agreed upon and beneficial projects. Ideally, the students will gain scholarly skills and will experience healthcare systems in a limited-resource setting. The host-site mentor will provide appropriate supervision, but will also receive assistance on projects he/she feels are important. Most students are inserted into on-going projects or work on quality improvement projects developed in collaboration with the host-site mentor.

4. Ethical considerations

Ethics in global health research must be carefully navigated. UTMB preclinical medical students participating in scholarly activity abroad receive training from expert faculty at UTMB on international research ethics and are required to complete CITI Basic Human Subjects Research course. Further, UTMB mentors discuss ethical considerations for specific projects with mentees. UTMB mentors work with host-site mentors to ensure the necessary ethical review boards at both UTMB and in the host-country review research proposals. In the absence of host-country review boards, it is the duty and responsibility of the UTMB mentor to make the U.S.-based review board aware of any cultural considerations and concerns with the research proposal. If the investigator is not familiar with the population to be studied, an expert should be obtained to advise the researchers and to inform the review board of potential concerns (Bhat & Hegde, 2006).

In line with guidelines suggested by Yassi et al. (2013), student research projects are initiated in collaboration with the host-site mentor and host-site stakeholders. The projects focus on the needs of the host-site and surrounding community as gauged by these key stakeholders (Dharamsi, Osei-Twum, & Whiteman, 2011). Host-site mentors serve as principal investigators on projects. This allows the host-site to retain control of data and to benefit from presentations and publications that result from the study. Students report the findings and provide status updates to the host-site mentor and other stakeholders during the rotation. Students and UTMB mentors remain in contact with the host-site mentor for on-going progress reports on continuing projects. Students must receive approval from the host-site mentor to utilize any data collected for all prospective presentations and publications. UTMB mentors provide guidance to students on navigating relationships with the host-site and serve as a resource for both the host-site and students on research design and implementation.

UTMB works diligently to follow ethical guidelines established by the Working Group on Ethics Guidelines for Global Health Training (WEIGHT) (Crump & Sugarman, 2008). Global health programs should work to ensure that their trainees are not adding burden and causing harm to our colleague's in the host country and the patients they serve. In an effort to provide reciprocity and bilateral exchange, UTMB sponsors several of our host-site mentors for training and observation at UTMB, hosts trainees in research labs and on clinical rotations, and sends teams of UTMB faculty to conduct training on host-institution requested topics such as grant development, scientific writing, and procedures. To offset the cost burden to our host-sites, UTMB pays a supervision fee per student to each field site to be used to purchase or repair equipment, infrastructure development, or supplies. The Bozinoff et al. (2014) study on host-site impact enumerated many of these same methods to mitigate harm and burden.

5. Methods of evaluation

The evaluation of the mentorship component of the ASB project was conducted through semi-structured, one-on-one interviews with mentors and students. Institutional Review Board approval was received for all aspects of this evaluation. Host-site mentors are a key element to effective research by students in an international setting and there is an on-going but separate evaluation project with this key group of stakeholders.

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5.1. Participants

5.1.1. Students
There were 43 students in the 2015 cohort of first-year medical students enrolled in the global health preclinical preceptorship experience at UTMB which took place from May to June 2015. The experience was open to all first-year medical students at UTMB. The ASB online module series was a requirement of the global health preclinical preceptorship. All 43 students who participated in the global health preclinical preceptorship experience were invited to participate in one-on-one interviews. Eight students agreed to be interviewed. The interviews took place in July and August 2015.

5.1.2. Mentors
Mentors for the UTMB first-year medical student global health preclinical preceptorship experience were assigned to students based on the field site location or type of experience. The mentor was a UTMB faculty or staff member who was responsible for the overall project and provided assistance in developing and implementing the project, coordinating with on-site supervisors, and reviewing abstracts and posters prior to dissemination. There was an on-site supervisor who provided daily oversight of the preclinical students' activities. There were 10 potential mentors to sample from in the 2015 cohort. Five mentors participated in the interviews.

5.2. Instrumentation and data collection procedures
The University of Houston (UH) Committee for the Protection of Human Subjects (CPHS) approved the protocol under expedited review, and UTMB granted reliance review to UH. UH CPHS was principal IRB for the study as part of doctoral dissertation research.

5.2.1. Mentor interviews
Mentors were invited to participate in one-on-one interviews by email invitation. Appointments with interested mentors were scheduled for in-person interviews at the convenience of the mentor.

The mentors were asked a pre-determined set of questions but flexibility was included should a mentor participant ask for clarifications or if there was additional feedback he/she wished to share. Mentor interview questions can be found in Appendix A. Completed interviews were transcribed from verbatim recordings.

5.2.2. Student interviews
Students were invited to participate in one-on-one interviews by email invitation. Like the mentor interviews, in-person interviews were chosen as the preferred method of data collection in order to establish rapport and better clarify any ambiguity about questions (Knox & Burkard, 2009). The students were asked a pre-determined set of questions which may be found in Appendix B. Completed student interviews were transcribed verbatim.

5.3. Data analysis
Feedback from both mentors and students was gathered to identify successes, challenges, and barriers in the mentorship component of the ASB project. A thematic analysis was performed to identify themes shared across student and mentor experiences.

5.4. Mentors

5.4.1. Time
The thematic analysis revealed notions discussed across all five mentor interviews related to the time required of mentors to properly mentor students on international scholarly projects. Mentors were asked to describe in time-relative terms such as "too little," "too much," or "just right" the amount of time they spent with their mentees before and during the international rotation. All five described needing more time with mentees and for other mentor-related activities, such as project

development. However, each mentor had relatively different opinions on the time needed with students before, during, and after the rotation.

Mentor 3 felt too little time was spent with students prior to departing to the field site for project work. Mentor 3 discussed the volatile nature of developing international projects—the time and steps involved in negotiating logistics, human subjects approval, and other research challenges in resource-limited settings, taking months of work on the mentor and field site collaborator's part, and having a project fall through at the last minute. Mentor 3 stated:

> Things just fell apart in every aspect … In terms of having projects that were readily available to them at the time … I don't think they [students] have a clue about challenges and I think that is part of the experience. At least in my opinion because they expect to go there and they are going to step in and everything is going to work as opposed to I'm going to get there and nothing is going to be done the way we expected it.

In regards to time during project preparation, Mentor 3 went on to say: "I think given what we ask them to do we probably don't have the ability to spend as much time with it and again I don't know how we would fix that short of having some sort of longitudinal elective that started say in January where we could have them meet with us on a regular basis."

Mentor 3 explained his views on the roles of the mentor when the student is at the field site stating:

> On-site, it's really variable … and I have mixed feelings about that. I think on the one hand … you want to be there and be helpful to them but on the other hand I want them to be alone … I think that's an important part of it … I don't want to be hovering there the whole time.

Mentor 5 detailed the struggles of providing adequate time to mentorship activities:

> I always feel like I could have spent more time with them before they left … We … were waiting for IRBs to be written and approved of, and then to go to their [Country B] IRB and then our IRB and it left me feeling like … those things needed to be taken care of so far in advance so that I could meet with the students and say here is your role, here is your responsibility, so they could then apply those skills that they have learned.

Mentor 5 also felt too little time was spent with students at the field site and concluded by saying "it's just an issue of time … it's just very difficult to provide that level of oversight."

Mentor 2 described time prior and during the rotation as "okay" and "just right". Mentor 1 had a different viewpoint on overall time spent with mentees saying: "I'm sure there is some amount of time that is too much but if it's paying off, I don't know where the limit is."

5.4.2. Expectations
A final theme expressed across multiple interviews was that of expectations. Three mentors expressed the need for a more clear definition of the CGHE's expectations of the mentor's role, the expectations the CGHE has of the students, and improved communication of both of those expectations to mentors and mentees. Mentor 2 discussed the lack of the student's knowledge of expectations, saying:

> These students … didn't know what to expect. I kind of set the expectations … sometimes I set my expectations too high or … I have to change [projects]. They might not be super happy about that. I think we can talk a little bit more about what are your [CGHE] expectations … I want them to get all they can get from a rotation … if I know a little bit more about your expectations I would feel … more comfortable.

5.4.3. Accountability

Mentor 4 discussed the need for mentors to understand they are expected to hold their students accountable for "making sure they have looked at the modules and that they are submitting what they need to submit on time." Further, Mentor 4 felt that the mentors needed to give students timely feedback on assignments.

5.4.4. Additional preparation

All of the mentors who suggested additions to preparation felt their suggestions were context-specific and that site-specific training should ultimately fall under the responsibility of the mentor. For example, one mentor felt that additional cultural awareness training was needed for students on the prevalence of racism common to the region.

5.5. Students

5.5.1. Project changes

The first category addressed concepts spanning multiple interviews. Three themes were identified in multiple interviews. The first theme related to students faced with changing projects when planned projects fell through. Of the eight students interviewed, five students discussed the impact of their planned projects falling through. All five of these students, however, stated that their mentor made an alternative project available.

5.5.2. Communication

The second theme that was present in multiple interviews was the responsiveness of the mentor before and during the rotation and the quality of communication in relation to project changes. All eight students interviewed reported positive statements related to time spent with their mentor overall. However, students who had project changes reported needing additional and more clear communication from their mentors than was experienced. Student 1 described his/her experience:

> It was good to have [mentor] there with us for the first week we were expected to go to the hospital, but after [mentor] left it seemed like we were still a little unclear about what our roles were in creating a scholarly project … When we did come back [to UTMB] and we were struggling to put things together and interpret data, [mentor] was able to step up and help us.

Student 2 also had a project not come to fruition at the last minute. After some initial confusion, Student 2 had this to say about the overall time spent with his/her mentor:

> Probably the right amount [of time], I think. We are still working with [mentor] because our project was so all over the place, and we are going to meet with [mentor] again to analyze more data and things like that. So I think it is an ongoing thing. I think we need that because honestly we were kind of lost about what we needed to do for our project because we were handed a bunch of data and we haven't really done a biostats course … so I think when we asked him for help, he's helping, and that's really good … I guess it was just frustrating at first … [mentor] did a really good job of coming up with a Plan B … but [mentor] has always [said] it's going to work out and that helps because sometimes as med students we stress out about little things like that.

When the project changed, Student 4 felt like the mentor was able to get things back on track and spend adequate time explaining the new project. Student 4 stated:

> I think it was enough. I think it was just right. I think to some degree I like to be able to do what we need to do but I don't need, you know; I don't think me or [student] needed our hands to be held the whole time. So once we had everything that we needed, we were good with that.

Student 5 discussed communications surrounding their project change, as well:

We worked with someone in [mentor's] lab for a lot of our research stuff … and that was fine. I guess the only communication issue I had was when my project ended up changing I felt like a lot of that information about the changes weren't coming from [mentor], they were coming from the lab manager … I wish it had come from [mentor] and we had more detailed instructions about where to go next.

Student 8 did not have a project change, but reported that communication with his/her mentor was variable while he/she was at the field site, saying:

Sometimes, [mentor] would reply quickly and then other times … I would ask some questions and it would be like two weeks until I got a response … but I think that is a part of global health, you just have to be flexible … I think it helped us grow actually just to be able to make our own decisions and reason things out without you know like a teacher telling you exactly what to do. It was good.

5.5.3. Mentor satisfaction

The final theme reoccurring across multiple interviews was that of mentor satisfaction. All eight students interviewed were satisfied to very satisfied with their mentor experience. Student 8 said this about the experience:

I was very satisfied [with the mentor experience]. I think the cool part is having subject matter experts. We were doing [project] and had never done anything like that before, [so] to have someone that really has that experience eased some of the bumps … I thought we were going to have to come up with our own project. So, at first I was kind of bummed, because I was like "oh they have projects for us" but then I found out that is so much better because it's someone that knows what a good project would entail. That's going to help me, not just in global health, and not just in developing a research project here, but the rest of my career.

Student 2 expressed how the mentor component not only added to the scholarly project but to the clinical experience as well.

I am really satisfied actually. I feel like I built a good rapport with [mentor] and … he went to rounds with us once and I really enjoyed seeing [mentor] work with patients. I have never seen [mentor] work with patients before and I felt like I could really relate to how [mentor] was handling certain situations.

Student 4 was "very" satisfied with the mentor experience. Student 4 stated that:

[Mentor] walked us through everything step by step, [mentor] didn't assume we had any prior knowledge but … explained things in a logical way that made sense. [Mentor] addressed our concerns and our questions very well. So when [mentor] actually answered the questions specifically, [mentor] kind of understood our thinking. How like a rookie would think about things and you know how it was like what piece of information are they missing that I need to tell them that would get the machine rolling again. And that, I think, that was very good.

Similarly, Student 6 stated:

I was very satisfied [with the mentor experience]. [Mentor] was very good about being educational [and pointing out things that were] important because [it] is something that [we] will see again or showing us something that [we] will never see again.

5.5.4. Suggested changes

The second category interviews were sorted into were those that suggested feasible changes to the mentorship component of the ASB project. There were only three changes mentioned related to the

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mentorship component—stable projects, better communication about project changes, and in-person meetings to discuss the draft abstract assignment. Of these three changes, feasible interventions could be developed for increased and better communications on project changes and in-person meetings for feedback on draft abstracts.

6. Discussion

This evaluation was helpful in determining programmatic changes for the mentorship of global health students at UTMB. Due to a relatively small number of available mentors in our program (10 mentors), a 50% response rate for the interviews may not be generalizable to the broader medical education community. However, we feel that the results of our pilot evaluation on mentorship are promising and align with the literature on mentorship, particularly in international settings for which there is very little available literature to date.

Results of the student and mentor interviews highlighted an overall satisfaction of the mentorship component of the ASB project. A few areas of improvement were illuminated.

Students and mentors both reported high satisfaction with the experience despite some challenges with projects. Students revealed that seeing mentors outside of the project context, and in the clinical arena, was highly valuable in strengthening the mentorship relationship. Mentors enjoy working with students and the enthusiasm they bring to the projects.

One area of concern for both students and mentors is that of project changes, before and during a rotation. While it is the nature of global health research for projects to be delayed due to funding, supply orders, and IRB issues. Students are repeatedly told that project changes will likely occur and students should remain flexible. However, this situation causes stress for the students. These changes are often out of the control of the mentor, but additional planning may mitigate the stressful effects on the student and provide readily available backup projects. Clear communication between mentors and students on why a project changed and a plan for moving forward is necessary.

CGHE can facilitate the students' request for face-to-face meetings with the mentor to discuss the draft abstract assignment by setting up a clear expectation with mentors that they should meet face-to-face or, if that is not possible, by phone or Skype to discuss the draft abstract assignment. Email communication about changes to the draft abstract may be insufficient to convey the need and nature of revisions clearly to students.

A final implication for practice that has come to light in this evaluation is the need for better communication among multiple parties. Most of the communication issues that were raised during the student and mentor interviews surrounded expectations. Mentors need clearer information on what CGHE expects of the students and of the mentors. Students need a better understanding of CGHE and mentor expectations for their scholarly project. The disconnect among multiple parties—CGHE, mentors, and students, has created confusion about the overall goal for the scholarly project. The students who were interviewed reported overall satisfaction with the mentorship experience, but clarifying expectations and improving communication may facilitate better relationships between mentors and students (such as when projects change). Further, mentors and CGHE staff struggled with the task of holding students accountable for task completion in a timely and quality manner, and with whom that responsibility ultimately resided.

6.1. Future research

There is limited literature on mentorship best practices in global health research and even more broadly in study abroad. Shah et al. (2011) outlined the importance of strong mentorship relationships both at the home institution and international field site. Feedback from students and mentors has led to additional thoughts on how mentorship for student research in global health settings ideally should function. Future iterations of the mentorship component of the ASB project will consist of triads—UTMB-based mentor, student, and international collaborator/mentor. Strengthening

this important triad will more fully develop a support system for student researchers and perhaps strengthen ties between the home institution and receiving institution.

One characteristic of the mentor role that was not addressed in this study was compensation. Further research and evaluation should include this characteristic to determine if quality differences in mentorship activities exist between compensated and uncompensated mentors. Additionally, appropriate and fair incentives are needed for international collaborators mentoring students.

A final area of future research should also explore whether gender biases exist in mentorship relationships in global health, and extend this to include field site supervisors, who may hold cultural views that create gender inequities. For example, do female students face more obstacles for completing a scholarly project abroad than their male student counterparts? Does the gender of the mentor or field site supervisor affect the quality of the scholarly work or satisfaction with the mentorship and rotation experience?

6.2. Limitations

The main limitations for this study revolved around the sampling technique used for mentor and student interviews. For mentor participants, there was a small sample of individuals from which to draw. Of the 10 mentors who were invited to participate in one-on-one interviews, five mentors agreed to be interviewed. This is a 50% participation rate, but does not represent a mentor at each field site, which would have made the results more complete.

Another limitation of this study is that the mentor and student interview questions were not piloted prior to the study commencing due to limited sample sizes and time constraints. While both sets of interviews elicited the necessary information to complete the evaluation for this study, the flow of the interviews may have gone more smoothly and certain questions may have been struck altogether. For example, piloting the interview questions for the mentors may have revealed the problems with comparing UTMB first-year medical students to other non-UTMB students and international students in terms of ability to work on scholarly projects.

Mentor compensation was not explored. UTMB global health mentors participate voluntarily in global health activities. While some mentors, particularly those with faculty appointments, may receive compensation to mentor students, other mentors do not receive direct compensation for this additional role. Compensation, or lack of compensation, may affect the effort and quality of mentor activity.

A final limitation to this study is the possibility of researcher bias. The researchers were heavily involved in the development of the content of the ASB project and continue to administer the project. Additionally, the researchers work closely with the students and mentors. While the researchers strived to complete an objective evaluation, personal bias based on previous positive or negative interactions with students and mentors should be acknowledged as a potential source of bias.

7. Conclusions

The next step in the process of building a sustainable and successful mentorship program for trainee research experiences is further evaluation of the mentorship program to determine if programmatic changes have the desired quality effect. UTMB's global health program relies on a small workforce of mentors. Expanding this evaluation to other institutions with global health mentorship programs will be necessary to gain more generalizable results. Further research on the mentorship triad of sending institution mentor, student, and host site mentor is needed to better establish best practices. To begin to address the nature of this triad, an evaluation with host site mentors is currently underway to gather feedback on the preparedness of the students they receive and the nature of the collaboration with the sending institution mentor. The researchers believe that development of best practices in mentorship triads will be crucial to the successful implementation of a trainee-based research workforce in global health.

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Appendix A

Faculty mentor interview questions

(1) As you understand it, please describe the scholarly project component of the global health electives course first year medical students take.

(2) Please describe how well prepared your student (s) you mentored during May/June 2015 were to participate in your project?

(3) Describe the topics your students were the best prepared for on the project. **will clarify this refers to the scholarly skills topics covered in the ASB module series**

(4) Describe the topics your students were the least well prepared for on the project. **will clarify this refers to the scholarly skills topics covered in the ASB module series**

(5) Do you mentor students from institutions in the United States other than UTMB? If yes, which institutions? If yes, are students from UTMB generally more or less prepared to work on your projects? Please explain.

(6) Do you mentor students from other universities located outside of the United States? If yes, which institutions? If yes, are students from UTMB generally more or less prepared to work on your projects? Please explain.

(7) Is there any training not currently being offered to UTMB first-year medical students participating in global health electives that you feel would be beneficial for UTMB to add to its preparation program? [If respondent did not know what training was offered—re: Question 1, explain here, or if respondent did know training was offered but did not know full details, explain here.] If yes, please elaborate on the type of training you would like to see.

(8) How could UTMB help to make the mentor role more useful to you? (Probes: Would you like more training in how to mentor students? More clear or detailed expectations of the mentor role?)

(9) Please estimate how much time you spent with your student(s) in a mentor-capacity before the student arrived at your field site (this can include email communications, Skype, and phone calls)? Do you feel this was - too much, too little, just right?

(10) Please estimate how much time you spent with your student(s) while they were at the field site (this can include email exchanges or phone/Skype conversations)? Do you feel this was - too much, too little, just right?

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Appendix B

Student interview questions

(1) Describe to me how the online module series affected your confidence regarding your scholarly product.

For the next few questions over mentorship, this refers to your UTMB faculty/staff mentor.

(2) Describe the contact (through in person meetings, phone calls, skype, or email) you had with your mentor prior to your elective abroad.

(3) Describe the contact and availability of your mentor while you were on your elective abroad.

(4) Do you feel the time spent with your mentor was too little, too much, or just right?

(5) Describe your satisfaction with the mentor experience and why you feel this way? What changes would you make, if any, to the mentor experience?

(6) Now that you have completed your scholarly project what changes, if any, would you make to the content of the preparation modules?

(7) Now that you have completed your scholarly project, are there any topics on which you wish you had been better prepared?