

**THE FIRST AFRICAN REGIONAL COLLABORATION FOR
EMERGENCY MEDICINE RESIDENT EDUCATION:
THE INFLUENCE OF A CLINICAL ROTATION IN TANZANIA ON
ETHIOPIAN EMERGENCY MEDICINE RESIDENTS**

by

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**Submitted in partial fulfillment towards the degree
MPhil in Health Professions Education at
Stellenbosch University**

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December 2017

DECLARATION

I, the undersigned, hereby declare that the work contained in this assignment is my original work and that I have not previously submitted it, in its entirety or in part, at any university for a degree.

Date: December 2017

ACKNOWLEDGEMENTS

I would like to express my sincere gratitude to:

- My supervisors, Dr. Elize Archer and Dr. Liezl Smit, for their valuable support and guidance throughout this research project and my MPhil journey.
- The students who agreed to participate in the study.
- My Ethiopian and Tanzanian colleagues who made the rotation and this research possible.
- My husband for his encouragement, patience and support during my studies.

This research assignment is dedicated to my emergency medicine colleagues in Tanzania and Ethiopia who inspire me by their efforts to spread emergency care across East Africa.

ABSTRACT

The African Federation for Emergency Medicine (AFEM) has regional groups dedicated to furthering African Emergency Medicine. In AFEM East, Tanzania and Ethiopia have emergency medicine residency programs at Muhimbili University of Health and Allied Sciences (MUHAS) and Addis Ababa University (AAU), respectively. In 2016, residents from AAU began to rotate for one month at MUHAS. To our knowledge this represents the first formal rotation of its kind, with residents from one African emergency medicine program rotating in another similarly resourced country as part of their clinical training. Prior to this study, there had been no formal evaluation of this program. The aim of this study was to evaluate the influence of a clinical rotation in Tanzania on Ethiopian emergency medicine residents. This was an evaluative study utilizing narrative information from semi-structured interviews with residents that participated in the first AAU-MUHAS rotation. Interview questions focused on residents' experiences during their rotation in Tanzania, their perceptions of the rotation, and the impact of the rotation. Interviews were recorded and transcribed. Anonymous transcriptions were then coded and themed using an inductive, iterative approach. All 13 Ethiopian residents who participated in the first year of the AAU-MUHAS rotation were interviewed individually. Four strong themes emerged from the interviews: 1) exposure to a different system, 2) the teaching environment, 3) rotation objectives, and 4) effects of the rotation upon returning to AAU. In conclusion, a rotation in Tanzania was found to positively influence Ethiopian emergency medicine residents. Key findings included: exposure to a new system of emergency care highlighted areas for improvement in their home setting, an environment conducive to teaching was greatly valued by residents, and the rotation resulted in implementable initiatives to improve patient care and education at AAU.

OPSOMMING

Om Afrika Noodgeneeskunde te bevorder het die Afrika Federasie vir Noodgeneeskunde (AFNG) streeks-groepe gevorm om die proses te dtyf. In AFNG-Oos het beide Tanzania en Ethiopie Noodgeneeskunde kliniese assistent programme; onderskeidelik die Muhimbili Universiteit van Gesondheid en Aanvullende Wetenskappe (MUHAS) en Addis Ababa Universiteit (AAU). In 2016, het kliniese assistente van AAU begin om vir een maand by MUHAS te roteer. Sover ons kennis strek verteenwoordig dit die eerste formele rotasie van die aard waar kliniese assistente van die een Afrika Noodgeneeskunde program roteer in 'n ander land met dieselfde hulpbronne. Voor hierdie studie was daar nog geen formele evaluasie van die program nie. Die doel van die studie was om die invloed wat die kliniese rotasie in Tanzanie op Ethiopiese Noodgeneeskunde kliniese assistente gehad het, te evalueer. Dit was 'n evaluasie studie wat van twee kwalitatiewe data bronne gebruik gemaak het: narratiewe inligting van semi-gestruktureerde onderhoude met die kliniese assistente wat deelgeneem het aan die eerste AAU-MUHAS rotasie, en 'n dokument analise van die prosedure-rekords van die rotasie. Onderhoudsvrae was gefokus op die kliniese assistente se ondervinding gedurende die rotasie in Tanzanie, hul persepsies van die rotasie en ook die impak van die rotasie. Die onderhoude was opgeneem en daarna getranskribeer. Die anonieme transkripsies is gekodeer en temas is daaraan gegee deur van 'n induktiewe iteratiewe benadering gebruik te maak. Al 13 Ethiopiese kliniese assistente wat gedurende die eerste jaar aan die AAU-MUHAS rotasie deelgeneem het, het aan die individuele onderhoude deelgeneem. Geeneen van die kliniese assistente het hul prosedures-rekord voltooi nie, en daarom is die resultate gebaseer op die onderhoudsdata asook 'n bespreking van die onvolledige prosedure-rekords. Vier sterk temas was duidelik vanuit die onderhoudsdata: 1) blootstelling aan 'n verskillende sisteem, 2) die leeromgewing, 3) rotasie doelwitte en 4) die effek van die rotasie op die terugkeer na die AAU. Die gevolgtrekking is dat 'n rotasie in Tanzanie die Ethiopiese Noodgeneeskunde kliniese assistente positief geaffekteer het. Kern bevindinge het die volgende ingesluit: blootstelling aan 'n nuwe sisteem van Noodgeneeskunde sorg het areas beklemtoon wat verbetering benodig het, 'n omgewing wat bevorderlik vir onderrig is was hoogs gewaardeer deur die kliniese assistente; en laastens het die rotasie gelei na die implementering van inisiatiewe wat pasiëntsorg en onderrig in die AAH kon bevorder.

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1. INTRODUCTION

Emergency medicine is a new medical specialty in Africa, and because of this, there are very few teachers and faculty members in the continent (Wen, et al., 2012; Reynolds et al., 2012; Busse, et al., 2013). The first emergency medicine physician training programs in low-income African countries began in Tanzania at Muhimbili University of Health and Allied Sciences (MUHAS) and in Ethiopia at Addis Ababa University (AAU) in 2010 (Nicks, et al., 2010; Germa et al., 2013). Due to the lack of local faculty, ensuring high-quality training experiences in these programs has been difficult, and because of this, these programs have sent their trainees abroad to bolster their educational experiences. From these East African programs, many residents (physicians in specialty training) have gone to higher-income countries (such as Canada, the USA, and the UK) for these educational exchange experiences. These international experiences have been sponsored to date, but the sustainability of this element of residency training is unlikely as it is quite expensive.

The African Federation of Emergency Medicine (AFEM) is a non-profit professional organization dedicated to improving emergency care throughout the African continent, and as such, has encouraged regional partnerships for education in emergency medicine. In early 2016, through the AFEM East regional group, an educational partnership began between the Ethiopian emergency medicine residency program, AAU, and the emergency medicine residency program in Tanzania at MUHAS. Residents from the AAU program began to rotate in Tanzania with the MUHAS program for one-month rotations in emergency medicine training. This represents the first educational exchange of its kind in African emergency medicine, and as such, program evaluation is of utmost importance.

Through this rotation, it was thought that Ethiopian residents would have exposure to critical care and paediatrics teaching that is not available in their own university. Furthermore, as the context and disease burden in Ethiopia is fairly similar to that in Tanzania, it was thought that the education they received in Tanzania would be more applicable to their own daily practice than rotations in high-income countries. AFEM and the universities involved in this collaboration are considering supporting the expansion and continuation of regional exchange programs for emergency medicine training. However, this program has not undergone any evaluation, and thus there is little evidence to support the expansion of such programs, or to suggest any necessary improvements.

The aim of this research assignment was to evaluate the rotation to determine if the rotation has influenced the practice of Ethiopian residents or met its stated objectives.

This assignment is presented in a format structured around an article that has been prepared for submission to *Academic Emergency Medicine Education and Training: A Global Journal of Emergency Care*. This assignment begins with extended literature review and methods sections to provide additional context and the theoretical framing of the work that word limits in the article submission specifications would not allow. The article, in the format prescribed by the journal, is presented next. The article may repeat some key aspects of the preceding sections for clarity. Finally, the assignment concludes with a summary, reference list and appendix.

2. EXTENDED LITERATURE REVIEW

International Rotations in Medical Education

International rotations have become a well-established part of medical education globally, and continue to gain popularity (Thompson et al., 2003; Drain, et al., 2009; Jeffrey et al., 2011; Sawatsky et al., 2010). The majority of the literature surrounding these international rotations has a focus on training programs from high-income/developed countries (often referred to as “North” countries) sending students to low-income countries (often referred to as “South” countries) (Flinkenflögel et al., 2015; Binagwaho, et al., 2013). These exchanges are often referred to as “North-South” rotations (Twagirumugabe & Carli, 2010; Olapade-Olaopa et al., 2014). A variety of educational benefits from rotations involving students from high-income countries travelling to low-income countries have been described. These benefits include increasing student physical examination skills, exposure to advanced pathology/disease, interest in public health, likelihood of entering a primary care specialty, and likelihood of entering a practice area that serves the underserved (Henry et al., 2013; Thompson et al., 2003; Drain, et al., 2009; Jeffrey et al., 2011; Sawatsky et al., 2010; Petrosoniak, McCarthy & Varpio, 2010).

For trainees from low-income countries visiting high-income countries, there is less literature on the outcomes of exchange rotations, but benefits are still described (Busse et al., 2013; Vidyasagar, 2009). These include leadership development, skills development, and providing professionals with educational opportunities that are not available in their home country (Busse et al., 2013).

Very few international exchanges and rotations have been described between two or more low- and middle-income countries, referred to as “South-South” rotations. Those that have been described are typically masters-level partnerships that do not include clinical care (Amde, Sanders & Lehmann, 2014). Clinical rotation exchanges between two lower-resource programs are rare (Wilmhurst, et al. 2016). However, the potential benefits of such programs are intriguing. These programs are thought to be more sustainable and provide many of the same benefits of other exchange programs with the potential of being more relevant to student home practice settings (Wilmhurst et al., 2016).

International Rotations in Emergency Medicine Training

With respect to international rotations, training in the specialty of emergency medicine has followed a similar trend to that shown in the majority of medical education literature (Alagappan, et al. 2007; King et al, 2013). International rotations are gaining in popularity, and the literature focuses on rotations in which residents from North America, the UK and Australia visit a variety of low-income countries (Keyes, et al., 2009; Osei-Ampofo et al., 2013). A few examples of residents from low-income countries rotating in high-income countries have also been described. For example, emergency medicine trainees from Ethiopia and Tanzania have traveled to the United States for training (Busse et al., 2013; MUHAS, 2015; Reynolds, et al., 2012).

Within emergency medicine, educational South-South exchanges between two or more low- and middle-income countries, or descriptions of inter-Africa educational exchanges are not well described in the literature. However, in early 2016, such an educational partnership began. Through an AFEM East collaboration, residents from the Ethiopian emergency medicine residency program at AAU began coming to MUHAS in Dar es Salaam, Tanzania for a one-month rotation in emergency medicine training. This represents the first educational exchange of its kind in African emergency medicine.

Experiential Learning and Socio-Cultural Exposure in International Exchange Rotations

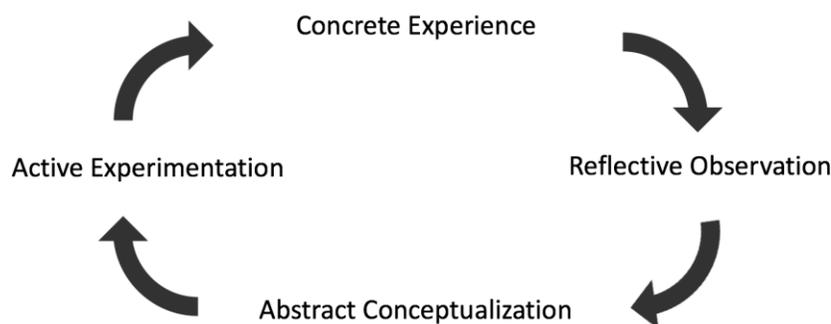
International clinical exchange rotations follow in the footsteps of some of medicine’s earliest educational models, traditional apprenticeships, by allowing residents to have a hands-on

experience in a clinical, workplace-based setting while supervised by experts in the field (Dornan et al., 2007; Monroe-Wise et al., 2014). However, beyond simple apprenticeships, clinical exchange rotations can be designed to use experiential learning theory to maximize the learning experience, and introduce learners into the socio-cultural environment of patient care settings in a structured way (Dornan, 2012; Swanick, 2005; Van der Zwet et al., 2011).

Experiential learning is learning by doing, and thus, in medicine takes place by applying theoretical knowledge to the care of actual patients under the supervision of a clinical educator, in a real clinical environment (Billett, 2002; Yardley, Teunissen & Dornan, 2012a; Yardley, Teunissen & Dorman, 2012b; Swanick, 2005; Dornan et al., 2007). Kolb's model of experiential learning has been widely applied to medical education and provides a lens through which to consider the learning process of clinical rotations, and the benefits that international exchange rotations could have on the education of residents (Kolb, 1984; Yardley, Teunissen & Dorman, 2012b). Kolb built heavily upon the work of Dewey (1938), Lewin (1981), and Piaget (1971) that concentrated on social psychology, action research, and group dynamics. Kolb stressed that transformative learning, learning that serves as a means of transformation at the personal or societal level, can take place through having experiences and by focusing on reflection and action (Kolb, 1984; Kauffman & Mann, 2010; Papastamatis & Panitsides, 2014).

Kolb's experiential learning model is comprised of four-stages that describe the acquisition of new knowledge (Kolb, 1984). It relies on the idea that learners gain knowledge and change as a result of adding to their personal experience, engaging in reflection, conceptualizing, and experimentation (Kolb, 1984; Yardley, Teunissen & Dorman, 2012b). The four-stage model is shown in Figure 1 and is a cycle that can begin at any point.

Figure 1. Kolb's Model of Experiential Learning (Kolb, 1984)



Kolb's four stages include concrete experience, reflective observation, abstract conceptualization, and active experimentation (Kolb, 1984; Kauffman & Mann, 2010). Through these four stages, learning can be enhanced. Kolb's model concentrates on an individual's worldview and interactions (Swanick, 2005). Thus, applying Kolb's theory to international rotations, learners from a different country will come with their own knowledge base and add to it while on rotation, but may continue Kolb's cycle of learning when they return home through further active experimentation of their newly gained knowledge in their home environment. It is therefore also important to consider that during international clinical rotations, these learning processes take place in a workplace based context, and there is a large contribution to learning from exposure to the socio-cultural environment of the healthcare workplace (Swanick, 2005; Rogoff, 1990).

Residents on clinical rotations are subjected to the social and cultural environment of the site that they are rotating in, and this must be considered as a factor in their learning process and experience (Yardley, Teunissen & Dorman, 2012b). Experiential learning opportunities in clinical medicine are therefore heavily influenced by socio-cultural factors. Clinical resident education includes learning that happens as part of the planned curricula, but also outside of planned curricula (Eraut, 2004; Yardley, Teunissen & Dorman, 2012b). This informal learning is opportunistic and helps to acclimate learners to the environment in which they are being prepared to work (Swanick, 2006; Eraut, 2004).

Rotations that do produce robust experiential learning opportunities and exposure to the culture of medicine in a structured way can be expensive and resource consuming to create, and require the presence of experts. Creating an effective clinical learning environment has been described as challenging (Elisha & Rutledge, 2011; Piquette, Moulton, & LeBlanc, 2015; Monroe-Wise et al., 2014). This can be especially true in resource-limited settings (Monroe-Wise et al., 2014). However, international exchange rotations in clinical medicine can help to extend the efficacy of limited human resources for health professions education. Rotations such as the AAU-MUHAS rotation have the potential to assist universities to maximize limited human resources by collaboration between universities in the same region.

The World Health Organization has called for innovative scale-up of transformative programs for health worker education in underserved regions (World Health Organization, 2016). However,

one of the major challenges to this call is the available human resources and expertise for training healthcare providers (World Health Organization, 2016). Exchange rotations between countries with similar resources and cultures, such as the AAU-MUHAS rotation, may provide a unique option for increasing workforce training opportunities in medical education and providing experiential, transformative learning experiences.

Program Evaluation

As the AAU-MUHAS rotation is the first of its kind, program evaluation is essential. The fundamental goal of program evaluation is to provide evidence to examine and improve a program (Rossi, Lipsey & Freeman, 2003). Evaluation can help to ensure that newly implemented educational programs, such as the AAU-MUHAS rotation in emergency medicine, provide high-quality educational experiences and meet the desired outcomes (Palomba & Banta, 1999; Greene, 1994; Vassar et al., 2010; Goldie, 2006).

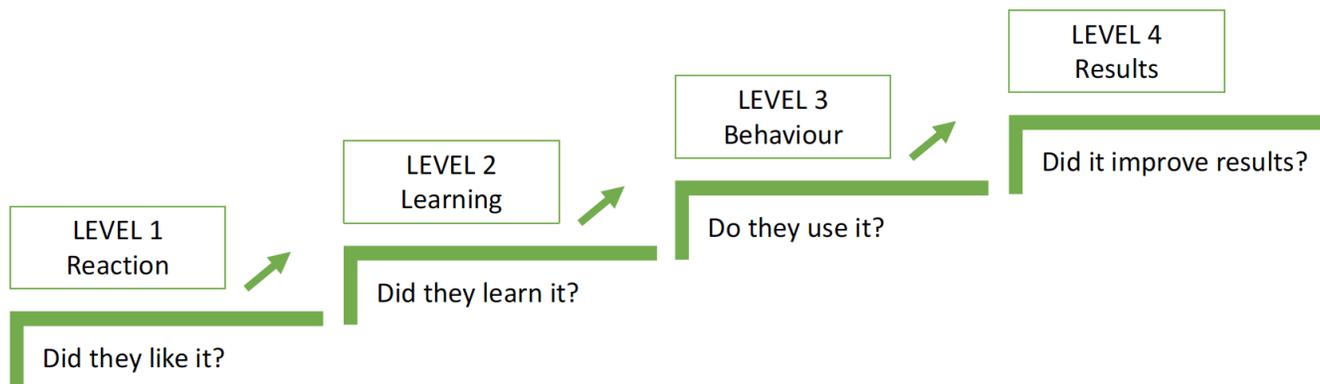
A primary element of medical education rotation evaluation involves determining the effectiveness of rotations for participants (Goldie, 2006). Examining participant perception of a rotation can help examine multiple complex aspects of an educational environment that contribute to educational effectiveness (Cook, 2010). Specifically, a participant-based evaluation approach can provide valuable information on context and motivation (Goldie, 2006; Cook, 2010). As successful deep learning in adult education is related to context, student motivation, and student perception, data from participant-oriented evaluations can be utilized effectively to improve programs (Cook, 2010; Strasser & Neusy, 2010; Taylor & Hamdy, 2013).

Furthermore, along with participant-based evaluation, a rotation should be examined to see if it meets the desired outcomes (Cook, 2010). As program outcomes are typically set out before a program begins, they can typically be evaluated at the end of a program to see if they are met (Vassar et al., 2010). The meaning and validity of this aspect of evaluation is dependent on carefully chosen outcomes (Cook, 2010). However, if the chosen outcomes are meaningful, outcome-based evaluation can produce clear data for program improvement.

One popular framework for the evaluation of training programs in medical education is that of Kirkpatrick (Kirkpatrick, 1996). Kirkpatrick's model has four levels of evaluation that are shown in Figure 2. Level 1 begins with participant-based evaluation and examines the learner

satisfaction and perception of the learning environment and material (Reaction Level), levels 2 through 4 begin to look at outcomes on the student level (Knowledge, Behavior), and higher level outcomes that may result in different care to patients (Results). These levels are particularly important in medical education as they explore not only if the learners were satisfied with the program, but if there were appropriate outcomes of the program to benefit the overall healthcare system.

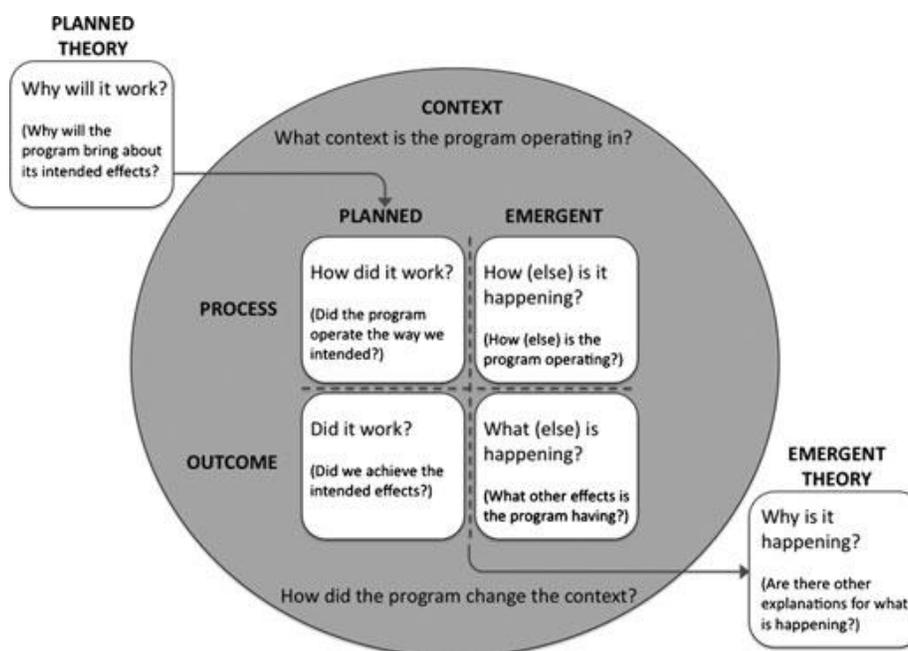
Figure 2. Kirkpatrick's Four Levels of Program Evaluation (Kirkpatrick, 1996)



Kirkpatrick's framework (1996) presents elements that are important for evaluation of the AAU-MUHAS rotation. However, a limitation of Kirkpatrick's framework is that it does not stress the context in which learning is taking place. As the primary innovation in education represented by the AAU-MUHAS program is that of placing students into a unique learning context, a program evaluation framework that stresses the context in which learning takes place is more appropriate for evaluation of this program.

Haji, Morin and Parker (2013) have presented such a framework, as shown in Figure 3. This framework evaluates the planned and emergent processes and outcomes of a training program with emphasis on the context that the program is operating in. Evaluating the AAU-MUHAS rotation through the lens of the Haji, Morin and Parker framework allowed us to determine if the program is meeting its outcomes, and also to evaluate other emergent effects that the program had that were not necessarily planned. Furthermore, this evaluation will assist program leadership to improve the rotation, and assist other programs considering regional exchange rotations to design programs.

Figure 3. Haji, Morin and Parker's Framework for Program Evaluation (2013)



3. EXTENDED METHODS SECTION

This was an evaluative study that aimed to utilize qualitative data from two sources: Narrative information from semi-structured interviews with EM residents who participated in the first AAU-MUHAS rotation, and document analysis of logbooks completed by those residents during the rotation. However, the logbooks were not completed by any participant, and thus, this fact served as a point of reference in the interviews, but no document analysis could take place.

Participants

All 13 emergency medicine residents from AAU that participated in the first AFEM East emergency medicine rotation at Muhimbili National Hospital in Dar es Salaam, Tanzania during the 2015-16 academic year participated in the study.

The Researcher's Role

Since August of 2016, I have been an Assistant Professor at Emory University School of Medicine. Emory University has a long-term partnership with AAU aimed at supporting medical education.

Prior to joining the faculty at Emory, I worked full-time in Dar es Salaam, Tanzania as a faculty member in the Department of Emergency Medicine at MUHAS and the manager of emergency care training programs at Muhimbili National Hospital. I was on-site in Tanzania during the entirety of the rotation being evaluated in this proposal. I was a member of the curriculum design team for the rotation, provided logistical support for the rotation, developed teaching materials for the rotation, and taught sessions during the rotation. I did not participate in testing/grading participants in the rotation or any disciplinary actions that took place during the rotation, and I do not have any relation to the funding structures for the rotation.

Recruitment and Enrollment

The 13 residents who were involved in the rotation were invited to participate in this study via email. The purpose of the study was explained and written, informed consent was obtained from each participant. It was made clear that participation was voluntary and that they could withdraw at any time. Participants were assured that the research would have no influence on their academic assessments. The consent form is shown in Appendix A.

Study Design and Data Collection

I performed semi-structured individual interviews to gather qualitative data (Denscombe, 2014:E-book Part 1). I also intended to examine rotation logbooks with the participants to provide a further source of data on the rotation experience. However, the logbooks were not completed by any participant, and thus, this fact served as a point of reference in the interviews, but no document analysis could take place. A logbook is shown in Appendix C.

For the interviews, I used a semi-structured interview guide with prompts based on Haji, Morin and Parker's framework (2013) to gather the Ethiopian emergency medicine residents' experiences during their rotation in Tanzania, and their perceptions of the rotation. To facilitate

in-depth answers, the interview guide was followed with additional questions when necessary (Denscombe, 2014:E-book Part 2). The interview guide is shown in Appendix B.

I conducted interviews one-on-one in a quiet, neutral environment. I took notes during the interviews, and the interviews were audio recorded. After recording, the interviews were transcribed and anonymized by a professional transcription service.

Data Preparation

Original copies of audio recordings, interview notes, and anonymized transcriptions were kept in a password protected computer throughout the duration of the study and were accessible only to me to ensure that raw data was available for re-evaluation/reference if required. Copies of the transcriptions and notes were used for analysis.

Data Analysis

I utilized the transcribed anonymous interviews and interview notes to analyse the content using thematic analysis. Thematic analysis focuses on grouping and organizing the data into patterns and concepts that form themes (Braun and Clark, 2013; Ng, Lingard, & Kennedy, 2014: 377). To perform thematic analysis, I coded the interview data using an inductive, iterative approach (Auerbach & Silverstein, 2003:14-31). This involved reading and re-reading the notes and transcriptions. Coding was then performed through annotation in Microsoft Word (Microsoft Word for Mac, 2011 version 14.4.5, Microsoft Corporation, Redmond, WA, USA) (Denscombe, 2014:E-book Part 3). Open coding, axial coding, and selective coding were combined to generate themes. Analysis was ongoing as data was collected and continuously re-evaluated. Themes were identified and refined through reflection and iterative processing.

After initial theme identification, member checking of the themes took place through review with three of the interview participants. A physician from Ethiopia familiar with the rotation, but not involved in the evaluation of the residents, also reviewed the qualitative data and themes to provide peer scrutiny and cultural context to strengthen the themes. Finally, supervisor debriefing allowed additional input to help improve the credibility of the themes and interpretation.

Ensuring Research Quality

The quality of qualitative research can be evaluated by the trustworthiness of the research. Four primary elements contribute to this:

- 1) credibility
- 2) transferability
- 3) dependability
- 4) confirmability (Shenton, 2004).

The **credibility** of qualitative research refers to the trustworthiness of the study to measure what was intended to be measured (Shenton, 2004). Credibility can be improved by using established research methods, developing familiarity with the context/culture to be studied, keeping a research record that shows all steps of the research project, researcher reflection, peer scrutiny, supervisor debriefing, and member check (Shenton, 2004; Ng, Lingard, & Kennedy, 2014: 378). In this study, the well-described methods above were used, and a research record was kept with active reflection throughout the process. As the researcher, I had local expertise and was already intimately familiar with the context of the rotation. Peer and supervisor input was obtained throughout the process of data analysis, and study participants were asked to verify transcription content as well as evaluate emerging themes through the process of data analysis.

The **transferability** of the study refers to the extent to which the results of a study may be applicable to other situations (Shenton, 2004). As the rotation in this study is the first of its kind, and the context of the rotation is of primary importance to the research question, the transferability to other situations may be limited. However, reviewing literature and findings from other studies in different environments and comparing and contrasting the themes and results of this study may help to frame the discussion and possible use of the research results in the future.

Dependability refers to the reliability of the data and consistency of findings. If repeated in the same context, dependable research would produce the same results (Shenton, 2004). Dependability was addressed in this study by using well-described research methods, keeping an audit trail consisting of a complete set of records of the research process, and researcher reflection.

The **confirmability** of the research refers to the objectivity of the researcher and ability to present the data obtained during the study (Shenton, 2004). To ensure confirmability in this study, I practiced reflection and clearly stated my role in the research process. A detailed research record and audit trail were kept throughout the process.

With attention to these elements of research quality, this study has been able to produce trustworthy results.

4. THE MANUSCRIPT

(Prepared for submission to *Academic Emergency Medicine Education and Training: A Global Journal of Emergency Care*, Author Guidelines are presented in Appendix E with relevant sections highlighted)

TITLE:

The First African Regional Exchange Rotation for Emergency Medicine Physician Education: A Qualitative Evaluation

Word count: 4997

ABSTRACT:

Background:

The African Federation for Emergency Medicine (AFEM) has regional groups dedicated to furthering African emergency medicine. In AFEM East, Tanzania and Ethiopia have emergency medicine residency programs at Muhimbili University of Health and Allied Sciences (MUHAS) and Addis Ababa University (AAU), respectively. In 2016, residents from AAU began to rotate for one month at MUHAS. To our knowledge this represents the first formal rotation of its kind, with residents from one African emergency medicine program rotating in another similarly resourced country as part of their clinical training.

Objective:

To evaluate the influence of a clinical rotation in Tanzania on Ethiopian emergency medicine residents.

Methods:

This was an evaluative study utilizing narrative information from semi-structured interviews with residents that participated in the first AAU-MUHAS rotation. Interview questions focused on residents' experiences during their rotation in Tanzania, their perceptions of the rotation, and the

impact of the rotation. Interviews were recorded and transcribed. Anonymous transcriptions were then coded and themed using an inductive, iterative approach.

Results:

All 13 Ethiopian residents who participated in the first year of the AAU-MUHAS rotation were interviewed individually. Four strong themes emerged from the interviews: 1) exposure to a different system, 2) the teaching environment, 3) rotation objectives, and 4) effects of the rotation upon returning to AAU.

Conclusion:

A rotation in Tanzania was found to positively influence Ethiopian emergency medicine residents. Key findings included that exposure to a new system highlighted areas for improvement in their home setting, an environment conducive to teaching was greatly valued, and that the rotation resulted in implementable initiatives to improve patient care and emergency medicine resident education at AAU

INTRODUCTION

Background

Emergency medicine (EM) is a new medical specialty in Africa, and because of this, there are few teachers and faculty members in the continent.^{1,2,3} The first EM physician training programs in low-income African countries (as designated by the World Bank) began in Tanzania at Muhimbili University of Health and Allied Sciences (MUHAS) and in Ethiopia at Addis Ababa University (AAU) in 2010.^{4,5} Due to the lack of local faculty, ensuring high-quality training experiences in these programs has been difficult, and because of this, these programs have sent their trainees abroad to bolster their educational experiences. From these East African programs, many residents (physicians in specialty training) have gone to higher-income countries (such as South Africa, Canada, and the USA) for these educational experiences. These international experiences have been sponsored to date, but the financial costs make sustainability unlikely.

The African Federation of Emergency Medicine (AFEM) is a non-profit professional organization dedicated to improving emergency care throughout Africa, and as such, has encouraged regional partnerships for EM education. In early 2016, through the AFEM East regional group, an educational partnership began between the Ethiopian and Tanzanian EM residency programs. Residents from AAU began to rotate in Tanzania with the MUHAS program for one-month clinical rotations. This represents the first educational exchange of its kind in African EM, and as such, program evaluation is of utmost importance.

Through this rotation, it was thought that Ethiopian EM residents would have exposure to a different EM system that incorporated critical care and paediatrics aspects not available in their own department. Furthermore, as the context and disease burden in Ethiopia is similar to that in Tanzania, it was thought that the education they received in Tanzania would be more applicable to their own daily practice than rotations in more highly resourced, higher-income countries. AFEM and the universities involved in this collaboration are considering supporting the expansion and continuation of regional exchange programs for EM training. However, this program has not undergone any evaluation, and thus there is little evidence to support the expansion of such programs, or to suggest any necessary improvements.

Theory

The aim of this study was to evaluate the rotation and its influence on the Ethiopian residents. One popular framework for the evaluation of training programs in medical education is that of Kirkpatrick.⁶ Kirkpatrick's model has four levels of evaluation that are shown in Figure 1. Level 1 begins with participant-based evaluation and examines the learner's satisfaction and perception of the learning environment and material (Reaction Level). Levels 2 through 4 begin to look at outcomes on the student level (Knowledge, Behavior) and higher-level outcomes that may result in different care to patients (Results). These levels are important in medical education as they explore not only if the learners were satisfied with the program, but if there were appropriate outcomes of the program to benefit the healthcare system.

Kirkpatrick's framework therefore presents elements that are crucial for evaluation of the AAU-MUHAS rotation. However, a limitation of Kirkpatrick's framework is that it does not stress the context in which learning takes place, or unintended outcomes of the program. As the primary innovation in education represented by the AAU-MUHAS program is that of placing students into a unique learning context, a program evaluation framework that stresses the context in which learning takes place is appropriate for further evaluation of this rotation. Haji, Morin and

Parker have presented such a framework, as shown in Figure 2.⁷ This framework evaluates the planned and emergent theory, processes and outcomes of a training program with emphasis on the context that the program is operating in. In this study, we aimed to evaluate the AAU-MUHAS rotation through both Kirkpatrick's framework and the Haji, Morin and Parker framework.

Research Question:

How does a one month rotation in a Tanzanian Emergency Department influence the clinical practice of Ethiopian emergency medicine residents?

Specific Objectives:

To determine what elements of the rotation impacted clinical practice, if the rotation was contextually appropriate, if the rotation met its objectives, and if there were other effects of the rotation.

METHODS

This was an evaluative study that aimed to utilize qualitative data from two sources: Narrative information from semi-structured interviews with EM residents who participated in the first AAU-MUHAS rotation, and document analysis of logbooks completed by those residents during the rotation. However, the logbooks were not completed by any participant, and thus, this was discussed in the interviews, but no document analysis could take place.

Study Setting

The rotation was based at Muhimbili National Hospital (MNH) in Dar es Salaam, Tanzania. MNH serves as the top referral hospital in Tanzania and has a bed capacity of 1,500. The ED-MNH was established in 2010 and is the only full-capacity public ED in Tanzania. It sees approximately 65,000 patients a year, 25% of whom are children. The ED-MNH has a resuscitation area dedicated to mechanically ventilated patients. The MUHAS EM residency program is based in the ED-MNH.

The AAU residency program is based at Black Lion Specialized Hospital. It is an 800-bed hospital that serves as the largest teaching hospital in Ethiopia, and is a tertiary referral center. The ED sees approximately 80,000 patients per year. Paediatric patients are seen in a separate area of the hospital. At the time of the rotations, the ED did not have a dedicated area for critically ill patients.

Interviews took place at AAU after residents had completed their rotations in Tanzania.

Rotation Information

The rotation was a month-long rotation in the ED-MNH. AAU residents participated in clinical shifts, lectures, simulations, and journal clubs alongside MUHAS residents. The objectives of the rotation were for AAU residents to gain procedural experience, critical care experience including the use of ventilators, and pediatric emergency medicine experience.

Participants

All 13 EM residents from AAU who participated in the first year of the AAU-MUHAS rotation at MNH in Dar es Salaam, Tanzania participated in the study.

The Researcher's Role

I performed the interviews and was known to the residents as I was a faculty member at MUHAS and on-site in Tanzania during the AAU-MUHAS rotations. I was a member of the curriculum design team for the rotation, developed teaching materials, and taught educational sessions. I did not participate in testing/grading of participants or in any disciplinary actions that took place during the rotation, and I do not have any relation to the funding structures for the rotation. The residents were aware of my role and my separation from their grades.

Recruitment and Enrollment

The 13 residents who were involved in the rotation were invited to participate in this study via email. The purpose of the study was explained and written, and informed consent was obtained from each participant. It was made clear that participation was voluntary and that they could

withdraw at any time. Participants were assured that the research would have no influence on their academic assessments.

Study Design and Data Collection

Semi-structured interviews were performed to gather qualitative data. A semi-structured interview guide with prompts based on Haji, Morin and Parker's framework was used to gather the Ethiopian EM residents' experiences during their rotation in Tanzania, their perceptions of the rotation, and the impact of the rotation.⁷ To facilitate in-depth answers, interview guide questions were followed with additional prompts when necessary. The interview guide is shown in Table 1.

Logbook reviews were planned, and participants were asked to bring their logbooks for review during their interviews. However, the logbooks were not completed by any participant, and thus, this fact served as a point of reference in the interviews, but no document analysis could take place.

Interviews were conducted one-on-one in a quiet, neutral environment. Notes were taken during the interviews, and the interviews were audio recorded. The audio recordings were then transcribed by a professional transcription service.

Data Preparation

Original copies of audio recordings, interview notes, and transcriptions were kept in a password protected computer throughout the duration of the study to ensure that raw data was available for re-evaluation/reference if required. Copies of the transcriptions and notes were used for analysis.

Data Analysis

I analyzed transcribed anonymous recordings and notes through thematic analysis. To perform thematic analysis, I coded the data using an inductive, iterative approach.⁸ This involved reading and re-reading the notes and transcriptions. I then coded the data through annotation in Microsoft Word (Microsoft Word for Mac, 2011 version 14.4.5, Microsoft Corporation, Redmond,

WA, USA).⁹ Open coding, axial coding, and selective coding were combined to generate themes. Analysis was ongoing as data was collected and continuously re-evaluated. Themes were identified and refined through reflection and iterative processing.

After initial theme identification, member checking of the themes took place through short interviews with three of the interview participants. A physician from Ethiopia familiar with the rotation, but not involved in the evaluation of the residents, also reviewed the qualitative data and themes to provide peer scrutiny and cultural context to strengthen the themes. Finally, research team debriefing allowed additional input to help improve the credibility of the themes and interpretation.

RESULTS

All 13 Ethiopian residents who rotated in Tanzania during the first year of the AAU-MUHAS rotation were interviewed individually. The interviews were between 8min 0sec and 35min 54sec in length with an average length of 13min 14sec. Although some of the interviews were short, in total they provided a rich data source and resulted in thematic saturation.

This was the first international clinical experience for all 13 participants. Each of them expressed that the rotation in Tanzania had been an influential and beneficial learning experience for them personally, and that junior trainees in their program would benefit from the program continuing. Through the interview narratives, four main themes emerged:

1) Exposure to a different ED system

The most frequently mentioned area of robust learning and lasting impact was exposure to a new EM system in which the ED functions differently. Many residents related their surprise at how differently the ED functioned in Tanzania, a country similarly resourced to their own. As Resident 1 voiced, “I didn’t expect that there would be such a big difference... because both of us are in East Africa... but there is a great difference.”

Resident 5 stated, “The best parts of the rotation was how the ED functions and generally you can see how an ED can function better.”

Clinical protocols, patient flow measures, physician scheduling, and equipment availability were the most frequently mentioned areas of department management that the residents reported learning from. Comments regarding the ED system and setup in Tanzania were positive, even while acknowledging that the system still had significant limitations. The majority of comments focused on the disposition of patients to other wards, as this is something the residents struggle with in Ethiopia. Resident 3 expressed the difficulty of transitioning patients from the ED to the wards in Ethiopia: “It is very difficult. As you have seen, we have five days, six days stay per patient in our department. But our plan is to make like that of just managing the acute case and disposing them.”

The Ethiopian residents commented positively on the disposition of patients in the Tanzanian system as something to aspire to. Resident 13 noted, “One thing we should praise there is the emergency flow of patients and the emergency system itself.”

Resident 1 said, “The better thing is the patient disposition, the patients will not stay longer than 24 hours in the emergency.”

Resident 10 stated, “I must say the setup—it was the best part. Their disposition.”

However, Resident 10 also went on to suggest improvements, “I would suggest if they expand more. Expand because sometimes it’s crowded and the Resus rooms are crowded, lots of patients, and it will be difficult to manage.”

Overall, residents stressed that in seeing a similarly resourced department that functions differently, the exposure to the Tanzanian EM system had a significant impact on their education, and motivated them upon their return home. All residents expressed that future Ethiopian residents should participate in the rotation in Tanzania. Resident 6 stated, “I think it is a must,” and Resident 4 said, “I think they have to... yeah... it’s a kind of a new experience. There is no other place they have that they will learn some things.”

However, despite the positive impressions of the rotation in Tanzania, which focused strongly on exposure to the Tanzanian EM system, some residents suggested that going to a more highly resourced, or more established system would be better. Resident 4 expressed the desire to rotate somewhere else: “Another country, another better centre with a better setup and a

better regiment, better facility, better, long years of experienced people, and long years of experienced department.”

2) Teaching in the ED

A second strong theme that emerged from the rotation was the importance of creating a teaching environment in the ED. Ethiopian residents expressed witnessing a curricular structure and educational environment that they felt was more supportive of resident education than in their home setting. Resident 3 noted, “The best point is they concentrate more on learning and teaching, not only patient management. There is simulation, there is case discussion, bedside rounds, and more concentrated teaching. It is a good environment to learn.”

Resident 4 agreed, adding that the structure of ED staffing allowed for residents to step away from clinical work for more dedicated teaching time: “They have better teaching time as compared to us, like we have more working time than teaching time. And, also the actual work is also going to be done by other emergency staff, GP’s, especially the green cases and most of the cases that will be seen by medical physicians are the red and some of the yellow patients. So this is the best at the emergency practices, better than us.”

Several residents also noted that in Tanzania, senior physicians were often available for bedside teaching and reported this as different from their home program. Resident 12 described the Tanzania trainee experience: “In managing patients the seniors are always there, even during duty time. You don’t, you as a trainee, you’ll not have any challenge, you will decide together. You assess the patient together with a senior and they always are continuously supervising you, that means they are teaching you. That is the most important thing that you learn each time, and you do, you learn. That is the very big difference.”

However, many residents expressed that they, as visiting residents, did not experience the full benefit of the teaching practices and environment they saw in Tanzania. Resident 2 stated, “There were lots of exams and research, I think their schedule was crowded. So we don’t have that time for us to discuss about the specific topics that we wanted.”

The residents also expressed that their role as visitors was often as observers, which limited their experiential learning. As resident 6 stated, “There we were observers most of the time. We

observed procedures, we observed how they pay attention for the patient, how they clear patients. I think what is needed to be improved is, according to my thought, if we were part of the managing team and if we were performing some procedures.”

Despite limitations of the educational environment expressed by the residents, they showed strong interest in continued collaborative rotations, including hosting Tanzanian residents in Ethiopia. Several residents also expressed that they believed AFEM, or other professional organizations, should support educational exchange rotations. Resident 7 said, “I think it’s better to just have more experience, to have more rotation, it could be here or there, but just like interdepartmental rotation, spending more time together and learning more.”

Resident 5 expressed, “For the future I hope we can accommodate the rotations here as well.”

3) Meeting rotation objectives

When discussing specific rotation objectives, most residents were unable to state the objectives of the rotation and did not recall being formally told the objectives. Just as they had focused on exposure to a new system of emergency care as the best part of their rotation, they also hypothesized that this was the primary objective of their rotation. In the words of Resident 7, “From my understanding they want us to get some experience, to share experiences, to see how other people work—how emergency is running in other countries.”

Resident 5 also mentioned the objective of critical care exposure, “The objectives were to share experience generally, general experience in ED management, ED leadership and also the real patient care practice, the emergency and ICU. This was the objective and the objectives were met and met more than expected.”

No resident mentioned paediatrics experience or procedural experience as specific objectives until prompted. When prompted, some mentioned that they saw some paediatrics experience, and the majority reported that they did not get procedural experience. In fact, many believed that their experience in Ethiopia provided better procedural training than the rotation in Tanzania. Resident 3 remarked, “No, the procedures as far as I saw, it is better here”, referring to AAU.

Resident 11 pointed to the incomplete logbook and noted, “We didn’t see many of the procedures. We wished that we could see pacing because we do not have cardiac pacing, and fiberoptic intubations. And there were also the other plans we had, but we couldn’t get that.”

Although some objectives of the rotation were not met, the residents did not report diminished value to the overall rotation. Creating clearer objectives that are known to the residents was one area of possible improvement mentioned by several residents. Resident 10 refers to his leadership in Ethiopia who planned the rotation and states, “Maybe if they communicate directly with the seniors who are working in Tanzania... and told them what we have to achieve... I think that would be better.”

4) Effects of the rotation upon returning home

Residents report that the AAU-MUHAS rotation motivated and inspired them to be agents of change upon returning home. All residents reported speaking with their departmental leadership and suggested changes that could be made within their own ED and academic program based upon their experiences at MUHAS/MNH. Resident 9 said, “It kind of opened my eyes to a whole variety of things that are out there.”

Resident 12 reported success in bringing home lessons learned, “Just to gain experience abroad, to share the teaching/learning process there, and to bring it back to our country and to our situation. I think we managed that, we have good experience and we are able to translate what we have seen and what we have been taught and told.”

The residents noted three areas in which the rotation motivated them to improve their own environment: 1) Equipment availability, 2) Patient flow within, and disposition from the ED, and 3) Residency education structure. Residents also commented that seeing the overall management and leadership structure of the ED-MNH and MUHAS residency program allowed them to think more broadly about their own department, and departments where they will work in the future. Resident 6 discussed the rotation as an investment, “I think it’s an investment. It’s a very inspiring moment.”

Furthermore, the residents reported that actual changes had been put into place at AAU based upon their requests. Resident 5 reports that since the rotation they have been successful in

“Improving resuscitation rooms and having equipment needed for emergency care, and much more improvement could be seen here, and we are also really motivated for better ED care.”

They reported that after seeing the use of ventilators in the ED-MNH, and the transition of patients from the ventilators in the ED to the ICU, they wanted to provide patients with this as well. Resident 5 describes seeing ventilators in the ED-MNH, and remarking: “So before that even we didn’t think that we can have ventilators.” Upon return to AAU, the residents asked their own hospital for ventilators and were able to procure ventilators for use in the ED.

Other areas of learning from their Tanzania rotation, such as educational program structure and patient flow, had not yet resulted in changes, but residents reported discussing them with departmental leadership, and hoped for future changes. Some residents, such as Resident 1, believed that current leadership would help to enact changes. Discussing conversations with AAU leadership upon return from Tanzania, Resident 1 stated, “We also commented on the educational schedule. Most of the time we don’t have lectures. There they have lectures, so we do have commented on that and I think soon they will start a class for residents.”

However, other residents, such as Resident 12 believed that the changes would be spearheaded by their class once they become specialists after graduation, “It will, it will change actually. I hope, especially those also who were there in the rotation, when they become seniors.”

DISCUSSION

Our study shows the potential influence of an exchange rotation in a similarly resourced low-income country on EM residents in training. This study highlights some of the benefits of this learning opportunity. The key finding in this study is that the Ethiopian residents gained exposure to a new system, which highlighted areas for improvement in their home setting with regards to resident education, ED management, and patient care. Furthermore, this exposure influenced the residents to enact change at AAU upon their return.

This discussion will begin by evaluating the rotation through Kirkpatrick’s Framework shown in Figure 1⁶, and then add to the evaluation by applying Haji, Morin and Parker’s framework shown in Figure 2.⁷ The evaluation of Kirkpatrick outcomes of this rotation was augmented by an

expanded version of Kirkpatrick's model that divides levels 2 and 4 into two sections each: 2a) modified attitudes/perceptions and 2b) acquisition of skills/knowledge, and 4a) change in organizational practice and 4b) benefits to patients, families and communities.^{10,11} Kirkpatrick level outcomes of the rotation as reported in the interviews are shown in Table 2.

This objective evaluation of the rotation using Kirkpatrick's Framework, therefore, shows resident satisfaction with the rotation, modified perceptions and attitudes from the rotation, translation of the knowledge gained in Tanzania into the workplace and system in Ethiopia, and an improvement in patient care even though not all specific objectives of the rotation were met, and not all effects were planned. Through this lens, the rotation could be considered moderately successful, with suggestions for improvement including better dissemination of rotation objectives and quantifying knowledge gains, behaviour changes, and impact on patient care in a more robust way. However, Kirkpatrick's framework provides an incomplete evaluation of this rotation, as it does not speak specifically to the context and setting in which the program took place, which is the primary innovation of the rotation. Kirkpatrick's framework has inadequate explanatory power as it answers what has happened, but why those things have happened are often not explored.¹²

Further evaluation of context and setting are vital to understanding the educational effects of the AAU-MUHAS rotation in which residents from Ethiopia rotated in a similarly resourced low-income country. Furthermore, all the outcomes of the rotation, planned and unplanned should be addressed in evaluation of the rotation and for consideration in planning future similar rotations. Thus, to further evaluate the rotation in context and examine its planned and emergent outcomes, we will follow the seven essential elements of program evaluation proposed in the framework by Haji, Morin and Parker⁷, shown in Figure 2.

The planned theory of the rotation focused on the principles of adult educational theory including that the residents would learn in a self-directed way, bring their own experiences with them, and be relevancy- and goal-oriented.^{14,15} It was thought that having residents rotate in a setting similar to their own in terms of resources, burden of disease, and geographic location, would allow these adult learners to relate to the setting and use the similarities to meaningfully apply the knowledge gained to their own setting. These theoretical underpinnings of the rotation were demonstrated to be accurate by residents making direct comparisons between the two settings and focusing greatly on the elements of the Tanzanian system that they wished to

employ in Ethiopia. However, although the theory seems to have been upheld, the planned process of the rotation did not fully materialize.

The planned process was to have the Ethiopian residents fully participate in clinical activities in the ED-MNH, and to experience the system by directly engaging in the care of paediatric patients, critical care, and procedures. This planned experiential learning process followed the theories developed by Kolb, and aimed to allow the residents to live the direct experience, reflect upon it, and then assess its generalizability and applications.¹⁶⁻¹⁸ However, the residents related that they often felt like observers, and were not fully engaged in patient care experiences, which limited their gains in certain areas such as procedural skills. This resulted in the planned outcomes of the rotation (as listed above in the evaluation through Kirkpatrick's framework) not being fully met. However, several processes and outcomes emerged from the rotation that were unplanned.

It is primarily these unplanned outcomes that the residents report as being beneficial, and demonstrative of the true value of the rotation. Haji, Morin and Parker convey the importance of evaluating not only the planned process and outcomes of a program, but also the emergent processes and outcomes of a program in their framework.⁶ They draw heavily from Scriven's work when they make this point.^{6,13} Scriven argued that the main purpose of program evaluation was to judge the value or merit of a program, and in doing so, the actual effects or outcomes of a program must be considered, whether or not they were planned.¹³

The planned process of an experiential rotation was not demonstrated in the interviews, as the Ethiopian residents described themselves as observers instead of participants, however, this role allowed them to evaluate the Tanzanian program and resulted in deep reflection on their home program. This emergent reflective process allowed the residents to prioritize exploration of the system and educational structures they saw in Tanzania, and this process resulted in outcomes that the residents felt were the most beneficial parts of the rotation. They were also able to implement these changes to improve patient care upon returning to Ethiopia. Critical reflection has been shown to be a tool that can augment learning in health professions education through deep engagement with subject matter, and this seems to have been demonstrated in this rotation.¹⁹ The rotation ultimately resulted in motivated residents returning to Ethiopia and enacting change.

Evaluation of the rotation through Haji, Morin and Parker's framework highlights that the planned theories of adult learning held true, but that outcomes emerged through unexpected processes. Additionally, concepts of learning theory, such as the importance of reflection, were demonstrated in unexpected ways.

Finally, the context and setting of the rotation played an important role. As it was the first rotation in which residents from Ethiopia rotated in Tanzania, there was a lot of initial uncertainty. The residents seemed unclear in how to engage in the system, and this may have resulted in them describing themselves primarily as observers during the rotation. Many of the residents also expressed surprise that Tanzania, a similarly resourced nation, would have made some advances not seen in their own country. Through their interviews, residents highlighted the fact that Tanzania was a similar environment to Ethiopia, and expressed that this allowed them to make direct comparisons and import ideas from Tanzania into their own setting. Thus, rotating in a setting similar to their own seemed to have a tangible benefit. However, as this was the first international rotation that any of the residents had participated in, they expressed the ingrained and persistent idea that rotating in a more highly resourced setting, as some of their seniors had done, would have resulted in even more benefit. The relative benefit of a rotation in a higher-resourced setting versus a similarly resourced setting is unknown and is an area that deserves further research.

Overall, when evaluated through the Kirkpatrick and Haji, Morin and Parker frameworks, the AAU-MUHAS rotation was found to have not met all stated objectives, but nonetheless, resulted in a positive influence on the Ethiopian residents and their system of education and patient care upon returning to Ethiopia. With this, we encourage organizations such as AFEM to further explore the role of clinical exchange rotations between similarly resourced settings as ways to maximize human resources for health professions education.

LIMITATIONS

This study examines only the first year of a rotation between AAU and MUHAS. The results may not be applicable to other settings, or to future years.

I, as the interviewer, was known to the residents that participated in the study. Although they were guaranteed that the answers to their questions would not impact their program, or grades, this may have influenced their participation.

This rotation has already resulted in some changes in the Black Lion ED, however, many of the changes and ideas mentioned are described by study participants as future goals. The long-term effects of this rotation are not known.

Although individual residents from Ethiopia had previously rotated at sites in higher-income countries, those rotations have not been formally evaluated. Therefore, making a direct comparison between the impact of rotating at MUHAS/MNH versus rotating in higher-income countries, with presumably more resources, remains unknown.

CONCLUSION

This study explored the influence of a clinical rotation in Tanzania on Ethiopian EM residents. It is evident that the residents perceived the rotation positively, describing it as influential, motivational, and beneficial. Furthermore, they described the rotation as having an objective impact on their own practice and department upon returning to Ethiopia. However, despite this, there remained a lingering question in the minds of many residents. They wondered if the benefit of an exchange rotation would have been greater if the rotation had taken place in a more highly resourced setting. There are several opportunities for further research in this area. Research into the transferability of knowledge between similarly resourced settings, and differently resourced settings, may provide further evidence to reveal the value of international exchange rotations.

CONFLICTS OF INTEREST

None declared.

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TABLES

Table 1: Interview Guide

General Perceptions

- 1) Tell me about the rotation in Tanzania?
- 2) Was it what you expected it to be?
- 3) What was not as you expected?
- 4) What were the best parts of the rotation?
- 5) What could be done differently if the rotation was offered again?

Planned Effects/Meeting Objectives

- 6) What were the objectives of the rotation?
- 7) Do you think that these objectives were met?
- 8) *If specific objectives of critical care and pediatrics experience are not mentioned by the resident
 - a. Obtaining pediatrics experience was an objective set out by your program director. What was the pediatrics element of your rotation like?
 - b. Obtaining critical care experience was an objective set out by your program director. What was the critical care element of your rotation like?

Effect of the Rotation in Tanzania

- 9) Has the rotation changed how you care for patients or practice emergency medicine in Ethiopia? If yes, How? If no, Why not?

10) Do you think the rotation should continue for future years? Why? Or Why not?

11) Any additional comments about the rotation?

Meeting procedural experience objectives- Procedure Logbook review

12) Now I would like to review your procedure logbook with you. What do you think of the procedural experience during the rotation?

- i. Document #/procedure recorded during Tanzania rotation
- ii. Document #/procedure self-reported by resident as performed prior to Tanzania rotation.
- iii. Document #/procedure self-reported by resident as performed since Tanzania rotation.

Table 2: Rotation Outcomes Evaluated through Kirkpatrick's Expanded Framework

Kirkpatrick Level	Outcome Area	Results
Level 1	Reaction	Ethiopian residents report being satisfied by the rotation in Tanzania, finding it relevant, and reporting that it was a good use of their time.
Level 2a	Perceptions and Attitudes	Ethiopian residents report that they gained knowledge from the rotation to help them in the future development of EM in their own country.
Level 2b	Knowledge and Skills	The pre-planned objectives of the rotation involved gaining knowledge and exposure to paediatrics emergencies, critical care, and procedures were not met.
Level 3	Behaviour	The Ethiopian residents reported changing their own behaviour when they returned to AAU.
Level 4a	Service Delivery	The residents report actively requesting additional improvements in their educational programs and patient care systems from their program leadership after the rotation in Tanzania.

Level 4b	Patient care	The residents report implementing specific systems changes that resulted in improvements to the care of their patients, such as procuring and using ventilators in the ED.
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FIGURES

Figure 1. Kirkpatrick's Four Levels of Program Evaluation.⁶

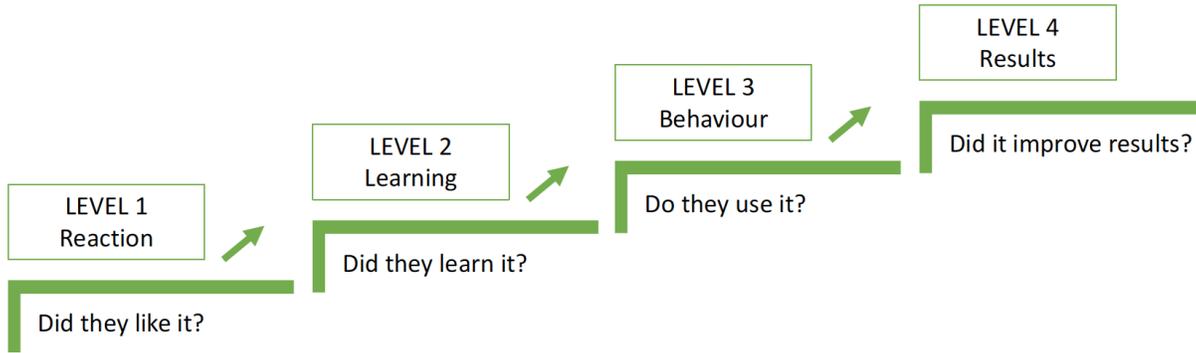
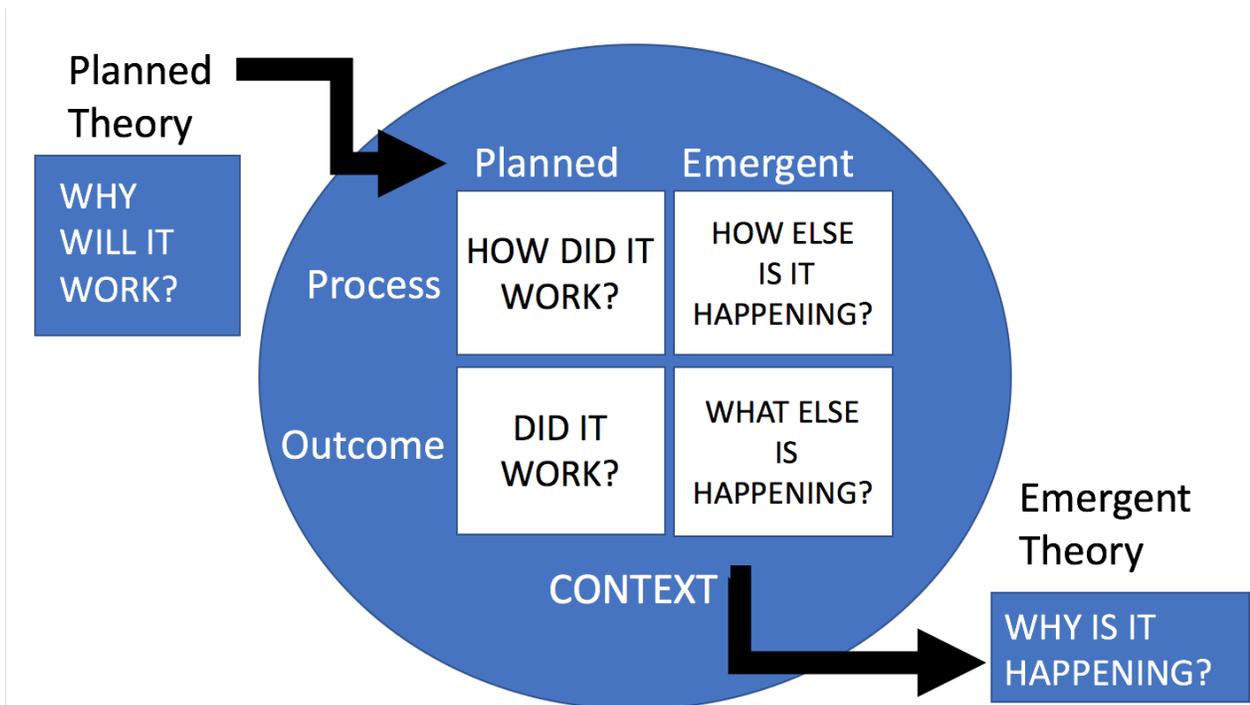


Figure 2. Framework for Program Evaluation, from Haji, Morin and Parker⁷



CLOSING SUMMARY

This assignment explored the influence of a clinical rotation in Tanzania on Ethiopian emergency medicine residents. It has been presented in article form with extended literature review and research methodology sections to provide additional details. This study demonstrates the potential benefits of clinical exchange rotations between similarly resourced low-income countries, and showed that Ethiopian residents became agents of change through the rotation, positively impacting their home program upon return from the rotation. The transferability of things seen in Tanzania to the Ethiopian setting seemed directly related to the similarities between the countries and settings, however, residents that participated in the rotations expressed that they believed rotating in more advanced, and more resourced settings may have had additional benefit. The transferability and impact of clinical and systems knowledge gained through rotations in similarly resourced settings versus differently resourced settings is unknown and may provide opportunities for future research endeavors.

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APPENDIX

APPENDIX A: Participant Information Leaflet and Consent Form

PARTICIPANT INFORMATION LEAFLET & CONSENT FORM

TITLE OF THE RESEARCH PROJECT:

The first African regional collaboration for Emergency Medicine Resident Education:
The influence of a clinical rotation in Tanzania on Ethiopian Emergency Medicine residents

REFERENCE NUMBER:

PRINCIPAL INVESTIGATOR: Brittany Lee Murray, MD

ADDRESS:

Division of Pediatric Emergency Medicine, 1645 Tullie Circle Atlanta, GA 30329

CONTACT NUMBERS:

+1-845-797-8155 (USA)
+255 769 759 077 (Tanzania)

You are being invited to take part in a research project. Please take some time to read the information presented here, which will explain the details of this project. Please ask the study staff or doctor any questions about any part of this project that you do not fully understand. It is very important that you are fully satisfied that you clearly understand what this research entails and how you could be involved. Also, your participation is **entirely voluntary** and you are free to decline to participate. If you say no, this will not affect you negatively in any way whatsoever. You are also free to withdraw from the study at any point, even if you do agree to take part.

This study has been approved by the **Health Research Ethics Committee at Stellenbosch University** and will be conducted according to the ethical guidelines and principles of the international Declaration of Helsinki, South African Guidelines for Good Clinical Practice and the Medical Research Council (MRC) Ethical Guidelines for Research.

What is this research study all about?

- *This research study aims to determine the influence of a rotation at Muhimbili University of Health and Allied Sciences in Dar es Salaam, Tanzania on visiting residents from Addis Ababa University's Emergency Medicine training program.*

Why have you been invited to participate?

- *You are invited to participate because you were one of the residents that participated in the first AAU-MUHAS emergency medicine rotation during the 2015-16 academic year.*

What will your responsibilities be?

- *You will attend an interview of approximately one hour in duration*
- *Your responsibility will be to give honest reflections on the rotation in an interview. The interview will be audio recorded.*

- *After the interviews, the principal investigator may ask you to provide your opinion on emerging themes.*

Will you benefit from taking part in this research?

- *The results from this research will be used to improve the AAU-MUHAS rotation for future classes.*

Are there in risks involved in your taking part in this research?

- *No risks are expected with participation in this study. The interview tapes and transcripts will be held in the strictest of confidentiality.*

If you do not agree to take part, what alternatives do you have?

- *You can decline to participate in this research, or you can stop participating in this research at any time with no negative consequence.*

What will happen in the unlikely event of some form injury occurring as a direct result of your taking part in this research study?

- *As this research involves only interviews, injury is unlikely to occur.*

Will you be paid to take part in this study and are there any costs involved?

No you will not be paid to take part in the study. There will be no costs involved for you, if you do take part.

Is there anything else that you should know or do?

- You can contact Dr. Murray at tel +1-845-797-8155 or +255 769 759 077 if you have any further queries or encounter any problems.
- You can contact the Health Research Ethics Committee at +27(0)21-938 9207 if you have any concerns or complaints that have not been adequately addressed by your study doctor.
- Study monitors, auditors, supervisors or Research Ethics Committee members may need to inspect research records.
- You will receive a copy of this information and consent form for your own records.

Declaration by participant

By signing below, I agree to take part in a research study entitled

The first African regional collaboration for Emergency Medicine Resident Education:
The influence of a clinical rotation in Tanzania on Ethiopian Emergency Medicine residents

I declare that:

- I have read or had read to me this information and consent form and it is written in a language with which I am fluent and comfortable.
- I have had a chance to ask questions and all my questions have been adequately answered.
- I understand that taking part in this study is **voluntary** and I have not been pressurised to take part.

- I may choose to leave the study at any time and will not be penalised or prejudiced in any way.
- I may be asked to leave the study before it has finished, if the study doctor or researcher feels it is in my best interests, or if I do not follow the study plan, as agreed to.

Signed at (*place*) on (*date*) 2005.

.....
Signature of participant

.....
Signature of witness

Declaration by investigator

I (*name*) declare that:

- I explained the information in this document to
- I encouraged him/her to ask questions and took adequate time to answer them.
- I am satisfied that he/she adequately understands all aspects of the research, as discussed above
- I did/did not use an interpreter. (*If an interpreter is used then the interpreter must sign the declaration below.*)

Signed at (*place*) on (*date*) 2005.

.....
Signature of investigator

.....
Signature of witness

APPENDIX B- Interview Guide

Interview Guide: This is just a guide. Interviews will aim to get appropriate information from each participant. Not all questions may be necessary and additional follow-up questions may be asked of each resident to clarify or expand answers given.

Prior Experience and Building Interview Rapport

- 1) How many years have you been a doctor for?
- 2) What has been your training prior to emergency medicine residency?
- 3) Prior to the Tanzania rotation, had you ever participated in any international rotation during your medical training?

Tanzania rotation- general perceptions

- 4) Tell me about the rotation in Tanzania?
- 5) Was it what you expected it to be?
- 6) What was not as you expected?
- 7) What were the best parts of the rotation?
- 8) What could be done differently if the rotation was offered again?

Tanzania rotation- meeting objectives

- 9) What were the objectives of the rotation?
- 10) Do you think that these objectives were met?
- 11) *If critical care and pediatrics are not mentioned by the resident
 - a. Obtaining pediatrics experience was an objective set out by your program director. What was the pediatrics element of your rotation like?
 - b. Obtaining critical care experience was an objective set out by your program director. What was the critical care element of your rotation like?

Tanzania rotation- impact

- 12) Has the rotation changed how you care for patients or practice emergency medicine in Ethiopia? If yes, How? If no, Why not?
- 13) Do you think the rotation should continue for future years? Why? Or Why not?
- 14) Any additional comments about the rotation?

Tanzania rotation- quantitative procedural experience

- 15) Now I would like to review your procedure logbook with you. What do you think of the procedural experience during the rotation?
- i. Document #/procedure recorded during Tanzania rotation
 - ii. Document #/procedure self-reported by resident as performed prior to Tanzania rotation.
 - iii. Document #/procedure self-reported by resident as performed since Tanzania rotation.

APPENDIX C: Procedure Logbook

AAU Rotator Procedure Logbook

Name.....

REG. NO......

DATES OF ROTATION.....

No	PROCEDURE NAME	ASSISTED	PERFORMED	COMMENTS	SUPERVISOR SIGNATURE
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					

PLEASE LIST ANY PROCEDURES DONE DURING YOUR ROTATION ON THIS SHEET.
IF YOU REQUIRE ANOTHER SHEET, PLEASE ASK YOUR ROTATION COORDINATOR.

APPENDIX D: Extract from Coded Interviews

From Resident 4's Interview:

INTERVIEWER: After you and your classmates went to Tanzania, do you think anything was changed here? Do you do anything differently, or does the department do anything differently?

RESIDENT 4: So we reported, the department asked us to report, so we reported to the department **positive and negative things that we have seen there. We compare them**, one of the recommendations that we gave to our department was to **decrease the number of patients staying in their department for more than 24 hours so the department also changed the long-staying clinical and surgical patients and gave the space for other departments in the department** Like medical, surgical ward, even in this department. So that was a crucial thing that there has been at a department level and we have gave them some good input. The other is that **our program also involves emergency plus ICU and we said that critical care is not enough to learn with this setup, so we asked the ICU department to give us at least two ventilators at least.**

INTERVIEWER: And are those the ones here?

Brittany Murray
"gave the space"
SYSTEM
INTERDEPARTMENTAL

RESIDENT 4: Yeah. So that unless we have the machine, we don't practice that much, so that was one of the challenges, but the department also was challenged by if we have some ventilator, we will keep the patients for long, that was the initial consideration, but we are finally with a department who has some ventilators. This is the second one. The third one is about taking responsibility as a resident. In their place the residents take responsibility for almost, there are four resuscitation lobbies, beds, so each lobby is managed by one consultant, or one senior resident, or if it's training, the consultant will be around. So what we recommended is the department to give us more responsibility and to have check and a balance system to make sure that the patient gets the treatment well. So after which the department is getting us to make rounds on sometimes by our own and to make re-round with the consultant so that we believe that by teaching others, we learn also. And this is I think the recommendations that we are making because what it triggered in Tanzania is there are ways that we should do our own thing in our own way. We have some challenge that some places they don't have. For example oncology centre, since the centre is only here in our hospital, so the other emergency centres in Dar they don't see those oncology.

Brittany Murray
CHALLENGE

Brittany Murray
SPECIALIST

Brittany Murray
SPECIALIST

Brittany Murray
"Triggered"
CHANGE
INSPIRE
REFLECT

Key:

exposure to a different system

effects of the rotation upon returning to AAU

the teaching environment

Suggested Changes

rotation objectives

Changes

APPENDIX E: Summarized Author Guidelines for *Academic Emergency Medicine Education and Training: A Global Journal of Emergency Care* with relevant sections highlighted



Author Guidelines

8/10/2017

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ABOUT AEM E&T

Academic Emergency Medicine Education and Training (AEM E&T) is the official educational journal of the Society for Academic Emergency Medicine (SAEM). **AEM E&T publishes peer-**

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- **Original Contributions** : manuscripts addressing a new question or problem in emergency medicine education and training; scholarship of discovery, integration and application relevant to emergency medicine; and reviews
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- **New Ideas in B-E-D-side Teaching** : educational case reports
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- **Canvas/Transitions** : poetry, essays, creative photographs, original artwork, personal narratives; writings about transitions for med student/resident/fellow /attending/researcher

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MANUSCRIPT SUBMISSION

AEM E&T submission requirements correspond with the [ICMJE Recommendations for the Conduct, Reporting, Editing, and Publication of Scholarly work in Medical Journals](http://www.icmje.org/recommendations/)(<http://www.icmje.org/recommendations/>). Use of generally accepted guidelines for reporting the study is highly recommended; some of these are available at the [Equator Network website](http://www.equator-network.org/)(<http://www.equator-network.org/>).

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When submitting a manuscript to the online system, authors must provide an electronic version of the manuscript. For this purpose, original source files, not PDF files, are preferred. Submissions must include:

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FIRST

AUTHOR

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Writing should conform to accepted English usage and syntax. Avoid the use of slang and medical jargon. All abbreviations should be defined the first time used in the manuscript; obscure abbreviations should be avoided. Measurements should be given in standard international units and generic drug names should be used unless the trade name is relevant.

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Original Contributions and Brief Contributions

Original Contributions and Brief Contributions submissions should contain the following sections. Number the pages consecutively, and include the running title as a header.

1. *Title Page.* The title should not exceed 20 words. Do not use abbreviations. We prefer that titles use active tense. Editors reserve the right to alter titles.

Instructions:

At the bottom of the Title Page, please list each author's initials, followed by a declaration of the potential conflict. Please name the following information: 1. The funding source; 2. who received the funds (the author, a family member, or the author's employer); and 3) the reason for the funds (e.g., salary support, fees for consulting, paid participation in a speaker's bureau, paid participation in an advisory panel, grant funding for research, grant funding for educational activities, contracts, patents, stock ownership, or other).

Examples:

The following examples serve as guides to report conflicts of interest:

a. No conflict of interest
[Author initials] reports no conflict of interest.

b. Consulting for commercial interests, including advisory board work
[Author initials] has received funding personally from [Company Name] for consulting.

c. Grant money for commercial research
[Author initials] reports grant money to [Institution name] to conduct research conceived and sponsored by [Company Name].

d. Grant money for investigator initiated research
[Author initials] reports grant money to [Institution Name] to conduct research conceived and written by [Author Name] from [Institution Name].

e. Founder or owner of a start-up company or proprietary interest or stock or ownership in a company with an interest for or against the subject matter

f. [Author initials] owns stock in a company [Company Name] that produces a product relevant to the subject material.

g. Patent or other intellectual property
[Author initials] is the inventor on a patent [patent or filing number] that is filed or issued by the United States Patent and Trademark Office relevant to the material in this paper.

h. Payment for writing independent of grant funding
[Author Name] received payment from [Entity Name] for writing part of this manuscript.

i. Employment
[Author initials] is employed by [Company Name], which manufactures a product related to the subject matter.

j. Multiple conflicts
[Author initials]'s institution has received grant funding from the National Institutes of Health for investigator-initiated research. [Author initials] institution, [Employer Name] has received

contract funding from [Company] for industry-initiated research and has received contract funding from [Company Name] for investigator-initiated research.

*Policy on ghost writing. AEM E&T does not publish work that is written by a ghost writer, which is generally defined as an individual who was paid to write the paper and is not represented as an author on the Title Page.

2. *Study Group Authorship Page.* When authorship is attributed to a study group, all members must meet the criteria for authorship. Identify the members by responsibility or by institution on the study group authorship page.

3. *Abstract.* The abstract should contain no more than 300 words. Original research submissions require a structured abstract that defines the objectives, methods, results, and conclusions. The abstract should not include references, figures, tables, or graphs.

4. *Introduction.* The introduction should briefly describe the study question, its scope and relevance to emergency medicine education and training, and the hypothesis and/or objectives of the investigation. The reader should have a very clear understanding of exactly what the study question or objective is after reading the introduction section.

5. *Methods.* The methods should include subsections with headings that detail the study design (include human subject or animal use committee review), study setting and population, study protocol, measurements or key outcome measures, and data analysis (include sample size determinations and other relevant information, the names of statistical tests, and software used). The role of funding organizations and sponsors in the conduct and reporting of the study should be included here. When equipment is used in a study, provide in parentheses the model number, name, and location of the manufacturer. If citing an in-press paper for the description of methods (i.e. when referencing methods used in a prior study, which is currently in press), please upload a copy of the in-press paper for the editor and reviewers. This in-press material will be handled with appropriate confidentiality. Research involving human subjects or animals must meet local legal and institutional requirements and generally accepted ethical principles such as those set out in the Nuremberg Code, the Belmont Report, or the Declaration of Helsinki. (See Biros MH, Hauswald M, Baren J. Procedural versus practical ethics. *Acad Emerg Med* 2010;17:989-990 for more information.) Manuscripts reporting data involving human subjects must indicate a positive review by an Institutional Review Board (IRB) or equivalent. This requirement includes studies that qualify for IRB expedited status. Most institutions require IRB review of studies that qualify for exempt status and that this determination be made by the IRB, not by the authors. The methods section of the manuscript must explicitly state that IRB approval was obtained, that the IRB determined the study was exempt, or that the study did not involve human subjects (e.g. publicly available and previously de-identified information from national data sets, or other studies not meeting the definition of human subjects research as set forth in US Code of Federal Regulations, Title 45, Part 46. Additional information available at www.hhs.gov/ohrp/policy/cdebiol.html). The methods section should also indicate the type of

consent used (written, verbal, or waived), and confirm that consent was obtained from all subjects (unless waived by the IRB).

6. **Results.** Results should be concisely stated and include the statistical analysis of the data presented. Results presented in tabular or graphic form should be referred to in the text, but the material should not be presented again. In addition to the data collected in the study, the results should also indicate the success of protocol implementation (e.g., was blinding successful, was there a high inter-rater reliability?).

7. **Discussion.** The discussion should put the study results in the context of current knowledge. An unbiased review and critique of previous relevant studies should be included and appropriately referenced. There is no need to restate the results in the first paragraph of the discussion; instead, simply start the discussion.

8. **Limitations.** Discuss shortcomings and biases related to study design and execution. Highlight areas where future investigations and/or different methods of analysis might prove fruitful.

9. **Conclusions.** The conclusions should not simply repeat the results, but rather answer the study question. Recommendations supported by the study findings may be included.

10. **References.** Citations and references should be listed in **numerical order**. Every reference must be cited at least once in the text. **Use the NEJM reference style: all authors up to six, article title (and subtitle, if any), journal name (with no following period), year, volume number (and issue number if the journal's pages are not numbered consecutively throughout the year), and inclusive page numbers.** (Examples a and b below) When there are seven or more authors, list the first three, followed by “et al.” (Example c below) Book references should include: authors as above, chapter title, if any, editor, if any, title of book, city of publication, publisher, and year. Include volume and edition, specific pages, and translators where appropriate. (Example d below) Website references should include the most recent date of access. (Example e below) Personal communications and unpublished data should be cited in the body of the paper in parentheses, not listed in the references section. Manuscripts that have been accepted for publication may be listed as “in press”; manuscripts that have been submitted or are under revision but have not been accepted may not be cited as references. The use of abstracts that have not been published as full manuscripts is discouraged. Please do not capitalize each word in a reference title—only capitalize the first letter unless there is a proper noun or other word clearly needing capitalization in the title. Authors are responsible for the accuracy and completeness of the references and text citations.

a) Promes SB, Wagner MJ. Starting a clinical competency committee. *J Grad Med Ed* 2014;6(1):163-64.

b) Chou CL, Promes SB, [Souza KH](#), [Topp KS](#), [O'Sullivan PS](#). Twelve tips for facilitating successful teleconferences. *Med Teach* 2012;34(6):445-9.

c) Schott M, Kedia R, Promes SB, et al. *West J Emerg Med* 2015;16(6):871-6.

d) Mohr NM, Moreno-Walton L, Smith-Coggins, R, et al. Generational Differences in Emergency Medicine. In Strauss R and Mayer R, eds. *Emergency Department Management*. NY, NY: McGraw Hill, 2014.

e) Coaching Program. Dallas, TX: Council of Emergency Medicine Residency Directors, 2016. (Accessed on July 25, 2016 at <http://www.cordem.org/i4a/pages/index.cfm?pageid=3652>)

11. **Tables.** Tables should be created using the table tool in MS Word. Tables must be referenced in the text in sequential order. Each table should be submitted on a separate page with a descriptive title. Define all abbreviations in a footnote to the table. Symbols related to the table contents (e.g., *) must also be defined in a footnote.

12. **Figures and legends.** Figures must be referenced in the text in sequential order. Figures should clarify and augment the text. Put figure legends on a separate page. Figures should be prepared to 1 column (86 mm) or two column width (177 mm) for the journal. They should have a minimum resolution of 300 dpi for photos/images and at least 600 dpi for images with lines or text. Figures can be either BW (1 bit), greyscale (8 bit) or RGB (8 bit color). JPEG images are not recommended. We can accept TIFF, EPS, and PDF files. We also can accept images embedded in Word files, but they must still meet the requirements of file width and resolution quoted above before embedding. If compressed, use high-quality compress option while saving the image. If you are using Visio to create your charts or line diagrams, it is recommended that you save the file in EMF format and supply it separately along with your manuscript document. Figure reproduction cannot improve on the quality of the originals. Any special instructions about sizing, placement, or color should be clearly noted. Symbols, arrows, or letters used to identify parts of the illustration must be explained clearly in the legend. If a figure has been previously published, the legend must acknowledge the original source.

13. **Supplemental material.** Authors may provide a supplemental file in PDF format. The supplemental file can contain more than one item, including figures, tables, or additional methods. Each item should be labeled and identified in the main manuscript by this label (e.g., “see Figure 1S in the supplement” or “see Table 1S in the supplement). Supplemental material is not subjected to copyediting.

SPECIFIC WORD COUNTS

Below is a listing of specific word counts based on manuscript types:

<i>Original</i>				<i>Contributions:</i>			
Article	length	-	5000	words	maximum	excluding	abstract
Abstract	length	-	300	words,		structured	abstract
Figures/Tables		-			5		maximum
References	- no maximum						

STATEMENT ON PLAIGARISM

AEM E&T reserves the right to refuse publication of any submission that in the opinion of the senior editorial board duplicates a prior publication. AEM E&T uses Crosscheck® to assist in this decision.

AFTER ACCEPTANCE

At the time of acceptance, journal staff or an editor may contact corresponding authors to obtain information to enhance dissemination of the work. For example, we may ask authors to provide a <140-character script for posting on the society's Twitter feed. If the paper is selected as the Editor Pick of the Month (EPOTM), the editor may contact the authors for a quote or other information. Additionally, journal staff may ask authors for an image, for publication on the cover of AEM E&T, that the authors believe to best captures the essence of their work.