Development and Assessment of an Infection Control Workshop in Malawi

by

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A thesis submitted to the Graduate Faculty of
Auburn University
in partial fulfillment of the
requirements for the Degree of
Master of Science

Auburn, Alabama
May 8, 2016

Keywords: infection control, training methods, Malawi

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Abstract

The purpose of this research study was to develop and assess the effectiveness of an infection control program taught in Malawi, Africa. The workshops were conducted from June through July 2015. The intent was to evaluate the change of knowledge based on the information obtained through the workshop. The survey included demographic variables on gender, education level and current position. Analysis of variance was used to test for workshop bias on these variables.

The workshops were held at Blessings Hospital and Chinkoti Health Clinic, both located in Lumbadzi, Malawi, Malawi College of Health Science in Lilongwe and Mponela Rural Hospital located in Mponela. All the research sites were located in the Central District of Malawi. Participants were health practitioners, community health workers, students in the Health Sciences field, and others (i.e. drivers, cleaners, and cooks). The pre-test, an Infection Control workshop, and then a post-test were administered. The workshop focused on basic infection control procedures and definitions. Participants in the infection control workshop were asked to answer a 17 item pretest survey and immediately following the workshop to complete an identical 17 item posttest.

A majority (65%) of the participants in the study were female, and almost half (46%) of the participants were community health workers. The lack of bias for all three demographic variables was a significant finding. Bias indicates any factor that favors one group over another group, for each of the three variables measured in the infection control workshop; the assessment

shows a lack of bias. The assessment showed that the workshop performed equally well for both male and female participants. The assessment also showed lack of bias in education levels where all levels of education showed increase in overall scores and by category where each group improved overall scores. The assessment showed overall improvement in each demographic area. Training for a healthcare worker ranged from some informal training to no training. The pre-test scores indicated that those participants with the most education and working in the most professional areas had the most knowledge; however, the analysis also showed that all participants improved their knowledge of infection control, with the least educated making significant advances in knowledge to almost equal the higher educated participants.

The project resulted in a workshop that was unbiased toward gender, education level, or job category. The workshop can be used to train health care workers to use infection control practices to reduce the spread of infection.

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CHAPTER 1. INTRODUCTION

Introduction

Malawi, in Sub-Saharan Africa is the most densely-populated country in Africa, with 15 million residents. Malawi has two physicians per 100,000 people and a life expectancy of 39 years, and it is not surprising that infection and disease control is an ongoing epidemic in Malawi. Infectious diseases such as HIV/AIDS, malaria, and tuberculosis are at some of the highest levels of prevalence of any country in the world (Nampota, Thompson & Wikeley, 2009). Health care challenges exist due to extreme poverty, lack of facilities and equipment, and the lack of adequately-trained personnel. Healthcare workers have limited training or protective equipment, but are relied on to perform procedures that are vital to patient care, and put them at risk of acquiring a transmission-based infection. These facts make Malawi a country where infection control knowledge is a necessary tool in the fight for positive healthcare.

The researcher spent part of the past eight summers working in various healthcare settings in Malawi and has seen firsthand the lack of staff and the need for professional development. The specific field of study observed was clinical laboratory science. The statements of need are no less for other specific areas of healthcare in any developing country. There are parts of the country, urban and rural, where there is no laboratory scientist available and, in many cases, facilities are understaffed and underequipped. Malawi has 43 hospitals with 45 laboratories, and 86 trained laboratory staff; of that number, 37 were trained as laboratory technicians (3 year training program) and 49 trained as laboratory assistants (2 year training

program), 16 hospital laboratories had one trained laboratory worker, the majority being in district hospitals. The laboratories within the country are understaffed, and that staff is using in many cases outdated equipment and supplies. A study conducted by Harries, Kwanjana, Hargreaves, Van Gorkom, and Salaniponi (2001) concluded with "All hospitals, particularly the central hospitals, were short of laboratory, radiographic and TB personnel" (p. 334).

This has led to a situation where many tests and procedures that are critical for proper patient care are not able to be performed. It is imperative as Malawi moves forward with quality healthcare services that the laboratory personnel are receiving continuing education. This is critical in the laboratory setting for reporting accurate and precise results. It is also needed in order for trained laboratory staff to remain in Malawi and have a sense of value within the health care system.

Observations made in private hospitals, small government clinics and rural regional hospitals in Malawi, and limited mobile clinics to extremely-isolated villages highlighted the need to develop a type of training and assessment that will be replicable, reliable and sustainable. In addition, many community health workers in Malawi have limited training or accessibility to training. Practices such as hand washing and the proper use of personal protective equipment such as gowns and masks, which are often used improperly or not used at all; increase the risk of infection and disease to both patients and healthcare workers alike.

"International travel and bacterial resistance are major global health issues that draw attention to the need for improved infection control" (Atack & Luke, 2008, p.175). Given the seriousness of outbreaks of unknown pathogens worldwide, and the amount of travel in which people of all nations are now engaging, it is important to look at putting complete infection control practices into use.

According to the World Health Organization (WHO, 2015), infection prevention and control should stress protection of those most vulnerable to acquiring infection; this applies both to the general community and when patients are receiving care in other health settings. The primary tenet of infection control and prevention is basic hygiene. Infection control practices also include; management measures, personal protective equipment, isolation, environmental decontamination, education and training (Shaw, 2005). Using this statement as a guideline, an assessment and workshop development project was developed to teach healthcare personnel and others lessons in basic infection control. There is a need for training of clinical health workers in Malawi, Africa.

Statement of the Problem

In developing countries, healthcare systems face many obstacles to healthcare, including lack of funding, equipment, and personnel. Because of these shortages, any healthcare (or health-related) orientation is focused primarily on curing disease; therefore, training and preventive measures are difficult to obtain. Observing this over a period of years became the impetus for the development and assessment of an infection control workshop. There is a lack of training and preventative measures that could empower healthcare workers and allow them to provide more effective health care in Malawi.

Conceptual Framework and Training Model

The conceptual framework for this study is grounded in adult education. A workshop was developed to train adults whose work brings them into potential contact with infectious diseases.

Malcolm Knowles defined andragogy as “the art and science of helping adults learn” (Knowles, 1980, p. 43) contrasted with pedagogy, the art and science of helping children learn.

Many see the difference between pedagogy (the art of teaching children) and andragogy (the art of teaching adults) as a continuum and that learner's fall on a scale that includes the role of the learner's experience, readiness to learn, orientation to learning, and maturity level (Knowles, 1980). Using these models of adult learning educational objectives (applications), a workshop training model was developed.

1) Make training relevant: (Role of the learner's experience) to develop the training workshop a needs assessment was conducted during on-site visits to Malawi in the summer of 2014. Included interviews, and completion of an assessment questionnaire with hospital staff and administrators. After the visit in June and July of 2014 it was determined that going forward the focus of the workshop would be infection control.

The focus of the workshop was determined due to an overall need for basic infection control knowledge, the Ebola epidemic in West Africa, and preference by hospital staff and administrators for a training that would benefit most members of the staff not just laboratory personnel. The training model began to take shape. The training model begins with information on basic knowledge of safety and increased to a more rigorous standard of specific information for infectious disease agents and then addressed the response to containment, control, disposal and educating others on staff. The settings can vary, but will include hospitals and rural settings.

2) Teach what learners need to learn: (Readiness to learn) As objectives were defined the training manual and workshop development included: 1) understand the principles of infection control, 2) define standard precautions, 3) perform proper hand hygiene, 4) define, identify, and use personal protection equipment, 5) identify transmission-

based precautions, 6) recognize and respond to accidents and exposures, 7) utilize appropriate disinfection, 8) identify and dispose of biohazard waste.

3) Assessments were included throughout the workshop, in addition to a pre-test/post-test, each participant participated in hand hygiene activities, where everyone performed the appropriate steps for hand hygiene as defined by the World Health Organization (WHO, 2006).
4) Experiential activities: (Orientation to learning) included in the workshop: 1) performing hand hygiene, 2) using protective equipment properly, this included choosing which pieces of protection would be used in various scenarios, i.e. gloves, plastic gowns, shoe covers, boots, masks, respiratory masks. Participants were able to see, use and demonstrate putting items on and taking off in correct manner to avoid contamination with infectious pathogens.

There was also a built-in time for questions during each section of material. Finally, during development of the workshop a handout was created to match the material and a PowerPoint presentation. These materials were used throughout the workshop to emphasize important points, notetaking and to create a sense of ownership by participants.

Three types of adult learning objectives were used in the workshop: Attitude, skills, and knowledge. The knowledge portion was assessed by the pre-test and post-tests, the skills portion by hand hygiene demonstrations and the use of personal protection equipment, and attitude was assessed by the referrals for more trainings at different locations and follow-up of participants.

Purpose of the Study

The purpose of the study was to develop and assess the effectiveness of a workshop designed to teach infection control for healthcare personnel in Malawi, Africa. The model was

used to teach infection control skills in three different types of hospitals in rural and urban areas of Malawi. The workshop was presented to all levels of healthcare providers including; practitioners, community health workers, college students, and others working in healthcare situations. It served as a pilot program and provided feedback to propose follow-up courses for continued education and staff development. The goal of the workshop was to teach infection control practices that will impact the lives of healthcare workers and patients in both rural clinics and public hospital settings.

Research Questions

The following research questions were used in this study:

1. What are the differences between the pre-test and post-test scores by gender (male, female)?

2. What are the differences between the pre-test and post-test scores by category (practitioners, community health workers, and students)?

3. What are the differences between the pre-test and post-test scores by education level (University, College, MSCE, Other)?

Significance of the Study

In 2010, the World Bank reported Malawi as the ninth poorest country in the world. Malawi reports an annual gross national product of US $170 per capita, and over 60% of the population lives below the absolute poverty line (LeMay & Bocock, 2012). The country's health indicators are among the worst in the world. Life expectancy at birth stands at 39–44 years (Nampota, WHO, 2009). The infant mortality rate is 134 per 1,000 live births; the under-five mortality rate is 234 per 1,000 live births, and this is expected to rise as a result of the HIV/AIDS epidemic. HIV/AIDS is now the leading cause of death in the most productive age group (20–

50). In 1995, the HIV-seropositive rate in antenatal women was estimated to be over 30% in urban areas and 12–14% elsewhere (Harries et al., 2001). Malaria, tuberculosis and HIV/AIDS are present in high numbers in Malawi. The adult prevalence rate of HIV is estimated at 11% with more than 5,904 out of 100,000 persons testing HIV positive (WHO, 2012). Treatment of these and other diseases are dependent on accurate and reliable laboratory testing, trained staff, adequate supplies and equipment. It is important that more healthcare workers are kept informed of the best infection control procedures and are performing at the highest level (Harries et al., 2001).

These statistics show an ongoing need for quality healthcare throughout the country. In order to accomplish this goal, healthcare services need to function at the highest level with ongoing training in order to promote quality assurance and high professional standards. "Without quality laboratory systems in place in every region of the world, we are simply less prepared for emerging pathogens and, potentially, for global epidemics" (Bersch, 2009, p. 42).

Limitations

Every study has limitations. These are defined as possible threats to the validity of a study, and to acknowledge flaws to the research design. Limitations to this study are situations inherent in a study taking place in a country where facilities and infrastructure are limited. The lack of transportation for healthcare workers to attend trainings and lack of availability of healthcare workers limited the sample size of the study. The need to utilize a second language at times during training sessions was a restriction to the participants and the study. The study did not include a 'control group', a group who did not receive the training. Instituting a control group in a developing country is logistically difficult if not impossible. All healthcare workers are striving to be included in learning new information that could reduce their risk of contracting

an infectious disease, thus it was not prudent to deny training. Time was a limiting factor to the assessment of the workshop. The study had to be completed within a six-week time frame allowing for site authorization, finalizing of workshop dates, travel to and from workshop sites and conducting the workshops. The study also lacked long-term follow-up necessary to establish whether the infection control training benefits were sustained over a longer period of time.

Assumptions

- One assumption was that all participants in the workshop wanted to learn infection control procedures.
- A second assumption was that participants would answer their own pre/post-test honestly and to the best of their ability.

Definitions

Center for Disease Control and Prevention (CDC): United States health protection agency that conducts ongoing science and provides health information to protect against dangerous health threats, and responds when threats arise.

Community health worker: refers to any healthcare provider who delivers medical services to patients. Typically, they have received little or no formal training.

Gold standard: denotes the best tool available at that time to compare different measures.

Healthcare associated infection (HAI): also known as nosocomial infection; defined as "An infection occurring in a patient during the process of care in a hospital or other healthcare facility which was not present or incubating at the time of admission. This includes infections acquired in the hospital but appearing after discharge and also occupational infections among staff of the facility" (Allegranzi et al., 2007, p. 116).

Infection control: the use of procedures and practices to reduce and or eliminate the contracting and spread of healthcare associated infections. Infection control practices utilize systems that include hygiene and protective clothing, disinfection and disposal techniques and standard precautions when dealing with any patient or client (Shaw, 2005).

Practitioner: refers to anyone who diagnosed, treated, or prescribed for patients. This group has received formal training.

Standard precautions: refers to a term that replaces "universal precautions" that expands the coverage of universal precautions by recognizing that any or all body fluid may contain contagious and harmful microorganisms (Wasswa et al., 2008).

World Health Organization (WHO): Directs and coordinates international health within the United Nations' system. It supports countries as they work to attain their health objectives, policies and strategies.

Organization of the Study

Chapter 1 (Introduction) contains the problem statement, purpose of the study, the research questions, the significance of the study, limitations, delimitations to the study, assumptions, and definitions for major terms used in the study. Chapter 2 identifies literature pertinent to the study including a review of studies and research concerning Malawi health care and types of education training. It also contains a review of literature of the history of infection control and the ongoing need. Chapter 3 contains the methods and instrumentation used to assess the workshop including data collection and analysis. Chapter 4 contains the results of the research and demographic results. Chapter 5 presents a summary and conclusions, implications, and recommendations for further studies and practices that could be implemented.

CHAPTER 2. LITERATURE REVIEW

Introduction

The literature review chapter contains a compilation of literature relevant to developing a workshop to teach techniques for infection control to healthcare workers in Malawi, Africa. Literature reviewed is focused on justifying the need for such a workshop, the issues that need to be taught, how to best teach that material and how to evaluate workshop success.

Infection control is not a new topic of concern in the healthcare field. Since the 1850's when Florence Nightingale's processes and approach to patient outcomes gained acceptance in medical circles, healthcare professionals began to see the correlation between precautions and safety practices and the health of patients and workers (Pearson, 2009). By the very nature of the profession healthcare workers have been at direct risk of exposure to blood and body fluids during the course of their job.

By the mid-1900s the Centers for Disease Control and Prevention (CDC) had collected data and presented guidelines for preventing hospital-acquired infections and strategies for healthcare workers to protect themselves from infection (CDC, 2011). While infection control and prevention have been advocated for many centuries, the need and willingness to train healthcare workers has lagged behind. The 2003 outbreak of Severe Acute Respiratory Syndrome (SARS) has highlighted the importance of education and training for healthcare workers in complying with infection control recommendations (Shaw, 2005). Despite these and

other outcomes, infection control in most developing countries remains either ineffective or non-existent (Ider, Adams, Morton, Whitby & Clement, 2012).

In order to develop an infection control workshop, to teach infection control practices in Malawi, a developing nation, a literature review of best practices in teaching infection control in Africa was conducted. The literature review is divided into the following sections: infection control programs, content of infection control programs, and effective implementation of infection control programs.

Healthcare-associated infection, are also known as nosocomial infection, these include infections acquired in the hospital that appear after discharge, and infections among staff, both are nosocomial infections (Allegranzi et al., 2007). Prevention of healthcare infections consists of two aspects, the healthcare workers knowledge and practice of infection prevention and the way infection prevention is handled within the system.

The World Health Organization (WHO) estimates that over 1.4 million people suffer from nosocomial infections at any one time, with an up to 20 times higher prevalence in low and middle income countries. Industrialized nations report healthcare-associated infections in 5-10% of patients; whereas, in developing countries, healthcare-associated infections can exceed 25% (Allegranzi et al., 2007). Healthcare-associated infections cost thousands of lives each year, yet most nosocomial infections can be prevented with available and inexpensive infection control measures such as hand hygiene and wearing of gloves. Globally, standard precautions of infection control are considered an effective means of protecting healthcare workers, patients and the public (Wasswa et al., 2015).

The World Health Organization (WHO) Health Report (2006) reported that worldwide, 57 developing countries have critical staff shortages. This critical need accounts for undertrained

personnel performing procedures without proper guidance, training and precautions. Understaffing and low levels of staff preparedness and knowledge are key factors leading to poor infection control in developing countries. The lack of knowledge together with outdated or non-existent equipment and structure are some of the basic determinants of healthcare-associated infections in developing countries (Allegranzi et al., 2007). The knowledge gained through implementation of infection control guidelines will lead to better patient care and lowering of mortality rates among healthcare providers and patients. Historically, in developing countries, the issues related to healthcare-associated infections were only viewed in relation to epidemic events. However, if infection control practices are not in place, ongoing transmission of harmful pathogens to staff and patients, with or without an epidemic affects the ongoing quality of healthcare (Allegranzi et al., 2007).

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Infection Control Programs

Infection control is necessary to reduce the high levels of healthcare-associated infections (Kamulegeya, Kizito & Balidawa, 2013). Healthcare-associated infections are preventable and infection control programs are a cost-effective way to significantly reduce infection rates and save scarce and valuable resources (Allegranzi et al., 2007). Another study reported a significant reduction in infections demonstrated in intensive care units of four Mexican cities by "effective skill-based training and education of direct health-care providers" (Singh, Kumar, Sundaram, Kanijilal & Nair, 2012). These studies support the need for ongoing infection control protocols and training for healthcare workers.

In the past 20 years, the World Health Organization (WHO) and the Center for Disease Control and Prevention (CDC) have realized a need to create guidelines of implementation and development of infection control programs in developing countries (Ducel, Fabry & Nicole, 2002). As a result of an increased incidence of drug-resistant bacteria and an ever increasing population of patients with infectious diseases, the World Health Organization (WHO) initiated the World Alliance for Patient Safety in October 2004 (Pittet et al., 2008). Center for Disease

Control and Prevention's landmark Study on the Effectiveness of Nosocomial Infection Control (SENIC) concluded that hospitals using Center for Disease Control and Prevention (CDC)-recommended infection control practices reduced the risks from healthcare-associated infections; as a result, the United States implemented the National Patient Safety Goals in 2003 (Sydnar & Perl, 2011). Two large infection prevention projects, "Keystone Project" and "100,000 Lives Campaign" reported large declines in healthcare-associated infections when proven infection control strategies were implemented (Lynch, Pittet, Borg & Mehtar, 2007).

Some alarming statistics include estimates that in developing countries 39.3% of injections were given with syringes or needles that are reused without sterilization (Lynch et al., 2007); more than 70 countries did not test all donated blood for HIV, Hepatitis B and Hepatitis C. These statistics are in stark contrast to the World Health Organization's (WHO) recommendations that 100% of donated blood is tested for evidence of HIV, Hepatitis B and Hepatitis C virus. Viral hemorrhagic fever (e.g., Ebola) is largely preventable through simple barrier precautions (Rothe, Schlaich & Thompson, 2013). Healthcare workers are at direct risk of exposure to body fluids and blood during the course of their work. Needle stick injury is the most common form of exposure that results in transmission of blood-borne infections. Two recent studies found that one-third of healthcare workers had a needle stick injury in the past year (Jere et al., 2010). In countries where basic equipment and trained personnel are in short supply, even simple infection control procedures may be hard to implement and maintain (Rothe et al., 2013). Most infections contracted in a hospital can be prevented when infection control measures such as hand hygiene and the practice of wearing gloves are maintained (Ducel et al., 2002).

Health professionals may unintentionally transfer infection between patients and within their workplace. Healthcare workers in sub-Saharan Africa are at risk due to a high general prevalence of biological hazards along with a lack of personal protective equipment, suitable facilities, and organizational support (Rothe et al., 2013).

Jere et al. (2010) and Amoran and Onwube (2013) conducted studies about the levels of knowledge healthcare workers had concerning infection control procedures in sub-Saharan Africa. Both studies found that overall the healthcare workers in rural areas had little knowledge of infection control practices, Amoran and Onwube (2013) stated, "Few health workers had attended any workshop or training in infection control in the last two years" (p. 161).

Researchers used a self-administered questionnaire to collect relevant information about infection control training and practices (Amoran & Onwube, 2013; Ghabrah et al., 2007). Amoran and Onwube (2013) concluded that healthcare workers that had received infection control training had significantly more knowledge of infection control procedures. The only factor found to be independently associated with healthcare workers practice of using standard precautions was prior exposure to blood and body fluids. After training, the healthcare workers began using universal precautions.

Ghabrah et al. (2007) gathered responses from 392 healthcare workers, representing a cross-section of the population and found a significant deficiency of knowledge in many important areas of infection control including transmission-based precautions, recapping of needles, and isolation precautions. There was also a deficiency of knowledge that blood specimens from patients with blood-borne pathogens should not be labeled as infectious since all patients and specimens must be treated with the assumption that they are infected.

Claassens et al. (2013) studied infection control training and measures associated with the incidence of tuberculosis in healthcare workers. Respondents in each facility (*N*=133) completed a questionnaire about administrative, environmental, and personal protection measures. The researchers found that infection control measures were essential at all health facilities, especially in high tuberculosis and HIV settings. The study lends further support to the need for infection control training at every level of health care.

Ider et al. (2012) conducted research regarding infection control training for 87 health professionals in Mongolia. The researchers found infection control training to be lacking or not implemented. Additionally, they found low compliance with the recommended control measures. They concluded that "all study group participants acknowledged their poor knowledge of infection control" (p. 9).

Conclusions of studies in Ethiopia, Nigeria, Thailand and Uganda involving doctors and nurses, found them to be lacking in knowledge, understanding, and interpretation of infection control procedures (Wasswa, 2015). A lack of knowledge, even amongst trained healthcare professionals is a confounding factor in the development of adequate infection control practices.

Friday et al. (2012) and Amoran and Onwube (2013) found the most distressing issue in infection control to be a lack of supplies for handwashing, a lack of personal protective equipment, and shortages of disinfecting and sterilization supplies. Global health constraints that affect infection prevention include insufficient financial resources for healthcare in general, failure of facilities to use proven prevention strategies, and inadequate training for healthcare workers (Lynch et al., 2007). In a study by Ider et al. (2012), healthcare professionals regarded limited laboratory capacity, poor disinfection, and sterilization as barriers to implementing good infection control. Researchers studied the effectiveness of infection control procedures in

Mongolia (Ider et al., 2012), Nigeria (Amoran & Onwube, 2013; Friday et al., 2012), South Africa (Claassens et al., 2013), Makkak, Saudi Arabia (Ghabrah et al., 2007), Malawi (Jere et al., 2010), and Australia (Roberts et al., 2000). Each of these studies found a lack of training followed by a lack of supplies and infrastructure to be severe limitations to infection control.

Ghabrah et al. (2007) conducted a study in Makkak, Saudi Arabia and found doctors and nurses exhibiting poor adherence to infection control protocol, especially handwashing. The effectiveness of infection control depends on the training and subsequent utilization of the training by healthcare workers (Friday et al., 2012; Jere et al., 2010; Shaw, 2005). Each of these studies addresses issues of observation and, while documentation of training takes place, it is not always followed. Shaw (2005) provided an overview of the impact of infection control practices during the 2003 SARS outbreak, concluding that ongoing infection control practice was necessary to prevent panic during an acute event. A second study, conducted in Nigeria (Friday et al., 2012) concluded that implementing infection control programs will significantly reduce the number of maternal deaths. A similar study conducted in Malawi (Jere et al., 2010), showed a positive correlation between the use of infection control practice and the occurrence of HIV transmission to both the healthcare workers and their clients (Jere et al., 2010). An infection control study in Uganda found that a healthcare worker was more likely to be compliant if he/she had more experience on the job, was more knowledgeable about transmission of blood-borne pathogens and was strongly committed to a positive occupational safety climate (Wasswa et al., 2015). These studies have identified how effective infection control programs must be implemented by the healthcare worker in order to show positive results.

Content of Infection Control Programs

The Center for Disease Control and Prevention (CDC) determined that rigorous scientific assessment of the effectiveness of infection control programs would be necessary to help further world adoption of hospital-based infection control programs (Sydnar & Perl, 2011). The foundations of infection control are a number of simple, well-established, and widely understood measures, such as standard precautions, and compliance with recommended hand hygiene practices, and injection safety (Allegranzi et al., 2007; Rothe et al., 2013). According to Rothe et al. (2013), prevention of healthcare-associated infections involves two major components: 1) the healthcare worker's knowledge, and 2) practice of infection prevention.

The Ministry of Health in Uganda lists five basic standard precaution measures that can help prevent infection within healthcare facilities: hand hygiene, adequate protective wear, proper sterilization, proper sharps disposal, and safe waste management (Wasswa et al., 2015).

World Health Organization (WHO) guidelines (Allegranzi et al., 2007) emphasize clean products (collection, processing and administration of blood, and safe transfusion practices at the bedside), clean practices (surgical procedures, surgical hand preparation, and access to safe emergency and essential surgical areas), clean equipment (hand hygiene, disposable syringes and safe sharps disposal), and clean environment (clean water and safe management of infectious healthcare waste).

Effective Implementation of Infection Control Programs

There are a variety of educational models already in use in other small developing countries. Payler, Meyer and Humphris (2008) reported on work in inter-professional education pedagogy and noted that it is important to create a non-threatening learning environment and a cooperative atmosphere. Theories of adult education; reflection in practice, problem-based

learning, and experiential learning, are components of progressive and tacit theory in acquiring metacognitive skills (Kenner & Weinerman, 2011). Professional healthcare workers will likely have skills derived from previous learning. These deeply embedded skills acquired from peers, teachers, and local cultures are an important component of acquiring new skills. The healthcare worker may utilize new information in problem solving to arrive at their own conclusions (Kenner & Weinerman, 2011). The appropriate infection control workshop model should take into consideration existing views, beliefs and practices (Chikasanda, Otrel-Cass, Williams, & Jones, 2013).

It is helpful to identify the best practices available for delivery of infection control material in a developing country. A study conducted in Uganda found that healthcare workers who had received training on infection control were more likely to wash their hands than were untrained healthcare workers in similar positions (Wasswa et al., 2015). Several researchers (Amoran & Onwube, 2013; Claassens et al., 2013; Friday et al., 2012; Ghabrah et al., 2007; Ider et al., 2012; Jere et al., 2010; Roberts et al., 2000; Shaw, 2005) have shown that in-service training enhances compliance with infection control measures and helps reinforce the importance of these infection control measures. Wasswa et al., (2015) showed that in-service training enhances compliance with infection control measures and found that regular training helps to remind the healthcare workers of the importance of infection control measures. Health facilities and organizations should provide continuous education and training on infection control to all staff (Wasswa et al., 2015).

A fundamental best practice in the area of research is the need for training. Research has focused on different audiences, including military, low-income developing countries, national policies, and health professional students. The research cited here uses a variety of delivery

methods: online, modular/online training, workshops, and didactic training. Each study used a pre-test/post-test methodology. The online, standardized training facilitated the teaching and kept costs of training to a minimum (Singh et al., 2012). A study of online training methods (Bryce, Choi, Landstrom & LoChang, 2008) utilized a survey to evaluate feedback from healthcare workers about the training. Lockhart and Smith (2009) evaluated an e-learning training program integrating infection control training into a health professional school curriculum. The advantage of an e-learning training program is the ability to choose the time, place, and pace of study. Similarly, Atack and Luke (2008) conducted a quasi-experimental study using questionnaires and open-ended questions, to examine the impact an online course had on competency in infection control for 76 healthcare workers.

While online, e-learning, and virtual learning environments fill a need in developed countries, students in developing countries found their experience with virtual learning environments and online learning was "terrifying and stressful"(Mash et al., 2006, p. e5). The researchers determined that the online course was helpful in providing information, but developing countries lacked the infrastructure necessary for healthcare workers to utilize at this time. Students travelled extensively to find telephone connections or to find an internet café to complete assignments (Mash et al., 2006). In the future, as infrastructure improves, online learning can be an effective way to enhance knowledge and provide access to new information to healthcare workers in developing countries.

Singh et al. (2012) used a two-module step-by-step teaching program; involving two half-day training programs. In a study by Palmer et al. (2014), training was delivered through a series of one-day workshops. This study took place in South Sudan and utilized a healthcare worker population similar to that found in Malawi. The training model was didactic as well as

participative and covered several topics. A pre-test/post-test was utilized, but outcomes were based on healthcare-associated infection rates. The results suggested workshop training that includes individualized and supervised instruction to improve infection control practice can be effective in a low-income country.

Training methods that utilize a shift in teaching styles from traditional lecturing and telling to facilitating and guiding are effective in improving infection control knowledge. Pratt et al. (2006) utilized a similar training, incorporating a face-to-face trainer-led component. This blended learning is highly interactive and has an intended purpose of the achievement of learning outcomes. In a study of military training, (Crouch, Murray, & Hospen et al., 2010) a didactic and hands-on approach was used and focused on developing a training that could be taught quickly to military personnel about to be deployed. The research design was a pre-test/post-test to evaluate the course effectiveness and a survey to assess perceived effectiveness and/or deficiencies and determine need for course modifications. The study results indicated a gain in infection control knowledge and course evaluations were positive.

Summary

The literature review indicated that there was a lack of knowledge in many developing countries due to a lack of training and available materials. There is a need to provide infection control measures in healthcare settings to lower the risk of healthcare-associated infections to patients and workers alike. Many low income countries lack the supplies to implement all the infection control practices necessary and, while that is not the subject of this research, it is a common thread in all the literature reviewed. As a working model, the research contributed by the World Health Organization (WHO) and the Center for Disease Control and Prevention (CDC) has helped define the knowledge that should be provided to healthcare workers and sets a

gold standard, the best practice available, for compliance. Training methodology and andragogy research provide evidence of many different types of training techniques that work in various settings with different levels of effectiveness.

CHAPTER 3. METHODS

Introduction

This research study used a quantitative approach by using a pre-test and post-test model to measure a gain in knowledge about infection control. Chapter 3 contains the following sections: the researcher's role, participants, description of the instrument, design and use of instrument, and data analysis. The research questions were designed to develop a training workshop that was effective for healthcare workers in all segments of society.

Infection control is a necessary component of any healthcare system. It is useful in providing positive health outcomes for clients, patients and healthcare workers. Controlling the spread of infection through the use of effective procedures and practices saves lives and utilizes resources in a positive manner.

Developing countries like Malawi have a shortage of materials necessary for infection control; therefore, developing an infection control workshop is critical to the healthcare setting. To assess the effectiveness of the workshop, the knowledge pre-test and post-test were given to provide data to add to the research about training and the effectiveness on infection control knowledge.

Purpose of the Study

The purpose of the study was to develop and assess the effectiveness of a workshop designed to teach infection control for healthcare personnel in Malawi, Africa. The model was used to teach infection control skills in three different types of hospitals in rural and urban areas

of Malawi. The workshop was presented to all levels of healthcare providers including; practitioners, community health workers, college students, and others working in healthcare situations. It served as a pilot program and provided feedback to propose follow-up courses for continued education and staff development. The goal of the workshop was to teach infection control practices that will impact the lives of healthcare workers and patients in both rural clinics and public hospital settings.

Research Questions

The following research questions were used in this study:

1. What are the differences between the pre-test and post-test scores by gender (male, female)?
2. What are the differences between the pre-test and post-test scores by category (practitioners, community health workers, and students)?
3. What are the differences between the pre-test and post-test scores by education level (University, College, MSCE, Other)?

Researcher's Role

The researcher has traveled to Malawi for the past eight years and worked in hospitals in rural areas with Malawian staff and American volunteers on surgical teams. Field work was in rural areas where there is a great need for training in infection control methods. The time spent in various healthcare areas in Malawi offered insight into the type of infection control measures lacking and how additional training would be beneficial. The need for infection control became apparent and when teamed with research by the World Health organization (WHO) and Center for Disease Control and Prevention (CDC), the training manual and workshop became a reality. The researcher established relationships with officials at the workshop sites. This allowed the

training to take place in various hospitals and facilities. The researcher developed the training manual, taught the training and administered the pre and post-test surveys.

Participants

The research protocols and instruments were approved by the Institutional Review Board at Auburn University. Participants had a wide range of healthcare training and consisted of 126 healthcare workers in four different settings in central Malawi. In order to assess the infection control workshop, participant groups were from different sites and possessed diverse educational backgrounds, including Malawi Senior Certification Exam (MSCE), college (vocational) school and university education, and other (less than a MSCE). The demographics included on the pre-test/post-test asked participants for gender as well as category of work within the healthcare system. For this study a practitioner refers to anyone who diagnosed, treated, or prescribed for patients. This group has received formal training. A community health worker is any healthcare provider who delivers medical services to patients. Typically, they have received little or no formal training. The category "did not answer" referred to participants who work in a healthcare setting as a driver, cleaner, cook, or aid. In three workshops that were conducted at hospitals or clinics, the participants ranged from the hospital director to the cleaners. Each of these individuals had a need to know and understand infection control.

One group of participants, the third year Clinical Laboratory Science students, had a special need for the workshop. This content ensured that students going forward would have the necessary knowledge to assess infection control in the rural settings where they would be assigned upon graduation from their college program.

Settings

Malawi, Africa is part of sub-Sahara Africa (see Figure 1). Malawi is one of the poorest countries in the world, with a population of more than 15 million. Malawi has an enormous shortage of trained healthcare workers and a high incidence of infectious diseases (e.g. HIV, TB and malaria). The potential contribution of healthcare workers is especially important in Malawi, where over 80% of the population lives in rural areas. These factors make Malawi a country where the need for training in infection control is essential for healthcare workers. The workshops were conducted in three different rural hospitals/clinics in Central Malawi and the College of Health Science in Lilongwe. Results of the preliminary research suggested a need to conduct the workshops at the targeted hospital or facility so that the expenses and time for travel would not keep participants from attending. The three healthcare facilities provide services for over 150,000 Malawians (P. Hawonga, E. Gondwe, personal communication, January 5, 2016).

Description of Workshop

This workshop was designed according to three principles. First, it should provide accurate information about infection control procedures. Second, it should be realistic in terms of what can be delivered in a short time period. Third, it should present material in such a way that different levels of education can benefit from the training and use it in the future (Beebe, Mottet, & Roach, 2013).

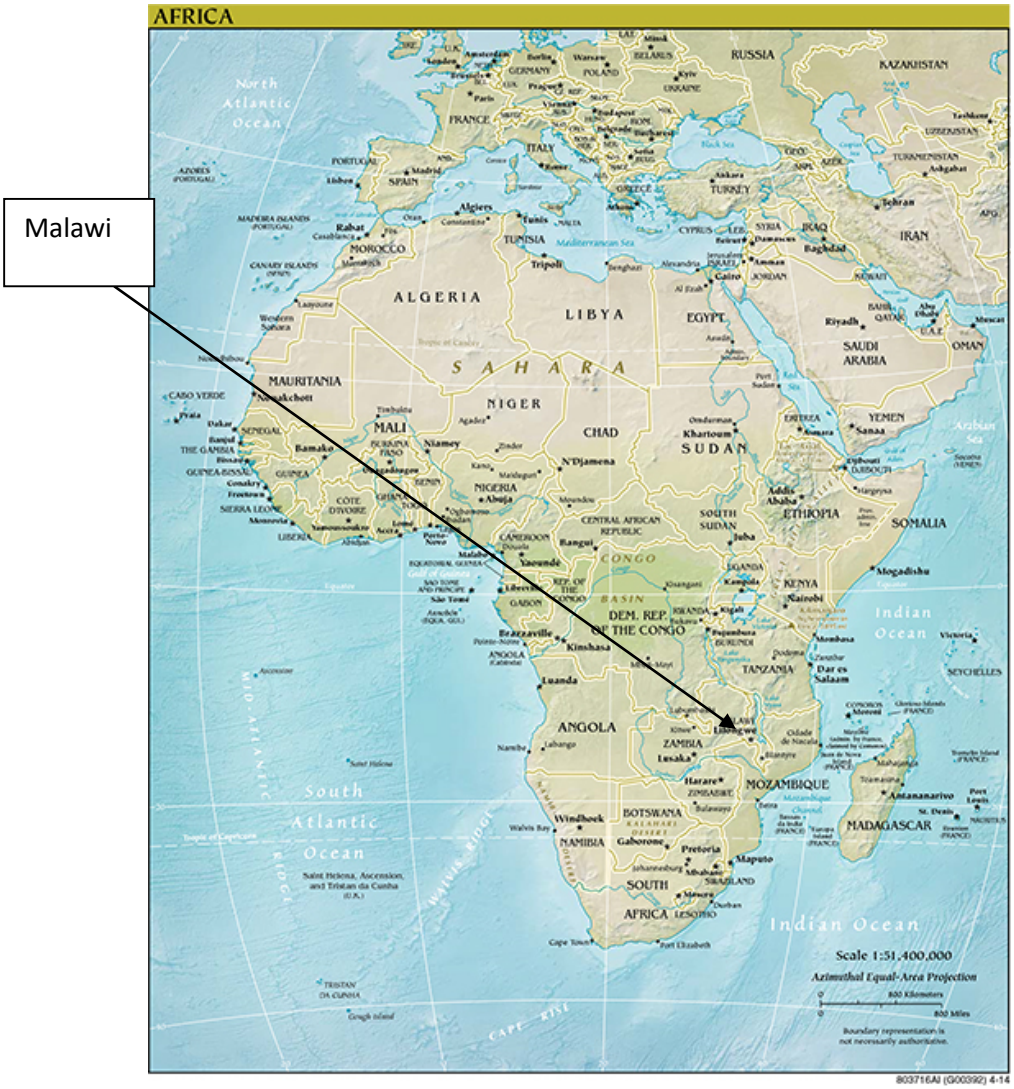

Figure 1. Map of Africa including Placement of Malawi

Source: *The World Factbook* 2013-14. Washington, DC: Central Intelligence Agency, 2013. Available at https://www.cia.gov/library/publications/the-world-factbook/index.html

The infection control workshop was comprised of information from the World Health Organization (WHO), Center for Disease Control and Prevention (CDC) and Ministry of Health guidelines from neighboring Uganda. Workshop content consisted of seven specific areas: 1) standard precaution measures, 2) hand hygiene, 3) personal protective equipment, 4) transmission-based precautions, 5) accidents, 6) cleaning and 7) biohazard waste.

The training was didactic as well as participative using PowerPoint slides and handouts. The teaching style was dictated by research that indicated that an approach involving lecture and demonstrations and student participation with question and answer sections would be most effective (Crouch et al., 2010; Singh et al., 2012). A training manual was developed and printed. The manual included every point taught throughout the workshop, and highlighted the areas that should be emphasized. The training manual was given to all directors and managers to provide a resource for follow up and future trainings.

Also included in the workshop was a handout with fill-in blanks. This handout was provided to each participant and the PowerPoint slides highlighted in a different color the correct responses for the participant to fill-in the appropriate blank. The handout gave each participant not only a hands-on way to remember the information, but something to take away for future reference (see Appendix A).

The infection control workshop was developed during 2014 and pilot tested in the summer of 2014. After the pilot study, the infection control workshop was modified to improve the delivery of the content. Also, the summer trip of 2014 utilizing the pilot study coincided with an outbreak of Ebola in western Africa. While the locations are thousands of miles apart, the Ebola outbreak functioned as a catalyst to reinforce the need for infection control guidelines, training and procedures throughout all countries, especially those on the African continent. The training included transmission-based precautions; specifically teaching how to best handle infectious agents, including, but not specific to, Ebola.

Design of Instrument

To assess the effectiveness of the training workshops in enhancing knowledge, a survey instrument was created. The infection control knowledge survey was created and then revised

based on the results of pilot testing. The final instrument contained questions taken directly from the PowerPoint slides and the handout. The questionnaire items pertained to specific infection control procedures and covered parts of each section; hand hygiene, personal protective equipment, proper sterilization, proper sharps disposal, safe waste management, standard precautions and transmission-based precautions. The instrument was edited to improve content validity, i.e., to be consistent with the workshop and training manual. Participants were asked to complete the test at two different times: immediately before the workshop (pre-test), and immediately after the workshop (post-test).

The test instrument included a section for demographics including gender, education level and healthcare position; these demographic variables would be analyzed to ensure that the workshop materials were not biased. Unique identifier codes, rather than names, were used on each survey. The pre-test and post-test had 17 questions with 4 multiple choice answers. Each question had a correct answer (see Appendix B).

Research Design and Data Collection

Prior to beginning the study, the researcher submitted a Research Protocol Review Form to the Office of Research Compliance at Auburn University (see Appendix C). Upon approval from the Institutional Review Board for Research involving Human Subjects (IRB#15-225 ex 1505), the researcher began the study. Four sites were chosen to conduct the infection control workshop. Each facility submitted an approval letter (see Appendix D). Individuals volunteered to participate in the workshop and testing. Each participant was identified by a number given to them as they entered the room. The number was random and was used only to correlate pre-test and post-test surveys. The participants' names were kept confidential in a

sealed envelope as part of the IRB plan. These names were later destroyed and the only identifier being the random number entered on pre-tests and post-tests.

Data Analysis

The data was analyzed using SPSS to conduct an analysis of variance (ANOVA) on the three demographic variables (gender, category, and education). The analysis of variance (ANOVA) was utilized because it can be used to compare two or more groups and the data involved more than two groups. The dependent variable was the pre-test and post-test scores of participants.

CHAPTER 4. FINDINGS

Introduction

The chapter contains the results of participants' pre-test and post-test scores related to the workshop. It also provides an analysis of the demographic variables.

Purpose of the Study

The purpose of the study was to develop and assess the effectiveness of a workshop designed to teach infection control for healthcare personnel in Malawi, Africa. The model was used to teach infection control skills in three different types of hospitals in rural and urban areas of Malawi. The workshop was presented to all levels of healthcare providers including; practitioners, community health workers, college students, and others working in healthcare situations. It served as a pilot program and provided feedback to propose follow-up courses for continued education and staff development. The goal of the workshop was to teach infection control practices that will impact the lives of healthcare workers and patients in both rural clinics and public hospital settings.

Research Questions

The following research questions were used in this study:

1. What are the differences between the pre-test and post-test scores by gender (male, female)?

2. What are the differences between the pre-test and post-test scores by category (practitioners, community health workers, and students)?

3. What are the differences between the pre-test and post-test scores by education level (University, College, MSCE, Other)?

Demographic Results

Five workshops were conducted at four different sites; one private hospital, two rural government hospitals and the College of Health Science. The training interventions included 126 participants. Of the 126 participants, there were 27 participants who either did not take the pre-test or post-test and/or who failed to write an ID number on the test, resulting in 99 completed pretest/posttest knowledge surveys suitable for analysis. There were almost twice as many females as males that completed complete the intervention, with 65 female participants and the remaining 34 male participants.

Seventeen participants were practitioners, defined as any person who has completed a program of study that enables them to work in a professional position, i.e. nurse, lab tech, clinical officer, public health official. The largest proportion of participants, 46, were community health workers. Community health workers in this context refers to personnel who have less than nine months of clinical training and participants working in health facilities with no formal clinical training, mostly nursing assistants and community healthcare workers trained on the job. The 26 students were all students in their final year of college at Malawi College of Health Science in Lilongwe. They will begin work in public hospital laboratories at the end of the year. The final ten participants responded as “Did Not Answer”, this group of participants included cleaners, and drivers. In many cases, participants would travel with the community health worker into a rural area and record names, obtain blood samples, family history; in many areas they would come into physical contact with the patient.

Participants were stratified based on educational levels. Eight students had a university education, 33 had college/vocational training, 39 had completed the Malawi Senior Certification Exam (MSCE), equivalent to a high school diploma, 12 participants marked "other" which would indicate less than MSCE, and 7 did not answer the question.

Research Question Results

All participants were administered a pre-test and an identical post-test containing 17 items. After the training, there was a significantly higher increase in knowledge. The mean score on the pretest was 9.94 and the mean score on the posttest was 13.46 (t_{98}= -12.657, sig. =.000). Post test scores were significantly higher than pretest scores (n=99, corr. = .502, sig. =.000).

Research Question 1: What are the differences between the pre-test and post-test scores by gender (male, female)?

It was important to utilize an instrument that would not show bias between genders. While not significant statistically, it should be noted that the mean score for females showed greater increase pre-test/post-test than males and actually had higher mean score post-test (see Table 1).

It could be argued that these results indicated that the workshop and instrument were biased toward females but ANOVA suggests otherwise. The information gathered by this statistical analysis provides assurance that the workshop and the corresponding knowledge instrument were not biased with regard to gender. Participants did not differ on pre/post score when grouped by gender (see Table 2). A one-way ANOVA was performed on the descriptive "gender", and showed no significant difference on pre-test (F_{98}=.144, sig. =.705) and post-test (F_{98}=1.302, sig. =.257).

Table 1

Descriptive Statistics Comparing Pre- and Post- Test Scores by Gender

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean Lower Bound	95% Confidence Interval for Mean Upper Bound	Minimum	Maximum
Pretest Total								
Female	65	9.8615	2.87705	.35685	9.1486	10.5744	4.00	16.00
Male	34	10.0882	2.70093	.46321	9.1458	11.0306	4.00	15.00
Total	99	9.9394	2.80604	.28202	9.3797	10.4990	4.00	16.00
Posttest Total								
Female	65	13.6923	2.57344	.31920	13.0546	14.3300	5.00	17.00
Male	34	13.0294	3.04994	.52306	11.9652	14.0936	4.00	17.00
Total	99	13.4646	2.74907	.27629	12.9164	14.0129	4.00	17.00

Table 2

One-Way ANOVA Comparing Pre- and Post- Test Scores by Gender

	Sum of Squares	df	Mean Square	F	Sig.
Pretest Total					
Between Groups	1.147	1	1.147	.144	.705
Within Groups	770.489	97	7.943		
Total	771.636	98			
Posttest Total					
Between Groups	9.810	1	9.810	1.302	.257
Within Groups	730.817	97	7.534		
Total	740.626	98			

Research Question 2: What are the differences between the pre-test and post-test scores by category (practitioners, community health workers, and students)?

For category, the overall mean on knowledge level increased between pre-test and post-test (see Table 3). There was a significant difference in pre-test scores between some of the groups ($F_{98} = 7.541$, sig. = .000) and post-test scores ($F_{98} = 3.463$, sig = .019) and a post hoc analysis was used to determine where groups differed.

Table 3

One-Way ANOVA Comparing Pre- and Post- Test Scores by Position

	Sum of Squares	df	Mean Square	F	Sig.
Pretest Total					
Between Groups	148.415	3	49.472	7.541	.000
Within Groups	623.221	95	6.560		
Total	771.636	98			
Post Test Total					
Between Groups	73.013	3	24.338	3.463	.019
Within Groups	667.613	95	7.028		
Total	740.626	98			

Table 4 provides the mean scores on the pre-test and post-test by Category. Practitioners differed from community health workers (x = 11.765, compared to x = 9.174, sig. = .003) but did not differ from students (x = 10.885). Practitioners who generally have the highest educational background also had the highest mean score. Students, who were currently taking science

oriented classes, also had high mean scores. There were 17 practitioners, 46 community health workers, and 26 students. Following completion of the workshop none of these groups differed significantly on the posttest score, though practitioners still had the highest ($x = 14.941$), followed by students ($x = 13.769$), and then community health workers ($x = 13.109$). There were 10 participants who did not fall into any of these categories; they were gardeners, lab aids, or drivers. The mean score for this group pre-test was $x = 7.900$ and post-test had improved to $x = 11.800$. Many of the job categories in this group would bring these participants into direct contact with patients; therefore, the increase in knowledge is of considerable value in how they handle infection control measure between themselves and their clients. This is a significant finding indicating that while the practitioners had the most knowledge prior to attending the workshop, after the workshop the community health workers and students had also increased their knowledge in infection control procedures and practices. The mean values of the community health worker and the student both improved to be more comparable to the practitioners.

Research Question 3: What are the differences between the pre-test and post-test scores by education level (University, College, MSCE, Other)?

Participants were grouped into four educational levels: Malawi Secondary Certificate Examination (MSCE) ($n = 39$), College ($n = 33$), University ($n = 8$), and Other ($n = 12$). Analysis of variance showed groups to differ on pre-test and post-test scores (see Table 5).

Table 4

Descriptive Statistics Comparing Pre- and Post- Test Scores by Category

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean Lower Bound	95% Confidence Interval for Mean Upper Bound	Minimum	Maximum
Pretest Total								
Did Not Answer	10	7.9000	2.23358	.70632	6.3022	9.4978	4.00	11.00
Practitioner	17	11.7647	2.43745	.59117	10.5115	13.0179	7.00	16.00
Health Care Worker	46	9.1739	2.88524	.42541	8.3171	10.0307	4.00	16.00
Student	26	10.8846	2.08474	.40885	10.0426	11.7267	6.00	14.00
Total	99	9.9394	2.80604	.28202	9.3797	10.4990	4.00	16.00
Posttest Total								
Did Not Answer	10	11.8000	3.79473	1.20000	9.0854	14.5146	6.00	17.00
Practitioner	17	14.9412	1.59963	.38797	14.1187	15.7636	12.00	17.00
Health Care Worker	46	13.1087	2.85368	.42075	12.2613	13.9561	4.00	17.00
Student	26	13.7692	2.28574	.44827	12.8460	14.6925	8.00	17.00
Total	99	13.4646	2.74907	.27629	12.9164	14.0129	4.00	17.00

Table 5

One-Way ANOVA Comparing Pre- and Post- Test Scores by Education Level

	Sum of Squares	df	Mean Square	F	Sig.
Pretest Total					
Between Groups	180.381	4	45.095	7.169	.000
Within Groups	591.255	94	6.290		
Total	771.636	98			
Posttest Total					
Between Groups	116.381	4	29.095	4.381	.003
Within Groups	624.245	94	6.641		
Total	740.626	98			

Table 6 provides the means of pre-test/post-test by Education: MSCE had a mean score of (x = 9.154) which was significantly lower than the college mean (x = 11.363) and approached but was not significant (sig. = .063) compared to the university score (x = 11.875); the difference may have been significant with a larger sample size of university students. The mean pretest score for the "Other" group was 7.833, which was significantly lower than the college (x = 11.3636, sig = .001) and university (x = 11.875, sig = .006) groups. The participants indicating university education have the highest education background and would therefore be expected to score highest. The college educated participant may have studied a specific subject for a shorter period of time. The MSCE students have completed and passed the basic national schooling for Malawi and the participants indicating "Other" would have less than the minimum basic or less than twelfth grade equivalent education.

Post-test scores increased for each group; however, college and university scores were still significantly higher than the "Other" category (x = 14.303, sig = .023, x = 15.625, sig = .009, x = 11.583, respectively). However, the "Other" group improved their mean score by 3.75 to 11.583 on the post-test. The most highly represented group (MSCE, n = 39) had a post-test mean of 13.077.

As the education level increases the pre-test score means increased. After the intervention, the post-test scores of participants with less education had also improved their knowledge scores significantly. The knowledge increase is an indicator of the validity of the training workshop.

Table 6

Descriptive Statistics Comparing Pre- and Post- Test Scores by Education Level

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean Lower Bound	95% Confidence Interval for Mean Upper Bound	Minimum	Maximum
Pretest Total								
Did Not Answer	7	9.0000	3.41565	1.29099	5.8411	12.1589	7.00	16.00
MSCE (High School)	39	9.1538	2.54991	.40831	8.3273	9.9804	4.00	14.00
College (Vocational)	33	11.3636	2.10384	.36623	10.6176	12.1096	6.00	16.00
University	8	11.8750	2.94897	1.04262	9.4096	14.3404	7.00	15.00
Other	12	7.8333	2.55248	.73684	6.2116	9.4551	4.00	12.00
Total	99	9.9394	2.80604	.28202	9.3797	10.4990	4.00	16.00
Posttest Total								
Did Not Answer	7	12.4286	2.37045	.89595	10.2363	14.6209	10.00	16.00
MSCE (High School)	39	13.0769	2.51715	.40307	12.2610	13.8929	4.00	17.00
College (Vocational)	33	14.3030	2.24283	.39043	13.5078	15.0983	8.00	17.00
University	8	15.6250	1.84681	.65295	14.0810	17.1690	12.00	17.00
Other	12	11.5833	3.87201	1.11775	9.1232	14.0435	5.00	16.00
Total	99	13.4646	2.74907	.27629	12.9164	14.0129	4.00	17.00

Summary

The infection control workshop was presented to 126 participants, of that number 99 participants completed both the pre-test and post-test to yield a qualifying entry. Sixty-six percent (n = 65) of the participants were female and 34% (n = 34) male. The intervention and knowledge survey were non-biased toward gender, allowing learning to take place in both genders. The analysis of data by category suggested that while the practitioners scored higher initially (x=11.765) than all other job categories, after the training workshop, the community

health worker and student mean had risen to similar levels. The third variable, of educational level, also saw the mean scores increasing in all educational categories.

CHAPTER 5. SUMMARY, CONCLUSIONS, IMPLICATIONS, AND RECOMMENDATIONS

Introduction

The chapter will provide a summary, conclusions, implications and recommendations for future studies. It will also summarize the development and assessment of the infection control workshop. It will give recommendations for further study and implications related to the concluded research.

Purpose of the Study

The purpose of the study was to develop and assess the effectiveness of a workshop designed to teach infection control for healthcare personnel in Malawi, Africa. The model was used to teach infection control skills in three different types of hospitals in rural and urban areas of Malawi. The workshop was presented to all levels of healthcare providers including; practitioners, community health workers, college students, and others working in healthcare situations. It served as a pilot program and provided feedback to propose follow-up courses for continued education and staff development. The goal of the workshop was to teach infection control practices that will impact the lives of healthcare workers and patients in both rural clinics and public hospital settings.

Research Questions

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2. What are the differences between the pre-test and post-test scores by category (practitioners, community health workers, and students)?

3. What are the differences between the pre-test and post-test scores by education level (University, College, MSCE, Other)?

Summary

A majority (65%) of the participants in the study were female and almost half (46%) of the participants job category was community health worker. Bias, when used in this context indicates that one demographic is favored over another; therefore, the lack of bias indicates that none of the demographics that were measured with the assessment favored one group over another. The lack of bias for all three demographic variables was a significant finding. It creates validity toward the workshop and the training, allowing every demographic to improve in knowledge. Training for a healthcare worker ranges from some informal training to no training. The pre-test scores indicated that those participants with the most education and working in the most professional areas had the most knowledge; however, the analysis also showed that each improved their knowledge of infection control, with the least educated making significant advances in knowledge to almost equal the higher educated participants. One of the important aspects of this finding is that while all categories of personnel learned from the workshop, the students and community health workers came up to the level of the practitioners and

consequently, will be more able to use the knowledge gained to protect themselves and their patients from infection.

Conclusions

A workshop was developed to educate healthcare personnel about procedures to improve infection control for themselves and their patients, clients, and family. These infection control measures included understanding terms (e.g. standard precautions), proper hand washing, the use of appropriate personal protection equipment, disposal of needles, and effective disinfectant techniques.

A pre-test/post-test instrument was developed to evaluate the effectiveness of the workshop. The instrument was pilot-tested, modified and administered to workshop participants. All participant groups showed gains in mean score with no bias toward gender, category, or education; more importantly, scores for those with lower educational levels improved to a level equivalent to those with higher educational levels. It is significant to improve the knowledge of those with less educational background because all groups play a role in infection control.

When everyone has the same knowledge base and begins to work with the same model of handwashing and using standard precautions with each patient contact, then the levels of infection will decrease. The intervention was successful in creating a workshop model that was not biased according to any of the three demographic variables. The participants, female and male, learned the knowledge needed to protect themselves and their patients. Since almost twice as many females as males attended the training, there will be a positive effect on the interactions that future female participants have with patients, especially maternity patients.

Practitioners, community health workers, students and “did not answer” categories all improved their knowledge of infection control. There were two significant findings in the demographic variables. The first was that all categories gained knowledge through the

workshop. From practitioners, (those who diagnose and assign treatments); students, (those who are in school learning about disease, treatment and infection control); community health workers, (those who perform daily medical care), and the "did not answer" group, (those who can come in contact with infectious situations, yet these individuals receive little to no training regarding infection control); all gained knowledge through the workshop. Second, is the ability of the workshop to communicate knowledge to a wide variety of learners, indicating an intervention that can be used for multiple group types.

The analysis of the research question, relating to educational level provided a measure of validity to the test instrument. One would expect a person with more education or professional training in healthcare to have a higher score on a test instrument and this was true in this case.

Implications

The study developed and assessed an infection control workshop intervention and found it to be effective in increasing knowledge along all levels of education, category, and gender. The infection control workshop can be generalized for use in other rural and developing parts of Malawi because the workshop was presented and evaluated in a variety of areas which are representative of the country, and the workshop was found to be unbiased for general demographic variables involved in healthcare.

Another implication of the study shows that the workshop was developed in a manner that made it teachable for different education levels, allowing many different groups to learn valuable information and skills at the same time. The value of knowledge increase while a diverse educational group is taught is valuable in a developing country where there is a lack of trainers, lack of travel time and availability of healthcare workers to leave the workplace for

training. One workshop was conducted and various education levels increased their knowledge of infection control.

The effect of the intervention in teaching infection control procedures and standards will increase compliance and attitude, therefore lowering healthcare associated infections. Studies have shown that an increase in knowledge of infection control leads to greater compliance (Singh et al., 2012; Valim, Marziale, Richart-Martinez, & Sanjuan-Quiles, 2013).

It is vitally important for the knowledge attained in the workshop to be presented in a manner that is able to be learned and applied by both men and women. Culturally, it is more common in Malawi for men to attain a higher education than do women. However, this trend is on the decline, therefore, a workshop that is not gender biased empowers women to protect themselves, their families, and their patients. The process of healthcare in Malawi relies heavily on community health workers due to a human resource challenge within the healthcare sector. The ratio of doctors, nurses, and other medical professionals is extremely low at 38 per 100,000 people (WHO, 2008). The development of the workshop and subsequent assessment of its rate of knowledge increase can allow community health workers, regardless of gender or education level access to information they need to care for their clients (LeMay & Bocock, 2012).

Recommendations

The successful implementation of infection control practices by healthcare workers is influenced by social environments, peer group pressure, their own experiences, as well as modeling (Pittet, 2005). Therefore, while knowledge was gained through the training workshop, it will take regular in-service training and follow-up contact to help remind the healthcare worker of the importance of these measures.

Another recommendation for further research would include hands-on skill training in various aspects of infection control procedures. Developing countries like Malawi lack the infrastructure to comply with many infection control standards and while initiating knowledge through this workshop, more study could go into how to formulate networks within the healthcare community in Malawi to create working models of specific infection disease protocol for various healthcare settings. The infection control workshop would be used as an educational starting place within the university trained professionals' community to build awareness and accountability.

Further research should involve a longitudinal study looking at the attitudes and knowledge of this same group of healthcare workers in one year. Additional research would examine the training of the trainers and how that might increase knowledge and attitudes of infection control in Malawi.

Another area of further research would be to go back to the literature and the infrastructure in Malawi and develop an online teaching model for more rural and isolated healthcare workers and pilot test it for effectiveness and accessibility as Malawi moves forward in technology.

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Appendix A

Workshop Handout

Infection Control Biohazard Safety Workshop
Shaliah Armstrong, MT(ASCP)
Auburn University
Summer 2015

1. _____ who works in healthcare needs to be concerned about infection control.

2. Infection control involves taking precautions to protect _____, the _____, and _____ against infection.

3. All infections occur when an infectious agent is transmitted to a susceptible person, called a _____.

4. The best known method of prevention is _____.

5. Standard Precautions mean that _____ specimen should be treated as though it is _____.

6. Most infection transmissions are _____, Blood and body_____, _____.

7. Standard Precautions apply to ALL _____, ALL _____, ALL _____ _____.

8. Hand Hygiene should be done _____ and _____ any direct patient care.

9. Healthcare personnel can _____ transmission by following _____ _____for all patients _____ of their diagnosis.

10. P_____ P_____
    E_____ provides a physical barrier between micro-organisms and the wearer.

11. PPE is specialized clothing or equipment worn by a HCW for protection against _____materials.

12. Change gloves when they are _____, _____ _____, between _____.

13. The three types of transmission-based precautions are _____, _____, and _____.

14. _____ _____ should be used for patients that have an infection that can be spread by contact with the person's skin.

15. _____organisms are expelled by coughing or sneezing. They are heavy and fall to the ground within 3 feet of the patient. Surgical mask should be put on before entering the patient's room.

16. _____organisms are expelled by coughing or sneezing. They are very small and can stay suspended in the air for long periods of time.

17. Infection exposures are _____ _____, body fluids splashed in your _____, or patient _____ in your mucous membranes,

18. If you accidentally stick yourself with a needle, you should immediately wash the area with _____ and _____.

19. Needles, syringes with needles, and blades all go into a _____ _____.

20. Disinfection makes objects _____, kills _____ and _____, and makes objects _____ to handle.

21. A good disinfectant is a _____% _____ solution.

22. Biohazard waste are items that are _____ with blood, tubes containing _____, _____ lab culture plates, exam gloves coated with _____ or _____.

Biohazard waste should be _____in a plastic bag.

Infection Control Workshop
Malawi – Africa
Pre-Test

Location: _____

Participant Identifier: _____

Please check the appropriate response:

1. **Sex**: ____Male ____Female
2. **Category**: ____Practitioner ____Community Health Worker ____Student (enrolled in Health Sciences)
3. **Education Level**:
   ____MSCE (High School) ____College (Vocational) ____University
   Other: _____

Please circle the most correct response:

1. What is the most effective step of infection control?	
a. Hand washing	c. Wearing protective gloves
b. Wearing a face mask	d. Using hand sanitizer
2. What does PPE stand for?	
a. Primary Preparation Examination	c. Personal Protection Equipment
b. Proper Protective Equipment	d. Preparation Premier Evaluation
3. What does "Standard Precautions" mean?	
a. Use protection only if needed	c. Use caution when opening
b. Be careful when using this item	d. Every specimen should be treated as though it is infectious
4. When should you wash your hands?	
a. When you return from lunch	c. First thing in the morning
b. After every interaction	d. Before the next meeting
5. Which of these is <u>not</u> a function of infection control?	
a. To protect the health worker	c. To protect the patient
b. To identify bacteria	d. To reduce the spread of infection
6. When should you change your gloves?	
a. When gloves are torn	c.Between patients
b.When gloves are heavily soiled	d.All of the above
7. What makes something a biohazard waste?	
a. Tubes containing blood	c. Urine specimens without visible blood
b.Bandages with a few drops of blood	d.Gloves not visibly contaminated
8. Organisms that are expelled by coughing or sneezing, are very small and stay suspended in the air for long periods are referred to as?	
a. Contact isolation	c.Airborne isolation
b. Droplet isolation	d. Level Four isolation

9. Where do you not put biohazard waste?	
a. In the garbage can	c. Sealed in a plastic bag
b. In the water system	d. On counter until it dries
10. Which of the following is not an infection exposure?	
a. A needle stick	c.A torn glove
b.A splash to your eyes	d.Patient secretions into mucous membranes
11. What should you do first if you are accidentally stuck with a used needed?	
a. Run to the nearest doctor	c. Wash with soap and water
b. Swab the stab area with alcohol	d. Scream and yell
12. All infections occur when an infectious agent is transmitted to a susceptible person, called a	
a. Host	c. Suspect
b. Agent	d. Patient
13. Disinfection is the process that	
a. makes objects sterile	kills germs and pathogens
b. makes objects safer to handle by staff	d. All of the above
14. Which of these is the best disinfectant	
a. Soap and water	c. Alcohol
b. 10% bleach solution	d. A damp cloth
15. Modes of Infection transmission	
a. person to person	c. airborne
b. blood and other body fluids	d. All of the above
16. Transmission-based precautions	
a. Contact isolation	c. airborne infection isolation
b. Droplet precaution	d. All of the above
17. Which of these things do not go into a “Sharps Keeper”?	
a. Needles	c. Syringes without needles
b. Syringes with needles attached	d. Blades

Infection Control Workshop
Malawi – Africa
Post-Test

Location: _____

Participant Identifier: _____

Please check the appropriate response:

1. **Sex**: ____Male ____Female
2. **Category**: ____Practitioner ____Community Health Worker ____Student (enrolled in Health Sciences)
3. **Education Level**:
   ____MSCE (High School) ____College (Vocational) ____University
   Other: _____

Please circle the most correct response:

1. What is the most effective step of infection control?	
a. Hand washing	c. Wearing protective gloves
b. Wearing a face mask	d. Using hand sanitizer
2. What does PPE stand for?	
a. Primary Preparation Examination	c. Personal Protection Equipment
b. Proper Protective Equipment	d. Preparation Premier Evaluation
3. What does "Standard Precautions" mean?	
a. Use protection only if needed	c. Use caution when opening
b. Be careful when using this item	d. Every specimen should be treated as though it is infectious
4. When should you wash your hands?	
a. When you return from lunch	c. First thing in the morning
b. After every interaction	d. Before the next meeting
5. Which of these is <u>not</u> a function of infection control?	
a. To protect the health worker	c. To protect the patient
b. To identify bacteria	d. To reduce the spread of infection
6. When should you change your gloves?	
a. When gloves are torn	c.Between patients
b.When gloves are heavily soiled	d.All of the above
7. What makes something a biohazard waste?	
a. Tubes containing blood	c. Urine specimens without visible blood
b.Bandages with a few drops of blood	d.Gloves not visibly contaminated
8. Organisms that are expelled by coughing or sneezing, are very small and stay suspended in the air for long periods are referred to as?	
a. Contact isolation	c.Airborne isolation
b. Droplet isolation	d. Level Four isolation

9. Where do you not put biohazard waste?	
a. In the garbage can	c. Sealed in a plastic bag
b. In the water system	d. On counter until it dries
10. Which of the following is not an infection exposure?	
a. A needle stick	c.A torn glove
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11. What should you do first if you are accidentally stuck with a used needed?	
a. Run to the nearest doctor	c. Wash with soap and water
b. Swab the stab area with alcohol	d. Scream and yell
12. All infections occur when an infectious agent is transmitted to a susceptible person, called a	
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16. Transmission-based precautions	
a. Contact isolation	c. airborne infection isolation
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17. Which of these things do not go into a “Sharps Keeper”?	
a. Needles	c. Syringes without needles
b. Syringes with needles attached	d. Blades

AUBURN UNIVERSITY

COLLEGE OF EDUCATION

EDUCATIONAL FOUNDATIONS, LEADERSHIP AND TECHNOLOGY

INFORMATION LETTER
for a Research Study entitled:
"The Effect of an Infection Control Workshop on Practitioners, Community Health Workers, and Students in Malawi, Africa."

You are invited to participate in a research study to *assess the effectiveness of an Infection Control workshop and to identify any differences between the pre-test and post-test results by sex, category, or education level.* This study is being conducted by Shaliah Armstrong, master's thesis student in Adult Education, in the Department Educational Foundations, Leadership, and Technology at Auburn University, under the direction of Dr. Maria M. Witte.

What will be involved if you participate? If you decide to participate in this research study, you will be asked to participate in a pre-test survey, an Infection Control workshop, and complete the post-test survey. Your participation is completely anonymous and voluntary, with a time commitment of approximately 60 minutes. There is no compensation for participation. Information collected may be used for publication or professional presentation.

Are there any risks or discomforts? There are no foreseeable risks associated with participation in the study. However, if you feel uncomfortable answering any questions, you can withdraw from the survey.

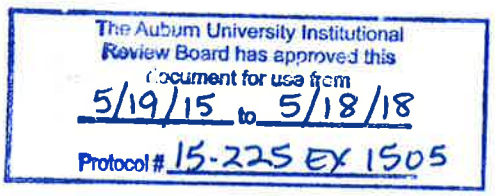
Are there any benefits to yourself or others? If you participate in this study, you can expect to learn about infection control. We cannot guarantee that you will receive any additional benefits.

Will you receive compensation for participating? There is no compensation for participating in this study.

Are there any costs? If you decide to participate, there are no costs involved.

If you change your mind about participating, you can withdraw at any time during the study. Your participation is completely voluntary. If you choose to withdraw, your data can be withdrawn as long as it is identifiable. Your decision about whether or not to participate or to stop participating will not jeopardize your future relations with Auburn University or the Department of EFLT.

Any data obtained in connection with this study will remain anonymous. We will protect your privacy and the data you provide by keeping the pre and post-tests in a safe and secure location. Information collected through your participation may be used to *fulfill an educational requirement, publish in a professional journal, and/or presented at a professional conference.*



4036 Haley Center, Auburn, AL 3684-5221; Telephone: 334-844-4460: Fax: 334-844-3072

www.auburn.edu

If you have any questions about this study, please ask them now or contact Shaliah Armstrong at armstsm@auburn.edu.

If you have questions about your rights as a research participant, you may contact the Auburn University Office of Research Compliance or the Institutional Review Board by phone (334)-844-5966 or e-mail at IRBadmin@auburn.edu or IRBChair@auburn.edu.

HAVING READ THE INFORMATION PROVIDED, YOU MUST DECIDE IF YOU WANT TO PARTICIPATE IN THIS RESEARCH PROJECT. IF YOU DECIDE TO PARTICIPATE, THE DATA YOU PROVIDE WILL SERVE AS YOUR AGREEMENT TO DO SO. THIS LETTER IS YOURS TO KEEP.

Shaliah M Armstrong

Shaliah Armstrong

April 29, 2015

The Auburn University Institutional Review Board has approved this document for use from 5/19/15 to 5/18/18 Protocol # 15-225 EX 1505

AUBURN UNIVERSITY INSTITUTIONAL REVIEW BOARD for RESEARCH INVOLVING HUMAN SUBJECTS

REQUEST FOR EXEMPT CATEGORY RESEARCH

For Information or help completing this form, contact: **THE OFFICE OF RESEARCH COMPLIANCE**, 115 Ramsay Hall
Phone: 334-844-5966 **e-mail:** IRBAdmin@auburn.edu **Web Address:** http://www.auburn.edu/research/vpr/ohs/index.htm

Revised 2/1/2014 **Submit completed form to IRBsubmit@auburn.edu or 115 Ramsay Hall, Auburn University 36849.**

Form must be populated using Adobe Acrobat / Pro 9 or greater standalone program (do not fill out in browser). Hand written forms will not be accepted.

Project activities may not begin until you have received approval from the Auburn University IRB.

1. PROJECT PERSONNEL & TRAINING

PRINCIPAL INVESTIGATOR (PI):

Name Shaliah Armstrong **Title** Graduate Student **Dept./School** College of Education

Address 2826 Cox Rd, Auburn, AL 36832 **AU Email** armstsm@auburn.edu

Phone 334-750-8161 **Dept. Head** Sherida Downer

FACULTY ADVISOR (if applicable):

Name Dr, Maria Witte **Title** Professor **Dept./School** College of Education

Address 4012 Haley Center, Auburn University

Phone 334-844-3078 **AU Email** wittemm@auburn.edu

KEY PERSONNEL: **List Key Personnel (other than PI and FA). Additional personnel may be listed in an attachment.**

Name	Title	Institution	Responsibilities

The Auburn University Institutional Review Board has approved this Document for use from 5/19/15 to 5/18/18 Protocol # 15-225 EX 1505

Received MAY 12 2015 Research Compliance

KEY PERSONNEL TRAINING: **Have all Key Personnel completed CITI Human Research Training (including elective modules related to this research) within the last 3 years?** ☑ **YES** ☐ **NO**

TRAINING CERTIFICATES: **Please attach CITI completion certificates for all Key Personnel.**

2. PROJECT INFORMATION

Title: The Effect of an Infection Control Workshop on Practitioners, Community Health Workers, and Students in Malawi, Africa

Source of Funding: ☑ **Investigator** ☐ **Internal** ☐ **External**

List External Agency & Grant Number:

List any contractors, sub-contractors, or other entities associate with this project.

List any other IRBs associated with this project (including those involved with reviewing, deferring, or determinations).

FOR ORC OFFICE USE ONLY

DATE RECEIVED IN ORC:	5.12.15	**by**	CB	**APPROVAL #**	
DATE OF IRB REVIEW:		**by**		**APPROVAL CATEGORY:**	
DATE OF ORC REVIEW:		**by**		**INTERVAL FOR CONTINUING REVIEW :**	
DATE OF APPROVAL:		**by**			

COMMENTS:

3. **PROJECT SUMMARY**

a. **Does the research involve any special populations?**

- ☐ YES ☑ NO **Minors (under age 19)**
- ☐ YES ☑ NO **Pregnant women, fetuses, or any products of conception**
- ☐ YES ☑ NO **Prisoners or Wards**
- ☐ YES ☑ NO **Individuals with compromised autonomy and/or decisional capacity**

b. **Does the research pose more than minimal risk to participants?** ☐ YES ☑ NO

Minimal risk means that the probability and magnitude of harm or discomfort anticipated in the research are not greater in and of themselves than those ordinarily encountered in daily life or during the performance of routine physical or psychological examinations or tests. 42 CFR 46.102(i)

c. **Does the study involve any of the following?**

- ☐ YES ☑ NO **Procedures subject to FDA Regulation** Ex. Drugs, biological products, medical devices, etc.
- ☐ YES ☑ NO **Use of school records of identifiable students or information from instructors about specific students**
- ☐ YES ☑ NO **Protected health or medical information when there is a direct or indirect link that could identify the participant**
- ☐ YES ☑ NO **Collection of sensitive aspects of the participant's own behavior, such as illegal conduct, drug use, sexual behavior or use of alcohol**
- ☐ YES ☑ NO **Deception of participants**

If you checked "YES" to any response in Question #3 STOP. It is likely that your study does not meet the "EXEMPT" requirements. Please complete a PROTOCOL FORM for Expedited or Full Board Review.
You may contact IRB Administration for more information. (Phone: 334-844-5966 or Email: IRBAdmin@auburn.edu)

4. **PROJECT DESCRIPTION**

a. **Subject Population** (Describe, include age, special population characteristics, etc.)

The participants in this study will be practitioners, community health workers (CHW) and students from the Health Sciences College in Malawi, Africa. The participants must be 19 yrs of age or older in order to participate.

b. **Describe, step by step, all procedures and methods that will be used to consent participants.**

☐ **N/A (Existing data will be used)**

After receiving the IRB approval, and traveling to Malawi, the investigator will invite practitioners, community health workers, and students to participate in the Infection Control workshop held at Blessings Hospital, through the Chikondi Health Foundation, in Lumbadzi, Malawi. Participants will be provided the information letter and invited to participate in the Pre-Test, Infection Control workshop, and then the Post-Test. Participants in the control group will receive just the pre and post-tests.

c. **Brief summary of project.** (Include the research question(s) and a brief description of the methodology, including recruitment and how data will be collected and protected.)

The purpose of this study is to assess the effectiveness of an Infection Control workshop. The workshop will be held at Blessings Hospital in Lumbadzi, Malawi. Health practitioners, community health workers, and students in the Health Sciences field will be provided the Information Sheet and a pretest on Infection Control. The pre-test will be followed by an Infection Control workshop and then a post-test will be administered. The workshop will cover basic infection control procedures and definitions. The following research questions will be used:

1. What are the differences between the pre-test and post-test scores of practitioners, community health workers, and students by sex?
2. What are the differences between the pre-test and post-test scores of practitioners, community health workers, and students by category?
3. What are the differences between the pre-test and post-test scores of practitioners, community health workers, and students by education level?
4. What are the differences between the pre-test and post-test scores of practitioners, community health workers, and students in the control and treatment groups?

Recruitment- Flyers will be sent to hospital personnel in surrounding areas of the region, as well as through the word of mouth, to recruit participants. Data will be collected and secured by the investigator. Participants will be assigned a number to use to group pre/post test answers. The investigator will explain that participation is optional and voluntary and they can quit at any time during the workshop. All data will be kept anonymously.

The participants information will be confidential. I will not collect names anywhere and because many of the participant will have very limited English, I plan to use masking tape and give each person a number to stick to their shirt as they come into the workshop. They will take the pretest, placing that number on the pretest. I will collect and secure the pretest in a large, close-able, envelope. After the workshop, participants will use the tape number to remember their number and place it on the posttest and then discard the tape. I will collect and secure the numbered posttest in a secure method. All tape numbers will be removed from clothing and discarded.

d. **Waivers. Check any waivers that apply and describe how the project meets the criteria for the waiver.**

- ☐ **Waiver of Consent (Including existing de-identified data)**
- ☑ **Waiver of Documentation of Consent (Use of Information Letter)**
- ☐ **Waiver of Parental Permission (for college students)**

The Information Letter will be used as the waiver of consent documentation.

e. **Attachments.** **Please attach Informed Consents, Information Letters, data collection instrument(s), advertisements/recruiting materials, or permission letters/site authorizations as appropriate.**

Signature of Investigator Shaliah Armstrong Digitally signed by Shaliah Armstrong DN: cn=Shaliah Armstrong, o=Auburn University, ou=College of Education, email=smsa@auburn.edu, c=US Date: 2015.04.29 16:40:05 -05'00' Date 4/29/2015

Signature of Faculty Advisor Maria M. Witte Digitally signed by Maria M. Witte DN: cn=Maria M. Witte, o=Auburn University, ou=Auburn University, email=wittemm@auburn.edu, c=US Date: 2015.04.29 17:24:13 -05'00' Date 4/29/2015

Signature of Department Head Sherida Downer Digitally signed by Sherida Downer DN: cn=Sherida Downer, o=Auburn University, ou=EFLT Department, email=downesh@auburn.edu, c=US Date: 2015.04.29 17:32:11 -05'00' Date 4/29/2015

Appendix D

School of Medical Technology

April 19, 2015

Institutional Review Board
c/o Office of Research Compliance
115 Ramsay Hall
Auburn University, AL 36849

Dear IRB Members,

After reviewing the proposed study, "Assessment of an Infection Control Workshop", presented by Mrs. Shaliah Armstrong, a graduate student at Auburn University, I have granted permission for the study to be conducted at Malawi School of Medical Technology.

The purpose of the study is to determine if the infection control workshop is effective in teaching basic infection control information. The primary activity will be pretest and posttest given after listening to the lecture. Only students over 19 years of age are eligible to participate.

I understand that the program will occur during the month of June and/or July as our schedule allows. I have confirmed that Mrs. Armstrong has the cooperation of the classroom teachers. Mrs. Armstrong has agreed to provide to my office a copy of all Auburn University IRB-approved, stamped consent documents before she recruits participants on campus. Any data collected by Mrs. Armstrong will be kept confidential and will be stored in a locked filing cabinet in her AU advisor's office. Mrs. Armstrong has also agreed to provide to us a copy of the aggregate results from her study.

If the IRB has any concerns about the permission being granted by this letter, please contact me at the phone number listed below.

Sincerely,

JONES M. KADEMBO
HEAD OF BIOMEDICAL SCIENCES
MALAWI COLLEGE OF HEALTH SCIENCES

CHIKONDI
HEALTH FOUNDATION

April 27, 2015

Auburn University Institutional Review Board
c/o Office of Research Compliance
115 Ramsey Hall
Auburn, AL 36849

Please note that Mrs. Shaliah Armstrong, Auburn University Graduate Student, has the permission of the Chikondi Health Foundation to conduct research at Blessings Hospital in Lumbadzi, Malawi for her study, "Assessment of an Infection Control Workshop in Malawi, Africa".

Mrs. Armstrong will conduct an intervention workshop during her stay in Malawi this summer. Her plan is to recruit practitioners and community health workers. She will administer a pretest, present the training on infection control and then administer a posttest. Mrs. Armstrong's on-site research activities will be completed by July 31, 2015.

Mrs. Armstrong has agreed not to interfere with the regular operation of the hospital and will conduct her workshops during periods when patients will not be affected. Mrs. Armstrong has also agreed to provide to the Board of Directors a copy of the Auburn University IRB-approved, stamped consent document before she recruits participants on campus, and will also provide a copy of any aggregate results.

If there are any questions, please contact me at wes@chikondihealth.org

Sincerely,

Wes Gunn
President
Chikondi Health Foundation

Mr. E. J. Bakali,(District Health Officer)
Dowa District Hospital
P.O. Box 25
Dowa, Malawi

April 26, 2015

Auburn University Instutional Review Board
c/o Office of Research Compliance
115 Ramsey Hall
Auburn, AL 36849

Please note that Mrs. Shaliah Armstrong, Auburn University Graduate Student, has the permission of the District Health Office to conduct research at Mponela Rural Hospital, Mponela, Dowa, Malawi for her study, "Assessment of an Infection Control Workshop in Malawi, Africa".

Mrs. Armstrong will conduct an intervention workshop during her stay in Malawi this summer. Her plan is to recruit practitioners and community health workers. She will administer a pretest, present the training on infection control and then administer a posttest. Mrs. Armstrong's on-site research activities will be completed by July 31, 2015.

Mrs. Armstrong has agreed not to interfere with the regular operation of the hospital and will conduct her workshops during periods when patients will not be affected. Mrs. Armstrong has also agreed to provide to the District Health Office a copy of the Auburn University IRB-approved, stamped consent document before she recruits participants on campus, and will also provide a copy of any aggregate results.

If there are any questions, please contact me at bchikaphonyaphiri@gmail.com.so

Signed,

DOWA DISTRICT HEALTH OFFICER
04 MAY 2015
P.O. BOX 25, DOWA
MALAWI

B. Strong (Clinical Officer) for

Mr. E. J. Bakali,(District Health Officer)(DHO)
Dowa District Hospital
P.O. Box 25
Dowa, Malawi