The Development of an Evidence-Based Ebola Virus Disease Preparedness Plan for a College Health Center

Julie Cooper
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THE DEVELOPMENT OF AN EVIDENCE-BASED EBOLA VIRUS DISEASE PREPAREDNESS PLAN FOR A COLLEGE HEALTH CENTER

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A Dissertation Submitted to the Faculty of
GRAND VALLEY STATE UNIVERSITY

In
Partial Fulfillment of the Requirements
For the Degree of
DOCTOR OF NURSING PRACTICE

Kirkhof College of Nursing

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Dedication

For Mark, my best friend and support system, and for my children--Maddie, Wyatt, and Dylan--who have supported me throughout my schooling, sacrificing home-cooked meals, family vacations, and so much more.
Acknowledgment

I wish to acknowledge the contributions of my dissertation committee members who provided me with ongoing support and guidance. I extend a special thank you to Dr. RuthAnn Brintnall for her wisdom and patience as I navigated this journey. I would also like to show my appreciation to Dr. Laura Champion for taking a chance on an unknown graduate student and granting me the time and resources to complete this project. I am grateful to Dr. Wallace Renter and Dr. Bacon-Baguley for providing feedback and redirecting my efforts. In addition to my committee members, I would also like to express my gratitude to Heather Chapman for counseling and encouraging me through the unfamiliar territory of emergency preparedness.
Preface

I did not set out to choose Ebola Virus Disease (EVD) as the topic of my dissertation--instead it chose me. I was interested in addressing health issues within a college community; however, when I approached my implementation site, the college was preoccupied by the threat of the West African EVD outbreak. I completed this project in partial fulfillment of the Doctor of Nursing Practice Degree (DNP); however, I am also writing it for fellow nurses who may be interested in developing organizational policy, for schools struggling with how to address unique health scenarios, and for anyone interested in initiating the quality improvement process.

When reviewing the literature, process change sounds like a smooth, linear (or sometimes cyclical) process; however, I am fairly certain that most quality improvement projects do not proceed exactly as they are depicted in a conceptual diagram. Due to the rapid evolution of EVD guidelines, this project was reinvented many times over the course of writing the dissertation, teaching me to be creative and, more importantly, flexible.

When I started the project, the EVD outbreak was growing. Local media reports made it seem as if the public was divided between those who were terrified that EVD would invade the country, and those who entirely disregarded the concept. One of the challenges of writing about EVD preparedness was being unable to anticipate how individuals would respond to the topic. Now, as I finish writing the dissertation, the EVD outbreak is dying down and is rarely mentioned in media reports. The project does, however, remain vitally relevant for three reasons: 1) Nobody knows when EVD or a similar emerging infectious disease might erupt again; 2) The process served as a learning opportunity for everyone involved; and 3) The project generated tools that can be repurposed for future projects.
At the end of this document I discuss how the DNP degree relates to using a transdisciplinary team to create and implement organizational policy. The degree is well-suited to this process, as DNP students are trained to be scholars, innovators, and educators. I learned that nursing is relevant outside of a clinical setting, that it involves teamwork and leadership. The project taught me to persevere—even when faced with uncertainties—and to value the learning process.

This paper is structured in a traditional dissertation format and follows the timeline of how I began to explore and understand the topic. The appendices contain many of the documents discussed in the paper, but do not contain the preparedness policy itself. This was done intentionally, as the product contains a great deal of site-specific information, including the names and contact information for school officials.

I will always be grateful for my positive experience collaborating with this organization. There were many individuals at the implementation site who helped me complete this project; their hospitality and assistance were immensely valuable. They provided me with ample resources and I was welcomed and accepted at every meeting and training session. I cannot imagine a more gracious community.
Abstract

Ebola Virus Disease (EVD) represents a new and previously unexplored threat to college campuses across the United States. In the fall of 2014, thousands of international students arrived on college campuses across the nation, but there were few resources for officials in higher education to reference as they sought to manage the threat of an unfamiliar hemorrhagic disease. Preparing for viral outbreaks is an essential task for campus emergency response committees. Colleges and universities are at risk for disease outbreaks because of extensive travel programs and close living quarters. At the same time, colleges must also promote hospitality and avoid stigmatizing individuals and groups.

The purpose of this project is to improve the health and safety of a college campus through the generation of an evidence-based EVD preparedness plan for a private Midwestern college. The project utilized three theoretical frameworks and a thorough literature review to develop site-specific emergency guidelines, addressing factors that are unique to the college setting. Donabedian’s Structure-Process Outcome Theory outlines how structures and processes influence outcomes, while the Plan, Do, Study, Act (PDSA) Model and the Transdisciplinary Model of Evidence-Based Practice guide project implementation. The literature review demonstrates the value of deliberate, ongoing, and site-specific preparedness planning.

The project utilized a quality improvement team to execute the PDSA model. During the initial phase, the team developed a problem statement, clinical questions, and goals and objectives. The “do” portion of the cycle included the implementation of EVD policy while the “study” stage assessed performance measures and project deliverables. The “act” stage involved the acceptance of the EVD policy and the determination of next steps for quality improvement within the college health center.
The scholarly project reveals how the essentials of the Doctor of Nursing Practice degree were applied to policy development and project management. It demonstrates how a transdisciplinary team created, revised, and implemented a campus-specific EVD preparedness plan, stimulating conversations among about disease management. Ultimately, the successful completion of the project objectives resulted in a document that serves as a template for responding to threats to campus health.
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CHAPTER 1
INTRODUCTION

Ebola virus disease (EVD) has been making headlines throughout the world for most of 2014. The ongoing epidemic of Zaire ebolavirus represents the largest and deadliest known EVD outbreak and marks the first time the disease has spread outside of Central and East Africa (Frieden, Damon, Bell, Kenyon, & Nichol, 2014). In August of 2014, the World Health Organization (WHO) declared the outbreak to be a Public Health Emergency of International Concern: “an extraordinary event which is determined...to constitute a public health risk to other States through the international spread of disease; and to potentially require a coordinated international response” (Cowell & Cumming-Bruce, 2014; WHO, 2014a, para. 1).

EVD is a contagious disease caused by an enveloped single-stranded RNA virus; the illness is spread via direct contact with the body fluids of a symptomatic EVD patient (Bausch et al., 2007). When pathogens exist in an environment at a relatively constant rate, they are considered to be endemic; however, when the number of disease cases rises higher than expected, the situation is considered to be either an outbreak, epidemic, or pandemic, depending on area of impact (Institute of Medicine [IOM], 2003). EVD is sometimes referred to as Ebola hemorrhagic fever because the disease is associated with high fevers and vascular damage. More recently, however, this name has fallen out of favor since less than 50% of Ebola patients demonstrate appreciable hemorrhagic symptoms (Paessler & Walker, 2013).

The disease has an incubation period that ranges from two to twenty-one days, with symptoms typically appearing eight to twelve days after exposure (CDC, 2014f). Early symptoms of EVD include fever, headache, muscle pain, and anorexia. Prompt identification of Ebola based on these symptoms can be difficult, as they are similar to those seen in patients with
malaria, typhoid, Lassa fever, yellow fever, influenza, or pneumonia (Breman & Johnson, 2014). As EVD progresses, patients often develop watery diarrhea, nausea, vomiting, and abdominal pain. Hemorrhagic symptoms may include petechia, conjunctival bleeding, melena, hematemesis, hemoptysis, hematuria, epistaxis, and bleeding gums (Paessler & Walker, 2013; Roddy et al., 2012). In late stages of the disease patients demonstrate tachypnea, anuria, and obtundation (Paessler & Walker, 2013). Death occurs after an average of ten days of illness, and it may take survivors two months to make a full recovery (Legrand, Grais, Boelle, Valleron, & Flahault, 2006).

**EVD Background**

EVD was first recognized in 1976 when two separate outbreaks occurred in Zaire and Sudan. The outbreak in Zaire began with a man who arrived at a hospital with a high fever and died a week later from a severe hemorrhage (Ki, 2014). Five days prior to the hospital admission he had been given a chloroquine injection at Yambuku Mission Hospital for treatment of malaria-like symptoms; at the time of the outbreak, it was common for syringes to be rinsed and reused between patients. Over the next three months, more than 300 people in Zaire developed symptoms of EVD. Epidemiological studies show that more than 25% of the infected EVD patients had received injections at the Yambuku Mission Hospital (WHO, 1978). During the outbreak, 280 out of 318 Ebola patients died from the virus, representing a case fatality rate of approximately 88%. Of the 17 hospital employees exposed to the disease, 13 individuals became ill and 11 died.

Since 1976, there have been multiple outbreaks of Ebola virus in Africa: Sudan, Gabon, Uganda, and the Democratic Republic of the Congo, with a total of 1,594 deaths from the disease (Ki, 2014). Most of the outbreaks occurred in rural villages and were quickly contained. Over
the years, the fatality rate for EVD has varied been between 25-90%, with some strains of the virus being much more deadly than others (WHO, 2014b). Early outbreaks affected only small rural villages; however, as the disease infiltrates more populated areas, there is greater concern for disease spread.

**EVD Significance**

EVD poses a significant health care challenge for a number of reasons, the first reason being that it is a virulent disease, causing significant death and illness in the affected communities. Virulence refers to the severity of a disease, and although EVD may be less infective than some other viral diseases, it has a high mortality rate. As of April 8, 2015, the EVD epidemic in West Africa sickened over 25,000 people and caused more than 10,000 deaths (CDC, 2014c). Lefebvre et al. (2014) performed a meta-analysis using WHO data from 19 different EVD outbreaks, and found an overall case mortality rate of 65.4% (CI 95%, [54.6, 75.5]). Due to the severity of EVD symptoms, caring for infected patients requires a great deal of time and resources. As a result, EVD indirectly increases morbidity and mortality among individuals with other serious health conditions by interrupting the normal provision of health care services (WHO, 2014e).

While the fatality numbers are clearly concerning, there are additional complicating factors associated with the disease. At this time, there is neither a vaccine for EVD, nor is there any specific treatment for EVD. Therefore, care providers have limited tools available to prevent or slow pathogenesis, and rely heavily on isolation and contact tracing practices. Delays in the identification of EVD greatly increase the chance of viral transmission, as one missed diagnosis can lead to a new chain of infection (Frieden et al., 2014). The IOM (2003) points out that contact tracing is more difficult in heavily populated, mobile societies; globalization makes
communicable disease management more challenging and increases the utilization of public health resources.

The personal protective equipment (PPE) needed for EVD management poses yet another hurdle for health care workers. Initial guidance from the CDC stated that healthcare workers should use standard contact and droplet precautions when caring for infected patients. However, when health care workers continued to become ill, it became apparent that PPE modifications were needed. In October 2014, the CDC issued updated EVD PPE guidelines stating that individuals working with EVD patients must receive thorough training on EVD infection-control practices, that PPE should cover all skin, and that a trained observer should oversee the process of donning and doffing PPE (2014g). These updated guidelines require a greater level of PPE training and vigilance, and the purchasing of new supplies.

The cost of EVD—both financially and in terms of human suffering—is significant. EVD is impacting impoverished countries, such as areas of the African continent that are already struggling economically. The World Bank estimates that West Africa could lose billions in lost gross domestic product (The World Bank Group, 2014). In addition to economic burdens, it is even more difficult to measure the mental and physical pain of human suffering. Families have been separated and possessions destroyed in an effort to halt transmission of the virus; the psychological impact of the outbreak is severe enough that the WHO has developed a 60 page training document on the provision of psychological first aid (WHO 2014c). Among Ebola survivors, the physical suffering also continues, as there are reports of lingering physical symptoms, including visual loss, muscle aches, and fatigue (WHO, 2014d).

One final reason that EVD poses a challenge to health care communities is because there is a significant amount of fear associated with the disease. Many members of the general public
know several things about EVD—that it has an enormous and devastating effect on affected communities, that it has a high mortality rate, and currently there is no vaccine to prevent EVD. The newness of the illness, in conjunction with the high mortality rate and lack of preventive measures, generates considerable fear and anxiety. Research suggests that feelings, rather than statistical likelihood, often dictate one’s perception of perceived risk (Slovic, 2010). Slovic (2014) states that people perceive themselves to be at greater risk for any disease that is unfamiliar, thought to be uncontrolled, considered to be poorly-understood by experts, and has fatal outcomes.

The excitement and media coverage of Ebola begs the question: does this outbreak pose a health risk for people outside of the African continent? EVD is an emerging infectious disease (EID), an illness that has only recently been recognized as a threat to humans in a particular area. In this regard, it falls into the same category as other relatively new illnesses such as human immunodeficiency virus (HIV), severe acute respiratory syndrome (SARS), or the swine flu. The impact of EIDs on a community can be enormous. For example, in 2003 SARS sickened approximately 8000 people, with a mortality rate of less than ten percent. The SARS outbreak led to an economic loss of approximately $30 billion, which is roughly equivalent to $3 million per sick individual (Henry J. Kaiser Family Foundation, 2014).

Emerging infectious diseases can appear unexpectedly due to drug resistance, population changes, international travel, or alterations in human-animal contact (Henry J. Kaiser Family Foundation, 2014). According to the Institute of Medicine (IOM), there is a need for an integrated system of networks aimed at preparing for, identifying, and responding to disease outbreaks (2003). Organizations must have basic response capabilities in order to respond
quickly and effectively. The IOM report states that EIDs will continue to be identified and there must be leaders ready to protect human against microbial threats.

Although the international community is making every effort to halt the spread of EVD, one cannot be certain where the disease may appear again. It is interesting to note that Sanchez et al. wrote a paper in 1995 calling on providers and public health agencies to be aware of the reemergence of EVD. The warning was largely ignored, but serves as a reminder that one does not know when the next big public health threat will develop.

**Purpose**

Although individuals in Africa have been concerned about the threat of EVD for nearly 40 years, the disease has only recently captured the attention of the international community. Colleges and universities in the United States have large numbers of students traveling abroad and actively recruit students from all parts of the world. Although the probability of an EVD outbreak on a college campus in the United States is low, the undesirable consequences of such an outbreak would be enormous—threatening the health and safety of thousands of individuals as well as the reputation and economic stability of the affected institution. College students often live in close proximity to one another, share bathrooms, and participate in sports and other recreational activities that involve physical contact. Any time individuals are grouped together, there is an increased risk of infection; for this reason, many college health centers are concerned by the potential for infectious disease outbreaks.

If one considers the African countries where EVD was transmitted in 2014, one would see that a significant number of students travel from these countries to the United States for tertiary education. Data from 2012 indicates that more than 7,000 students per year travel from these countries to the United States to attend universities and colleges (United Nations
Educational, Scientific and Cultural Organization, 2014). Also, since most colleges and universities start classes around the same time, there is often a large influx of international students into a country during a brief time frame, meaning there are certain times of the school year when one may be more likely to see a disease spread outside of its area of origin.

Most colleges and universities have well-developed strategies for how to respond to and manage a variety of different emergency situations and public health crises. However, prior to the current viral crisis, there was little investment in guidelines designed to address the threat of EVD. In fact, as the 2014 EVD crisis unfolded, there were few resources for schools of higher education to reference as they considered how to best manage the threat of hemorrhagic disease on a college campus. The purpose of this dissertation project is to improve the health and safety of a college campus through the generation of an evidence-based EVD preparedness plan for a student health center. The center promotes healthy living and provides high quality primary care services, adding value to the college experience, and attending the health needs of the student population at a small, private Midwestern college.

Benefits of a Preparedness Plan for a College Campus

The main benefit to be gained from the development of an EVD preparedness plan is that a school will have a well-planned response if a student or staff member becomes a person under investigation for Ebola. However, even if EVD never reaches the college campus, the school must be ready for instances when a person affiliated with the school is required to self-monitor him or herself for symptoms of EVD after traveling abroad. The campus health center should be prepared to work with regional and national health departments to coordinate disease surveillance efforts and identify health risks.
A secondary benefit of an EVD preparedness plan is that it may alleviate some of the anxiety surrounding the topic of EVD. College health centers with an EVD preparedness plan are better prepared to address the questions of students, parents, faculty, and the general public. Concerns about EVD could potentially lead to absenteeism, withdrawal from the college, or enrollment reduction, and could negatively alter public perception of the school. One university in Texas reported that students’ parents wanted to withdraw their children from the school because of three EVD patients who were being treated at a local hospital (Roberts, Van Orman, & Vogel, 2014). Having a plan that includes prepared statements to parents and the public allows the college to disseminate information in a carefully considered and deliberate manner, demonstrating that the school is prepared and is making every effort to keep students safe.

A final benefit of EVD planning is that the planning process serves as a learning experience that could be replicated and applied to other communicable diseases. Some common communicable diseases that affect college campuses include norovirus, influenza, and meningitis. Details of the EVD plan would be modified based on the epidemiology of the disease of concern, but many steps could remain the same, such as the need to notify school and public officials, maintain the safety of the ill individual, utilize appropriate personal protective equipment, and decontaminate affected areas.

**Existing Evidence**

The first confirmed case of Ebola in the United States was diagnosed on September 30, 2014 (CDC, 2014b). The infected person presented for treatment in a typical healthcare setting and could have chosen to go to a primary care clinic or urgent care center. For this reason, every ambulatory care facility in the United States needs to be ready to identify and manage patients with Ebola. The CDC recommends that ambulatory care centers focus on three general
guidelines when responding to EVD: identify, isolate, and inform (2014h). These simple directives focus on pinpointing potential cases of EVD, outlining where and how to isolate these individuals, and knowing who to contact when the situation arises. The CDC created a one page document for ambulatory care clinics outlining steps for Ebola readiness (2014e). The document contains specific recommendations, such as using an algorithm for EVD screening, updating infection control policies, ensuring adequate levels of PPE are on hand, practicing use of PPE, and reviewing disinfection procedures. It is important to note that these guidelines address the needs of the average ambulatory care setting, but do not fully address the unique concerns of a college health center. Unlike a typical primary care office, college health centers must consider the risks associated with dormitory housing, the challenges of monitoring international travel, the notification of school officials, and the advisement of the college community.

The American College Health Association (ACHA) recommends that college health centers plan for the possibility of EVD by updating emergency response plans, implementing travel screening, generating a communication plan, and identifying how to house and feed any quarantined individuals (2014a). The CDC and ACHA guidelines are fitting, as most student health centers do not have the tools and resources to positively diagnose or provide long-term treatment for EVD patients. Instead, their aim is to provide high-quality care to individuals who may be at risk for EVD and protect the health of the surrounding community until the affected individual can be transported off-site.

The Role of College Health Centers

EVD preparedness is particularly important for higher education campuses, as the role of the college health center is to promote the health of the student population. College health centers vary in capacity from campus to campus but generally function in the same way as other
primary care offices, treating illnesses and educating patients about healthy behaviors. Many college students do not have a local primary care provider and lack the time, transportation, or financial resources to find a health care provider when they have health concerns. College health centers ameliorate this problem by providing close and convenient primary care coverage to individuals who otherwise would not have access to health care. Additionally, many health centers accept major insurance carriers, making their services more affordable than those provided in urgent care centers or emergency departments.

There are several ways in which a student health center serves a slightly different purpose than that of a primary care office (Swinford, 2002). First, student health centers are largely tailored to the treatment of young adults, a group that has a unique set of health problems and modes of communication. For example, many student health centers see patients participating in international travel as part of the schooling experience. For this reason, health center employees are familiar with the process of preparing students for international travel and treating different ailments they may have contracted during their travel. Second, the efforts of a student health center are closely aligned with the mission of the college, in that a student health center aims to promote academic success. The health center does this by creating and maintaining a healthy learning environment in order to increase student retention and improve academic outcomes (Swinford, 2002). Third, health centers place a heavy emphasis on preventive services—both on the individual and population-level. This is done by performing health screening measures, counseling individuals on self-care, and improving access to health care. In the case of EVD preparedness, the health center can promote academic success and reduce health risks by minimizing the likelihood of EVD interfering with the education process.
EVD Preparedness as a Nursing Scholarly Project

The development of a preparedness plan requires the ability to conceptualize and actualize a project. Project management skills represent an important toolset for experts in any profession, including nursing. Members of the business community are widely recognized for their project management expertise; however, these competencies are equally vital to leaders in other professions. Nurses must demonstrate proficiency in developing and managing projects if they are to effectively transform healthcare and establish professional capability. The process of initiating, planning, executing, controlling, and closing a project hones organizational and decision making skills and prepares an individual for the successful completion of projects in his or her future career (Chow, Woodford, & Lambe, 2014).

The topic of EVD preparedness is relevant to the nursing profession. Nursing has always been committed to maximizing health and minimizing pain and suffering; policy development and disaster mitigation provide avenues for pursuing these goals. EVD preparedness is also highly relevant to the field of nursing because healthcare professionals are at higher risk for contracting Ebola than people working in other fields. As of August 2014, the ongoing EVD outbreak was responsible for the deaths of 120 healthcare workers in Western Africa (WHO, 2014e), and during the fall of 2014, two nurses in the United States developed the virus after caring for an infected patient (CDC, 2014b). The nurses received a great deal of publicity and criticism, with members of the media publicly questioning their preparedness and training. If nurses are at risk for becoming ill due to close contact with EVD patients, then it is fitting that they participate in the development of EVD preparedness measures.

In 2010, the IOM published a report entitled The Future of Nursing: Leading Change, Advancing Health. The report encourages nurses to pursue higher levels of education, and as
integral members of the healthcare system, collaborate with others in transdisciplinary teams to improve healthcare policy and implementation. Waldrop, Caruso, Fuchs, and Hypes (2014) provide specific guidance for nurses who are completing a Doctor of Nursing Practice scholarly project. They propose that a successful project will demonstrate five features: it must strive to improve health outcomes or health policy, utilize scholarship to enact change, involve transdisciplinary teamwork, translate evidence into practice, and have measurable outcomes. The authors list quality improvement (QI) measures and newly implemented health care policies as examples of possible outcome measures. A QI project differs from a research project in that it aims to improve outcomes within an organization rather than contributing to a body of generalizable knowledge. This preparedness project aligns with the message put forth by the IOM report and meets the five criteria for a successful Doctor of Nursing Practice project as outlined by Waldrop et al. (2014).

**Project Objectives**

The United States Department of Homeland Security website defines preparedness as "a continuous cycle of planning, organizing, training, equipping, exercising, evaluating, and taking corrective action in an effort to ensure effective coordination during incident response" (2014). A preparedness plan incorporates the best available evidence into a detailed proposal, outlining the actions to be taken and the tools necessary to prevent and manage outbreaks. This paper will outline how one student health center is taking steps to mitigate the effects of EVD on a college campus.

The overarching goal of this project is to promote campus health by contributing evidence-based knowledge and a new perspective to the organized efforts of a transdisciplinary EVD preparedness team. The specific objectives for the project were developed based on an in-
depth review of scholarly literature, WHO and CDC guidelines for EVD preparedness in the healthcare setting, and Waldrop et al.’s (2014) criteria for a successful Doctor of Nursing Practice project. The objectives are: 1) enhance existing college health center policies by co-creating site-specific EVD preparedness and response guidelines; 2) form partnerships within the college community as well as in the state and local community to enhance the preparedness response; 3) translate existing knowledge into practice through the generation and implementation of training sessions on how to respond to a suspected case of Ebola; 4) create a presentation for key stakeholders, updating them on EVD preparedness, what has been learned, and future goals and directives.

**Facilitators and Barriers**

There are two main factors that may help facilitate the successful completion of the dissertation project. First, EVD is receiving a significant amount of media attention, contributing to a sense of unease among the general public. The international community is realizing that the initial EVD response was ineffective and slow, and that preparedness efforts may have saved lives. Second, the college center serves a number of international students and international travelers and is committed to optimizing the overall health and productivity of the students and staff members at the college. Preparedness planning can be used to not only prevent and control outbreaks, but also to clear up any misunderstandings about who may be at risk of transmitting disease.

Barriers to implementation may include the belief that EVD does not pose a serious threat to school campuses in the United States or the view that local and state health departments will handle outbreaks and individual campuses do not need to take additional protective measures. The International Federation of Red Cross and Red Crescent Societies, or IFRC,
(2000) points out that organizations may be resistant to preparedness planning is because it requires a significant amount of time, energy, and resources to plan for an eventuality that may never happen. Additionally, preparedness planning may highlight vulnerabilities that would otherwise remain unnoticed.

**Conclusion**

In summary, EVD represents a new and previously unexplored threat to college campuses across the United States. This scholarly project will integrate existing evidence into an EVD preparedness plan, addressing the requirements outlined by the CDC, in addition to addressing needs that are unique to the college setting. The successful completion of the project objectives will result in a document that could serve as a template for developing responses to other threats to campus health.
CHAPTER 2

CONCEPTUAL FRAMEWORKS

A scholarly project is influenced by both theory and research (Moran, Burson, & Conrad, 2014). The purpose of this chapter is to explain the theoretical basis for this project through the incorporation of Donabedian’s Structure-Process Outcome (SPO) Theory, the Plan, Do, Study, Act Model (PDSA), and the Transdisciplinary Model of Evidence-Based Practice (TM). The SPO Theory provides a phenomenological framework for understanding the QI process. The PDSA serves as a methodological framework to guide the implementation of the scholarly project. The TM serves as an ancillary model, demonstrating how individuals from different disciplines can approach decision-making and balance the influence of competing factors. The three constructs complement one another; the SPO Theory creates a broad foundation for understanding how structures and processes influence outcomes, while the two models propose methods for implementing change and utilizing a team for project planning.

Structure-Process-Outcome Theory

The Structure-Process-Outcome Theory, or SPO, was created in the 1960s by physician Avedis Donabedian. Donabedian was interested in learning how to assess the quality of health care and he created a theory to explain the relationship between three different components: structure, process, and outcome. He proposed that the three components are interconnected, with structures directly influencing processes, and processes directly influencing outcomes. His theory proposed that one must consider all three components when evaluating quality of care (Donabedian, 2003).
**Structure**

The term structure refers to the environment in which health care takes place, the tools that are used, and the people who provide care (Hammermeister, Shroyer, Sethi, & Grover, 1995). In terms of this evidence-based scholarly project, the structure includes written policies, the health center building and quarantine area, financial resources, and the tools and equipment used by the health care team. It also includes people: the environmental services team members who clean the building, the registered nurses who perform phone triage, and the nurse practitioners and physicians who assess and determine the plan of care for patients (see Figure 1).

Some QI processes may require changes to be made to the structure of an institution. For instance, equipment might be ordered, buildings remodeled, policies created, or staff members hired, in order to complete a QI project. Therefore, in some instances it may be appropriate to assess organizational structure as a method of measuring the effectiveness of an intervention. One might do this by counting supplies, evaluating the level of training achieved by employees, or calculating hours worked. The benefit of evaluating organizational structure is that it is relatively easy to find measurable information. However, one caveat is the realization that a solid structure does not necessarily translate into improved processes and outcomes.

**Process**

Donabedian defined process as “the activities that constitute health care—including diagnosis, treatment, rehabilitation, prevention, and patient education” (Donabedian, 2003, p. 46). For this scholarly project, processes include screening patients and training employees. Perry and Lindell (2003) point out, process completion requires adequate structural components,
such as skilled and motivated employees. Without these structures, process implementation can be delayed or fail altogether.

All colleges and universities in the United States have access to the same CDC guidelines for EVD. However, institutions may interpret and implement the same guidance in different ways depending on financial resources or available employees. If an institution provides a student health center with a great number of resources and well-informed employees, preparedness planning will likely look different than it does at an institution with limited resources and poorly-informed employees. The planning step for this scholarly project will investigate the best ways to raise awareness of the EVD threat and to incorporate evidence-based EVD research into practice within a health center. Implemented processes could be evaluated by assessing how patients are screened for EVD or how training exercises are being conducted.

Outcome

Outcomes are the most widely used tool used in quality assessment. Outcomes are the direct results of care, and may include information on disease status, functional status, patient satisfaction, or health knowledge (Hammermeister et al., 1995). It can be tempting to gloss over the structure and process indicators and focus exclusively on health outcomes, but Hammermeister et al. make a strong argument against doing so. There are several complicating factors when assessing outcomes. First, one must ensure that the outcome is a relevant measure. According to Donabedian, outcomes should represent “a change in status confidently attributable to antecedent care” (1988, p. 178). Second, one must consider if there are any other factors that may influence the outcome. In the case of communicable diseases, viral strains, quality of care, and access to care could all play a role in determining health outcomes. Third,
outcomes may not be readily available until years after an intervention; this is certainly the case when one is looking at preparing for disease outbreaks.

Donabedian (2003) theorized that because there is always some doubt as to what factors contribute to an outcome, one must always look for additional quality indicators. Assessing health outcomes of EVD patients would not be a relevant measure of how ready a school is for handling an EVD outbreak, as the likelihood of an on-campus case is relatively low. Given this scenario, it would seem appropriate for an institution to focus assessment efforts on structures and processes.

| Structure: written policy, quarantine areas, staff expertise, financial resources |
| Process: Patient screening, EVD training |
| Outcome: EVD readiness |

**Figure 1.** Elements of structure, process, and outcome as applied to EVD preparedness efforts. Adapted from Donabedian’s Structure-Process-Outcome Theory (2003).

**Plan, Do, Study, Act**

Quality Improvement is an ongoing process that can be assessed using the PDSA model (Institute for Healthcare Improvement [IHI], 2014). The model is cyclical in nature and, as the name implies, it consists of four stages. The first stage is the “plan” stage. During this time QI leaders plan the intervention and collect baseline data. During the next stage, the “do” stage, changes are implemented and data is collected. The “study” phase involves observing results of intervention and analyzing the data. The final stage is the “act” stage, and during this time QI
leaders must act on what is learned. If a change leads to positive results, then it should be adopted, monitored, and implemented on a larger scale.

The IHI (2014) states that there is a step that should occur prior to initiating the PDSA cycle. During this first step, QI planners are chosen, making an effort to include any individual or agency that may be affected by the QI project. Once the individuals are identified, they must answer three questions: What are we trying to accomplish?; How will we know that a change is an improvement?; and What changes can we make that will result in improvement? These questions are important because they help define what success will look like. Once they have been answered, the project proceeds on to step two, which is the PDSA cycle (see Figure 2). The PDSA cycle helps one discern whether or not implementation goals have been met and provides feedback for key stakeholders information about what is being done. Chapter 3 of this dissertation will provide examples of how the PDSA model has been applied to health care scenarios.
Transdisciplinary Practice Model

Evidence-Based Practice (EBP) is an area of interest for all health care professions, and individuals from these professions are increasingly being called upon to work together in teams. Many of the health professions—including medicine, psychology, and nursing—have developed their own models explaining how evidence should be incorporated into practice. Satterfield et al. (2009) argue that rather than having separate EBP models for each profession, the language and concepts from the various fields should be combined into a single Transdisciplinary Practice Model, or TM.
Many different terms are used to describe the collaboration and integration of efforts among disciplines, including multidisciplinary, crossdisciplinary, and interdisciplinary (Stock & Burton, 2011). The term transdisciplinary is unique from the others in that it specifically refers to “a process of collaboration between scientists and non-scientists on a specific real world problem” (Walter, Helgenberger, Wiek, & Scholz, p. 325, 2007). The TM acknowledges that team members have diverse educational backgrounds and experiences and reflects the complex process of translating research into practice. The authors suggest that although organizational policies and decision-making are informed by research and evidence, there are also other competing factors, such as the availability of resources and the desires of patients and stakeholders. More importantly, they acknowledge that decision making occurs within the confines of a unique organizational environment and that the environmental culture ultimately affects all aspects of project planning.

Satterfield et al. (2009) developed the TM as a training tool that could be used across the health disciplines in order to improve evidence-based health training and communication (Bellamy et al., 2013). A diagram of the model depicts three overlapping circles surrounded by a larger oval. The circles represent 1) the best research evidence, 2) available resources (including practitioner expertise), and 3) individual or population characteristics. Satterfield et al. explain that the area where the three circles overlap represents shared decision-making. The large oval surrounding the three circles represents the environment and organizational context. It is interesting to note that in the TM, evidence is not depicted as being the most influential factor in decision-making, but is considered to have the same value as available resources and population characteristics (see Figure 3).
Satterfield et al. (2009) point out that this model of EBP can be applied when making health decisions regarding either an individual patient or a group or community. They argue that the oval that surrounds the other pieces is particularly important for public health interventions, as the environmental context is extremely influential when developing policies for community health. By considering cultural context during policy development, one is able to increase the acceptability of proposed interventions and increase the likelihood of successful implementation.

The TM is relevant to the topic of EVD preparedness, as the planning process includes individuals from a number of different departments and professions. In these types of transdisciplinary situations, it is helpful to use a model that is appreciated and understood by all individuals, rather than one that is unique to medicine or to nursing. The model represents how decision-making will occur during the EVD preparedness process; it will be based upon 1) EVD and preparedness research and guidelines, 2) the time and money available for preparedness activities, and 3) the travel and behavioral patterns of the community. All three of these factors are influenced by the overarching goals and values of the college and its key stakeholders.
Figure 3. Application of the TM to EVD preparedness efforts. Adapted from the Transdisciplinary Model (Satterfield et al., 2009).

Conclusion

The three constructs reviewed in this chapter inform and direct the implementation of this scholarly project. The SPO Theory helps to conceptualize how various facets of an organization interact and influence one another; it also highlights areas that can be evaluated for effectiveness during a QI process. The PDSA model explains the steps required to complete the change cycle and demonstrates how to assess if changes are successful. The TM displays the complexity of decision-making using a transdisciplinary team and graphically represents the various factors that influence the development of a group consensus. When used in combination with one another, the theory and models provide structure and insight to help guide QI efforts.
CHAPTER 3

LITERATURE REVIEW

Evidence-based practice, also known as EBP, refers to the purposeful consideration of evidence when making decisions. It is a concept that was introduced and promoted by a British epidemiologist, Dr. Archie Cochrane (Melnyk & Fineout-Overholt, 2011). Dr. Cochrane argued that one should consider all available evidence, including research studies and expert opinion, before making a healthcare decision. The purpose of this chapter is to present a literature review of the best evidence available regarding EVD and preparedness planning. The information will be used to answer the following questions: 1) What actions should a private Midwestern College take to maximize EVD preparedness and minimize fear and academic disruption? and 2) how can the effectiveness of these measures be evaluated?

A literature search was performed of the CINAHL and MEDLINE databases using the search terms Ebola, disaster, emergency, pandemic, preparedness, assessment, measures, instruments, and tools. The search results were reviewed, paying particular attention to systematic reviews and meta-analyses, as they offer the highest quality evidence. Additional sources of information were obtained by searching the citation lists of the articles that were examined. As internationally recognized sources of public health information, the CDC and the WHO websites were used to access current EVD information and guidelines. Recommendations from the ACHA (2011, 2014a) were also assessed, as they are specific to the higher education community. This chapter will cover the epidemiology of EVD, existing EVD guidelines, and various methods for improving and evaluating preparedness efforts.
EVD: History and Epidemiology

The classic signs of EVD are fever and hemorrhage. Hemorrhagic fevers can be caused by four different families of enveloped viruses: filoviruses, flaviviruses, arenaviruses, and bunyaviruses (Paessler & Walker, 2013). These four families of viruses are responsible for a number of different diseases and appear cyclically in a variety of animals such as bats, primates, mosquitoes, and ticks. The symptoms associated with the viruses range from mild to lethal. Fatality tends to be high with Ebola and Marburg fevers, both of which are caused by filoviruses. There are five different species in the genus *Ebolavirus*: *Zaire, Sudan, Tai forest (Cote d’Ivoire), Bundibugyo, and Reson* (Lefebvre, Fiet, Belpois-Duchamp, Tiv, Astruc, & Aho Glélé, 2014).

*Zaire ebolavirus* is one of the more deadly forms of the disease and is the causative agent in the ongoing 2014 outbreak in West Africa. It is speculated that the difference in EVD case-fatality rates may be explained by variations in diagnosis, supportive care, and the causative species (Laupland & Valinquette, 2014). The ongoing epidemic represents the 25th EVD outbreak (WHO, 2014b), and is occurring in a new geographical area, with previous outbreaks having occurred in rural areas of Central and East Africa. The disease is generally transmitted via person-to-person contact or contact with dead bodies during burial procedures, however, it can also be transmitted via fomites (Francesconi et al., 2003; WHO, 2014b).

The 2014 EVD outbreak primarily involved the West African countries of Guinea, Liberia, and Sierra Leone. During this outbreak, additional cases of EVD were identified in a remote area of the Democratic Republic of the Congo, a country that has experienced six previous outbreaks. Genetic sequencing and epidemiological research indicate that the strain of EVD responsible for the West African outbreak emerged in Guinea and evolved separately from
the strain found in the Democratic Republic of the Congo (Baize, et al., 2014). The findings suggest that the West African disease outbreak did not spread from the Democratic Republic of the Congo or regions of Central and East Africa, but may have circulated in the animal population of the area for a significant period of time. West Africa is home to several different types of fruit bats that can serve as EVD reservoirs, suggesting that residents of the region remain vulnerable to future outbreaks.

There is an ever-increasing recognition of the importance of disaster preparedness. The Healthy People 2020 website now lists a preparedness goal: “Improve the Nation’s ability to prevent, prepare for, respond to, and recover from a major health incident” (United States Department of Health and Human Services [HHS], 2014). The nation’s health is threatened by a number of different microbial factors, including EIDs and bioterrorism.

According to the CDC, Ebola is a Category A Bioterrorism Agent. This grouping indicates that the disease is easily transmitted, has a high mortality rate, can cause significant disruption, and requires special action from public health entities. The CDC states that public health systems and healthcare providers must be able to identify and address patients infected with Ebola and other Category A Bioterrorism Agents (CDC, Bioterrorism Agents/Diseases, n.d.).

**Disease Transmission**

For years scientists have been trying to uncover how and why EVD outbreaks occur periodically on the African continent. Leroy et al. (2004) explored a theory that linked EVD transmission to contact with great apes. They sought to determine if there was a correlation between declines in large animal populations in Africa and human EVD outbreaks. Prior to a 2001 EVD outbreak in Gabon, local residents noted high numbers of dead animals in the area.
surrounding the infected village. There was also a marked decrease in the gorilla population following a 2003 EVD outbreak in the Republic of Congo. Data from these and other EVD outbreaks showed that the index case was often found to be a hunter who had recently handled the dead bodies of gorillas, chimpanzees, or antelope. DNA testing later confirmed the presence of the Ebola virus in the carcasses of these animals. Leroy et al. demonstrated that there are both temporal and spatial correlations between large animal deaths and human cases of EVD.

Having established that both humans and large animals are being killed by EVD, Leroy et al. (2005) worked to identify the viral reservoirs of the disease. They trapped animals in the areas where EVD outbreaks occurred, and discovered immunoglobulin G for Ebola virus in three species of bats, noting that the bat populations demonstrated no signs of symptoms of illness. Based on this information, it is posited that fruit bats serve as natural reservoirs of the disease, and that other animals become ill after contact with the bats. Further research is being conducted to investigate other potential reservoirs for EVD.

Bausch et al. (2007) sought to learn more about disease transmission among humans by determining the body fluids that are most likely to spread EVD. The researchers collected clinical and environmental specimens from an isolation ward that was treating individuals with confirmed cases of EVD and tested the specimens for the presence of the virus. They identified the Ebola virus in saliva, breast milk, stool and tears of acutely ill patients. The presence of the disease in saliva was concerning due to the fact that it is customary for many African people to share food. Another concerning finding was that the virus was found to be present in breast milk even when the virus was no longer detectable in the patient’s blood, indicating that mothers should find alternative ways to feed their children even after recovering from the illness. Further research showed that the virus was present in semen 40 days after EVD symptoms began. For
these reasons, abstinence from both unprotected sex and breastfeeding is encouraged for three months following recovery from EVD. The Ebola virus was not identified in any of the seven urine specimens that were taken from acutely ill patients and was identified on the skin of one of the eight acutely ill patients.

Epidemic models from outbreaks in 1995 and 2000 were used to approximate basic reproduction numbers for EVD. A basic reproduction number ($R_0$) reflects how many secondary cases of disease are likely to develop from a single original case. Data from the 1995 Democratic Republic of the Congo outbreak were investigated using a compartmental model and the researchers estimated a $R_0$ of 1.83 in 1995 and a $R_0$ of 1.34 in 2000 outbreak in Uganda (Chowell, Hengartner, Castillo-Chavez, Fenimore, & Hyman, 2004). An outbreak cannot continue indefinitely if the basic reproduction number is less than one. Using epidemic models, the authors estimate that a two-week delay in implementing public health measures could double the number of individuals sickened by an EVD outbreak. This information reinforces the need for early recognition of Ebola as the causative disease. This can be difficult, as patients do not always seek medical attention during the early stages of illness. During the 2007-2008 Bundibugyo outbreak, patients reported experiencing symptoms of EVD for an average of three and a half days prior to seeking medical attention (Roddy et al., 2012).

Symptoms from EVD may appear anywhere between two to twenty-one days after infection. The virus is not detectable in the blood prior to the onset of symptoms, and even then it may take several days for the viral load to reach detectable levels. Individuals can be diagnosed using antigen-capture enzyme-linked immunosorbent assay and polymerase chain reaction testing during active infections. Individuals can still be tested even after recovery by
testing for IgM or IgG antibodies (CDC, 2014d). Any individual suspected of having EVD should be isolated until blood testing can be completed.

Human research on EVD is limited. Clinical research and laboratory study of EVD have been limited due to poor record keeping as well as the destruction of patient records in order to prevent transfer of fomites, as well as due to limited resources in the hospitals where the outbreaks have taken place (Paessler & Walker, 2013, Roddy et al, 2012). In 2012, Roddy et al, discussed the fact that EVD outbreak teams lack clear guidelines, appropriate and sufficient supplies, standardized data collection, standard blood tests, and on-site laboratories. He called for improved documentation, better symptom monitoring, training for staff, and supportive treatment for patients. Georges et al. (1999) reported difficulties diagnosing EVD when it is concomitant with yellow fever, and difficulty collecting data due to both cultural and political restrictions.

**Breaking the Cycle**

There are several proposed methods for slowing and stopping the cycle of EVD transmission. The first strategy involves prompt identification and isolation of affected individuals (Dhillon, Srikrishna, & Sachs, 2014). Individuals at risk for EVD can be identified using screening algorithms, such as the one provided by the CDC (2014h). Using the algorithm, individuals are first asked if they have travelled to a country with widespread EVD or been in contact with someone with EVD within the past 21 days. Any person who gives an affirmative response to this question is then assessed for signs or symptoms of EVD. It is only when a person screens positive for these two criteria that he or she must be isolated and the health department must be informed.
The isolation process requires health care workers to use PPE in a deliberate and consistent manner. It is important to note that health care workers can be infected by contaminated equipment, medical waste, or by laboratory samples. All equipment used in the care of EVD patients must be either disinfected or disposed of in an appropriate manner. It is also imperative that the bodies of EVD patients are handled by trained professionals in order to prevent disease propagation.

Following identification and isolation, the next step is contact tracing and education (European Centre for Disease Prevention and Control [ECDC], 2014). Contact tracing involves investigating all individuals who had contact with a symptomatic EVD patient or the corpse of an EVD patient. Once individuals have been identified, they must be monitored for 21 days following the last date of contact, in order to observe if there are any signs or symptoms of infection. At the same time that contact tracing is being performed, other health care workers should be educating the general public about EVD and working with community leaders to promote protective behaviors. The goal of these efforts is to influence the understanding and behavior of local residents in order to interrupt disease transmission.

**EVD Guidelines**

The international community was taken by surprise by the size and ferocity of the 2014 EVD outbreak. The United States did not have comprehensive guidelines in place for dealing with EVD, and directives were therefore developed, revised, and published in a relatively rapid manner. Guidelines serve as useful tools for health care workers as they contain concise, practical information that can be easily accessed and referenced during an emergency. They also offer ideas and guidance that can be used to generate preparedness plans.
The CDC created a checklist entitled *Ebola Preparedness Considerations for Outpatient/Ambulatory Care Settings* (2014e). The document is divided into three sections: detect, protect, and respond; there are multiple check boxes listed under each heading, as well as a list of websites to access for more guidance. In regards to student health centers, the CDC states that schools should advise against travel to Sierra Leone, Guinea, and Liberia, but that they should otherwise utilize the same guidelines used in other healthcare setting (CDC, 2014a). The CDC proposes that schools identify individuals who have traveled from countries where Ebola is present within the last 21 days. These individuals should then be assessed to determine if the person had high-risk exposure, low-risk exposure, or no known exposure to EVD and should be provided with guidance on how to perform self-monitoring for signs and symptoms of illness. Local health authorities should be notified of any individual with either high-risk or low-risk exposure to EVD.

In the fall of 2014, a number of different agencies published information on best practices for PPE use, including Emory University (2014), the University of Nebraska Medical Center (2014), and the Occupational Safety and Health Administration, or OSHA (2014). The document created by Emory University provides detailed guidelines for PPE use and includes process maps that outline the steps that should occur when EVD is suspected or identified. The University of Nebraska Medical Center published similar guidelines, but included some new concepts, such as the use of a disposable pad when doffing PPE. OSHA’s 2014 guidelines include a comprehensive PPE selection matrix that outlines various situations where an individual might be exposed to EVD. It explains how PPE use would vary depending on if patient contact is occurring in a health care setting, whether the individual demonstrates
symptoms of EVD or not, if one is handling laboratory samples, or if one is handling the dead bodies of Ebola victims.

For a student health center, the CDC goals of Identify, Isolate, and Inform appear reasonable and achievable. However, there are still a large number of details to address. The ACHA generated a list of questions for colleges to consider in regards to Ebola preparedness. The questions cover a number of topics, including the status of an emergency response plan, and whether or not the plan is coordinated with the efforts of local public health agencies. The document asks about internal and external communication plans, school quarantining capabilities, and contracts for handling medical waste. The final questions focus on whether travel screening is being done, and if travel is being monitored and/or restricted.

Stanford University (2014) offers an example of how colleges and universities in the United States are publicly responding to the threat of EVD. Stanford created a website outlining the efforts the school has made to prepare for a possible case of Ebola. The site affirms that they are adhering to the CDC guidelines and that they have a transdisciplinary infection control group planning for the possibility of EVD in their community. They add that they have protocols for both quarantine and observation measures, as well as established communication plans. The school advises their students and staff to avoid traveling to countries where there is widespread EVD and emphasizes the importance of hand-washing, hygiene measures, and self-care.

**Emergency Planning and Preparedness Assessment**

Emergency preparedness is a part of almost every organization and professional field, including education, law enforcement, and health care. Policy development represents one aspect of preparedness efforts. A number of different agencies have written documents on the
development of emergency response plans. Among industry leaders are the American Medical Association, the IFRC, the Pan American Health Organization, and the RAND Corporation.

The American Medical Association

The American Medical Association published a book for healthcare offices, guiding administrators through the steps of generating office-specific policies (Stanley, 2014). The book states that policies define boundaries, set expectations, and provide the infrastructure for decision-making. These attributes are particularly helpful during crises. Office policies should include an emergency response plan that is unique to the needs of the setting. When developing such a plan, administrators must first anticipate the types of care needed during an emergency, and consider how to notify staff members when such an event occurs. Emergency equipment should be obtained based on the tasks that the practitioners might be expected to perform in the office. Each clinic should generate an inventory list and assign one individual to the task of regularly inspecting and ordering supplies, ensuring they are located in an accessible location, and ensuring staff members know where to get supplies.

The International Federation of Red Cross and Red Crescent Societies

The IFRC emphasizes that preparedness planning serves multiple purposes (2000). First, it is meant to ensure that in the event of an emergency, an organization knows how to respond in swift and efficient manner. The planning process checks that emergency supplies are on hand, individuals have the tools needed to identify an emergency situation, and a communication plan in place. A second, and less obvious aim of preparedness planning is to generate discussion and interaction among the key stakeholders responsible for responding during an emergency. The IFRC points out that a plan is simply an instrument used to ensure the system is capable of responding appropriately—it does not guarantee a successful response.
The IFRC emphasizes that preparedness planning is not a one-time event. It should not be completed and then forgotten, but is instead an ongoing process. Teamwork is a key component of the process, and to be most effective, the team must include people from different departments and work backgrounds. A team approach is valuable because it increases the likelihood that the plan will be appreciated and utilized, and it incorporates multiple viewpoints, skills, and perspectives. Overall, a transdisciplinary team increases the likelihood that the planning committee has considered all the necessary information.

According to IFRC (2000), there are five steps to preparedness planning. First, the projects should be fully conceptualized by writing out a problem statement and goals and objective; this step includes brainstorming possible solutions and identifying needs and opportunities. It may also include an organizational assessment as this method systematically reviews an institution’s structure and capabilities. Second, a plan for the project is created by determining a course of action, developing work plans, and creating a timeline and a budget. Project planning also includes assigning job duties to team members and generating checklists to track task completion. Third, one prepares a project proposal by stating what needs to be done, why it is important, and how it can be accomplished. The proposal can then be presented to key stakeholders to ensure project support. The fourth step requires plan implementation and the continuous monitoring of progress towards predetermined goals and objectives. The project plan may need to be adjusted or timelines may need to be revised as new obstacles arise. The final step requires project planners to evaluate whether goals and objectives have been met and also the impact the project made on the organization.
The Pan American Health Organization

The Pan American Health Organization (PAHO) is the oldest international public health agency and is affiliated with the World Health Organization. In the introduction to their Guidelines for Developing Emergency Simulations and Drills (2011), they state that “Plans are not theoretical exercises: they must be tested frequently so that they can be evaluated, adapted, and updated before and after an actual event” (p. v). The organization goes on to say that simulations and drills offer some of the best options for evaluating emergency plans; as an added bonus, they also assist with training and team building. They PAHO guidelines provides methods and tools for developing and implementing simulations and drills.

One of the exercises recommended in the PAHO document, is the tabletop exercise (2011). It was developed as a tool for testing emergency plans, and as such, the participants must be chosen carefully. During a tabletop exercise, attendees are given a scenario and each attendee has a role to play in responding to the hypothetical situation. The participants need to decide on how to respond to the situation—both on an individual level and as a team. One key component of a tabletop session is the documentation of key questions or concerns that are uncovered as the participants discuss and interact. The documentation is then used to generate a written summary of findings that can be disseminated back to the participants and key stakeholders. The process reveals how response guidelines could be further developed or modified in order to better address the emergency scenario being discussed. The benefit of tabletop exercises is that they either validate the existing response system, or point to weaknesses that need to be addressed. Another benefit is that it affords responders an opportunity to consider how they would react during a specific type of emergency.
Emergency drills represent another type of simulation endorsed by PAHO (2011). A drill differs from a tabletop exercise in that it requires equipment and supplies, and participants must get up and actively perform their job duties in the same way that they would during an actual emergency. Individuals participating in the drill respond as if there is a crisis situation, not stopping to ask questions or step out of his or her respective role. Just as with a tabletop scenario, the purpose is to clearly define participant responsibilities and to test the readiness of the emergency response system. One of the benefits of drills is that they provide feedback on the amount of time needed to perform specific actions and allowing participants to practice skills and safety procedures. Again, as with tabletop sessions, it is extremely important to evaluate the outcomes of the drill and the lessons learned, so that preparedness plans can be improved and updated accordingly.

**The RAND Corporation**

Jackson (2008) authored a paper for the RAND Corporation, a nonprofit research organization, on the difficulties in assessing emergency preparedness. He states that evaluating preparedness efforts is paramount because it gives stakeholders a sense of what can be expected in the wake of a disastrous event. However, the author makes it clear that there are no perfect strategies for measuring preparedness. He points out that an institution’s state of readiness is often assessed and influenced by researching past events and evaluating the errors and failures, and cites how this has been done following Hurricane Katrina. In the aftermath of Hurricane Katrina, the New Orleans community discovered that the plans for responding to levee failures were underdeveloped only after experiencing catastrophic results.

According to Jackson (2008), the easiest way to quantify preparedness is by assessing equipment availability and the presence of a plan. One can use checklists to assess the number of
trained emergency responders, the quantity and availability of equipment, and the presence of a written plan. Some checklists ask reviewers to make assessments of the adequacy or comprehensiveness of a plan. However, the author cautions that the factors listed on checklists should be considered to be inputs of preparedness, and one should not assume that they ensure successful outcomes. Although checklists are useful for verifying the presence of emergency components, they tend to focus on quantity rather than quality.

Jackson (2008) points out that outcomes depend heavily on the reliability of the system; response reliability is a measure of how confident one is in the response mechanism. He suggests that the initial assessment of response reliability begins with identifying not only what can go wrong, but also what the potential impact of this would be. Since there are nearly limitless possibilities of what could be done to get ready for disasters, one must attempt to optimize readiness using the resources available—finding the desired balance between the money and materials invested and the level of response reliability. Preparedness, therefore, depends on the goals of response, and the proposed size of response. Jackson limits his discussion of preparedness to the narrow period of time that exists during and after an emergency situation, not the long-term recovery period. Prior to assessing preparedness, he suggests defining three things: the type of event being considered, the desired response, and the supplies and capabilities needed to respond.

In order to be reliable, preparedness plans should have multiple contingencies and should be reviewed on a regular basis. Contingency planning is necessary in case the initial plan is no longer logical or feasible. Jackson (2008) gives the example of a region needing more than one supply route or evacuation route if the main route gets cut off. Regular review of preparedness plans also increases reliability, and is particularly important in situations of high employee
turnover. Organization employees must review the plans to know that they exist and that equipment is available and in working order. Reliability can be partially assessed by quantifying the work experience of the leaders and first responders and identifying the triggers in place to activate an emergency response.

Jackson (2008) points out that exercises are often utilized to measure preparedness due to a lack of validated assessment tools. Exercises should be designed according to their purpose, depending on whether they are meant to train staff, develop policy, or assess readiness. An additional consideration is that the usefulness of exercises will vary depending on the scale and how representative they are, as full-scale realistic exercises are quite costly and disruptive. The complexity of preparedness exercises varies greatly, with discussion-based seminars and workshops representing the most basic exercises and drills and full-scale exercise being the most complex (Jackson & McKay, 2011).

The benefits of performing training exercises are multi-faceted. To begin, training exercises point out problem areas while providing a forum for brainstorming possible solutions (Jackson & McKay, 2011). They also allow an opportunity for face-to-face interaction between team members who might otherwise work independently on specific planning tasks. While preparedness plans can be published and sent out to responsible parties, the exercises provide opportunities to practice using equipment and participate in interactive question and answer sessions. Finally, preparedness exercises can be used as a form of evaluation, as a checkpoint to see if it is feasible to execute the plan as it is written.

**The Planning Process**

Perry and Lindell (2003) present a literature review of various articles discussing the process of disaster planning. They discuss the fact that there are three main components of
emergency preparedness: planning, training, and written plans. Based on their review, the authors argue that the greatest emphasis should be placed on the planning process, as this is what generates the response measures and protocols that can then be implemented and documented in a written document. When planning for an emergency, one must assess the risks associated with the potential disaster and weigh the risk it poses to the health, safety, and economic stability of a community. The authors propose that planning is an ongoing non-linear activity and that the written document represents the plan for a specific period of time. Emergency plans should be fluid in nature, continuously changing as situations develop and shift.

Having formal training exercises and a documented plan decreases the likelihood of forgetting key emergency measures and increases the likelihood of having a successful emergency response. The training exercises and written plan also serve another purpose in that they demonstrate that a threat was not ignored and that attempts were made to diminish the threat. Perry and Lindell (2003) sum up the benefits of emergency preparedness by stating that it readies an entity to “react constructively to threats from the environment in a way that minimizes the negative consequences of impact for the health and safety of individuals and the integrity and functioning of physical structures and systems” (p. 338).

**Assessment Tools**

Asch et al. (2005) sought to determine how to assess emergency planning procedures. The authors state that without good instruments for measuring success, one cannot know if preparedness is worth the cost. Without a standard definition of preparedness and reliable measurement instruments, people rely on checklists and inventories. However, in and of itself, inventory does not increase preparedness. Therefore, assessment tools are needed to ensure governments and organizations are not just wasting money. Asch et al. reviewed 27
different instruments for assessing preparedness, and only two of the instruments were found in peer-reviewed journals. The authors examined the 27 instruments looking for clear measurement parameters, a balance between structural and process measures, as well as evidence of effectiveness and accountability. They found that many instruments focused on epidemiologic staffing levels, disease reporting systems, the presence of communication protocols, and the designation of an emergency response official. There was also an emphasis on engaging with community organizations or government agencies during emergency planning.

Overall, Asch et al. (2005) found that many of the tools were poorly defined, using subjective measures with no clear parameters. Alternate tools focused on only structural measures of preparedness. Ideally, instruments will measure all aspects of Donabedian’s framework: structure, process, and outcome. The authors acknowledge that it is difficult to measure preparedness for emergent threats because there is generally not enough data or evidence to link process with outcomes. After reviewing their findings, Asch et al. (2005) summarized their recommendations for preparedness plans by stating that they should be evidence-based, include accountability measures—defining who is responsible for implementing preparedness procedures—and demonstrate enhanced inter-agency communication practices.

Sinclair, Doyle, and Johnston (2012) used a different approach to searching for preparedness assessment tools. Rather than combing the literature, they conducted a survey of 48 different emergency managers in North America and New Zealand to determine how they evaluate and monitor the effectiveness of emergency management training. They found that most organizations depend on participant self-assessment and evaluation forms. The authors point out that these evaluation methods are not necessarily evidence-based, as they have not been tested on a large scale.
Sinclair et al. (2012) conclude that there is no standardized system for assessing and evaluation emergency training exercises and there is little knowledge about how effective the exercises truly are. They state that in order to minimize unnecessary costs and maximize benefits, organizations need to make every effort to incorporate evidence-based approaches towards emergency training exercises. Based on the information they gathered from the questionnaires, they propose that emergency preparedness efforts are most effective when disaster responders are actively engaged during the training process. They recommend having participants interact, ask questions, practice response actions, and problem solve. The authors point out that adult learners often have experience or expertise that could enhance the preparedness process. Sinclair et al. recommend using small group activities to encourage discussion and interaction among team members. The authors discuss the use of post-exercise debriefing as a tool for identifying what went well and what did not. They state that it can be beneficial to do both a hot and a cold debrief, with the former occurring directly after the exercise and the latter occurring several weeks later. The debriefing can take the form of an informal discussion, written questionnaire, or a structured mediated session.

The Kirkpatrick Model of Training Evaluation (1998) offers an option for assessing the success of training efforts. Kirkpatrick proposed that in order to measure the effectiveness of a training program, one must consider four outcomes, or levels of success: reaction, learning, behavior, results. The first level, reaction, seeks to determine if participants reacted positively or negatively to the program. The second level focuses on whether or not participants learned from the training session and whether it impacted their attitude, knowledge, or skills. Level three investigates if training knowledge will be applied and if behaviors will be altered. The final level delves into whether or not the long-term goals of the training session are being met.
Cost of Preparedness

As the above literature demonstrates, evaluation of preparedness is generally accomplished by looking at outputs or deliverables rather than by looking at impact; this is done because it is difficult to monitor and evaluate the impact of something that has not occurred. For this reason, it is also difficult to measure both the cost of disasters and the benefits of disaster mitigation. For instance, if the likelihood of EVD being transmitted on a college campus is quite low, it is then challenging to quantify the impact of a preparedness plan. Despite these challenges, Steiner and Twigg (2002) argues that preparedness is cost-effective and lists examples that demonstrate this, citing efforts made in the areas of flood control and earthquake preparedness efforts.

Potter et al. (2010) describe a comprehensive literature review of 163 training reports that was performed by the Evidence-Based Gaps Collaboration Group. The goal of the project was to determine if the funding given towards public health preparedness results in positive outcomes. The researchers classified the content of training reports into three categories: workforce competencies, communication systems, and organizational capacities. They found that emergency training was generally assessed using surveys or focus groups and that the emphasis was on individual emergency performance rather than on organizational emergency performance. The authors were ultimately unable to establish the cost-effectiveness of preparedness efforts. However, they concluded that because public health preparedness is a new area of research, the government should continue to provide funding so that assessment tools can be developed and tested. They recommend that agencies evaluate training programs utilizing field exercises, in an effort to gain more information about the effect of training on preparedness outcomes.
Quality Improvement

Quality improvement “consists of systematic and continuous actions that lead to measurable improvement in health care services and the health status of targeted patient groups” (HHS, 2011, p. 1). The goal of emergency preparedness efforts is to improve the overall health and safety of a community; therefore, these efforts represent a form of QI. The ultimate goal of the QI process is to generate evidence—in this instance, an affirmation that preparedness efforts actually increase preparedness and are likely to result in a desired outcome. QI represents a deliberate effort to identify solutions, and then make the necessary changes to improve outcomes.

According to the United States Department of Health and Human Services, a successful QI program will incorporate four key principles (2011). The first principle is based on Avedis Donabedian’s SPO Theory, and states that a QI program will focus on understanding and developing systems and processes. Organizational activities should be assessed in two ways, first by evaluating what is being done, and then evaluating how it is being done. Process maps are tools that can help one visualize how events are currently being done. They can be used for staff training purposes and to minimize variation in workplace activities. The steps involved in developing a process map require the QI team to assess a system and agree on how it functions. The team must define where a process begins and ends, what the individual tasks are, and the order in which they are performed. Once the process map is complete, it can be helpful to create a second map—a simplified version of the first one, listing only the critical steps needed to achieve an outcome. Comparing the two process maps can highlight system inefficiencies and reveal aspects of the organizational process that can be modified.
The second and third QI principles state that a project must focus on patients and on teamwork. Patient-focused care incorporates the needs and desires of the patient population. The care must also be evidence-based and positively impact patient safety. The principle of teamwork is important because utilizing a team increases access to skills and knowledge and maximizes the overall impact of the enterprise. QI projects are generally complex, requiring both input and buy-in from individuals in a number of professional fields and work departments. Solving complex problems requires creativity, and a team approach allows the problem to be approached from multiple perspectives.

The final principle is that a QI project should focus on data, including both qualitative and quantitative data. Data provides a baseline and provides evidence of change; without it, one cannot know how well things are functioning or how a change is affecting processes. Data can be extracted from a variety of different sources including patient health records, internal websites, interviews, and survey. Charts provide an avenue for visually displaying changes and disseminating results.

**Use of PDSA in Norovirus Preparedness Efforts**

The National Health Service in Scotland provides an example of how the Plan, Do, Study, Act (PDSA) model can be used to develop and evaluate the success of a communicable disease intervention. In 2008, Health Protection Scotland utilized the PDSA model to implement a norovirus-focused QI project (Curran & Bunyan, 2012). The PDSA model is attractive because it emphasizes the importance of using information gained from the QI experience to plan future improvement efforts, thus demonstrating that enhancing quality within an organization is an endless cycle.
The authors of the study describe how the agency used infection prevention and control teams to help execute the model in an attempt to tackle the problem of norovirus outbreaks. During the “plan” phase, the organization held meetings with the infection prevention and control teams to discuss the experiences they had during previous seasons. They also created an outbreak tracking mechanism, generated media messages in regards to the virus, and created an escalation plan. Every ward received training on the proposed changes prior to the start of the next season. The tools that were created were implemented during the “do” phase, which coincided with the next norovirus season. The “study” phase consisted of monitoring the data from that time period and meeting once again with the infection prevention and control teams to assess the impact of the new tools. During the “act” phase, the organization began planning for a new PDSA cycle for the upcoming season.

When interviewed, the infection prevention and control teams reported feeling more prepared for handling norovirus than they had in the past. They also stated that the norovirus preparedness training improved inter-professional relationships among staff members, managers, and individuals from other departments. It is important to note that the number of cases of norovirus infection varies depending on the season and the virulence of the viral strain, therefore, the researchers needed more data to be able to determine if the interventions were successful in limiting the number of norovirus cases per season.

**Use of PDSA in Pandemic Influenza Preparedness Efforts**

Lotstein, Seid, Ricci, Leuschner, Margolis, and Lurie (2008) describe how various local health departments used the PDSA models to guide pandemic influenza preparedness endeavors. Different teams focused on specific aspects of preparedness, such as communication, staff mobilization, and triage. Each group created process maps, highlighting events that would
trigger processes to occur, and clarifying employee roles and responsibilities. They also worked with local hospitals to inform and guide their planning processes and generated mock scenarios to practice steps that would occur during an emergency. Lotstein et al. note that because there is a lack of reliable preparedness performance measures, the QI teams utilized a series of measures and deliverables rather than a single assessment instrument. Their measures of success included the development of alert systems, increased communication efficiency, and improvements in emergency response times. The teams assessed inter-professional collaboration using online surveys and interviews.

**Discussion of Evidence**

The information above demonstrates the challenges associated with studying and tracking EVD circulation. The current EVD outbreak is generating new evidence and prompting the development and implementation of new health care guidelines, and for this reason, preparedness and response plans must be malleable, evolving as new data is published and disseminated. The literature also shows that regardless of the type of emergency situation being considered, there are few validated measures for assessing a state of readiness.

However, when one considers the existing body of EVD and preparedness literature, one realizes that are several areas where experts agree. First, emergency readiness should focus on the planning process, and that this process should be ongoing and utilize transdisciplinary teams. Second, training efforts should be interactive and allow time for discussion and debriefing, as this will help leaders identify obstacles and allow opportunities for problem-solving. Finally, methods for assessing preparedness should focus on both structure and processes, and this can be done using feedback gained from various exercises, including the use of checklists, tabletop sessions, and drills.
Conclusion

In summary, a review of high-quality resources is imperative during the writing and development stage of preparedness planning. A literature review helps to organize and conceptualize the available data, and the information gleaned from the review informs the development of this scholarly project. The data from the current EVD crisis reminds colleges and universities that they are vulnerable to the threat of communicable diseases and that there must be a continuous planning process to ensure that emergency protocols and resources are updated and available. Preparedness efforts offer a valuable opportunity to discuss and pre-plan the steps that will occur during emergency situations, thereby minimizing the likelihood that an organization will over-react or under-react during an actual emergency event. Like all ambulatory care centers, health centers should be implementing EVD screening protocols and training on the proper use of personal protective equipment. In addition to these guidelines, institutes of higher education are encouraged to review communication plans and travel policies.
CHAPTER 4

PROJECT PLAN

The current chapter builds on previous chapters by delineating an implementation strategy for the scholarly project. The project plan begins with a description of the setting and population, and proceeds to highlight organizational strengths, weaknesses, opportunities, and threats. The chapter includes an account of the proposed methodology for enhancing quality and defines expected outcomes. The theoretical frameworks discussed in chapter two were used to guide the implementation process and the literature review from chapter three provided an evidence base for goals and objectives.

The initial concept for the scholarly project was centered on preparing a college health center for communicable disease outbreaks. In the fall of 2013, the school was specifically interested in studying norovirus gastroenteritis infections, as they often occur in densely populated settings and have negatively impacted other colleges. The health center theorized that the information learned from this process could be applied to other communicable diseases. For this reason, the project began by conducting hand-washing audits within the health center and researching norovirus transmission. However, before a preparedness plan was finalized, the EVD outbreak began.

As the outbreak grew, the health center began receiving inquiries from individuals wondering how the school would address international travel both to and from the college. During the summer of 2014, employees at the college health center became increasingly concerned that the school had students and staff members traveling through regions with high rates of EVD transmission, but no system for monitoring the health status of travelers upon their
return to campus. At that time, there were few published guidelines regarding EVD management in the United States, and almost no information specifically devoted to the concerns of colleges or ambulatory care clinics. The college health center used the best information available and began addressing the safety concerns of students, parents, and staff. However, the school quickly determined that there was a gap between the current state of EVD knowledge and readiness and the desired state of EVD knowledge and readiness. A timeline depicting how the project developed and evolved can be seen in appendix A.

The ACHA (2011) recommends that institutions of higher education compare and contrast emergency planning efforts in order to identify the efforts that are being made and to learn from one another. The college involved in this scholarly project contacted other schools in the region, but found that other schools were facing similar issues and shared the same concerns. The college health center sought to be proactive in dealing with the threat of EVD, rather than being forced to react to unexpected situations. Therefore, based on these developments, the focus of the project shifted from the development of a norovirus preparedness plan to the development of an EVD preparedness plan.

**Setting and Population**

The scholarly project was implemented at a private college in the Midwestern region of the United States; the school has a population of less than 5,000 students. Although it is a small school, its students come from over 50 different countries, and it offers more than 10 different semester abroad programs and even more off-campus programs of shorter duration. On average, the student health center manages approximately 6,000 visits per year, and many of these visits are performed for international travel services. The school has invested a great deal of time and
money into developing the college health center, as evidenced by the presence of a beautiful new facility and the level of autonomy afforded to the medical director and her staff.

During the summer of 2014, when the college had students returning from Africa, the health center pieced together a system for screening and monitoring for EVD using CDC and WHO documents for guidance. There were no campus-specific guidelines for recognizing individuals who might be at risk for the disease and the health center staff had little training on how to respond if they identified a person under investigation for EVD on campus. The health clinic director reports having concerned parents ask if it was safe for their children to live in the same room with individuals from other countries. It was at this time that the school determined it needed an enhanced response to the threat of EVD.

**All-Hazards Emergency Response Plan**

Even as the health center was recognizing the need to address EVD, the college appointed an executive safety committee to further develop its all-hazards emergency response plan. The ACHA (2011) recommends that schools of education develop such a plan using the National Incident Management System, a template adopted by the federal government. The template is used by both public and private organizations for disaster and crisis planning. The system is meant to be flexible so that it can be applied to emergencies of any type or size.

The all-hazards approach recognizes that certain types of emergencies require specific guidance (ACHA, 2011). This distinction is important, as EVD requires unique management tools. The all-hazards emergency response plan uses an Incident Command System (ICS) to provide structure and clearly identify the roles and responsibilities of leaders during a crisis. The system proposes that during an unanticipated emergency event, an incident commander and an emergency operations center must be identified. The incident commander is the most senior
administrative official responding to the specific incident; however, it is important to note that
the identity of the incident commander may change depending on the circumstances surrounding
the emergency event.

Cost

The costs associated with this project were limited to less than $2,000, with the bulk of
the money going towards the purchase of PPE. The cost was not prohibitive, as the college
already had funds budgeted for environmental health and safety and the health center already had
many of the gowns, masks, and gloves that the CDC recommends for ambulatory care
clinics. For the most part, training on EVD preparedness was completed during regularly
scheduled staff meetings in order to avoid the additional cost of training hourly employees. It is
important to note that a preparedness plan does not generate cost-savings, but instead offers risk-
reduction.

Objectives

The preparedness effort focused on meeting four objectives: 1) enhance existing health
center policies by co-creating site-specific EVD preparedness and response guidelines; 2) form
partnerships within the organization as well as in the state and local community to enhance the
preparedness response; 3) translate existing knowledge into practice through the generation and
implementation of training sessions on how to respond to a suspected case of EVD; 4) create a
presentation for key stakeholders, updating them on preparedness efforts, what has been learned,
and future goals and directives. The objectives were developed to address institutional needs and
were specifically chosen because they are measurable, attainable, and support the project goal.
**Strengths, Weaknesses, Opportunities, and Threats**

In preparation for this project, an organizational assessment and a Strengths, Weaknesses, Opportunities, and Threats (SWOT) analysis were completed. An organizational assessment provides an overview of the institution’s mission, structure, and capabilities, while the SWOT analysis investigates the strengths, weaknesses, opportunities, and threats that may affect project implementation. In regards to plan development, organizational strengths included a new, high-tech facility; financial support from the college; freedom to choose goals and initiatives; well-educated and seasoned staff members; and in-depth experience with international travel. An organizational weakness is that the school has limited staff and limited resources due to its small size. The SWOT analysis also uncovered a number of opportunities: the college has a good relationships with the county health department and local hospital; the United States is currently focusing on global health threats; and both the CDC and college associations are publishing EVD guidance and encouraging preparedness. External threats to the project include the rapidly changing guidance regarding EVD; sensationalism in media coverage of EVD; and the cost of PPE.

The literature review from the previous chapter, in conjunction with the organizational assessment and the SWOT analysis described above, provide details and background information to better understand the factors influencing the creation of EVD policies at the college health center. The literature review summarized the EVD research and guidelines used to develop plans for the school. The organizational assessment and SWOT analysis identified the resources available to the college for preparedness efforts and described the environmental context in which changes were made. Figure 4 illustrates how the QI team used the TM model to approach policy development: the group carefully weighed best evidence, available resources, and
population characteristics, while recognizing that decision making is influenced by the college environment and the school’s goals and values.

**Methodology**

Project implementation was based on the IHI’s use of PDSA model (2014). It was also informed by the IFRC’s five steps of preparedness planning (2000), as many of the steps overlap with the basic concepts of the PDSA model. Using these models as templates, a QI team was chosen, making an effort to include individuals from departments that would be most impacted by QI changes. The team includes the medical director of the health center, the triage nurse and
a nurse practitioner from the health center, the environmental safety manager, the director of
campus safety, and this author. Individuals from the marketing and communications department,
the physical plant, residence life, and the information technology department were also included
in portions of the planning process.

**Problem Statement and Clinical Questions**

The first task the QI team completed was generating a problem statement. They
determined that although the college has well-developed strategies for responding to many
different emergency situations, it does not have an EVD management policy and health center
employees were not trained on how to manage a possible case of EVD. The QI team sought to
find an optimal solution to this problem by asking its members: What is the best way for a
private college, with limited staff and funding, to address the threat of EVD?; How should the
school train employees about EVD?; Who are the community partners that should be involved in
an EVD response?; and How do we communicate the steps taken to key stakeholders at the
college?

**Scope**

In response to the clinical questions listed above, the QI team determined that their goal
was to promote campus health by developing and implementing an EVD preparedness plan. A
secondary goal was to prevent fear of EVD from negatively impacting the academic pursuits of
the school. The team decided to develop the project around the creation of a campus-specific
EVD policy, seeking to establish how and when to screen for EVD. They wanted to define who
to contact in the event of a positive screen and how to isolate persons under investigation for
Ebola. The QI team determined that staff training sessions should include a tabletop session and
group sessions with the health center and the campus safety department. They also decided that
planning efforts would require input from the local health department, hospital emergency department, and ambulance service.

In order to promote efficiency and accountability, job duties were created and assigned to various QI team members and a checklist was utilized to track task completion. Some of the job duties included: writing protocols, purchasing supplies, creating a communication tree, inventorying PPE, generating training documents, creating internal and external media messaging, and creating a presentation for key stakeholders to disseminate the results of the preparedness process. Initial steps required the scheduling of QI meetings, purchasing of supplies and PPE, and creating EVD training material.

**Human Research Status**

This project was conducted to improve the safety and preparedness of a college community. The results of the QI process were used internally to assess the impact of the project. There was never any intent to use the data for research purposes. A description of the project was submitted to the officials at Grand Valley State University for a Review of Determination. A letter was issued by the university documenting that a judgment was made that the project did not constitute research (see appendix B).

**Implementation**

The “plan” portion of the PDSA cycle involved conceptualizing the project and writing out the problem statement, clinical questions, and goals and objectives (see Figure 5). The step included brainstorming possible solutions and identifying opportunities; it also required the prioritization of tasks, ensuring that immediate needs be addressed first. As mentioned in the literature review, the planning stage demands careful consideration in order to be certain that the QI process is ready to proceed to the “do” portion of the PDSA cycle. For example, during the
planning stage, the QI team needed to obtain current business and after-hours phone numbers for
the health department and hospital system so that care providers and office staff would know
who to contact in the event of a positive EVD screen.

Although project planning initially started in the summer of 2014, project implementation
was not completed until the winter of 2015. The “do” portion of the PDSA cycle included the
generation and acceptance of an EVD policy. Implementation also required the organization and
distribution of PPE and the identification and preparation of isolation areas. The final realm of
implementation focused on EVD training, ensuring that individuals were familiar with EVD
guidelines and understood their roles and responsibilities in the event of a suspected case of
EVD. Training surveys were administered at training sessions in order to determine how to
improve future training sessions and to discover if participants found the trainings to be useful.
Figure 5: EVD preparedness efforts using the PDSA cycle. Adapted from the IHI guidelines for quality improvement processes (2014).

Measures and Deliverables

Once implementation was complete, the “study” stage of the PDSA model began. The QI team met to assess project deliverables and performance measures to determine if the
preparation plan met school needs and if the changes improved the health and safety of the college community. Project deliverables include an EVD policy, process maps, and a presentation outlining what was done and what was learned during the QI process. The EVD policy serves a dual purpose in that it provides EVD guidance but can also serve as a template for future communicable disease preparation efforts. The process maps depict how the various components of EVD protocols work together, and demonstrate the series of events that will occur in the event there is a positive EVD screening. As one of the final steps of the scholarly project, the generation of a presentation for key stakeholders provides a venue for disseminating findings amongst the college community. Measures of success included the completion of the job duties checklist, the incorporation of guidance from the local hospital and health department into EVD policy, the completion of training on PPE use and EVD response measures, and the successful implementation of the EVD screening algorithm (see Figure 6).

**Figure 6:** Measures of quality improvement. Adapted from Donabedian’s Structure-Process-Outcome Theory (2003).
Following the QI meeting, the team moved to the “act” portion of the PDSA cycle. During this stage, the team members made minor revisions to the policy and the associated tools based on changes in EVD guidance and feedback from both the QI team members and those who were trained on the EVD protocols. The team used the knowledge generated from the scholarly project to determine how to further improve emergency preparedness within the college health center.

**Sustainability**

Once a quality improvement process is implemented, efforts must be made to ensure it is sustainable. For this to happen there must be accountability within the organization, and individuals must be confident that they can perform assigned tasks. The threat of EVD demanded a significant amount of investigation and planning, and for this reason, it required a QI team. However, after being developed and implemented, the EVD plans will likely only require slight modifications along with periodic re-training and review. As mentioned previously, the college is developing an all-hazards emergency response plan, signifying their commitment to enhancing the health and safety of the campus. The health center has a communicable disease team and a strong environmental health and safety department. With these resources in place, the college has the personnel and commitment needed to sustain the EVD preparedness efforts.

The United States Department of Labor website (n.d.) states that employees should be trained on emergency response and evacuation plans when a new or revised plan is introduced, when new employees are hired, and when there are changes to the building layout or emergency supplies. The website also proposes that organizations consider performing annual training on emergency response plans. This guidance is reasonable and attainable; however, in the case of
EVD planning, it would also be prudent to offer training courses when the school knows of students or faculty arriving from countries with a widespread EVD outbreak. As this is a new policy, and employees have had no prior experience with the training material, members of the QI team have suggested that EVD materials should be reviewed with staff once a quarter for the first year after plan development.

**Conclusion**

In summary, this scholarly project emphasizes the “plan” stage of PDSA, spending a great deal of time on the organizational assessment and SWOT analysis, generating goals and objectives, and creating task lists. During the “do” stage, the EVD protocols will be written, process maps constructed, and training sessions completed. The “study” stage will look at measures of success and deliverables to determine if improvements have been made. Finally, during the “act” portion of the project cycle, the QI team will analyze project results and use what was learned from the process to determine the next steps in furthering QI efforts.
CHAPTER 5

RESULTS

This chapter will review the results of the scholarly project. As a QI project, the results inform the organization about the usefulness of the project; this differs from a research project in that the results do not contribute to generalizable knowledge. It is difficult to assess the impact of preparedness efforts without having an EVD incident; therefore the QI team generated a series of deliverables and performance measures to demonstrate the impact of the project. This chapter presents the documents created during the process and reviews the progress made towards preparedness goals. Ultimately, the information presented in this chapter will be used in chapter six to evaluate if the project succeeded in translating concepts from the literature to the work environment.

Project Deliverables

In regards to project outcomes, the scholarly project produced three deliverables: the EVD policy, process maps, and a presentation for key stakeholders. A deliverable is a “tangible or intangible object produced as a result of the project that is intended to be delivered to a customer” (Moran et al., 2014, p. 348). The deliverables provide check-points and increase adherence to the project goals and timeline. Deliverables help focus team efforts and result in the acquisition of new skills and abilities (Chow, et al., 2014).

EVD Policy

The EVD preparedness project aimed to integrate scientific knowledge into an easy-to-understand policy, preparing the organization for the threat of EVD while emphasizing the need for relevance and practicality. The QI team created a 26-page policy that is specific to the college’s needs. It contains campus-specific protocols to supplement the guidance provided by
the CDC and local health authorities in regards to EVD preparedness and response. The process was influenced by documents created by Emory University (2014), the Public Health Agency of Canada (2014), and the ACHA (2014).

The policy was formatted to align with existing school policies and provides basic information about how to respond when a person associated with the college screens positive for EVD. The document begins with an introduction reviewing the policy’s scope and intended audience. It includes an EVD screening algorithm that lists the contact numbers for college officials, the county health department, and the local hospital. There is a communication tree to ensure appropriate individuals are notified of the incident and a table to clarify the roles and responsibilities of the college staff during an EVD event, and an EVD supply list. The policy specifies the locations of the isolation room and the emergency equipment, and includes a list of questions for the medical director, or designee, to ask the person under investigation.

The initial draft of the policy was submitted in October, 2014. In the following months, it was re-written and revised as new guidance was published and as local health authorities developed their own response plans. For example, the initial version of the policy proposed that a person under investigation for EVD be transported to the local hospital within two hours of screening positive for EVD (the local hospital indicated that a two hour delay was needed to prepare an ambulance and emergency responders). However, once airports in the United States began screening international travelers for EVD and the county health department trained its employees to administer blood testing for EVD, the policy changed so that a person under investigation could remain on-site while awaiting the results of blood testing.
Process Maps

Process maps depict the anticipated response to a given situation and help individuals envision what a response will entail. When creating process maps, the QI team weighed out various options for how to respond, including how departments will communicate and manage their roles and responsibilities in an emergency situation. Similar to the EVD policy, the process maps underwent multiple revisions as initial versions did not correlate well with the campus’ all-hazards emergency response plan. A diagram helped the team envision how an EVD response would fit into the school’s existing emergency plan (see appendix C). Note: some images from the protocol have been simplified or edited, to maintain the privacy of the school.

The team created a process map illustrating the steps involved in screening patients for EVD (see appendix D), and other maps showing the anticipated response from both the lead clinician and the other health services staff members (see appendices E and F). The team also created a communication tree to ensure that key individuals are notified of an EVD investigation in a timely manner (See appendix G).

Presentation

A formal presentation was created for key stakeholders, condensing months of research, training sessions, and meetings into a brief presentation. Many of the scheduled attendees were not project participants so the presentation describes how and why the undertaking developed as well as a timeline to illustrate the steps involved in project implementation. Including sufficient background information is highly important, as the college invested time and resources into the project through the purchasing of supplies and equipment and the training of its employees. Reviewing the methodology of the project demonstrates to stakeholders that the problem was approached in a logical and systematic manner. Project results are disseminated using easy to
understand graphics. The presentation emphasizes how the project improved the health and safety of the college and how the QI process can be applied elsewhere within college.

**Performance Measures**

A performance measure is an indicator of the work that has been completed and the implications of that work. The use of performance measures offers a pragmatic approach to project analysis. According to the Office of Financial Management, performance measures are “based on data, and tell a story about whether an agency or activity is achieving its objectives and if progress is being made toward attaining policy or organizational goals” (2009, p. 2). They are important tools for monitoring and reporting work performance and they assist in determining whether the project is progressing, the team is working efficiently, and if individual team members are held accountable for their assigned tasks.

There are three performance measures associated with this scholarly project: the job duty checklist, training feedback surveys, and QI team interviews. It is important to note that both the surveys and the interviews were completed for practical purposes. They were not conducted in a research environment and were not completed for research purposes; the aim was to determine if QI components were useful and meaningful.

**Job Duty Checklist**

The job duty checklist provides a method for monitoring and assessing the completion of action items. By adhering to the action items on the list, project participants were able to complete tasks in a logical and efficient fashion. The tasks on the checklist were created by the QI team and assigned to individuals from several different departments, with the majority of the tasks being completed by persons from Health Services, Campus Safety, Environmental Health and Safety, and Communications and Marketing (See appendix H). Although it is not
specifically indicated on the checklist, several of these items required collaboration from the county and state health departments, the college’s waste management services, and the local hospital and its associated ambulance services.

The job duty checklist served as a malleable document as several of the tasks that were originally on the list were later removed. For example, the school originally intended to give international students a hospitality packet that not only welcomed them to the school, but also contained information on how the college was responding to EIDs such as EVD. This task was then removed since students were already being screened at the airports and tracked by the health department. Other tasks were added to the checklist, such as the installation of additional phone lines in the isolation room, as these would be needed if the patient and provider were to remain in the room for a significant period of time.

**Training Assessment Surveys**

During the training sessions, individual members of the clinical team and campus safety supervisors practiced donning and doffing PPE. During the second campus safety training sessions, the employees applied a fluorescent gel to their gloves to simulate microbial contamination; they then practiced doffing the PPE. An ultra-violet light was used to check the employees for fluorescence on their bodies and clothing. All eight employees completed the procedures without contaminating their skin or clothes with the glo-germ.

The QI team sought to actively engage participants and to appreciate and honor the experience and expertise that these individuals brought to the meetings. The sessions were interactive and informal, and training surveys were utilized to determine if the EVD training session were effective and how they might possibly be improved. Two training sessions were held with the health center staff and two additional sessions with the Campus Safety supervisory
staff. A tabletop session was held with key stakeholders from other departments and another meeting was held with the Residence Directors.

Training assessment surveys, which were developed using the Kirkpatrick method, were created by this author and administered by Health Services (see appendix I). The QI team sought to gain basic feedback on the training session, focusing on obtaining data that could enhance future training efforts. The surveys were brief as the aim was to maximize the amount of time available for the training sessions. The results were made available to the QI team for interpretation and used to assess the impact of the sessions, as well as to obtain suggestions for better implementation.

Twenty individuals completed the pre-training assessment. The results of these surveys show that 18 out of 20 (90%) respondents answered the first knowledge questions correctly and 100% answered the second knowledge question correctly. When asked if they felt that EVD training was relevant to their jobs, 19 out of 20 (95%) participants answered that they either agreed or strongly agreed with the statement. When asked if they knew how to respond to a potential EVD patient, 11 out of 20 (55%) of those that responded agreed or strongly agreed.

Twelve individuals completed the post-assessment survey. The data showed that 11 out of 12 (92%) respondents answered each knowledge question correctly. All of the respondents either agreed or strongly agreed with the statement indicating they had a positive experience with EVD training. They also all agreed or strongly agreed that they could apply the material learned to their current job. When responding to the statements that EVD is relevant to their jobs and that they knew how to respond to a potential EVD patient, all of the participants agreed or strongly agreed. Ten out of twelve (83%) of the individuals agreed or strongly agreed that they felt capable of performing the tasks as they were detailed in the EVD training.
The qualitative portion of the post-training assessment asked respondents which training topics were most beneficial and the most common answer was practicing using PPE. Participants also mentioned the benefits of reviewing the EVD screening algorithm and discussing how to address student concerns about EVD. When asked what could have been done to improve the training, five of the respondents stated that they would have liked more time to process the training material, and one individual desired more information on how an EVD response would work outside of normal business hours.

**Semi-Structured Interviews**

Three QI team members were interviewed using semi-structured interview questions (see appendix J). Although team members met regularly to discuss project progress, interviews allow time for reflective thinking, thereby providing the individuals an opportunity to mentally review and evaluate his or her experience. The meetings were conducted by this author in a private setting. The questionnaire included three open-ended questions aimed at uncovering the participants’ perceptions of the QI process. At the end of the meetings, the interviewer summarized the team members’ responses to ensure they were understood properly.

The interview responses revealed a number of themes: collaboration; the generation of momentum; and the challenges of responding to an emerging infectious disease. The participants revealed that collaboration among the transdisciplinary team was key to the success of this project. Interviewees affirmed that EVD planning tasks could not have been completed in the same manner were it not for the expertise, skillsets, and competencies of the team members. A second theme was that the QI process generated momentum for policy change and development. One participant stated that the EVD policy would likely serve as a starting point for future policy development efforts. The third theme was the challenge of preparing for an
EID and the “messiness” of the resulting change process. The team members report that there were a number of challenges associated with responding to the threat of an emerging infectious disease, the main one being that there was a constant stream of information being released about EVD. However, one person expressed that she feels the health center is less vulnerable after completing the preparedness process.

**Conclusion**

In summary, the project deliverables and performance measures provide a multi-faceted view of the results of the QI project. The project deliverables were successfully completed and serve as tools for the college to use again in future preparedness plans. The performance measures tell the story of how the project progressed and unfolded. When analyzed in conjunction with one another, these factors will demonstrate how the dissertation objectives were completed.
Chapter six interprets the project results that were presented in the previous chapter. The overarching goal of this project was to promote campus health by contributing evidence-based knowledge and a new perspective to the organized efforts of a transdisciplinary EVD preparedness team. This chapter will discuss how this was done. It will review how the project met the objectives listed in chapter one and illustrate how the efforts of the QI team relate to the conceptual models presented in chapter two and the literature review in chapter three. As a whole, this chapter seeks to analyze the impact of the project on the organization. It will apprise the reader of project limitations and conclude with recommendations for future preparedness efforts.

**Interpretation of Findings**

It is difficult to plan for unexpected emergencies because the task requires a careful blend of specificity, scalability, and flexibility. Preparedness planning is even more challenging when the phenomenon of interest is relatively unknown and poorly understood. In the case of EVD, there were varying messages from the media and disease experts; there was also a paucity of guidance specific to the population of interest, in this case higher education. Organizations such as the WHO and the IFRC offer guidance on how to prepare for disease outbreaks, but it can be difficult for an individual organization to know how to apply the guidance to their unique setting and practice environment.

Despite these challenges, the interviews and training surveys reveal that the participants’ interaction with the preparedness project was positive and useful. The qualitative information gleaned from both processes was used to identify what went well during the QI process and what
could be done to enhance the process. The interviews suggest that although there were hurdles during implementation, the project successfully integrated the skills and knowledge of the individual team members, and the participants think the process will likely be replicated again in the future.

**Objectives**

The findings from the previous chapter can be evaluated in terms of the individual objectives presented in the first chapter of this dissertation. The objectives were: 1) enhance existing college health center policies by co-creating site-specific EVD preparedness and response guidelines; 2) form partnerships within the college community as well as in the state and local community to enhance the preparedness response; 3) translate existing knowledge into practice through the generation and implementation of training sessions on how to respond to a suspected case of Ebola; 4) create a presentation for key stakeholders, updating them on EVD preparedness, what has been learned, and future goals and directives.

**EVD Policy**

The first objective was met via the creation of a site-specific EVD policy where one did not previously exist. The fact that the policy was adopted by the health center provides the strongest indication that the project is meaningful to the organization. Although the resulting document will still be revisited and revised, it provides a significant value to the school by establishing basic expectations for an EVD response. In addition to this, the process of policy development presented a learning opportunity for QI participants, both at the individual and group level.

When planning the implementation of this project, the QI team sought to determine the best way for a private college, with limited staff and funding, to address the threat of EVD. In
response, the policy was created as an extension of the goals and values of the college. The QI team took these organizational features into consideration when devising their policy. For instance, the college seeks to be good stewards of their resources; therefore, during implementation, every effort was made to avoid wasting time and resources while still enhancing the safety of the campus and its inhabitants.

The fact that the policies were frequently revised and updated does not necessarily reflect poorly on the development process. According to the AMA’s manual on the topic, policies are not intended to be fixed and unalterable (Stanley, 2014). Instead, they are intended to encourage teamwork, influence decision-making, and assist individuals in meeting organizational needs without overlooking critical steps. They also provide tools, such as process maps, an inventory list, a communication tree, and a screening algorithm.

Wendler et al. (2013) states that leadership support and strong collaborative relationships among staff members contribute to the successful translation of knowledge into practice. For this project, success was facilitated by support of the Director of Health Services and the Environmental Health and Safety Officer. The Medical Director provided storage space for supplies and work areas, and appropriated a significant amount of time to focus on the project. Likewise, the Environmental Health and Safety Officer coordinated meetings with leaders within the college and provided access to internal health and safety policies. The project also benefited from regular communication among team members. The QI team set periodic meeting dates and worked together amicably, without any major conflicts.

Community Partnerships

Objective two focused on the importance of forming community partnerships. The EVD policy demonstrates the integration of guidance from outside organizations into institutional
policy. Contact information for community partners have been built into the policy. These partnerships are crucial, as these local healthcare organizations have access to tools, data, and connections that are vital to emergency response efforts. Since the initiation of this project, the college has been in contact with the county health department about several non-EVD-related issues, indicating that a valuable relationship has developed, one where college authorities know exactly who to contact and feel comfortable doing so when questions arise.

**Knowledge Integration**

The third objective sought to integrate knowledge into practice through the use of staff training sessions. The training survey results indicate that the participants found the sessions to be relevant and useful. There was a discrepancy in the number of pre-training and post-training surveys, as the pre-training surveys were administered directly before the sessions and some of the post-training surveys were sent out after the sessions using an electronic survey service. There was no appreciable difference between the pre- and post-training survey responses on the knowledge questions. Several training participants documented responses stating that they would like more time for training sessions, but that they found it helpful to practice the skills they were taught. This information can be applied to improve future training sessions.

Training assessment surveys were not completed at the tabletop session, so there is no feedback indicating whether individuals found the meeting to be helpful or informative. It may be appropriate to utilize training surveys during future tabletop sessions, as the QI team gained valuable insight and information from the event and it led to policy changes. During the meeting, participants raised concerns that led to changes in the communication tree. They also helped think through dilemmas, such as how and when to close the health center and how to manage the phone messaging system during a crisis. By engaging these individuals, the team
promoted cooperation and continuity, increasing the number of aspects of emergency management that were addressed.

**Dissemination of Results**

The final objective required the creation of a presentation for key stakeholders for the purposes of project dissemination. According to the Agency for Healthcare Research and Quality, dissemination strategies should be appropriate to the needs and desires of the stakeholders (2014). For this reason, the resulting presentation emphasizes the achievements of the QI team and accentuates the usefulness of project deliverables. The health center would like to continue investing time and energy into policy development; therefore, it is vital for stakeholders to realize the benefits of the preparedness planning and the value that it brings to the college.

**Findings in Relation to the Conceptual Frameworks**

The college knew it had to create an EVD policy and alter current practice, therefore a QI project provided a systematic approach and a framework for implementing the necessary changes. The team applied Donabedian’s SPO theory to the problem in order to help better understand the relationship between structures, processes, and outcomes. Based on their understanding of the theory, the group decided to alter some structural and procedural components in the health center to decrease the likelihood of EVD disrupting the college campus. The team recognized that a transdisciplinary team was needed to increase project buy-in and enhance the knowledge and skillsets available to the team. They used the TM to understand and articulate the factors influencing decision-making. The members’ knowledge of the campus environment, the student body, organizational resources, and the school’s goals and
values helped them identify organizational priorities. They used this input to formulate a multi-faceted plan and utilized the PDSA model to implement the change process.

When initiating the PDSA model, change implementation appeared straightforward and sequential. However, during project implementation, the process was more dynamic than it appears in the IHI’s PDSA diagram, and plans were revised multiple times. One explanation for this is that the project evolved as new information and guidelines were released.

When the college first called the local and state health departments in the fall of 2014 asking what they could do to prepare for EVD, there were no simple answers. However, over the next several months, these questions were answered, and the policy planning process was revised in accordance to the responses. Much of the existing EVD guidance was not released until October of 2014, well after the preparedness planning process had begun. Adding to the planning difficulty, the QI team’s concerns shifted as media reports were released. When it was reported that two nurses in the United States contracted EVD, the focus shifted to the importance of training on PPE use. As schools in Dallas discussed the problems they had with parents wanting to remove students from their school, the team raised questions about how the college should respond if the disease were identified in local hospitals. Due to the continual updates in guidelines and news releases, the project plan was revised on numerous occasions.

The college also had to work under realistic deadlines. Due to the timing of EVD, the college felt it had to implement individual components of the policy prior to formally adopting and implementing the policy as a whole. For example, the QI team did not feel it would be prudent to wait to screen patients for EVD until the entire preparedness policy had been completed. However, the “messy” nature of the project implementation appears to be expected; Wendler et al. (2013) indicate that complexity is a defining attribute of translating research into
practice, particularly since organizational decision-making is not based solely on existing evidence. By their nature EIDs represent something new, and because of this, there will likely always be changing guidelines and conflicting news reports.

The Transdisciplinary Model of Evidence-Based Practice posits that evidence and expert opinion are not the only factors to consider when making decisions within an organization. The QI team also needed to consider the college’s resources, leadership support, and organizational values. Additionally, there was a need to be pragmatic; preparedness efforts work in theory, but the team had to determine how to initiate change within their unique environment.

The QI team reports that the project was transdisciplinary by necessity, rather than by choice. In order to succeed, the team required input from a wide variety of subject experts. For example, the media relations department knows the best ways to update students, staff, faculty, parents, and outside media about important events; the information technology group activates emergency messaging services; residence life manages the resources for feeding and relocating students; the physical plant cleans, disinfects, and closes buildings; and the administrators consider the overall impact of emergency scenarios and determine whether there needs to be an interruption in class schedules or special events. Without input and guidance from any of these groups, the EVD response would fail.

According to ACHA recommendations, each department must be prepared for emergencies that exist under their scope of influence or area of expertise: “Emergency preparedness is an interdepartmental project involving input from various constituencies working on a plan over time with realistic deadlines” (ACHA, 2011, p. 5). In an effort to assist with college preparedness efforts, the ACHA developed an Emerging Public Health Threats and Emergency Response Coalition (2015). The coalition aims to address the threat of pandemic
influenza and other communicable disease health threats as well as provide information, tools, and training on managing these issues in the higher education community. Resources provided by the ACHA may be useful when developing future emergency plans.

**Findings in Relation to the Literature**

The project results are consistent with the information published in the literature. In the fall of 2014 colleges and universities across the country had international students arriving, but were frequently uncertain exactly as to where those students had been. Airports in the United States did not begin screening international travelers for Ebola until early October, 2014. The college struggled with how to address the threat of an unfamiliar disease and found that public health guidance did not fulfill their needs, even as they were in the midst of welcoming international students.

They were not the only institution of higher education grappling with this issue. In an article for the New York Times, Rabin (2014) states that the federal government focused time and energy on hospital guidelines, but had minimal guidance for ambulatory care, resulting in fragmented and individualized policy development. Rabin points out that the Texas Medical Association recommended that all patients should be screened for travel history by telephone prior to making an appointment, but this is not a recommendation from the CDC, nor is it recommended in other states. Following an incident with a Yale student who was tested for Ebola after returning from West Africa, the chief executive of the Connecticut State Medical Society was asked a number of difficult questions regarding primary care and Ebola. The questions included: how should patients be isolated or transported off-site?; when should an office be closed?; when should staff members be quarantined?; and when does an office need to
be decontaminated? These are many of the same questions that the QI team struggled with during policy development.

Industry experts support the need for EVD preparedness and training. Craig Roberts, an epidemiologist from the University of Wisconsin, states colleges need to be prepared for either a case of EVD or even a threat of a case (ACHA, 2014b). He offers insight as to what is required when preparing for infectious disease crises and he provides examples of three categories of diseases that could require a large response on the part of the student health center. The first is exotic diseases like EVD, Middle East Respiratory Syndrome, or Chikungunya; the second category represents more common illnesses such as norovirus, mycoplasma, or influenza; and the third group consists of serious diseases that require a significant response, such as meningococcal disease or measles. He argues that schools should have a pandemic planning group and a crisis response plan, collaborating with other departments to plan for these types of health emergencies.

**Unanticipated Factors**

There were a couple of unanticipated factors that the QI team had to consider while implementing this project. To begin, even as the school was planning for one emergency, a separate campus emergency occurred. For this reason, some members of the team were asked to initiate a separate preparedness protocol, specific to the emergency situation that occurred. The team used the basic format of the EVD plan to begin this process, as the two types of emergencies require similar communication routes and notification procedures.

Another factor that the team had not initially considered was how to link the EVD preparedness plans to the all-hazards emergency response plan. They felt that the actions taken during an EVD investigation must correlate with the actions taken during other types of campus
emergencies, including the identification of an incident commander. The QI team carefully considered who would be the most appropriate person to fulfill this role during an EVD investigation. They decided that the Director of the Health Center would likely serve as the initial incident commander, as this individual is the first person to be called in the event of a positive EVD screen. However, the QI team proposed that the role be transferred to Campus Safety if the individual requires blood tests for EVD. At this point, the Director of the Health Center will play an advisory role, while the Director of Campus Safety coordinates the overall emergency response. The QI team made this decision based on two things: first, Campus Safety is already familiar with the incident command system and is well-prepared to coordinate the closing of buildings or communication with local police and fire authorities; second, the Director of the Health Center will want to remain focused on patient care and the health of the community rather than on other emergency tasks.

**Limitations**

There are several limitations of the project. The first limitation is that the QI team did not include the director of international travel in the policy development process. This individual has vast knowledge of where students and staff members travel and the best ways to track where they have been. As the EVD policy is revisited and revised, it would be appropriate to invite this individual to participate in the QI process. Gaining the international travel director’s buy-in and expertise, could add credence and strengthen the final product.

A second limitation is that the job duty checklist did not include a time-table for action items. A checklist does not notify the reader whether an incomplete task has been initiated or how long it took to complete a task. Adding a Gantt chart to the checklist informs the reader about the amount of time needed for each job. A Gantt chart is a horizontal bar chart that visually
demonstrates the time lapse between when a task is initiated and completed. It provides a simple
way of tracking progress and would be useful to reference when developing time-tables for other
projects.

A final limitation is that the EVD training surveys were not assessed for validity or
reliability and did not incorporate measures for assessing the long-term effects of the EVD
training sessions. Although the Kirkpatrick method of assessment is extremely popular and easy
to administer, it remains difficult to assess the long-term implications of training sessions.
Critics question the effectiveness of the model, stating it is too simplistic and assumes a
relationship between an individual’s reaction to a training session and organizational change
(Bates, 2004). Despite any weakness associated with the questionnaire, it allowed the
participants to write-in thoughts and comments, thereby providing highly valuable qualitative
information for the QI team to incorporate into future training sessions.

Recommendations

The college has already begun developing a communicable disease task force and this
project emphasizes the importance of continuing the task force. The threat of EVD has
heightened awareness of preparedness opportunities and demonstrated that planning for an EID
does not necessitate fear or drama. The disease prompted the health center to pay careful
attention to travel histories and to develop strong relationships with public health authorities.
Furthermore, as Roberts (ACHA, 2014b) mentions, there are many health issues for a college to
address, and having an active task force would keep infectious disease planning a priority within
the health center and the greater college community.

Another recommendation is to continue developing and implementing training sessions.
The survey respondents indicated that they would like more practice using PPE and that although
they found the training material applicable and relevant, they did not all feel capable of performing the tasks as they were outlined in the training sessions. As part of training development, it would also be beneficial to create a training assessment tool for tabletop sessions. Tabletop sessions represent an important component of both training and policy development and it would be advantageous to obtain participant feedback. This information would allow the health center to identify ways in which a session was beneficial as well as areas for improvement.

The Doctor of Nursing Practice Essentials

This project emphasized the different roles that nurses fulfill, including those of scholar, educator, and leader. It provided an opportunity to research best practices, utilize problem-solving skills, and work in a transdisciplinary team. The American Association of Colleges of Nursing (AACN) defines nursing practice as “any form of nursing intervention that influences health care outcomes for individuals or populations, including the direct care of individual patients, management of care for individuals and populations, administration of nursing and health care organizations, and the development of health policy” (p. 2, 2004). Advanced nursing practice incorporates a number of different competencies that one develops through the completion of graduate-level nursing courses (Brown, 1998).

The AACN outlines eight essential competencies of doctoral nursing practice education (2006). This project incorporated aspects of each of the essentials but emphasized four of them: organizational and systems leadership for QI and systems thinking; health care advocacy in health care; interprofessional collaboration for improving patient and population health outcomes; and clinical prevention and population health for improving the nation’s health. Mastery of the DNP competencies necessitates leadership, innovation, and scholarship and
provides nurses with the skills to help transform healthcare.

There are several reasons why a doctorally-prepared advanced practiced registered nurse (APRN) is well-suited to planning and implementing a preparedness plan for a college health center. To begin, an APRN has the clinical background to understand both the pathology of disease and the challenges of patient care. Second, doctoral-level education provides the nurse with critical thinking skills and the ability to conceptualize health issues at both the organization and systems level, expertise that is invaluable for health care advocacy and policy development. Third, the Doctor of Nursing Practice degree teaches leadership and management skills, allowing the APRN to guide transdisciplinary teams through the steps of a quality improvement project.

**Conclusion**

The scholarly project demonstrates how a transdisciplinary team created, revised, and implemented a campus-specific EVD preparedness plan. It sets a precedent for future QI efforts within the organization and brought team members together, making communicable disease management a priority within the organization. The change process provided the college with an opportunity to develop the tools to address a real world problem, and was enhanced by the use of conceptual models to guide the implementation process through to completion. It also demonstrated how the essential competencies of the Doctor of Nursing Practice degree can be utilized for policy development and project management.

As with most preparedness efforts, it is difficult to grasp the long-term effects of the project, however, there is little doubt that the process stimulated conversations and reinvigorated policy writing within a college health center. One must realize that the creation of a plan is not an end, but a beginning: there will continue to be emerging health threats and the college will
continue to develop, revise, and enhance their emergency response plans. Ultimately, this project demonstrates one small step in a much larger endeavor.
Appendix A: Project Timeline

- **First approached Health Center about scholarly project**: November, 2013
- **Conducted handwashing audits**: January, 2014
- **WHO declares EVD a Public Health Emergency of International Concern**: August 8, 2014
- **Initial Planning Session with Health Services**: November 5
- **Tabletop Session with Key Stakeholders**: November 26
- **Health Services and Campus Safety Trainings**: December 10
- **Present project findings at Health Services**: April 1, 2015
- **First case of EVD in West Africa**: December, 2013
- **Switched project topic to EVD**: February-June, 2014
- **Conducted handwashing audits**: August 20, 2014
- **Switched project topic to EVD**: November 12
- **Initial Planning Session with Campus Safety**: December 9
- **Informational Session with Student Life**: March, 2015
- **Interviews with Key Stakeholders**: April 1, 2015
- **Policy Revisions Submitted and Approved**: April 1, 2015

Plan: Revise → Revise → Revise → Revise → Do
Study → Act
12 March, 2015

Ms. Julie Cooper  
155 Hidden Lake Ct SE  
Grand Rapids, Michigan  49546

Dear Ms. Cooper,

Upon review of the aims and description of the project you are planning entitled, “The Development of an Evidence-Based Ebola Virus Disease Preparedness Plan for a College Health Center”, it has been determined that it does not fit the U.S. Dept. of Health & Human Services’ definition of research. This definition states that research is, “…a systematic investigation, including research development, testing and evaluation, designed to develop or contribute to generalizable knowledge…” (Code of Federal Regulations, Subpart A, Section 46.102 [d], 2005, 2009).

The determination of this project as not being research is based on my review of the materials you submitted. Because it is not research, submission to GVSU’s Human Research Review Committee (HRRC) is not necessary. You may proceed with this project.

As you move forward, you are cautioned that your project should not be referred to as research when you discuss it with others. Should you change the aims and activities of your project such that it would then meet the definition of research as quoted above, please cease any contacts with potential human subjects until such time as you submit the project protocol to the HRRC and receive the committee’s approval to proceed.

Good luck with your project.

Cordially,

Cynthia P. Coviat, PhD, RN, CNE  
Professor & Associate Dean, Nursing Research & Faculty Development

Cc: R. Brintmell

Appendix B: Review of Determination
Appendix C: All-Hazards Emergency Response Overview

Executive Safety Committee:  
Emergency Response Plan

Incident Commander: the most senior administrative manager for the specific incident

Policy Group:

Emergency Operations  
Center Staff:  
Operations  
Planning/Recording  
Logistics  
Finance/Administration  
Environmental Safety

Campus Safety

Health Services

Environmental Health & Safety

Physical Plant  
Communications & Marketing

Residence Life  
Information Technology

Environmental Health and Safety  
Building Liaison
Appendix D: Screening and Patient Management Algorithm for EVD

### Screening and Patient Management Algorithm for Ebola Virus Disease (EVD)

- **Has the individual travelled from a country with widespread EVD transmission** in the last 21 days? **YES**
  - Escort the individual to an isolated room in Health Services and close the door. Notify the lead clinician and initiate notification plan. If positive screening occurs outside of health center, ask individual to remain in place while initiating notification plan:
    - Health Services Director: [Contact Information]
    - Campus Safety Director: [Contact Information]
    - Health & Safety Manager: [Contact Information]

  - If unable to reach any of the above directors contact the Kent County Health Department: [Contact Information]

  - Only essential personnel with designated roles should care for patient.
  - The use of PPE should be based on the patient’s clinical status.
  - Consult with the Calvin Health & Safety Manager and KCHD before cleaning up blood or body fluids.
  - Any reusable equipment should not be moved or reused until it has been appropriately cleaned and disinfected.
  - Any updated information is available at the CDC website: Ebola Virus Disease information for Clinicians

- **NO**
  - Follow routine practices; Standard Precautions

- **Has the individual travelled from a country with widespread EVD transmission** in the last 21 days? **NO**
  - Follow routine practices; Standard Precautions

- **Does the patient present with a fever > 100.4°F or compatible EVD symptoms**? **YES**
  - Coordinate with KCHD to notify Spectrum ED about patient transfer:
    - Infection Control Unit: [Contact Information]
    - ED Intake Nurse: [Contact Information]
    - ED main: [Contact Information]

- **NO**
  - Report asymptomatic individuals to KCHD. Follow routine practices; Standard Precautions

### Notes:

1. Country with widespread EVD transmission = Guinea, Sierra Leone, Liberia, (Mali, Congo)
2. Compatible EVD symptoms = headache, Weakness, muscle pain, vomiting, diarrhea, abdominal pain, or hemorrhage.

This tool, the screening criteria, and recommended precautions are subject to change based on new information from the WHO, CDC and/or MI Department of Health.
Appendix E: Clinician Response to a Person Under Investigation for EVD

**Clinician Response to a Person Under Investigation for EVD**

1. Positive EVD screen identified by Health Center staff or Campus Safety.
   - **YES**
     - The lead clinician will confer with Kent County Health Department and the PUI\(^1\) to investigate and determine EVD risk level.\(^2\)
     - Per investigation of EVD risk level, does PUI require EVD testing?
       - **NO**
         - KCHD\(^3\) will assist in determining any public health actions, such as patient monitoring or movement restrictions. Follow routine health care practices and utilize standard precautions.
         - **YES**
           - Advise the PUI to remain in place and to follow guidance from KCHD while awaiting the arrival of the strike team.

2. Was the PUI identified while in health center?
   - **NO**
     - Health center employees are to follow EVD protocol for PPE\(^4\) use and patient isolation and await KCHD strike team\(^5\).
   - **YES**
     - Campus Safety employees are to don PPE and transfer PUI to Health Center per EVD protocol. Health center employees will follow EVD protocol for PPE use and patient isolation and await KCHD strike team.

3. Is the PUI currently on-campus?
   - **NO**
     - The Health Center will remain closed pending results of EVD testing.
   - **YES**
     - NO

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**Notes:**

1. PUI = Person Under Investigation
2. EVD Risk Level = See attached list of risk level definitions from the CDC
3. KCHD = Kent County Health Department
4. PPE = Personal Protective Equipment
5. Strike team = KCHD nurses trained to perform blood draw on PUI for EVD.
Appendix F: Health Services Response to a Person Under Investigation for EVD

Health Services Response to a Person Under Investigation for EVD

Triage Nurse
1. Call Directors of Health Services, Campus Safety, and Environmental Safety per EVD Algorithm
2. Check in with clinician to determine how to be of assistance

Front Desk
1. Ask patient to remain in place until he/she can be escorted to designated room
2. Close the front window
3. Notify Triage Nurse and Travel Team of situation
4. Ask patients in the waiting room to remain seated
5. Await guidance from lead clinician

Travel Team
1. Do not take any further appointments
2. Await guidance from lead clinician

Lead Clinician guides patient to isolation room, opening doors for the patient and avoiding unnecessary contact.

Clinician asks patient:
- Earliest date of symptom onset; sequence of signs and symptoms of illness
- Dates, times, locations, and reasons for travel within the last 21 days
- Any exposure to ill individuals
- Any malaria prophylaxis prior to travel

Clinician will consult with county health department to determine if patient needs to be tested for EVD. If no testing is needed, provide patient with standard care and resume normal work activities. If testing is needed, the clinician will inform staff members to close Health Services and proceed with the following steps:

Triage Nurse
3. Gather supplies for clinician as outlined in EVD policy
4. Remain available to lead clinician to provide support and assist in documentation of patient care

Front Desk
6. Assist clinicians in expediting processing of any patients in Health Services
7. Consult with Office Manager about changing voice messaging
8. Calls from the Health Department of Hospital System should be transferred:
   [Redacted]
9. Send calls with questions from parents or students to Communications team

Travel Team
3. Collect contact info from individuals in waiting room and escort them out
5. Place closing signage on doors
6. Use stands to block access to isolation room
Appendix G: Communication Tree

If an individual requires EVD testing, notify the following individuals:

Health & Safety Officer
  - Director of Physical Plant
  - Triage Nurse
  - Building Services Director

Campus Safety Director
  - Dean of Residence Life
  - Associate Dean of Residence Life
  - Resident Director on Call

Health Services Director
  - College President
  - County Health Department
  - Infection Control Unit

Interim VP for Student Life
  - Director of Communications and Marketing
  - Remaining Cabinet Members
  - Media Relations Manager
## Appendix H: EVD Response Job Duty Checklist

<table>
<thead>
<tr>
<th>Item</th>
<th>Responsible Person</th>
</tr>
</thead>
<tbody>
<tr>
<td>Finalize PPE protocol</td>
<td></td>
</tr>
<tr>
<td>Create Campus Safety protocol for dispatch questions</td>
<td></td>
</tr>
<tr>
<td>Create Campus Safety protocol for responding to dispatch call</td>
<td></td>
</tr>
<tr>
<td>Create Campus Safety Protocol for coming upon sick person</td>
<td></td>
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<tr>
<td>Prepare communication to public: generate talking points and prepared statement</td>
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</tr>
<tr>
<td>Prepare communication document for travelers (students/faculty/staff) going to or returning from effected countries</td>
<td></td>
</tr>
<tr>
<td>Ensure plan in place for sending automated messaging to appropriate groups of people (i.e. crisis management teams)</td>
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<tr>
<td>Determine when Policy Group convenes in the event of a suspected case</td>
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<tr>
<td>Update Health Center website to recent CDC info on Ebola</td>
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<tr>
<td>Generate talking points for travel coordinator</td>
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<tr>
<td>Demonstrate PPE donning and doffing using fluorescent gel</td>
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<tr>
<td>Create environmental cleaning protocol</td>
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<tr>
<td>Create waste management protocol</td>
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<tr>
<td>Provide overview of current progress and plan to stakeholders</td>
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</tr>
<tr>
<td>Create Go-Kits</td>
<td></td>
</tr>
<tr>
<td>Define roles and responsibilities for EVD response team</td>
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<tr>
<td>Create Health Services SOP for EVD response</td>
<td></td>
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<tr>
<td>Create signage for temporary closing of Health Services</td>
<td></td>
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<tr>
<td>Create task list for Health Services front desk staff</td>
<td></td>
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<tr>
<td>Generate phone tree (approve list beforehand; implement during event)</td>
<td></td>
</tr>
<tr>
<td>Create frequently asked questions list regarding EVD</td>
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</tr>
<tr>
<td>Install additional phone lines in exam room</td>
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</tr>
</tbody>
</table>
Appendix I: Training Assessment Surveys

Ebola Virus Disease

Pre-Training Assessment Survey

The basic CDC guidelines for how to manage individuals with possible Ebola Virus Disease in a non-hospital environment are:

a). Identify, Isolate, and Inform
b). Stay calm and call the local health department
c). Prepare and Prevent
d). Take Temperature, Triage, and Treat

Ebola Virus Disease is transmitted via:

a). Food and water
b). Contact with body fluids
c). Air
d). Mosquitos

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Neutral</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ebola Virus Disease training is relevant to my job.</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>I know how to respond if I encounter an individual who has recently traveled to Guinea and states they have a high fever.</td>
<td></td>
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</tr>
</tbody>
</table>
Ebola Virus Disease

Training Assessment Survey

We appreciate your feedback! Your response and comments will help us improve future training sessions.

<table>
<thead>
<tr>
<th>Statement</th>
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<th>Neutral</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>My overall experience with the Ebola Virus Disease training was good.</td>
<td></td>
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<tr>
<td>I will be able to apply the material learned today to my job.</td>
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</tbody>
</table>

Which topics covered in the training session were most beneficial?

What could have been done to improve the training?

The basic CDC guidelines for how to manage individuals with possible Ebola Virus Disease in a non-hospital environment are:

a). Identify, Isolate, and Inform
b). Stay calm and call the local health department
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<td></td>
</tr>
<tr>
<td>I feel capable of performing the tasks detailed in the Ebola Virus Disease Training.</td>
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</tbody>
</table>
Appendix J: Semi-Structured Interview Questions

Ebola Virus Disease
Semi-Structured Interview Questions

1. How do you feel about your participation in the development of an EVD preparedness plan? Tell me about anything that you found surprising or unexpected about the process.

2. This preparedness project utilized an interdisciplinary team. How do you feel the incorporation of individuals from a variety of disciplines impacted the quality improvement process?

3. How would you describe the usefulness of the project? What do you think was done well? How do you think the project could have been modified to be more useful or to have a greater impact?
References


Centers for Disease Control and Prevention. (2014g) Guidance on personal protective equipment to be used by healthcare workers during management of patients with Ebola Virus Disease in U.S. hospitals, including procedures for putting on (donning) and removing (doffing). Retrieved from http://www.cdc.gov/vhf/ebola/healthcare-us/ppe/guidance.html


Epidemiologic and health control issues. *The Journal of Infectious Diseases, 179*(S1), S65-S75. doi:10.1086/514290


Submission agreement for Scholarworks (no page number)