

PERCEIVED BIOTERRORISM PREPAREDNESS AND THE IMPEDIMENTS TO
BIOTERRORISM PREPAREDNESS OF RURAL PHYSICIANS

By

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This document is dedicated to Mom and Tricia.

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Abstract of Dissertation Presented to the Graduate School
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PERCEIVED BIOTERRORISM PREPAREDNESS AND THE IMPEDIMENTS TO
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Recent public health emergencies such as the September 11, 2001, terrorist attacks on the World Trade Center in New York City, the use of anthrax as a bioterrorist tool against citizens, and other natural disasters in the United States have increased awareness of the nation's vulnerability to large-scale emergencies. To moderate the risks and magnitude of public health emergencies deriving from such events, the United States has made emergency preparedness a priority for public health advocates and physicians. In particular, scant attention has been given to preparing physicians and other health care providers in the United States' sparsely populated areas for public health emergencies such as bioterrorist events. Yet emergency preparedness in rural communities is a significant issue for the nation given that roughly 80% of United States land is classified as rural and one-fourth of the United States' population lives in rural areas.

The study utilized the interview data transcripts from six rural physicians as the primary data with which to explain the state of emergency preparedness of rural physicians and to explain and better understand the barriers to preparedness encountered by these rural health care providers. The principal objectives of this study were to

provide a greater description and understanding of rural physicians' perceived preparedness regarding public health emergencies such as bioterrorist events.

Physician participants expressed a lack of bioterrorism preparedness in five facets: cognitive, clinical, expectation, simulation and resource preparedness. In essence, rural physicians were unaware of the pertinent signs and symptoms of bioterrorist-inducing agents, the relevant risk factors, and the appropriate therapeutic treatments. Additionally, rural physicians described their expectation preparedness as low. Physicians explained that although simulation exercises and corresponding training opportunities existed, many of them had not availed themselves to these endeavors. A dearth of resources, specifically a lack of specialty physicians, was also cited. Thus, rural physicians felt less than fully prepared both intellectually and professionally for a bioterrorist event.

This study discovered that, although there are knowledge gaps in physician's bioterrorism education and training, these gaps appear to be the result of personal choice and discretion. This study substantiates that there appears to be a significant need to take additional decisive steps to encourage rural physicians to attend bioterrorism preparedness seminars. Furthermore, it appears there is a compelling need for improved preparedness regarding bioterrorism knowledge surrounding the associated important risk factors and therapeutic medical interventions for bioterrorist infectious agents. Furthermore, it appears from this study that if rural physicians are provided with a greater number of resources – financial, educational and technological –they will inevitably feel better prepared and perceive more auspicious health outcomes for their patients. Thus, strategically implemented health policy objectives can have a tangible impact on the impediments identified in this study which have hindered rural physician preparedness.

CHAPTER 1 INTRODUCTION

Natural disasters such as earthquakes, tropical cyclones, floods, and volcanic eruptions have claimed approximately three million lives worldwide during the past 20 years, have adversely affected the lives of at least 800 million more people, and have caused more than \$50 billion in property damage (Office of US Foreign Disaster Assistance, 1995; National Academy Press, 1987). Worldwide, a major disaster occurs almost daily, and natural disasters that require international assistance for affected populations occur weekly (Binder & Sanderson, 1987).

Today, with increasing frequency, the global community is witnessing complex human-induced disasters such as terrorist attacks resulting from the breakdown of traditional state structures, armed conflict, and the upsurge of ethnicity and micronationalism (Noji, 1997). The cause of these human-induced emergencies as well as the assistance provided to the afflicted is influenced by intense levels of complex political, social, and economic considerations (Noji, 1997). The number of refugees affected by a combination of natural and human-induced disasters has increased significantly over the last two decades to an estimated 17 million, and the number of persons displaced through other causes, though difficult to estimate, is probably just as large (Noji, 1997). With both human-induced disasters and the number of their victims increasing, disasters constitute a major public health problem. According to a United States Centers for Disease Control and Prevention (CDC) study, the economic impact of a bioterrorist attack scenario with anthrax as the agent per 100,000 citizens exposed

would be approximately \$26.2 billion (Kaufman et al., 1997). In the absence of an intervention preparedness program for the 100,000 persons exposed, the anthrax cloud would result in 50,000 cases of inhalation anthrax, with 32,875 deaths (Kaufman et al., 1997). Although a large-scale bioterrorist attack of that magnitude has not yet occurred in the United States, the brush with anthrax in October 2001 filled every American with a sense of fear and foreboding (Fottler, Scharoun, and Oetjen, 2004).

The widespread national media attention belied the fact that only five mortalities and 22 persons were actually contaminated from the anthrax bioterrorist attack. Yet our initial response to the anthrax attacks was marred by misinformation, confusion, and widespread public alarm which predominantly flowed from the lack of bioterrorism preparedness. The fear of the unknown gripped Americans as individuals flocked to doctor's offices and emergency departments worried that they might have come in contact with anthrax. They demanded screening and testing for exposure to anthrax, and begged for prescriptions for antibiotics deemed effective for treating anthrax exposure. Although only 22 individuals were infected, more than 10,000 people took antibiotics as a precautionary measure (CDC, 2005). Alarming, as panicked as the American public was with this anthrax scare, a full-blown release of a biological agent could cause immeasurably greater levels of chaos, panic, and mass hysteria (Fottler et al., 2004). Consequently, it is particularly important that front-line healthcare responders such as primary care physicians are well trained and educated regarding bioterrorism agents in order to present clear information to allay the fears of patients and the general public.

The recent public health emergencies such as the September 11, 2001, terrorist attacks on the World Trade Center (WTC) in New York City and the use of anthrax as a

bioterrorist tool against citizens in the United States have increased awareness of the nation's vulnerability to large-scale emergencies. Bioterrorism is now perceived as a real threat to public health. Many healthcare facilities have created emergency operations plans, but it is very questionable if all of our healthcare facilities can effectively respond to a bioterrorist attack (Fauci, 2002; Grow & Rubinson, 2003; Leavitt, 2003; Macintyre & Deatley, 2001). A number of reports have continued to show that public health, healthcare facilities, and local and state governments are not ready for a bioterrorist event (Blair et al., 2004). For example, the most recent one on hospital preparedness by the U.S. Government Accountability Office (2003) came to that conclusion regarding urban hospitals. One may expect even less preparedness from rural hospitals (Blair, Fottler, and Zapanta, 2004). Perhaps the most disturbing information is that hospitals may be more prepared than before, but physicians' offices and ambulatory clinics are not (Wolper et al., 2003). This is particularly problematic because most biological agents result in flu-like symptoms. Thus, it is far more likely that in the early stages for infected or contaminated patients in the early stages to visit their family primary care physicians than to frequent the emergency department of a hospital.

To moderate the risks and magnitude of public health emergencies deriving from such events, the United States has made emergency preparedness a priority for government and military agencies, public health advocates, law enforcement, physicians, and other first responders. Although much of the aftermath of these events has resulted in an increased focus on agencies in urban areas (McHugh, Staiti, and Felland, 2004), it has also become clear that such a focus is necessary in rural areas. Rural areas are especially vulnerable to bioterrorism for a number of reasons (Stamm, 2002; Office of

Rural Health Policy, 2002). National energy sites, nuclear sites, and hazardous materials manufacturers are often located in rural areas. In the advent of a bioterrorist event, rural communities may encounter a mass exodus of many urban residents to neighboring rural areas. Such an event could conceivably overwhelm the existing rural health infrastructure. Additionally, many rural communities are less well defended with respect to urban areas making them easier targets to release bioterrorist agents. Yet little attention has been given to preparing physicians in America's sparsely populated areas for public health emergencies such as bioterrorist events, even though experts warn the risks such incidents would pose to human health appear equally great in rural and urban areas (Stamm, 2002; Wetter, Daniell, and Creser, 2001; Treat et al., 2001).

Unfortunately, there are few data to quantify emergency preparedness in rural communities (Clawson & Brooks, 2003; Stamm, 2002; Office of Rural Health Policy, 2002). If emergency-related resources in rural areas are lacking, rural readiness for future emergencies may be compromised (Clawson & Brooks, 2003).

Emergency preparedness in rural communities is a significant issue for the nation given that roughly 80% of United States land is classified as rural (Office of Rural Health Policy, 2002). One-fourth of the United States' population lives in rural areas. Rural communities are found in all states, and 65 million Americans live in these communities (Glasgow, Morton, and Johnson, 2004). Adequate emergency preparedness in rural communities depends on coordinated efforts among public health departments, community health centers, hospitals, and physicians. However, rural public health departments tend to have less capacity and resources as well as less epidemiological surveillance capacity than their urban counterparts. For example, physicians and mental

health providers are much less common on a per capita basis in rural settings than in metropolitan or urban settings (Office of Rural Health Policy, 2003; Wallace, Grindeanu, and Cirillo, 2004). Further, in comparison to urban communities which typically have several hospitals, in many rural communities a single hospital may be the only nucleus of health planning, activity, and resources for the entire community (Office of Rural Health Policy, 2002). However, national policy changes have encouraged hospitals to downsize bed capacity in an effort to contain costs and, as a result, rural hospitals lack surge capacity for personnel and beds (Office of Rural Health Policy, 2002). Rural physicians, similar to urban physicians, may lack the training and resources to respond to a public health emergency such as a bioterrorist event. Rural physicians are also more likely to provide care outside their specialty areas and do so more often than their counterparts in urban areas (Office of Rural Health Policy, 2003; Wallace et al., 2004).

Even within the community of rural physicians there is variation in emergency preparedness for bioterrorist events. Some rural community physicians are completely unprepared, others are somewhat prepared, and some are taking active steps to achieve a level of preparedness that is consistent with the inherent unpredictability of these events. Quite apart from their actual preparedness, physicians have highly variable perceptions of their preparation. It may be that some are well prepared but perceive themselves as ill-equipped, whereas others may have misplaced confidence in their degree of preparedness.

Barriers to improved preparedness have been well documented and must be overcome in order for physicians to be prepared (McHugh et al., 2004; Blair et al., 2004; Fottler et al., 2004; United States Government Accountability Office, 2002). These

barriers include but are not limited to a dearth of applicable knowledge and education, a lack of finances, geographical isolation, a lack of communication or coordination, and a lack of access. However, we do not know which barriers are most important in impeding rural physicians' emergency preparedness for bioterrorist events and if rural physicians are not prepared for public health emergencies such as bioterrorist events because of these barriers. Thus, we do not know which of these impediments that rural physicians face are the most important to overcome in attempting to become better prepared for rural bioterrorist events. Thus, the purpose of this study is to describe and understand the variation in emergency preparedness for bioterrorist events of physicians within the rural settings. An additional purpose is to attempt to explain the reasons why rural settings and rural physicians are unprepared or less prepared than they should be. The final purpose of this study is to identify barriers to preparedness, thereby elucidating who is better prepared and why are they perceived as better prepared.

Figure 1-1 illustrates a graphical representation of the four principal spheres of inquiry that this study will examine. Of the four spheres, the central focus of the research questions will be to examine the two spheres of perception.

An important distinction needs to be made between actual preparedness and perceived preparedness. This distinction is salient because actual emergency bioterrorism preparedness may or may not be synonymous with or equal to perceived preparedness. Actual preparedness involves tangible experiences such as medical education and training in identifying bioterrorism agents and the corresponding infectious diseases. Perceived preparedness involves those very same elements as well as the individual physician's perception of his/her preparedness. A physician may have had

actual training and education and yet still not perceive himself/herself as being prepared. For instance, a physician may have learned of the signs and symptoms and how to identify a bioterrorist incident, but not perceive himself/herself as being prepared because of the lack of a tangible real-life experience. Thus, one of the spheres reflects actual emergency bioterrorism preparedness (upper sphere) among rural physicians and the other reflects perceived emergency bioterrorism preparedness (left sphere).

This same distinction may be made between actual barriers to preparedness and the perceived barriers to preparedness. A physician may be able to identify actual barriers to preparedness and these barriers may be rectified a priori to an event. Yet this amelioration of actual or tangible barriers to preparedness may not even dispel an individual's perception of barriers to preparedness. This is because individuals may feel that increased resources, education, or training may assist in mitigating barriers, but may not completely resolve what is being perceived as a barrier. Thus, the resolution of perceived barriers may not be possible. Nevertheless, the identification of these individual perceptions is important because perception is a powerful arbiter of actions that might influence preparedness. So one of the spheres reflects actual barriers to emergency bioterrorism preparedness (right sphere) among rural physicians and the other reflects perceived barriers to emergency bioterrorism preparedness (lower sphere).

This study is extracted from primary data of a larger study funded by the Agency for Healthcare Research and Quality (AHRQ). This larger study is an AHRQ 1 UO1 HS14355-01 grant entitled "Bioterrorism Preparedness among Rural Florida Communities." The project is a two-year federally funded project to evaluate

bioterrorism preparedness and health needs in rural North Central Florida and the Florida Panhandle.

Florida is an important state to examine regarding bioterrorism preparedness for a number of reasons. As of 2005, it is the fourth most populated state in the nation with an estimated population of almost 18 million (U.S. Census Bureau). Florida contains 67 counties and 37 are designated as rural counties (U.S. Census Bureau). These rural counties possess similar attributes, impediments and socio-cultural characteristics that define rural areas across the United States. Florida's annual tourist population is estimated to be between one million and four million persons (Clawson & Brooks, 2003). This includes a significant portion of international visitors, as well as transient tourists who number over 40 million during any given year (Clawson & Brooks, 2003). Thus, the implications for preparedness involving rural settings in Florida may be generalizable and therefore valuable from a policy perspective.

The AHRQ grant project's principal objective is to gain a better understanding of the treatment of rural residents following the aftermath of bioterrorist and other public health emergencies. The aim of the project is to promote public health emergency preparedness, including needs for long-term care, rehabilitation services, chronic physical ailments, and mental healthcare. Interviews were conducted with key organizations and individuals across the state of Florida to assess existing resources and response mechanisms in rural communities to meet anticipated health needs arising from bioterrorist events. The information obtained from these assessments may serve as the basis for recommendations to policymakers to improve bioterrorism preparedness in rural communities across the nation. The assessments will highlight special concerns of

certain priority populations, including women, children and families, and senior citizens. The project will also develop an intervention to educate primary healthcare providers concerning important aspects of mental healthcare.

The interviews included questions regarding the organization, annual budgets and funding sources, services provided at the clinic, and patient socio-economic demographics. Questions were posed regarding medical and mental health conditions commonly encountered at the clinic. Additionally, questions were asked regarding policies concerning the various medical conditions and training/policies regarding infectious diseases and other agents that may be used in bioterrorist events.

My research interests combined with my intellectual curiosity and my professional background within public health and as a physician have fostered unique yet related research questions to augment the larger federally funded project's objectives. This study's principal objectives are to describe and explain physicians' perceived bioterrorism preparedness and the individual perceived impediments affecting physicians' preparedness. The evidence obtained from this research is intended to serve as an addition to the core project. It will serve as the basis for policy and clinical recommendations and possible tools to assist physicians and other healthcare providers to improve bioterrorism preparedness at medical sites and within health systems.

Thus, this qualitative study will describe the observed state of emergency preparedness and barriers impeding preparedness from the rural healthcare providers' perspective. The interviewed healthcare providers were selectively sampled from sites in rural North Central Florida and the Florida Panhandle and include individual healthcare professionals who work in rural community health centers (CHC), rural county

Departments of Health (DOH), rural healthcare clinics, and rural private medical offices. The study will use the interview data transcripts from these sites and six rural physicians as the primary data with which to explain the perceived state of emergency preparedness of clinicians and to explain and better understand the barriers to preparedness encountered by these rural physicians. This study will not focus on empirical testing, but instead will qualitatively explore the variation or degree to which rural physicians consider themselves to be prepared for bioterrorist events. In summary, this study will address two research questions:

- What is the perceived bioterrorism preparedness among rural physicians?
- How do the perceived impediments hinder rural physicians' preparedness?

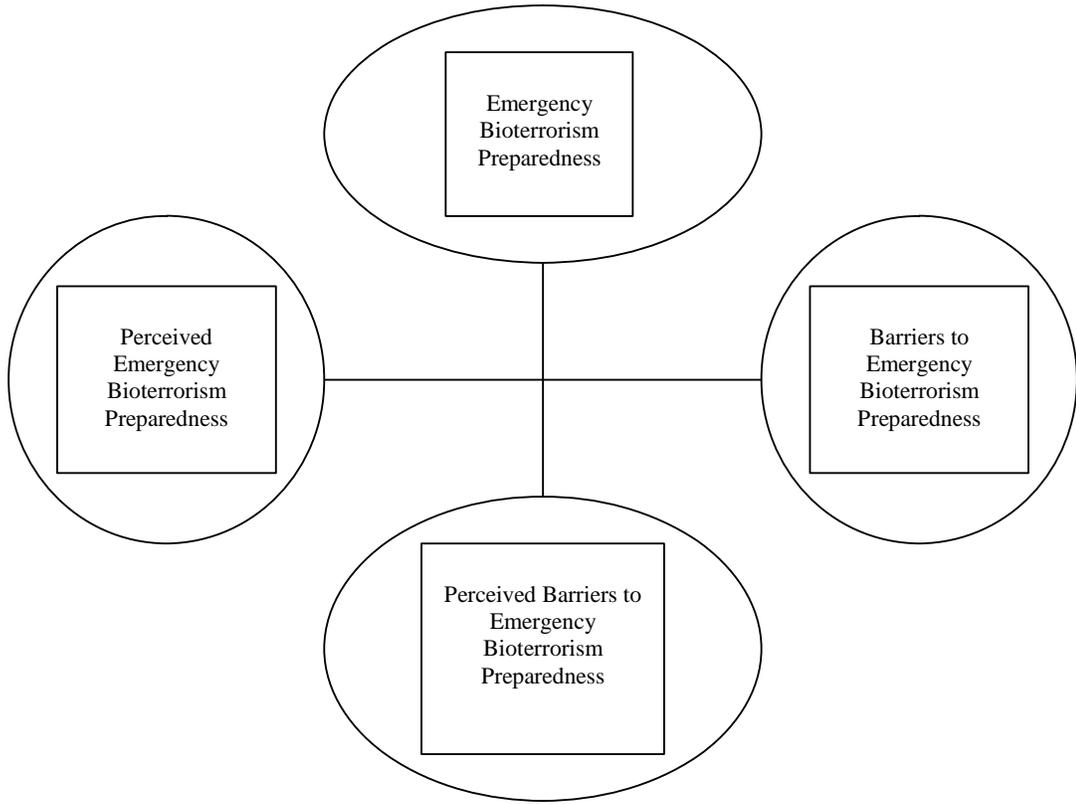


Figure 1-1: Actual Versus Perceived Bioterrorism Preparedness

CHAPTER 2 BACKGROUND AND LITERATURE REVIEW

Background of Disasters

A disaster by definition is a calamitous event, especially one occurring suddenly and causing great loss of life, damage, or hardship (Webster's Dictionary, 1984). A disaster from a healthcare perspective may be defined as "a catastrophic event which, relative to the manpower and resources available, overwhelms a healthcare facility and usually occurs in a short period of time" (Betts-Symonds, 1994). Thus, disasters are tragedies that overwhelm our communities, destroy our property, and harm our populations (Waeckerle, 1991).

Disasters in general may be divided into either natural disasters or human-caused disasters (Figure 2-1). Natural disasters include events such as hurricanes, earthquakes, and tornadoes. The numbers of natural disasters, the people affected by them, and the economic costs associated with them have been steadily increasing since the mid-twentieth century (FEMA, 2003; Alexander, 1997; Berz, 1994; Berz, 1991). The number of people affected by natural disasters in the last 50 years equals about two-thirds of the world's population (FEMA, 2003). These natural disasters have claimed approximately three million lives worldwide during the past 20 years, and have adversely affected the lives of at least 800 million more people, and have caused more than \$50 billion in property damage (Noji, 1997).

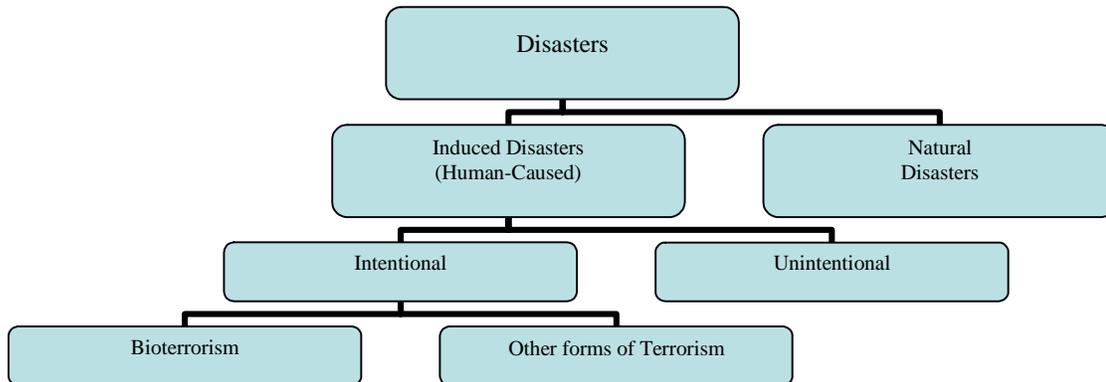


Figure 2-1: Overview of Disasters

In the United States, presidential disaster declarations averaged 35 per year from 1976 to 2002 and were routinely sought for events that exceeded state capabilities (FEMA, 2003). With both disasters and the number of their victims increasing, disasters are now recognized as a major public health problem. Every state and territory in the United States has communities that are at risk from one or more natural hazards (Hays, 1990). The CDC has a principal responsibility to nationally prepare for and respond to public health emergencies such as disasters, as well as to conduct investigations into the health effects and medical consequences of disasters (Noji, 1997).

A disaster may also be induced or caused by humans, and this category includes both unintentional and intentional disasters. An unintentional induced disaster includes events such as the fire in one of the reactors at Windscale in Great Britain in 1957, the nuclear explosion at Chernobyl in 1986, or the mechanical failures that led to the release of volatile radioactive materials in Pennsylvania at Three Mile Island in 1978, whereas an

intentional induced disaster is one in which the principal direct causes are identifiable deliberate human actions. The global community is witnessing an ever-increasing number of complex emergencies resulting from the breakdown of traditional state structures, armed conflict, and the upsurge of ethnicity and micronationalism, including examples such as Bosnia, Somalia, and Rwanda (Noji, 1997). The numbers of refugees affected by both natural disasters and human-caused disasters have increased to an estimated 17 million (Noji, 1997). Another subset of these human-caused intentional disasters includes acts of terrorism accomplished through the use of biological or chemical agents, explosives, or radiation.

This study will focus on intentional domestic disasters, or more specifically, bioterrorist events. Terrorism may be further subdivided into biological terrorism or other forms of terrorism. Bioterrorism may be defined as the intentional release of potentially deadly bacteria and/or viruses into the air, food, or water supply (Frist, 2002; Karwa, Currie and Kvetan, 2005). With the events on September 11, 2001, and the subsequent anthrax attacks, the once seemingly remote threat of a bioterrorist attack in the United States is now a reality (CDC, 2001; Borio et al., 2001; Mayer, Bersoff-Matcha, and Murphy, 2001, Cherry, Kainer, and Ruff, 2003; Jernigan, Stephens, and Ashford, 2001; Tucker, 1999; Trumbull & Abhayaratne, 2004). The terrorist attacks of September 11, 2001, demonstrated that the United States is no longer isolated from a dangerous world or protected by its geography.

The other forms of terrorism include the use of explosives, chemicals, nuclear weapons, and radiation as instruments of mass destruction. Previous research related to terrorism such as the WTC disaster on September 11, 2001, will be included and

reviewed as it relates to bioterrorism in general, but the central thrust of this study is to examine rural physicians' perceived emergency preparedness for terrorism, specifically bioterrorism, although also chemical and radiation terrorism in the United States post September 11, 2001. Thus, the emphasis is very contemporary, i.e., late 20th century and early 21st century.

Terrorism History and Perceived Threat

Historically, there have been relatively few instances of the use of bioterrorist agents, but recently their use has escalated and the threat of a large-scale bioterrorist attack has become quite real (Jernigan et al., 2001; Inglesby, Grossman, and O'Toole, 2001). A recent report by the Monterey Institute for International Studies found a total of 121 bioterrorist agent crimes have been committed since 1960, with a reported sharp rise in them since 1995 (Tucker, 1999). In 1999, there were a total of 175 incidents accounting for 25% of the total number since 1900. This was followed by a dramatic peak in 2001 of 629 incidents, although 603 were hoaxes (Trumbull & Abhayaratne, 2004). Although the number of terrorist incidents may have been small by percentage in 2001, the increasingly omnipresent threat and perception of a possible bioterrorist event and the subsequent hysteria that is produced can be quite disruptive.

Bioterrorism may be defined as the intentional release of biological infectious agents, including microbes such as *Bacillus anthracis* (anthrax), *Variola major* (smallpox), *Yersinia pestis* (plague), or *Clostridium botulinum* toxin. Bioterrorism in the United States was seen with the use of *Salmonella* by the Rajneesh Sect in 1984. This was a bioterrorist event that resulted in 750 cases of salmonellosis with 45 hospitalizations and zero fatalities (Torok, Tauxe, and Wise, 1997; Tucker, 1999). Internationally, there were multiple failed bioterrorist attempts by the Aum Shunrikyo

sect in Japan between the years of 1990 through 1995. The sect's failed attempts consisted of the use of aerosolized anthrax and botulinum toxin with no reported casualties (Tucker, 1999; Henderson, 1999). And there was a bioterrorist event as recently as of October 2001 in the United States with the dissemination of anthrax spores through the United States Postal Service.

Today oceans and borders are readily crossed, making the United States as vulnerable as other nations to acts of terrorism. International unrest and terrorism have become all too familiar to Americans. Although the predominant weapons of international terrorism continue to be improvised explosive devices, as evidenced by the bombings in London in July 2005 and Madrid in March 2004, acts of biological terrorism are a potential threat that could have serious immediate and long-term consequences. Bioterrorist agents could cause mass casualties, resulting in significant morbidity and mortality, societal disruption, and long-term human and economic hardship (Danzig, 2003; Inglesby et al., 2000). The strain that such events would impose on the medical infrastructure—from hospital beds and pharmaceutical supplies to emergency departments, primary care medical offices, and clinics—would probably be unprecedented, especially given the fact that an attack with biological weapons would not be known in advance (Karwa, Bronzert, and Kvetan, 2003; Inglesby et al., 2001; Borio et al., 2001; O'Toole, 1999). The scientific advances in the field of microbial genomics, proteonomics, and related technologies further contribute to the fear of biological weapons use with potentially devastating results. With the dissolution of state-sponsored biological weapons programs, the security surrounding this vast intellectual property is questioned, theoretically making it easier for a rogue nation or radical extremists to buy or steal it for

use in terrorist activities (Karwa et al., 2005). Thus, despite few historical precedents, the possibility of a large catastrophic bioterrorist attack is quite possible.

National Preparedness Efforts

Prior to the WTC Disaster on September 11, 2001, the CDC was designated by the United States Department of Health and Human Services to coordinate and lead an overall planning to upgrade national public health infrastructure and preparedness capabilities at the local, state, and federal levels to respond to biological and chemical terrorism (CDC, 2000; Lillibridge, Bell, and Roman, 2000). Examples of this planning were Project Topoff and Operation Dark Winter, which took place in May and June 2001, respectively, in the United States. Operation Dark Winter was a role-playing exercise developed and produced by the Center for Strategic and International Studies, Johns Hopkins Center for Civilian Biodefense Studies, and ANSER (Analytical Services) Institute for Homeland Security to test the ability of the federal, state, and local governments to respond to mass-casualty incidents of biological terrorism (Inglesby et al., 2001). In the mock disaster, former senior government officials played the roles of salient leaders as a way of testing the government's communication procedures and other processes that would be crucial to making decisions about responses regarding a smallpox attack. During a period of two weeks, the smallpox epidemic dispersed to more than 20 states and 10 countries, with 16,000 reported cases and 1,000 mortalities (Frist, 2002). The Dark Winter disaster exercise revealed a number of vulnerabilities in emergency bioterrorism preparedness. Operation Dark Winter suggested that the United States does not have adequate supplies, effective organizational systems, or the communication networks necessary to deal with such an attack (Frist, 2002; Inglesby et

al., 2001). The exercise also revealed that the public health system and hospitals would be rapidly overwhelmed by the enormous increase in patient demand.

Shortly after 9/11, in October of 2001, the anthrax attacks occurred and imposed enormous burdens on already strained public health systems. Public health responsibilities after the anthrax attacks included providing expert consultative advice regarding the appropriate care to anthrax patients, investigating possible contamination sites, testing of numerous suspected materials, hospital surveillance for new cases, administration of antibiotic prophylaxis to tens of thousands of at-risk individuals, and providing risk communication to the public (Gershon et al., 2004). These responsibilities were in addition to the routine delivery of essential services and affected nearly every sector of the public health infrastructure, including hospitals, clinics, pharmacies, and medical practices, all of whom reported a significant rise in the number of patients with psychosomatic complaints and antibiotic requests (Gershon et al., 2004).

The response to the anthrax attack was a multi-disciplinary effort involving epidemiologists, public health officials, law-enforcement personnel, government agencies, laboratory staff, media organizations, health professionals, and others. The scale of this response exemplifies the resources and planning needed for emergency bioterrorism preparedness in the United States. Yet no amount of planning could have produced a good outcome without an astute physician who suspected and diagnosed the first case and immediately notified the appropriate authorities (Gerberding et al., 2002). Previous research has shown that optimal preparedness for an epidemic of any infectious disease requires a multidisciplinary approach (Inglesby et al., 2000; Osterholm, 2001). This multidisciplinary approach to preparedness includes a coordinated response from

physicians, governments, law enforcement, and civilian authorities (Inglesby et al., 2000; Osterholm, 2001; Schoch-Spana, 2000; Waeckerle, 1991).

This is equally important in preparing for an event of bioterrorism-the deliberate release of an infectious agent or toxin-as it is for naturally occurring outbreaks. Bioterrorism preparedness requires physicians to be aware of the possibility of bioterrorism at any time (Gerberding et al., 2002, Inglesby et al., 2000). Plans can only be implemented effectively if physicians are aware of the possibility of bioterrorism, suspect and recognize an event when it occurs, notify public health authorities promptly upon suspicion of such an event, and institute appropriate management. Broader public health aspects of bioterrorism preparedness, including primary prevention measures, are also important areas for informed action by physicians. Medical education and training curricula must include information on key potential agents of bioterrorism, and medical staffs, especially those, such as primary care physicians, who are most likely to see patients affected by a biological weapon, require continuous education in this area. Moreover, physicians from other specialties may need sufficient knowledge of the likely clinical features of potential biological agents in order to recognize patients presenting with a compatible illness (Gerberding et al., 2002; Karwa et al., 2003, Karwa et al., 2005).

Today, in the aftermath of these attacks, additional efforts have been undertaken to enhance the United States' preparedness against biological agents. Proper preparedness suggests the ability to respond to a threat and prevent morbidity or mortality. The CDC identified five key components for a comprehensive public health response to an incident of terrorism: detection (surveillance), rapid laboratory detection, epidemiological

investigation and implementation of control measures, communication, and preparedness planning (Rose & Larrimore, 2002, Gerberding et al., 2002).

Rural Areas and Vulnerability to Bioterrorism

Rural communities are found in all states and 65 million Americans live in these communities (Rosenthal, 2003). The lack of a perceived threat to rural communities often leads to less bioterrorism preparedness (Sterling et al., 2005; Shadel, Rebmann, Clements, Chen, Evans, 2003; McFee et al., 2004). However, given that 65 million Americans live in rural locations, many in close proximity to potential military or economic targets, it is critical that these areas prepare to respond in the event of a bioterrorist attack (Office of Rural Health Policy, 2002).

Rural areas are especially vulnerable to bioterrorism for a number of reasons (Clawson & Brooks, 2003; Office of Rural Health Policy, 2002; Rosenthal, 2003; Stamm, 2002). Rural areas comprise the source of most food and farming distribution, so localized bioterrorism against agriculture could threaten significant portions of the country. Many cities obtain their drinking water from rural reservoirs with limited security. Many national energy sites, nuclear sites, and hazardous materials manufacturers are located in rural areas. Contaminants could be dispersed to cities by crop duster aircrafts originating from rural airports (Stamm, 2002). Although rural areas are not high profile targets such as the WTC or the Pentagon, they are easier targets because of limited supervision and security.

Bioterrorism involves the spread of various infectious disease agents in order to inflict harm or kill others. These agents are a likely choice of weapons by terrorists because they are easy to conceal and disperse among a population. Bioterrorist agents do

not differentiate between individuals or geographical areas. The use of such agents could spread through a population rapidly, thus causing implications to the healthcare system.

The anthrax incident in late 2001 exposed some of the public health ramifications of bioterrorism. The fear of the unknown gripped Americans as individuals inundated physicians' offices and emergency departments worried that they might have been exposed to anthrax. Many patients demanded screening and testing for exposure to anthrax and begged for antibiotics deemed effective for treating anthrax exposure. Thus, access to care was severely affected during this crisis.

Access to care describes the fit between the patient and the healthcare system. Penchansky (1981) defines access as a set of five specific dimensions. The specific dimensions are availability, accessibility, accommodation, affordability, and acceptability. According to Penchansky (1981), problems with access to care, or more specifically with any of the component dimensions of access are presumed to influence patients and the healthcare system in three measurable ways. The first is that utilization of services, particularly entry use, will be lower. Second, clients will be less satisfied with the system and/or the services they receive. Third, physician practice patterns may be affected. For instance, inadequate supply resources may cause physicians to curtail services, devote less than appropriate amounts of time to each of their patients, or use the hospital as a substitute for their short supply. The anthrax incident described in great detail above illustrated and highlighted each of these effects.

A bioterrorist event in an urban area may also result in a mass exodus to a rural area, overwhelming rural physicians with ill and contaminated individuals (Clawson & Brooks, 2003). In a study conducted by Rosenthal (2003), it was found that, due to

lack of funding and complacency, many local health departments were unprepared for the burden of responding to a bioterrorist attack. The Rosenthal study notes that health departments in rural communities, in particular, are unequipped to provide 24-hour emergency response. Rosenthal (2003) also explained that nearly 20% of rural health departments have no Internet access and 10% do not have e-mail, all of which are critical for instant communication and information. Further, exacerbating rural areas vulnerability to bioterrorism is the fact that the number of physicians and other healthcare providers in rural areas is often limited (Clawson & Brooks, 2003). So in the event of a bioterrorist attack, rural communities may become overwhelmed and not be able to provide ancillary support for urban communities (Florida Department of Health, 2002). Moreover, augmenting these vulnerabilities, many rural community physicians do not feel immediately threatened by a bioterrorist attack, which often results in less professional preparation (Bartlett, 2001; Chen, Hickner, Fink, Galliher, and Burstin, 2002; Office of Rural Health Policy, 2002; Shadel et al., 2003; Sterling et al., 2005).

Local Preparedness Efforts and Public Health

Achieving local preparedness requires the translation of national policy initiatives into the implementation of local programs (McFee et al., 2004). Today, an urgent need exists to take decisive steps to improve bioterrorism preparedness especially among healthcare professionals (Rose & Larrimore, 2002). Rose and Larrimore (2002) explain that the current generation of physicians and nurses feel unprepared in both their knowledge base and confidence levels to deal with potential biological terrorism and its consequence. Previous research has underscored this point by showing that community clinicians often are the first to identify potential bioweapon victims yet remain inadequately prepared clinically to address such events (McFee, 2002; Pesik, Keim, and

Sampson, 1999; Sniffen & Nadler, 1999). Consequently, it has become clear that there is a pressing need to rapidly educate and train medical personnel on the signs and symptoms and reporting mechanisms of bioterrorism-related diseases (Gershon et al., 2004). Few studies have examined bioterrorism preparedness (Gershon et al., 2004), and several published reports provide evidence of both knowledge gaps and high levels of interest in bioterrorism-related training among physicians (American Medical Association [AMA], 2005; Heun, 2002; Sigmon & Larson, 2002).

In order to contribute meaningfully to the scholarly literature, we need to better understand perceptions, awareness, and the extent of emergency bioterrorism preparedness among physicians. This study will attempt to bridge those gaps and examine physicians' perceptions of their bioterrorism preparedness and their perceptions of the barriers to their emergency bioterrorism preparedness. This will provide an important link in understanding the context under which the research questions for this study were formulated.

Preparedness is a state of readiness to respond to a disaster, crisis, or any other type of emergency situation. The Federal Emergency Management Agency further defines it as “the leadership, training, readiness and exercise support, and technical and financial assistance to strengthen citizens, communities, state, local and tribal governments, and provisional emergency workers as they prepare for disasters, mitigate the effects of disasters, respond to community needs after a disaster and launch effective recovery efforts” (Bullock, Haddow, Coppola, Ergin, Westerman, and Yeletaysi, 2004). The CDC has implemented a national network of education and training resources between colleges and universities known as the Centers for Public Health Preparedness (CPHP) program.

According to this program (CDC, 2005), public health preparedness involves strengthening the public health workforce readiness through implementation of programs for life-long learning, strengthening capacity at state and local levels for terrorism preparedness and emergency public health response, and developing a network of academic-based programs contributing to national terrorism preparedness and emergency response, by sharing expertise and resources across state and local jurisdictions.

A 2003 report from the United States Government Accountability Office (GAO) states that four of five hospitals (81%) have a written emergency response plan that specifically addresses bioterrorism, and that 18% are developing one (United States Government Accountability Office [USGAO], 2003). Planning and preparing for bioterrorism is different for healthcare professionals than for other natural disasters principally because of the lack of experience and knowledge regarding bioterrorist agents and although the probability in any one city or town may be low, the risks nationwide are incredibly high (Jernigan et al., 2001; McGlown, 2004; Trumbull & Abhayaratne, 2004; Tucker, 1999). The more common weapons of terrorism (e.g., explosives) are visible; however, biological terrorism is an invisible enemy (McGlown, 2004). The bacteria and viruses unleashed may not be the same ones physicians deal with daily. Most medical providers have never seen a patient with anthrax or tularemia; caregivers do not know how these diseases present in patients or how to appropriately protect themselves or others. These are unknown entities to medical providers and thus are easily dismissed. Further, the mere existence of institutional or clinical guidelines regarding bioterrorism preparedness plans does not assure that a physician actually perceives himself/herself as being personally prepared. Among other things, bioterrorism preparedness plans are only

as effective as the assumptions on which they are based. As with most disasters, it has been suggested that the threat “must hit close to home” and affect one’s community directly before action is taken (McGlown, 2004). Thus, the current literature regarding physician and medical providers’ perceptions of preparedness for bioterrorism will be reviewed. So what follows is an intensive review beginning with the quantitative literature regarding physician perceptions of their bioterrorism preparedness and their perceived barriers followed by a review of the one qualitative study performed on this topic.

Physician Perceptions of Bioterrorism Preparedness: A Review of the Literature Regarding National Studies

A study conducted by Alexander and Wynia in 2003 shows that there is minimal information about contemporary physicians’ sense of preparedness for bioterrorism, willingness to treat patients despite personal risk, or belief in the professional duty to treat during epidemics (Alexander & Wynia, 2003). Few physicians reported in this study that they or their practice are “well prepared” for public health emergencies. This study explored physicians’ willingness to address potential acts of bioterrorism by conducting a national random mail survey of a sample of 526 physicians involved in direct patient care. The survey focused on physicians’ perceived personal and workplace preparedness for bioterrorist attacks. The survey asked physicians if their primary site of clinical practice was well prepared to play a role in handling a bioterrorist event. Twenty-two percent responded that they or their primary site of clinical practice (private practice or a hospital setting) was well prepared to play a role in responding to a bioterrorist attack. Personal and organizational preparedness were modestly correlated ($r = 0.27$). Physicians in primary care specialties were significantly more likely than those

not in primary care to report a willingness to treat, as were those who reported being more religious, being personally prepared, having “learned a lot about physicians’ roles in responding to bioterrorism post 9/11” and agreeing that physicians have a professional duty to care for patients in epidemics or with the Human Immunodeficiency Virus (HIV). On multivariate analysis, greater willingness to treat was associated with a belief in a professional duty to treat patients in epidemics, feeling personally prepared, and being in a primary care practice. The Alexander and Wynia (2003) study has a few potential limitations. The study may have been influenced by bias having been a mail survey, which relied on self-reporting. The type of bias distorting this study may have been what is known as socially desirable response bias. This type of bias occurs when respondents reply with a response that the respondents believe is acceptable both politically and socially.

These findings have several implications for healthcare providers and policymakers. First, they support concerns regarding bioterrorism preparedness among physicians. In 2002, Chen, Hickner, Fink, Galliher, and Burstin studied family physicians during a similar time period and found that only one-quarter felt prepared to respond to a bioterrorist event and that receipt of response training were associated with preparedness. Competing priorities and the perceived low likelihood of a local attack may reduce physicians’ preparedness (Bartlett, 2001). Chen et al. also noted that there are no published validated measures of bioterrorism preparedness and limited data on the effectiveness of specific educational programs. The Alexander and Wynia (2003) study found that one’s sense of personal preparedness correlated with having learned a significant amount about bioterrorism since September 11, 2001 (correlation coefficient

of 0.50). So, efforts to provide physicians with instructions for a general early response to medical disasters (such as where to report in an emergency situation) might foster a greater sense of readiness.

In 2003, the Alexander and Wynia study showed temporal trends that were noteworthy and yet also alarming. Both preparedness and the sense of professional obligation to treat during epidemics are declining according to a study conducted by Croasdale in 2002. These trends mirror the substantial decrease in physicians' use of online bioterrorism training programs throughout 2002 and the years thereafter. Changes in these areas are not unprecedented. In a similar fashion, early in the HIV epidemic, physicians contentiously debated the duty to treat (Emanuel, 1988). Arguments supporting a professional duty to treat in the face of uncertainty and risk have been based on multiple ethical and pragmatic grounds, including appeals to virtue, beneficence, patients' rights, the contract between physicians and society, and social utility (Bayer, 1988). Furthermore, W.D. Ross's seven prima facie duties are generally accepted to comprise the central tenets of both professional duty and modern Western healthcare ethics today. The Alexander and Wynia study reported that 79% of physicians today perceive an obligation to care for the HIV-infected person. Although the reasons for greater consensus of agreement today are complex, they are likely to include improved knowledge of medical transmission, medical societies' position statements, legal standards, and changing societal values. Risk has traditionally been part of medical care and there have long been statements in the American Medical Association professional codes of ethics as well as other medical academies' professional code of ethics supporting the duty to treat (AMA, 2005). The Alexander and Wynia study reinforces

this consensus view, but not without reservations. In the Alexander and Wynia study, 80% of physicians reported a willingness to treat patients without a priori knowledge of the level of risk while 20% refused to treat such patients. The study further states that only 55% agreed that “physicians have an obligation to care for patients in epidemics even if doing so endangers the physician’s health” (Alexander & Wynia, 2003).

According to the Alexander and Wynia study, physicians who believe in a profession-wide duty to treat have more than four-fold higher odds of reporting a willingness to treat during an outbreak involving an unknown initial level of risk. The study concludes that although the validity of reports about future behavior cannot be ensured, physicians who deny an obligation to treat under conditions of risk are probably less likely to treat patients in an actual incident. The results suggest that efforts to ensure physicians’ readiness to address bioterrorist events should include a renewed emphasis on this long-standing professional obligation. This is especially important because physicians would be called on to be one of the frontline responders’ in a post-catastrophic event such as a bioterrorist event. Thus, physicians must be prepared ethically, intellectually, emotionally, and socially for such an event. Physicians and possibly other healthcare personnel need to be trained in identifying rare infectious diseases, surveillance techniques, and epidemiology and quarantining procedures. According to the Alexander and Wynia study, “Preparing physicians for bioterrorism should entail providing practical knowledge, preventive steps to minimize risk, and reinforcement of the profession’s ethical duty to treat.” Similar factors should be considered in encouraging the duty to treat in future epidemics or public health emergencies such as a bioterrorist event.

Another study conducted by Cowan, Ching, Clark, and Kemper (2005) shows the willingness of private physicians to be involved in smallpox preparedness and response activities. The United States' federal, state and local governments have implemented a program known as the National Smallpox Vaccination Program (NSVP) to ensure that the public health system is prepared to respond quickly to a smallpox outbreak (Bush, 2002). This study exposes that it is unclear whether the capacity, specifically the surge capacity of the public health system, is sufficient to meet demand for vaccination in the event of a public health emergency such as the release of a bioterrorist agent like anthrax or smallpox.

An important aspect of bioterrorism preparedness is surge capacity. Surge capacity is a healthcare system's ability to rapidly expand beyond normal services to meet the increased demand for qualified personnel, medical care, and public health in the event of bioterrorism or other large-scale public health emergencies (AHRQ, 2005). The study expressed that to assure there is adequate capacity for various smallpox vaccinations, public health officials may seek the help of other healthcare professionals such as primary care physicians engaged in private practice settings. Previous research has shown that individuals would seek care from their primary care physician first in the event of a public health emergency over a hospital or a department of health, if they thought they had contracted smallpox disease (Blendon et al., 2003; Green, Fryer, Yawn, Lanier, and Dovey, 2001; Lane & Fauci, 2001).

The Cowan et al. (2005) study was a national random sample of 750 office-based direct patient care internal medicine physicians and 750 family practice physicians drawn from an American Medical Association Masterfile. The survey used was a 23-item

questionnaire exploring the willingness of private physicians to participate in pre-event and post-event smallpox vaccination activities. The study explored factors associated with this participation such as knowledge, attitudes, and beliefs about smallpox vaccination; sources of information about smallpox vaccination; and physician demographics and practice characteristics. In the Cowan et al. study, physicians were asked to consider a pre-event scenario in which interested adult members of the general public could voluntarily receive smallpox vaccinations. Under this scenario, 61% of the physician respondents felt that vaccine should be administered in both a public health setting and in a private office clinical setting versus exclusively in one setting or the other. Thirty percent of physician respondents would be “somewhat willing” or “very willing” to offer smallpox vaccination to interested patients in their practice (Cowan et al., 2005). However, most physician respondents were “not very willing” or “not willing at all” to offer the smallpox vaccination at their private offices (Cowan et al., 2005). The most likely reason according to the study as to why most physician respondents were not very willing or not willing at all to offer a smallpox vaccination at their private offices was because of a possible vaccination adverse event (68% of respondents). Other reasons included a possible smallpox outbreak (53%) and the risk of transmission of smallpox vaccine virus (52%) to others. Many physician respondents cited necessary factors before providing vaccination such as liability protection (95%), and guidance on program logistics (92%).

Physicians were also asked in the Cowan et al. (2005) study if they would be willing to participate in certain other pre-event vaccination activities if they received proper training, liability protection, and compensation, and if capacity in their community

to vaccinate interested members of the general public was otherwise insufficient. Fifty-nine percent reported that they would be willing to offer vaccinations in their practice to first responders such as police, 28% would be willing to offer vaccination to interested community members, and only 26% would be a vaccinator at a public health clinic. In addition, the Cowan et al. study shows that 68% of physicians would be “somewhat willing” or “very willing” to evaluate their patients with suspected mild to moderate adverse reactions to smallpox vaccination, regardless of at which location these patients had received their pre-event vaccination (Cowan et al., 2005). However, 14% of physician respondents were neutral and 18% would be “not very willing” or “not willing at all” to even evaluate their own patients (Cowan et al., 2005). This implies that the majority of physicians would be willing to vaccinate first responders such as police, but are more reluctant to vaccinate the general public. This is possibly due to similar reasons as stated previously of possible adverse side effects and litigation.

Among physician respondents, 59% would be willing to provide contact information for their practice to a federal registry of emergency smallpox vaccinators to facilitate rapid community response to a smallpox outbreak (Cowan et al., 2005). The study further stated that in preparation for responding to a possible outbreak, respondents would need training in recognizing smallpox (87%), vaccine handling and administration (97%), and recognizing and treating vaccine adverse events (98%). This implies that many physicians perceive themselves as unprepared and realize the need for education and training.

The Cowan et al. (2005) study also questioned physician primary care respondents under the scenario that the public health system may not have sufficient capacity to meet

the demand for vaccination in the event of a smallpox outbreak. Respondents were asked whether they would be willing to participate in certain post-event activities. Eight-nine percent responded that they would be willing to offer vaccination in their practice to their patients. Sixty-four percent would be willing to offer vaccination in their practice to members of their community who may not be their patients, but only 44% would be willing to be a vaccinator at a public health clinic.

The survey also attempted to assess physicians' knowledge, attitudes, and perceptions regarding smallpox vaccination and smallpox in general. It asked the respondents to assess the extent to which they agreed with five statements in the table below.

Table 2-1: Knowledge, Attitudes, and Beliefs Regarding Smallpox and Smallpox Vaccination

Statement	Agree	Neutral	Disagree
In the next five years, a smallpox outbreak or attack is likely in the United States	13%	26%	61%
Vaccination is effective in preventing smallpox disease.	88%	7%	5%
Overall, the smallpox vaccine is safe.	35%	27%	38%
I am confident in my ability to recognize symptoms of smallpox.	45%	22%	33%
I am confident in my level of knowledge regarding the smallpox vaccine.	44%	21%	35%

Although few respondents perceived the risk of a smallpox outbreak to be high (13%), the differences in perceived risk of an outbreak did not affect physicians' willingness to offer vaccination in their practice under a pre-event smallpox vaccination program for the general public. Forty-five percent of primary care physicians felt that they could recognize the symptoms of smallpox and 44% were confident in their knowledge of the vaccine. Thus, many primary care physicians demonstrated a willingness to be involved in post-event activities and to participate in a system to plan for such a contingency.

There are two main limitations in this study: the first is the validity of physicians' predicted behavior based on hypothetical scenarios is unknown. Secondly, the low response rates (less than 25% of surveys completed and returned) limit the external validity or the generalizability of the findings to other physicians in other settings. However, the results of this study suggest that there is a subset of primary care physicians in private practice that would be willing to assist public health officials in their smallpox preparedness and response efforts. Physicians in the study were reluctant to be self-vaccinated and this has been shown to be consistent with other studies involving hospital-based smallpox vaccination response teams in the first stage of the NSVP (Benin, Dembry, Shapiro, and Holmboe, 2004; Everett, Coffin, Zaoutis, Halpern, and Strom, 2003; Everett, Zaoutis, Halpern, Strom, and Coffin, 2004) and are also consistent with the low influenza vaccination rates of healthcare workers in general (CDC, 2004).

The physicians' lack of interest in pre-event vaccination has implications for potential plans for a voluntary, pre-event smallpox vaccination for the general public. The capacity required to implement such a program would depend in part on the level of

interest of the general public in being vaccinated. Although the public's interest has previously been shown to be relatively high, it is also greatly influenced by the vaccination decisions of practicing physicians (Blendon et al., 2003). In the Cowan et al. (2005) study, despite physicians' reluctance to be vaccinated they did express some willingness to participate in pre-event smallpox activities. The study explains that private physicians are an option for expanding the capacity to vaccinate first responders, which is the second stage of the NSVP. It explains that public health officials would need to establish contact with the primary care physicians in their community to ascertain who is willing to help and how best logistically to incorporate them into vaccination plans. The study also states that private physicians are not as willing to participate in efforts outside their own practice. Therefore, if there is a need to increase the number of available vaccinators for public health clinics, planners will likely need to consider other health professionals, such as school nurses (Gullion, 2004). According to the Cowan study, private physicians seem willing to vaccinate their own patients in the event of an outbreak scenario, but less willing to vaccinate the public in general. Thus, public health officials should ensure that these physicians are included in response planning efforts and determine how best to integrate their participation with that of other healthcare professionals.

In numerous studies it has been indicated that physicians would need additional training in order to assist with bioterrorism response efforts (Alexander & Wynia, 2003; Chen et al., 2002; Cowan et al., 2005; AMA, 2005; Heun, 2002; Sigmon & Larson, 2002). Providing appropriate guidance and training not only helps to assure that physicians feel prepared, but also increases the chances that physicians will participate in

response efforts and that the efforts will be successful (Alexander & Wynia, 2003; Gerberding, Hughes, and Koplan, 2002).

A study conducted by Chen et al. (2002) showed that 95% of family physicians agree that a bioterrorist attack is a real threat in the United States. This study used a 37-item questionnaire with a 3-category Likert scale, ranging from “strongly agree” or “agree” to “neutral” to “disagree” or “strongly disagree” to measure physicians’ assessments of bioterrorist risk and preparedness, specific clinical competencies, capabilities in bioterrorism response, and their prior level of interaction with the public health system. Physicians were also asked regarding four biological agents they perceive may be used in a terrorist attack. In this study, physicians were categorized according to a self-reported location of rural, urban, or suburban, and respondents were also asked to describe the size of the population in their area.

Two survey items were the main outcomes of the Chen et al. study because they were believed to represent the key features of family physician preparedness: (1) “knowing what to do as a doctor in the event of a suspected bioterrorist attack in my community,” (2) “knowing where to call to report a suspected bioterrorist attack,” (Chen et al., 2002). Student’s t-test and Pearson’s chi square test were used to assess the statistical significance of the bivariate analysis. Multivariate logistic regression was performed to assess the effects of age, sex, geographic location, risk assessment, ability to gather information, and previous training in bioterrorism preparedness on the main outcomes of interest.

Ninety-five percent of family physicians believed that a bioterrorist attack is a real threat in the United States and 39% of family physicians believed a bioterrorist attack are

real threat to their local community yet only 19% believed that their local medical community could respond effectively. Furthermore, only 27% believed that the United States healthcare system could respond effectively to a bioterrorist attack and fewer (21%) believed that their local hospital or their local medical communities (19%) could respond effectively to an attack according to a random national survey of 614 family physicians (Chen et al., 2002). The Chen et al. study has both similarities and salient differences from the Cowan et al. (2005) and the Alexander and Wynia (2003) studies. All three studies explain that physicians do not feel personally prepared to respond to bioterrorist events. However, the Chen et al. study reports that 95% of physicians perceive that a bioterrorist attack is both real and imminent while in the Cowan et al. study 13% of physicians perceive a bioterrorist attack with smallpox as an agent is likely either now or in the next five years. According to the Chen et al. study 26% of physicians reported that they could respond effectively in the event of a bioterrorist attack. In contrast, when asked if they could respond effectively to natural disasters or infectious disease outbreaks, a significantly higher percentage of physicians responded that they would know how to respond to these other public health emergencies. Sixty-five percent of physicians responded that they could respond effectively and would know what to do ($p < .001$) in the event of a natural disaster and 66% of physicians responded that they could respond effectively ($p < .001$) in the event of an infectious disease outbreak.

After they combined responses for local hospitals and community preparedness, only 17% of physicians believed that both their local hospitals and their medical communities could respond effectively to a bioterrorist attack, compared with 60% ($p <$

.001) for a natural disaster and 56% ($p < .001$) for an infectious disease outbreak (Chen et al., 2002). So significantly fewer family physicians feel they are personally prepared as well as their local medical community and their local hospitals for a bioterrorist event than for a natural disaster or an infectious disease outbreak. Yet there are similarities between bioterrorist events and natural disasters and infectious disease outbreaks in that early detection and reporting are also critical to a timely and effective response to a bioterrorist event (CDC, 2000; Franz et al., 1997; Kahn, Morse, and Lillibridge, 2000; National Academy Press, 1999;).

The Public Health System and Primary Care Physicians' Perceptions of Bioterrorism and National Bioterrorism Preparedness

For most Americans, their first point of contact with the healthcare system is the primary care physician, who is therefore on the frontline in this new era of bioterrorism (Green et al., 2001; Lane & Fauci, 2001). Many victims of a bioterrorist attack may not know they have been affected, and because the symptoms caused by many bioterrorist-related agents mimic those of common conditions, primary care physicians will likely be in the position of diagnosing and managing initial cases of bioterrorist-related illnesses (Gourlay & Siwek, 2001). Thus, a primary care physician's ability to identify cases and activate the public health system is a crucial step in effectively responding to a bioterrorist attack (Franz et al., 1997; Gordon, 1999; Haines, Pitts, and Crutcher, 2000).

Several recent studies have concluded that the preparedness and infrastructure of the public health system are inadequate to deal with a bioterrorist attack and need improvement (CDC, 2000; Garrett, Magruder, and Molgard, 2000; Inglesby et al., 2001; Kahn et al., 2000; Rosen, 2000). One survey found that fewer than 20% of emergency departments in the Pacific Northwest had plans for responding to a bioterrorist event

(Wetter et al., 2001). However, these studies, although examining the public health system, failed to discuss the critical role of primary care providers in responding to bioterrorism (Henretig, 2001; Sidel, 2001). Other studies have found that many local health departments are unprepared to respond to a bioterrorist attack (Rosenthal, 2003; USGAO, 2003).

According to the Chen et al. (2002) study, physicians felt more comfortable responding to other types of public health emergencies, such as natural disasters or infectious disease outbreaks. This may be in part due to their personal experiences in dealing with these events, or may reflect the formalized training in public health response that is part of the medical school curricula. The reporting and response skills physicians would use in dealing with the public health system during a bioterrorist event are similar to the ones that they would use during natural disasters and infectious disease outbreaks. Naturally, physicians' experiences with the public health system in responding to and managing natural disasters and infectious disease outbreaks are helpful, but a bioterrorist attack has unique features that require primary care physicians to be able to obtain and use information from public health sources and intelligence sources (National Academy Press, 1999). The Chen et al. study (2002) was the first to assess primary care physicians' personal sense of preparedness for responding to a bioterrorist event.

According to the Chen et al. (2002) study, biological agents physicians consider most likely to be used in a bioterrorist attack include anthrax (96%), smallpox (82%), plague (28%), botulism (22%), ebola (16%), nerve gas (14%), tularemia (11%), E. coli (7%), Salmonella (5%), and influenza (4%). The study performed by Chen et al. also found that only 24% of the family physicians surveyed believed they could recognize

signs and symptoms of an illness in their patients due to bioterrorism, and 38% rated their current knowledge of the diagnosis and management of bioterrorism-related illness as poor. Furthermore, the Chen et al. study stated that only 18% of physicians had received previous training in bioterrorism preparedness. Physicians who felt prepared for natural disasters were four times more likely than other doctors to know how to respond to a bioterrorist attack (36% versus 9%, $p < .001$). Physicians who felt prepared for infectious disease outbreaks were 6 times more likely than other doctors to know how to respond to a bioterrorist attack (37% versus 6%, $p < .001$). Physicians felt better prepared for a bioterrorist attack if they had training in bioterrorism preparedness. Physicians who had received training were 3 times more likely than other doctors to know how to respond to a bioterrorist attack (55% versus 20%, $p < .001$). Moreover, 98% thought it was important for them to be trained to identify a bioterrorist attack, and 93% of physicians said they would like such training.

The Chen et al. study demonstrated that familiarity with the public health system was not necessarily associated with physicians' preparedness for bioterrorism. Ninety-three percent of physicians report notifiable infectious disease cases to the health department, only 57% ($p < .001$) reported knowing whom to call to report a suspected bioterrorist attack and only 56% of physicians reported knowing how to get information if they suspected an attack in their community (Chen et al., 2002). In the multivariate model, having received training in bioterrorism preparedness (odds ratio (OR) 3.9 [95% CI 2.4-6.3]), and knowing how to obtain information in the event of a bioterrorist attack (OR 6.4 [95% CI 3.9-10.6]) were significantly associated with physicians' knowing what to do in the event of an attack. Believing that bioterrorism was a real threat to their

communities was also significantly associated with a physician's ability to recognize signs and symptoms of a bioterrorism-related illness (OR 1.9 [95% CI 1.2-2.9]). In the Chen et al. study, physicians' preparedness was not associated with geographic location, residence (rural, urban or suburban), age, or gender.

One limitation of the Chen et al. (2002) study was that the survey instrument did not define bioterrorism, but relied on the respondents' personal perceived definitions of bioterrorism. Although the timing of the survey coincided with national media attention on the anthrax cases, there was not a high level of confidence or knowledge in dealing with bioterrorism.

In a study conducted in 2005 by David Sterling and colleagues, the issue of a possible bioterrorist event occurring at the workplace is examined. The rationale for most preparedness training of healthcare professionals is based on the assumption that most persons infected following a bioterrorism incident will present first to emergency departments of acute care facilities or to ambulatory settings such as private physician offices, and such incidences would be recognized, appropriately treated, and reported to the local health departments (Sterling et al., 2005). The Sterling et al. study explains that an alternative first point of contact is industry, a location where workers gather and disperse on a regular and documented basis, and require healthcare. Sterling et al. further explains that in industry there are health professionals responsible for the health, safety, and on-site well-being of the workforce and surrounding community; these professionals are in a position for early recognition, surveillance, and isolation. It is the belief of the authors of this study that targeted education, therefore, must be provided to these health professionals. Several studies have asserted that no United States' asset is considered

safe from terrorist actions and large cities are not the only targets (Gwerder, Beaton, and Daniell, 2001; Sterling et al., 2005). In addition, the lack of a publicized threat to industry may impact the risk perceptions of occupational health professionals and downplay the need for increased awareness, preparedness, and response at industrial settings (Sterling et al., 2005). This lack of awareness and preparedness at the workplace would probably diminish the contribution that occupational health professionals can make to bioterrorism preparedness. A limitation of the Sterling et al. study is that it does not state which types of workplaces (i.e., industrial, financial, or others) are involved and 87% of the workplaces examined are in the five Midwestern states of Missouri, Indiana, Michigan, Wisconsin, and Illinois.

To address perceptions of preparedness and risk as well as preferred educational delivery methods for bioterrorism and emerging infections-related materials, a survey of occupational physicians was performed during the spring of 2001. Within the two months following the September 11, 2001, terrorist attack and subsequent anthrax bioterrorism event, and before release of any results from the first survey, a follow-up mail survey was initiated in November 2001. Previous studies have corroborated this study and concluded that the risk of a possible bioterrorist event is increasing and that physicians need to be prepared and educated (Henderson, 1999; Tucker, 1999; Jernigan et al., 2001; Rose & Larrimore, 2002; Trumbell, 2004; Sterling et al., 2005).

The survey instrument used was modified from a previous national survey of physicians (Shadel et al., 2003) to examine occupational physicians' preparedness. The instrument assessed several factors: the perceived threat of bioterrorism, past training, barriers to training, access to instructional technology, and preferred medium for

education and training. Perception questions were based on a standard Likert scale of 1-5 or important to not important. The survey was disseminated at a 2001 spring conference, Central States Occupational Medicine Association, for occupational physicians and then collected. Following September 11, 2001, the survey was modified and a follow-up survey was mailed to all physician participants from the conference.

Response rates to the pre-September 11 and post-September 11 survey were 58% (n = 56) and 33% (n = 33), respectively. No significant demographic differences were observed between the respondents of the pre-survey and the post-survey. Eighty-eight percent considered themselves to be computer proficient and the assumption was that computer proficiency does not change considerably over a brief six month period of time. In each survey more than 80% were located in urban or suburban locations. There were statistical differences noted during the pre-survey based on both the city involved ($p = .023$) and the size of the facility ($p = .004$), regarding the likelihood of the public health surveillance system to detect a bioterrorist event. The study found that the smaller the city and the larger the facility, the greater the perception that an event would be recognized. It also found that the larger the city then the greater the perception among physicians that a bioterrorist attack would occur near their place of work ($p = .019$).

Naturally, perceptions of likelihood of another bioterrorism event increased between the pre-September 11 and the post-September 11 survey. In the pre-survey, 61% of respondents felt it would happen in the United States, 21% expected that it would happen near their place of work, and 42% had received bioterrorism training. In the post-survey following September 11, 2001, 94% believed another event was likely to occur in the next five years, only 45% believed it would occur near them, and over 90% had

received some training. When participants were asked if another bioterrorist attack would occur over the next five years, a statistically significant difference emerged between the pre-survey and the post-survey respondents' perceptions ($p < .001$). The statistically significant increase in perceived risk between the surveys was notable for a local occurrence, i.e., expecting it to happen near their place of work ($p = .012$). When participants were asked how likely they would be to seek information regarding bioterrorism preparedness in the pre-September 11 surveys, 60.7% responded very to somewhat likely. Whereas when the same question was posed in the post-September 11 survey, 93.8% responded very to somewhat likely. This difference was also statistically significant ($p < .001$). Participants who had received bioterrorism training prior to the pre-survey did not differ significantly in their responses to the survey than those who had not received any training, although they were even less likely to believe that a bioterrorist attack would occur near their work (13%). This poses an interesting question, one which this study will attempt to clarify through examining the perceptions of preparedness of rural physicians regarding bioterrorist events. Fifty-eight percent of the participants indicated that they had not received any bioterrorism training prior to the pre-survey. These participants listed four similar barriers as the most common: no training available (59.4%, 53.6%), no continuing medical education training credits as part of their training (37.5%, 32.1%), not part of their responsibility (25%, 42.9%), and no time dedicated (21.9%, 25%). Occupational physicians noted that their first notifications for a suspected bioterrorist event would be the local health department (70.9%), followed by the state health department (65.5%), CDC (61.5%), an in-house infectious disease physicians (58.2%). The post-September 11 surveys showed a significant increase in notification for

a bioterrorist event to the local health department (96.8%, $p = .004$) and a decrease in notification to the state health department and the CDC. The responses for those with prior bioterrorism training during the pre-survey were similar to the overall post-survey results.

During a bioterrorist event, timely access to information is essential. The preferred information sources to contact during a crisis were the CDC, state and local health departments, and in-house infectious disease physicians. The preferences did not change following September 11, but their rank order changed. The use of in-house infectious disease physicians increased from 43.6% to 53.3% and the local health department from 40% to 53.3%. The use of poison control hotline decreased by a statistically significant factor of four ($p < .05$).

A comparison was performed of the preferred method of receiving education and training. The preferred methods of the pre-survey were professional meetings (69.6%), followed by Internet access (35.7%), journal review (30.4%), and CD-ROM (23.2%). In the post-survey following September 11, professional meetings were still most preferred (64.5%) but the use of video (35.5%, $p < .05$) and grand rounds (19.4%, $p < .05$) were statistically significant for preferred methods.

There were a few limitations in this study. The study was a small study with 56 respondents in the pre-survey and only 33 respondents in the post-survey. The study was national, yet a few different states were represented in the pre and post surveys although the authors note that they were demographically similar thus making it less generalizable. Another limitation is that the first survey was performed at a conference and the second study was a mail survey, which has its own inherent limitations.

Even though over 90% of the physicians had received immediate training following September 11, additional training/education needs were demonstrated (Sterling et al., 2005). Previous research corroborates this finding (Alexander & Wynia, 2003; AMA, 2005; Chen et al., 2002; Cowan et al., 2005; Heun, 2002; Sigmon & Larson, 2002). Although training and education modules can be designed without information based on the population that can be on the receiving end, it then rarely accomplishes its goal. Results from this survey can serve as a basis for designing various levels of targeted training and educational material specific to the perceived need, method of obtaining information, and the format considered to be most conducive for learning (Sterling et al., 2005). Sterling et al. further notes that the potential consequences from lack of bioterrorism preparedness due to low perception of need and threat awareness need to be addressed.

In sum, the previously conducted studies suggest that physicians studied in this literature review may not be prepared for bioterrorist events. The majority of physicians interviewed acknowledged that post September 11, 2001, the threat of a bioterrorist event was heightened. Many of the respondents also reported that they had received bioterrorism training because of the heightened threat. Yet, despite the training, physicians expressed an even greater need for additional bioterrorism training and education.

Continuing medical education (CME) is an evolving process of education for physicians that foster the individual's commitment to lifelong learning, optimal development, and maintenance of medical knowledge and skills. CME is also intended to enhance the ability of physicians and healthcare professionals to provide excellence in

patient care, health maintenance, and disease prevention with resultant improved outcomes of care of their patient population.

Physicians have been confronted with the need to keep their knowledge current for many hundreds of years. Ell (1984) describes CME that was practiced in Venice from 1300 to 1800. Practitioners were required to attend a yearly refresher course in anatomy in order to renew their licenses. In the United States, no formal attempts at requiring CME were required until 1932, when the American Association of Medical Colleges first proposed mandatory CME. After several decades of discussion and debate, in 1947 the American Academy of General Practice began to require 150 hours of CME every three years as a condition of membership (AMA, 1999). In 1975, the Accreditation Council for Continuing Medical Education (ACCME) was formed as a consortium of seven organizations which all have interests in CME (ACCME, 1999). Since that time, the AMA and the ACCME have played principal roles in the development and accreditation of CME. In a survey conducted in 1995, the AMA found that thirty-one states required proof of CME for re-licensure, and by 1997, twenty-four specialty boards had made CME a requirement for certification or re-certification (AMA, 1999). These requirements have led to a burgeoning of formal continuing medical education programs.

Traditional continuing medical education consists of physicians attending a meeting at their local hospital. The meeting ordinarily contains a lecture regarding a medical condition or a procedure. Sometimes the lecture may be based on a real or simulated case. This is often known as grand rounds. Typically the lecturer speaks for 40-45 minutes and leaves time for a five to ten minute question and answer period at the end. A lecturer ordinarily presents the information with computer generated slides and a

handout of salient points is distributed. There is generally no pre-lecture or post-lecture test of knowledge. Physicians earn credit by placing their name on a sign-in sheet.

This formatted lecture remains the dominant form of CME, although it has been difficult to prove if continuing medical education results in any change in the physician's practice behavior (Davis et al., 1999). Yet despite the reservations, there are important non-academic advantages to continuing medical education lectures. The individual physicians attending such CME lectures may learn that the lecturer, who is often also a physician, may practice in the same community or a nearby community and accepts patients with the conditions discussed or requiring the discussed procedures. Furthermore, although anecdotal, it appears advantageous from a collegial or social atmosphere. The CME meetings allow physicians to encounter other physicians and learn what is new in the hospitals, among other physicians, and in the local medical community.

Merriam (1996), in a review of adult learning theories, finds a number of implications for the education of health professionals. The first, she explains, is to develop self-directed learners. Merriam (1996) explains that no amount of academic preparation, undergraduate or graduate, or continuing professional education will be able to keep pace with changes in the health field. Professionals must take it upon themselves to be lifelong learners and to engage in learning projects to remain current. Merriam (1996) also explains that a second implication is that the more significant learning is that which is situated in the context of adult life or in actual activity. She further explains that some of these activities include lectures, internships, apprenticeships, mentorships, and case-study instructional methodologies. Thus, continuing medical education seminars

offer opportunities for physicians to engage professionally, intellectually, and socially with advances in medicine and public health.

In 2003, Shadel and colleagues performed a national needs assessment survey, which measured infection control practitioners' perception of the risk of bioterrorism in the United States and in their community. The needs assessment study also examined the proportion of infection control practitioners' with prior training in bioterrorism preparedness, and the barriers to receipt of such bioterrorism education (Shadel et al., 2003). The study used an SPSS software package to randomly identify 4000 infection control practitioners from a membership list of the Association for Professionals of Infection Control and Epidemiology. Shadel and colleagues mailed a 35-question survey to measure these factors (Shadel et al., 2003). The survey instrument was pre-tested for format and content. The healthcare professionals involved in the pilot testing were excluded from the random sampling. The questions were evaluated in 20 qualitative telephone interviews with healthcare professionals.

The instrument assessed the perceived threat of bioterrorism, the extent of the respondents' past bioterrorism training, and the perceived barriers to bioterrorism training. The questionnaire also addressed access to technology and the preferred instructional design and medium for delivery of educational opportunities and reference materials. The survey questions regarding perceptions of risk were evaluated using a 1-5 Likert scale (1 being very likely and 5 being very unlikely). Thirty-one and one-half percent or 1260 respondents from the original sample of 4000 participated in the mail survey. Approximately half of the respondents described themselves as working in direct

patient care with most describing their work environment as an inpatient care facility. In this national survey, 450 participants or 36.6% worked in rural areas.

The perceptions of risk regarding the intentional release of a bioterrorist agent in the United States in the next five years ($p = .475$) or in the infection control practitioners' work community ($p = .199$) did not differ by type of occupational setting (patient care, public health, or administration). The likelihood that a respondent would seek more information about bioterrorism preparedness was affected by the respondent's occupational setting ($p < .01$), with significant differences between those working in administration and patient care ($p < .01$). A smaller proportion of those respondents working in administration (40.9%) were likely to seek out bioterrorism information compared with those working in direct patient care (50.2%).

The study found significant differences between regions of the country when they assessed the perceived potential threat of a bioterrorist event occurring in the next five years in the United States ($p = .022$), and in the infection control practitioners' work community ($p < .01$). Infection control practitioners in the South were more likely to believe a terrorist attack would occur in the next five years in the US compared to those in the Midwest ($p = .13$). Also, infection control practitioners in the South (86.6%) were more likely to seek out bioterrorism preparedness information compared to those practitioners in the Midwest (79.5%; $p = .45$). Eighty percent of the infection control practitioners from the South believed that a bioterrorist attack was very likely to somewhat likely in the US compared with the Northeast (74.3%), the Midwest (71.8%), and the West (71.4%). Approximately one-third (32.2%) of all infection control practitioners believed that a bioterrorist attack was likely or somewhat likely in the next

five years in their community. There were no statistically significant differences by community size (urban or rural) when infection control practitioners ranked the perceived risk of a bioterrorist event in the next five years ($p = .923$). Yet the responses differed when participants assessed the risk regarding their own community ($p < .01$).

Participants were more likely to believe that a bioterrorist event was very likely to somewhat likely to occur in the United States during the next five years than in their own community (74.4% versus 32%). Interestingly, how likely (i.e., very likely to somewhat likely) those participants believed that a bioterrorist event would occur in their community in the next five years differed significantly ($p < .001$), between communities of different sizes: rural (16.1%), suburban (40.1%) and urban (42.0%). Differences were also found between rural, suburban, and urban communities regarding how likely they would be to seek information on bioterrorism preparedness ($p < .01$). Fewer than half (41.7%) from a rural community reported that they were very likely to seek out more information. This study's intent is to contribute information to the literature to help clarify and possibly explain rural physicians' perceived bioterrorism preparedness. It is also the intent of this study to examine how the barriers rural physicians encounter may pose impediments to garnering educational training or information and thereby possibly explain rural physicians' perceived behaviors and practice patterns

Only 56% of the respondents reported prior training in bioterrorism preparedness. Those who reported prior bioterrorism training were more likely to believe that a bioterrorist attack would occur in the next five years in the United States ($p < .001$). Most of the respondents who reported prior bioterrorism training (51.8%) were involved in direct patient care. Respondents reported that the two most common barriers to

receiving training were no training opportunities (70.2%) and no dedicated work time for training (19.4%). Among those who had prior bioterrorism training, most had attended a session on bioterrorism at a professional meeting (56%), obtained information through a journal article (54.5%), or attended an in-service lecture (33.4%). The three preferred training methods were the following: lecture at a professional meeting (59.6%), training video (32.3%), and satellite teleconference (29.2%). A larger proportion of members from rural areas selected videos (38.6%) or CD-ROM (17.4%) as the preferred method for education delivery than those in urban (27.6%, 13%) and suburban areas (30.2%, 11.8%) respectively.

This study has a limitation in that the participants surveyed were all members of the Association for Professionals of Infection Control and Epidemiology so one may conclude that they may have perhaps been better prepared than other physicians. This study was a randomly selected national sample, which provided the opportunity to evaluate regional differences and community size differences. This study showed that healthcare professionals in rural areas were the least likely to report that a bioterrorist event might occur in their community. Moreover, fewer than half of healthcare professionals from rural communities were likely to seek out additional information regarding bioterrorism preparedness. Thus, increased attention and vigilance is needed to increase the awareness of rural healthcare professionals who may not believe that they are at risk to ensure that these rural physicians are prepared for a possible bioterrorism event. Satellite teleconferences as an educational training method is particularly interesting for rural community physicians because of their remote locations and limited access. According to the Shadel et al. (2003) study, the satellite teleconference was

considered a preferred method of training; although in a study conducted on a national sample of physicians (Shadel et al., 2001) it was one of the least preferred methods.

Physician Perceptions and Knowledge of Bioterrorism Preparedness: A Review of the Literature Regarding Local Studies

In 2004, a study conducted by Gershon and colleagues showed the knowledge, attitudes, and intended behaviors of New York City clinicians regarding bioterrorism-related diseases. Data on urban clinicians' knowledge and attitudes toward bioterrorism and related diseases were collected using a self-administered questionnaire after a 3.5-hour educational intervention program was performed with presentations regarding up-to-date case information as well as information on the New York City Department of Health bioterrorism preparedness procedures. The lectures were supplemented with printed literature and handouts, including a copy of the slide presentations, rolodex card with New York State and New York City Health Department contact and reporting numbers, and seminal journal articles on clinical presentation of bioterrorism.

The Gershon et al. (2004) study administered a post-presentation questionnaire consisting of 37-items designed to evaluate their knowledge, beliefs, and confidence regarding their ability to diagnose, treat, and report certain diseases of bioterrorism such as anthrax, smallpox, tularemia, plague, and botulism. The questionnaire also evaluated their own concerns and fears regarding the contagious nature of the bioterrorist agents. They asked questions related to clinicians' degree of exposure to the WTC disaster (e.g., witnessing the event at the time it happened either in person or on television or having re-exposure through television broadcasts) to determine the impact, if any, this had on their bioterrorism attitudes and behavioral intentions. Items related to physicians' emergency preparedness and response were also included in the questionnaire. Statistical analyses

were conducted to measure knowledge, confidence, concerns, infection control intentions, and educational needs.

A total of 377 practitioners attended the program; of these, 310 completed the questionnaire (82% response rate). Most of the survey respondents were male physicians (55.2%) with a mean age of 52.9 years. The mean years of practicing medicine was 23.3 years and 36% were internal medicine specialists. After the three and one-half hour educational seminar, on a set of five basic knowledge questions, 69.6% of the participants had correct responses for reporting requirements although in other areas of knowledge such as appropriate diagnostic testing (65.2%) and differential diagnoses (41.6%) the correct responses was not particularly high even after the educational intervention program.

Many participants reported increased confidence in bioterrorism preparedness with regard to recognizing diseases of bioterrorism (88.6%), the ability to address patient concerns (83.2%), the ability to treat bioterrorism diseases (74.6%), the ability to report bioterrorism diseases (72.6%), and the ability to adopt appropriate infection control procedures (68.7%). Almost 38% reported increased confidence in the United States government's ability to protect the public's health during a bioterrorist attack and 13.9% reported increased confidence in the United States government's preparedness for a bioterrorist event.

Physicians reported overall concern about future bioterrorist attacks (77.4%) and specifically concern about anthrax (58.4%) and smallpox (61%). They also reported high levels of concern regarding bioterrorism among their patients; 90.5% of clinicians reported that they provided care to patients with complaints related to fears of

bioterrorism during a two month period before training program. There was no significant correlation found between clinicians' media exposure to WTC disaster and their bioterrorist-related concerns. Yet clinicians who reported high degrees of television exposure to the WTC disaster were 2.4 times more likely to volunteer in the disaster relief efforts (e.g., assist in rescue centers, emergency rooms, outpatient settings, or donate money and supplies) with an odds ratio of 2.45 (95% confidence interval [CI] = 1.12-5.35) than those who had limited exposure. Also, regarding the clinicians concerns, 61% were personally concerned about the risk of contracting smallpox and 58.4% were personally concerned about the risk of contracting anthrax as a result of bioterrorism. This may be in part due to the fact that the federal government, the media, and the medical societies placed an emphasis on bioterrorism and its related issues.

The clinicians expressed interest in additional training on clinical diagnosis of bioterrorism diseases (84.2%), infection control aspects of bioterrorism (81.9%), treatment aspects of bioterrorism diseases (81.6%), and psychological aspects of bioterrorism (74.5%). Training needs did not differ based on experience in treating patients at risk for exposure to anthrax.

One limitation of the Gershon et al. (2004) study was the use of a single questionnaire, which precludes the ability to evaluate the effectiveness of the program in terms of its impact on the baseline knowledge and attitudes of clinicians. Another potential limitation is that the sample is of participants limited to the greater New York City area, and may therefore be difficult to generalize these findings to clinicians from other parts of the country.

Rose and Larrimore performed a study in late 2002 to examine knowledge and awareness concerning chemical and biological terrorism among clinicians. This survey was used to assess the knowledge base of healthcare providers at an urban medical center in preparation for developing a workshop on domestic terrorism preparedness. Rose and Larrimore then conducted a second survey assessing domestic terrorism preparedness among infection control personnel and nurse educators.

This study reports results of a knowledge and awareness survey on bioterrorism agents prior to September 11, 2001. A possible limitation is that both surveys were conducted in the northeastern United States because the Gershon et al. (2004) found that geography may matter and the surveys were conducted prior to September 11, 2001. During the year of 2000, a total of 291 healthcare professionals (e.g., nurses, physicians) completed the survey on knowledge and awareness of chemical and biological terrorism. The knowledge scores for all respondents were low, with less than one-fourth answering the questions correctly. Few respondents had ever used respiratory protective equipment (32.6%), Hazmat level protective clothing (10.3%), or used decontamination showers (5.2%). Additionally, almost half of the respondents indicated that they were not certain they would report to work in the event of a domestic terrorism attack (46.7%). Less than 23% of the respondents reported confidence in providing healthcare related to a hypothetical terrorism event. The difference in scores among healthcare providers, specialty groups, and gender were not statistically significant.

A study conducted in mid-2001 by Lanzilotti and colleagues, examined Hawaiian medical professionals. The intent of the Lanzilotti and colleagues study was to assess the availability of doctors and nurses to staff non-hospital medical facilities for mass casualty

incidents resulting from the use of weapons of mass destruction or other terrorist events. The study also examined the level of knowledge and skills that these medical professionals possessed as related to the treatment of victims involved in terrorist incidents. This study consisted of a large-scale mail survey administered to medical and nursing professionals residing and working in the state of Hawaii (Lanzilotti, Galanis, and Leoni, 2002). This study examined the availability and capability of medical professionals to respond to casualties caused by weapons of mass destruction. Although this study had a low response rate (23%, $n = 3386$ for physicians; and 22.4%, $n = 2775$ for nurses), the findings yielded similar results to other studies reported in this literature review (Alexander & Wynia, 2003; Chen et al., 2002; Gerberding et al., 2002; Gershon et al., 2004). As in other studies discussed in this literature review exploring these issues, the investigators found that both physicians and nurses reported having low knowledge levels regarding bioterrorism agents such as smallpox, anthrax, tularemia, plague, and botulism. Also as in previous studies mentioned above, the investigators found that both the physicians and the nurses had a perceived inability to recognize and treat patients with diseases of bioterrorism. The Lanzilotti et al. study also reported that less than 10% of the physicians in the sample consider themselves able to treat victims of bioterrorist incidents. In contrast, the respondents in the study reported generally high levels of willingness to report to duty during a bioterrorism incident, with a positive correlation seen between high levels of self-reported knowledge, awareness, and willingness to respond. Thus, the study concludes that it may be possible to increase clinicians' willingness to respond to a bioterrorist emergency through physicians' education and training. This conclusion has been supported by several other studies examined within

this literature review (Alexander & Wynia, 2003; Chen et al., 2002; Cherry et al., 2003; Croasdale, 2002; Gerberding et al., 2002; Gershon et al., 2004).

The limitations of the Lanzilotti et al. (2002) study include the low response rate of only 23%, which may not accurately reflect many of the physicians' perceptions.

Another limitation in the study is the possibility of set response bias, which may lead to biased results. Set response bias often occurs with large-scale written or mailed surveys when respondents reply by marking the same response repeatedly to facilitate completion of the survey. My study will attempt to contribute to the literature in a novel fashion by examining physicians from a rural region in Florida from a qualitative perspective using semi-structured interviews rather than surveys to examine their perceptions to bioterrorism preparedness. Another potential limitation with the Lanzilotti and colleagues study is that the sample consists of participants limited to Hawaii, and it may therefore be more difficult to generalize these findings to clinicians from other parts of the country.

A small study by Rico, Trepka, and Guoyan entitled Knowledge and Attitudes about Bioterrorism and Smallpox: a Survey of Physicians and Nurses, was performed in 2002. This study surveyed licensed physicians (n = 134) and nurses (n = 121) in Miami-Dade County. The investigators found that 97% of physicians and 92% of nurses were interested in receiving bioterrorism training (Rico et al., 2002). The interest among both physicians and nurses was especially keen for training on the recognition of potential bioterrorist events and on the overall public health response to these emergencies. Only 21% of physicians and 7% of nurses in the sample of participants believed that they had updated knowledge on the signs, symptoms, treatment, modes of transmission, and

communicability of class A bioterrorist agents (e.g., smallpox, anthrax, tularemia, plague, and botulism). This study also confirms other studies pertinent to this literature review, which explain that most clinicians perceive themselves as unprepared to effectively deal with bioterrorism (Alexander & Wynia, 2003; Chen et al., 2002; Heun, 2002; Sigmon & Larson, 2002).

A limitation of this study is the small sample size of 134 physician participants. A small sample size may not accurately represent or depict the perceptions of a population. Another limitation of the study is the set response bias with survey methodology. Another potential limitation is that the sample is of participants limited to the Miami, Florida or the Dade County area and it is therefore difficult to generalize these findings to clinicians from other parts of the country.

A study performed by Alder, Clark, White, Talboys, and Mottice in 2004 examined physician preparedness for bioterrorism recognition and response. A survey was performed that included 30 rural and urban physicians in Utah. The survey included a needs assessment regarding roles, current levels of preparedness, interest in further training, and preference for training methods. The physicians were from various specialties: four family medicine physicians, five general internists, five pediatricians, six emergency medicine physicians, five infectious disease specialists, three dermatologists, and two radiologists, and were grouped as primary care (i.e., family medicine, general internist, and pediatricians), emergency care (i.e., emergency medicine physicians) or specialty care (e.g., infectious disease specialists, dermatologists, and radiologists).

This qualitative study assessed the attitudes and assumptions of practicing physicians regarding bioterrorism preparedness by using individual and small group

semi-structured interviews. Participants were asked about their perceived risk of bioterrorism, current roles and ability to detect and respond to events, interest levels in bioterrorism training, and preferences for educational offerings. Quota sampling, based on physician specialty and community or tertiary/academic practice was used to select participants.

Primary care physicians estimated that a direct local attack is unlikely, yet possible. Emergency medicine and infectious disease specialists had similar responses. They both felt that a national bioterrorist attack was more imminent than a local attack, yet a national attack may have local consequences. Infectious disease specialists, dermatologists, and radiologists stated that the likelihood of a local attack was extremely unlikely.

The physician's perceived role for detecting and responding to bioterrorism was found to be related to their type of practice. Both primary care and infectious disease physicians felt that in the event of a bioterrorist attack they would be expected to link into the public health infrastructure and notify emergency personnel. Primary care physicians felt, because of their ongoing relationships with pre-existing patients, that they would be able to detect unusual disease patterns and link the patients to medical specialists. Primary care physicians also admitted that they are not adequately prepared to recognize and treat bioterrorism related diseases. One primary care physician stated, "I could see patients today whose symptoms could be attributable to any one of the biological agents. I'm not going to be thinking about that because, number one, I can't distinguish the usual from the unusual right now," (Alder et al., 2004, p 70). Emergency care physicians felt that they would identify the index case and act as the primary medical respondent

because they are familiar with diseases caused by bioterrorism agents. One emergency physician stated, “I think there’s a good chance we would be one of the first people to identify it if there was actually an event,” (Alder et al., 2004, p 72). Infectious disease physicians felt confident in their ability to recognize and respond to uncommon diseases, including those caused by bioterrorism agents. Their confidence was partly due to an increased emphasis on bioterrorism-focused continuing medical education. One respondent stated, “I think one thing that maybe the anthrax case taught us was that if you’re not thinking about it, you’re not going to catch it,” (Alder et al., 2004, p 72). Both dermatologists and radiologists felt that their primary role would be to support primary care physicians.

Respondents cited time constraint and other competing demands as the primary reasons for not being able to spend more time dedicated to bioterrorism preparedness. One family practitioner stated, “You have to think of a disorder in order to ask the right questions or to do the right physical exam. It’s not seeing is believing, it’s believing is seeing. You have to have that mental model,” (Alder et al., 2004, p 72). Most family practice physicians wanted general information about disease processes and a better understanding of how to link into the medical specialist’s hierarchy, which could assist with patients with bioterrorism diseases. One family practice physician explained, “I wouldn’t expect most family physicians to be able to say here are the diagnostic criteria for anthrax. How important is it that I know the diagnostic criteria? Again, there is a certain amount of information I know I can look up anywhere,” (Alder et al., 2004, p 72). Infectious disease physicians felt that all physicians should have a basic understanding of diseases consistent with bioterrorism. One participant stated, “I think their most

important preparation is recognition of diseases, and they ought to have some inclination or readiness with regards of how to prevent spread,” (Alder et al., 2004, p 73). Another participant pointed out that if primary care physicians are involved in surveillance, the level of general bioterrorism preparedness would increase.

Preferences also varied according to medical specialty regarding which methods are preferred for training and continuing education. Primary care physicians requested training from health department personnel, fellow primary care physicians, or infectious disease specialists with expertise in bioterrorism recognition and response. Primary care physicians wanted to incorporate training into existing activities, such as CME activities or professional meetings. In addition, they wanted to be provided with quick reference materials. Emergency physicians wanted Web-based training activities, disaster training drills, and exercises that include information regarding bioterrorism agents. All physician specialists suggested grand rounds and physician meetings as valuable to provide education and training.

One possible limitation with the Alder et al. study includes the use of a “small focus” group, which may bias results. Several of the interviews only included a few respondents representing large medical specialty groups. Although the study includes a sample of participants limited to the one state, Utah, it is a well-conducted qualitative study. Qualitative studies are less concerned with quantitative external validity or generalizability across studies and are rather more concerned with what is known as internal generalizability. This is because qualitative researchers study a single setting or a small number of individuals or sites, using purposeful sampling rather than probability sampling, and they rarely make explicit claims about the generalizability of their

accounts (Maxwell, 2005). Thus, the objective of qualitative research is to understand the particular in depth rather than finding out what is generally true of many.

Specific Research Questions and Contribution to the Literature

Any bioterrorism event or threat of an event is a public health and community issue in which the medical community has a major leadership role. Physicians have a dual responsibility to educate the community and prepare for any event. Although only a few physicians would likely recognize the sentinel case in a bioterrorist event, the overall public health management would involve every physician. Consequently, physicians must be knowledgeable to accurately address questions from patients, friends, and acquaintances. Furthermore, every physician must be prepared to take an active role should a bioterrorist event surface in his/her community. Thus, each physician has a significant role to assume in our nation's defense against bioterrorism.

The intent of this literature review was to expose the need for rural physicians to be prepared for public health emergencies such as bioterrorist events. This literature review has shown that physicians feel better prepared to respond to other disasters such as natural disasters and infectious disease outbreaks than bioterrorist events (Alexander & Wynia, 2003; Chen et al., 2002). It has shown that physicians need and request additional training and CME regarding bioterrorism (Alexander & Wynia, 2003; Chen et al., 2002; Heun, 2002; Sigmon & Larson, 2002). It has further been demonstrated that when physicians are provided continuing medical education and training regarding bioterrorism, they perceive themselves as better prepared to respond to a public health emergency such as a bioterrorist attack (Alexander & Wynia, 2003; Chen et al., 2002; Cherry et al., 2003; Croasdale, 2002; Gerberding et al., 2002; Gershon et al., 2004). With improved training and continuing medical education, physicians also perceive fewer

barriers to delivering patient care because they feel better prepared (Alder et al., 2004; Cherry et al., 2003; Cowan et al., 2005; Sterling et al., 2005).

Bioterrorist agents can cause a vast array of constitutional symptoms such as fever, chills, headache, nausea, vomiting, and diarrhea. Bioterrorist agents can also cause more severe physical symptoms such as chest pain, pneumonia, convulsions, paralysis, and mortality. Bioterrorist agents also impact mental health in that they invoke or exacerbate fear, anxiety, acute stress disorder, depression, and other mental health conditions. Thus, rural physicians' preparedness for organic and mental health conditions related to bioterrorism is vitally important so when they encounter such signs and symptoms in patients they can discern and diagnose the condition expediently. Bioterrorism preparedness requires physicians to be aware of the possibility of bioterrorism at any time (Gerberding et al., 2002, Inglesby et al., 2000). Plans can only be implemented effectively if physicians are aware of the possibility of bioterrorism, suspect and recognize an event when it occurs, notify authorities promptly upon suspicion of such an event, and institute appropriate management.

Broader public health aspects of bioterrorism preparedness, including primary prevention measures, are also important areas for informed action by physicians. Medical education and training curricula must include information on key potential agents of bioterrorism, and medical professionals require continuous education in this area, especially those, such as primary care physicians, who are most likely to see patients affected by a biological weapon. Moreover, physicians from other specialties may need sufficient knowledge of the likely clinical features of potential biological

agents in order to recognize patients presenting with a compatible illness (Gerberding et al., 2002; Karwa et al., 2003, Karwa et al., 2005).

This study exposes the need that exists to take decisive steps to improve bioterrorism preparedness among physicians. Yet as previously stated in this literature review (Rose & Larrimore, 2002), the current generation of physicians perceive themselves as unprepared in both their knowledge base and confidence levels to deal with potential biological terrorism and its consequences. Previous research has underscored this point by showing that community clinicians often are the first to identify potential bioweapon victims yet remain inadequately prepared clinically to address such events (McFee, 2002; Pesik et al., 1999; Sniffen & Nadler, 1999; Varkey, Poland, Cockerill, Smith, and Hagen, 2002). Consequently, it has become clear that there is a pressing need to rapidly educate and train medical personnel on the signs and symptoms and reporting mechanisms of bioterrorism-related diseases (Gershon et al., 2004). Few studies have examined bioterrorism preparedness (Gershon et al., 2004), and several published reports provide evidence of both knowledge gaps and high levels of interest in bioterrorism-related training among physicians (AMA, 2005; Heun, 2002; Sigmon & Larson, 2002).

So, while the previous literature is both pertinent and valuable, there still remains a void in the literature on the understanding of public health emergency preparedness and especially of bioterrorism preparedness. Based on this literature review, there also has not been a significant amount of attention devoted to rural areas. Consequently, there remain gaps in the perceptions of preparedness among rural physicians. Furthermore, most of the studies that do exist address the issue exclusively from a quantitative perspective (Alexander & Wynia, 2003; Chen et al., 2002; Shadel et al., 2003; Sterling et

al., 2005). With the exception of the Alder et al. study (2004), there is not an in-depth qualitative examination of physicians' perceived emergency preparedness for bioterrorism. Thus, the topic could benefit tremendously from further qualitative exploration.

The Alder study exposed physicians' attitudes and assumptions regarding bioterrorism preparedness in the state of Utah. This study will further contribute to the literature regarding bioterrorism preparedness by providing an informative qualitative inquiry. This study has three principal distinctions from the Alder study. First, there is a focus on perceptions of physicians from rurally designated areas in the state of Florida. Florida occupies an especially important place regarding bioterrorism. It has the largest coastline of the 48 contiguous states, which could serve as a major route of access for bioterrorism. It also has a large rural population with 37 designated rural counties. Moreover, Florida has a diverse ethnic population along with numerous national and international tourists exceeding more than 40 million during any given year (Clawson & Brooks, 2003). Second, this study focuses exclusively on primary care community physicians in rural healthcare settings. Rural healthcare settings have few primary care community physicians and often lack specialty physicians altogether. Several previous studies have shown that primary care community physicians (McFee, 2002; Pesik et al., 1999; Sniffen & Nadler, 1999; Varkey et al., 2002) will most likely be the first to encounter sentinel bioterrorist events. Thus, this study is particularly relevant to rural healthcare settings with primary care community physicians. Third, this study will focus on the perceived barriers that prevent ample professional preparedness among rural physicians.

I propose an intensive qualitative study of key informant physicians from rural counties in North Central Florida. Rural physicians from these counties are hypothesized to vary in their bioterrorism preparedness because of diverse professional and pragmatic experiences, their varying degrees of training and education regarding bioterrorism, and the variation of impediments or barriers to delivering medical care.

The study will use the interview data transcripts from six rural physicians as the primary data with which to explain the state of emergency preparedness of physicians and to explain and better understand the barriers to preparedness encountered by these rural healthcare providers. This study will not focus on empirical testing, but instead will qualitatively explore the variation or degree to which rural healthcare providers consider themselves to be prepared for bioterrorist events. Thus, this study will address two principle research objectives. The first objective is to describe and understand how rural physicians perceive and explain their state of emergency preparedness particularly for a bioterrorist event. The second research objective is to describe and understand how the barriers that these rural physicians perceive to be operative affect their emergency bioterrorism preparedness.

The long-term objective of this study is to provide a greater description and understanding of rural physicians' perceived preparedness regarding public health emergencies such as bioterrorist events. The principal objectives of this study are to expose the current state of rural bioterrorism preparedness and to provide policy options to improve the rural healthcare system's bioterrorism preparedness. Thus, the findings of the proposed study should be relevant to researchers in the disciplines of public health and rural medicine, as well as practitioners in health policy.

CHAPTER 3 EPISTEMOLOGY, THEORETICAL PERSPECTIVE & RESEARCH METHODS

This chapter begins by providing a brief description of the epistemology and proceeds to explain constructivism as a theoretical perspective. The conventional qualitative inquiry format of epistemology followed by the theoretical perspective is followed (Figure 1). Although it should be noted that the epistemology and the theoretical perspective are inextricably integrated and intertwined (Crotty, 2003) and may have on occasion arrows pointing in both the reverse as well as the forward direction.

Chapter three begins with the methods of semi-structured interviews and constructivist grounded theory (Charmaz, 2004, 2005). Next, participant selection, participant demographics, and interviews are discussed. This is followed by grounded theory and data analysis. The chapter continues with an explanation of how validity is defined from both a quantitative and a qualitative perspective and the qualitative validity measures employed in this study. The chapter concludes with the limitations of the study and a subjectivity statement that describes my professional and personal experiences as a physician, related to physicians and emergency preparedness.

Quantitative and qualitative researchers use similar elements in their work. They state a purpose, pose a problem or raise a question, define a research population, develop a time frame, collect and analyze data, and present outcomes (Glesne, 1999). Yet qualitative research also has salient differences from quantitative research. Quantitative researchers assume a fixed, measurable reality exists which is external to people. In contrast, qualitative researchers are generally supported by the interpretivist paradigm,

which portrays a world in which reality is socially constructed, complex, and ever-changing. The belief for constructivists is that social realities are constructed by participants in social settings. To understand the nature of constructed realities, qualitative researchers interact and talk with participants about their perceptions. So qualitative researchers regard their research task as coming to understand and interpret how the various participants in a social setting construct the world around them (Glesne, 1999).

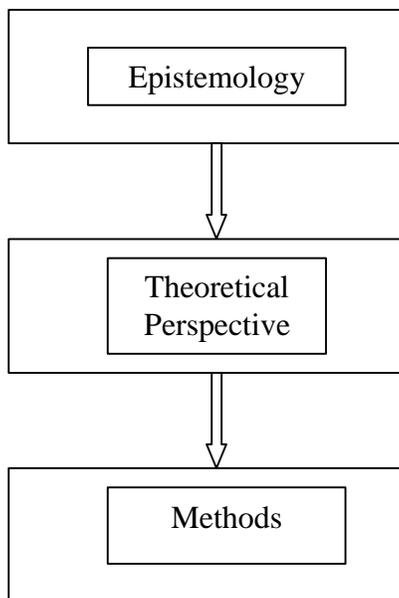


Figure 3-1: Qualitative Method Process

In qualitative research study, “research design should be a reflexive process operating through every stage of a project” (Hammersley & Atkinson, 1995, p 24). The activities of collecting and analyzing data, developing and modifying theory, and addressing validity threats are usually all occurring at the same time, each influencing all of the others (Maxwell, 2005). Qualitative research studies have become more prevalent in health services research and particularly the medical community (Crabtree & Miller, 1999; Frankel, 1999). For example, two prominent qualitative researchers, Miller and

Crabtree, developed a document for the Information Mastery Working Group to identify qualitative articles worthy of review for the medical journal, *The Journal of Family Practice and Evidence-Based Practice* (Crabtree & Miller, 1999). *The Journal of Family Practice and Evidence-Based Practice* has a web page in which supplementary materials for published articles can be placed. Crabtree and Miller (1999) explain this is akin to an external audit.

Qualitative research rests on assumptions that reality is socially constructed and variables are complex, interwoven, and difficult to measure. To understand the nature of constructed realities, qualitative researchers interact and talk with relevant participants about their perceptions. The research approach is descriptive and inductive in nature, searches for patterns, and may result in the formulation of hypotheses and theory. Qualitative research has the principal purposes of understanding and interpretation (Maxwell, 2005). According to Crotty (2003) and other qualitative researchers (LeCompte & Preissle, 1993; Miles & Huberman, 1994; Robson, 2002; Rudestam & Newton, 1992, p 5), the following components are important in research design: the research questions, methods and validity. There are three principal elements of the methodological research process (Crotty, 2003). This chapter will examine these important elements by addressing the following three questions: What methods will be used?, What theoretical perspective lies behind the methodology in question?, and What epistemology informs this theoretical perspective? Thus, what follows is an explanation to each question beginning with the epistemology, followed by the theoretical perspective and then the methods themselves.

Ontological and Epistemological Considerations

Prior to embarking on any kind of qualitative research, it is important for a qualitative researcher to consider and then identify assumptions regarding what constitutes valuable knowledge (Crotty, 1998). The epistemology that the researcher finds to be the most suitable should serve as the foundation on which research methodology selection and implementation will be grounded (Crotty, 1998).

According to Maxwell (2005), ontology is a set of general philosophical assumptions about the nature of the world and epistemology is how one can understand it. Epistemology is the theory of knowledge embedded in the theoretical perspective and thereby in the methodology (Crotty, 2003). So, an epistemology is a way of understanding and explaining how one knows what one knows (Crotty, 2003). Epistemology deals with the nature of knowledge, its possibility, scope, and general basis (Hamlyn, 1995). According to Maynard (1994), epistemology is concerned with providing a philosophical grounding for deciding what kinds of knowledge are possible and how a person can ensure that their knowledge is both adequate and legitimate. In essence, there is a need to identify, explain, and justify the epistemological stance. As participants in this study, the rural physicians share their perceptions and thereby inform the interviewers what knowledge is and the reality is what is reported in the study.

There are several types of epistemologies: objectivism, constructionism and subjectivism. An objectivist epistemology holds that meaning, and therefore meaningful reality, exists as such apart from the operation of any consciousness. An illustration of objectivism is that a tree in the forest is a tree, regardless of whether anyone is aware of its existence or not. As an object of that kind (objectively, therefore), it carries the intrinsic meaning of “tree-ness” (Crotty, 2003, p 8). Crotty further explains that when

human beings recognize a tree, they are simply discovering a meaning that has been lying there in wait for them all along.

Constructionism is another type of epistemology which rejects this view of human knowledge. According to constructionism, there is no objective truth waiting for us to discover it. Truth, or meaning, comes into existence in and out of our engagement with the realities in our world. There is no meaning without a mind. Meaning is not discovered, but constructed. According to Crotty, in this understanding of knowledge, it is clear that different people may construct meaning in different ways, even in relation to the same phenomenon. Crotty (2003) argues that this is precisely what one finds when one moves from one era to another or from one culture to another. In this view of things, subject and object emerge as partners in the generation of meaning (Crotty, 2003).

This study embraces constructionism as its principal epistemological stance. Constructionism is the view that all knowledge, and therefore all meaningful reality as such, is contingent upon human practices, being constructed in and out of interaction between human beings and their world, and developed and transmitted within an essentially social context (Crotty, 2003). According to constructionism, one does not create meaning, but one constructs meaning. Human beings construct meanings as they engage with the world they are interpreting. As Crotty explains, the world is always already present, and although the world and the objects in the world may be in themselves meaningless, they are partners in the generation of meaning. Thus, constructionism brings the interaction between subject and object to the forefront. Crotty (2003) explains that the image evoked from this interaction is the subject or humans engaging with their object or the world. Thus, constructionism brings objectivity and

subjectivity together and unites them and it is in and out of this interplay that meaning is born.

Subjectivism is another type of epistemology. In subjectivism, meaning does not come only from the interplay between subject and object, but is imposed on the object by the subject (Crotty, 2003). According to Crotty, in subjectivism one makes meaning out of something or one imports meaning from somewhere else. The meaning ascribed to the object may come from one's beliefs, or from one's professional experience, or from one's personal experiences, or from one's educational background, or from religious beliefs, or from primordial archetypes located within a collective unconscious, or from other realms. So, meaning comes from more than an interaction between the subject and the object to which it is ascribed (Crotty, 2003).

To be consistently subjective means to distinguish scientifically-established objective meanings from subjective meanings that people hold in everyday fashion and that "reflect" or "appear or perceive" or "mirror" objective meanings. Subjective meanings are very important within an individual's life to ascertain an individual's meaning making, perceptions, and reflections. Thus, subjectivism is an effort to identify, understand, describe, and maintain the subjective experiences of the respondents.

In essence with this context, the epistemological stance of constructionism is in search of the individual rural physicians' subjective experiences and constructed meanings, perceptions, and understandings of emergency bioterrorism preparedness, and the impediments preventing their preparedness. The rural physicians' perceptions and their individual meaning-making processes produce the source of information, truth, and knowledge.

Theoretical Perspective: Constructivism

Epistemology provides a philosophical background for deciding what kinds of knowledge are legitimate and adequate. Epistemology is the theory of knowledge embedded in the theoretical perspective. The theoretical perspective is the philosophical stance that shapes our methodologies, providing a context for the process and grounding its logic and criteria. The theoretical perspective is a statement of the assumptions brought to the research task and reflected in the methodology as one understands and employs it (Crotty, 2003). Thus, the theoretical perspective is a way of looking at the world and making sense of it. It, too, involves knowledge and embodies a certain understanding of what is entailed in knowing, that is, how one knows what one knows (Crotty, 2003), although, as has been previously stated, knowledge is generally considered more the realm of the epistemology, but there is overlap (Crotty, 2003). In this study, the form of inquiry and data collection employed involves selective sampling with semi-structured interviews. By the very nature of the interviews, some of the assumptions relate to matters of language and issues of subjectivity and communication. To account for these assumptions and justify them requires an explanation of the theoretical perspective. Consequently, the theoretical perspective is an elaboration of our view of the human world and social life within that world, wherein such assumptions are grounded.

Research in the constructivist vein requires that one does not remain straitjacketed by the conventional meanings that one has been taught to associate with the object. Instead, such research invites one to approach the object in a radical spirit of openness to its potential for new or richer meaning (Crotty, 2003). Constructivists believe that the social “constructions of individuals and groups are not more or less ‘true’ in an absolute

sense, but, simply more or less informed and/or sophisticated” (Lincoln & Guba, 1985, p 111). Constructivism asserts that nothing represents a neutral perspective, that is, nothing exists before consciousness shapes it into something perceptible (Kincheloe, 2005).

In constructivist theory, different individuals coming from diverse backgrounds will perceive and see the world in different ways. The backgrounds and expectations of the observer will also shape perception (Kincheloe, 2005). Constructivist theory defines shared constructs and meanings as “situated”; that is, they are located in or affected by the social, political, cultural, economic, ethnic, age, gender, and other contextual characteristics of those who espouse them (LeCompte & Schensul, 1997). These characteristics influence how individuals think, believe, and present themselves. Thus, interpretations cannot be separated from the interpreter’s location in the web of reality. One’s interpretive facility involves understanding how historical, social, cultural, economic and political contexts construct one’s perspectives on the world, self, and others (Kincheloe, 2005).

The knowledge that constructivist research produces is grounded on the assumption that the world is shaped by a complicated, web-like configuration of interacting forces. Knowledge producers, like everyone else, are inside, not outside, the web. The knower and the known are inseparable—they are both a part of the complex web of reality. No one in this web-like configuration can totally escape the web and look back at it from afar. Indeed, one must confess his/her subjectivity and one must recognize his/her limited vantage points (Kincheloe, 2005).

To recognize how one's particular view of the web shapes the conception of social, psychological, and educational reality, one also needs to understand the historical location. According to Kincheloe (2005), the world is socially constructed, that is, what one knows about the world always involves a knower and that which is to be known. Kincheloe states that how the knower constructs the known is principally through perceptions and reflections which constitutes what one thinks of as reality. He explains that all knowers are both historical and social subjects. Each person is from "somewhere", which is located in a particular historical time frame. These spatial and temporal settings always shape the nature of our constructions of the world. Not only is the world historically and socially constructed, but so also are people and the knowledge people possess. He explains that individuals create themselves with the cultural tools at hand. A person operates and constructs the world and his/her life on a particular social, cultural, and historical playing field (Kincheloe, 2005).

Schwandt states that constructivists "are deeply committed to the contrary view that what one takes to be objective knowledge and truth is the result of perspective" (Schwandt, 1994, p 125). Constructivists "emphasize the instrumental and practical function of theory construction and knowing" (Schwandt, 1994, p 125). Constructivism is primarily focused on an understanding of an individual in the context of the social. It involves the meaning-making activity of the individual mind (Crotty, 2003; Schwandt, 1994), and further explains the unique experience of each of us. It suggests that each one's way of making sense of the world is valid and worthy of respect as any other, thereby tending to ameliorate any innuendo of a critical spirit. The role of perceptions and reflections are the essential components in the formulation of individual meaning-

making and understanding. Therefore, constructivism describes the individual human subject engaging with objects in the world and making sense of them (Crotty, 2003).

Constructivism as a theoretical perspective facilitates individual meaning-making, perceptions, and reflections as crucial elements. This theoretical perspective will assist in understanding rural physicians' perceptions of their own perceptions to emergency bioterrorism preparedness. It also assists in understanding the barriers rural physicians perceive as impediments to emergency bioterrorism preparedness. Constructivism as a theoretical perspective guides the study research inquiries and the purposes of the study to understand the perceptions and reflections of rural physicians' preparedness for a bioterrorism event.

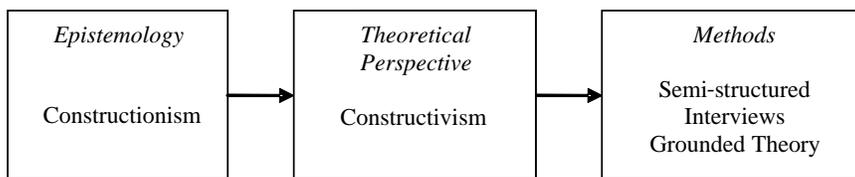


Figure 3-2: Detailed Qualitative Methods Process

Methods

This section describes the strategies that were used to recruit participants and collect data, as well as the analysis procedures employed. This study uses qualitative methodology to describe and understand rural physicians' and healthcare providers' perceptions regarding emergency bioterrorism preparedness and the perceived barriers encountered in preparedness. The detailed description of the methods used for this inquiry is presented for the reader to be able to adequately evaluate the rigor of the research process and findings.

Participants

Selection Criteria and Sampling

Crabtree and Miller (1999) ask how researchers select a sample from a larger pool for closer scrutiny. They further ask how can one feel confident that the sample chosen is appropriate and adequate (Crabtree & Miller, 1999). In such qualitative data collection, a challenge involves determining when one has exhausted new information or reached a saturation point. My qualitative study declares based on the rich content of the interview participants that new data would not emerge with additional interviews. Thus, additional data collection would merely result in repetitive data thereby suggesting data saturation. Patton suggests that qualitative research “typically focuses in depth on relatively small sample sizes, even single cases ($n = 1$), selected purposefully” (Patton, 1990, p 168). Patton contrasts this with quantitative research designs, which “typically depend on larger samples selected randomly” (Patton, 1990, p 169). Qualitative research uses field or documentary/historical research styles, and the sampling is driven not by a need to generalize or predict, but rather by a need to create and test new interpretations (Crabtree & Miller, 1999). Typically, the investigator intends to increase the scope or range of the data to reveal multiple realities and/or create a deeper understanding (Crabtree & Miller, 1999). This is what McWhinney refers to as “an acquaintance with particulars” (McWhinney, 1989). It allows for the development of theory that takes into account local conditions (Bogdan & Biklen, 1982; Glaser & Strauss, 1967; Guba & Lincoln, 1989; Lincoln & Guba, 1985; Patton, 1990). Thus, in field or documentary/historical research, sampling strategies strive for information richness (Patton, 1990).

There are several possible goals of purposeful selection according to qualitative researchers (Creswell, 2002; Guba & Lincoln, 1989; Maxwell, 2005). Purposeful

sampling is also known as criterion-based selection (LeCompte & Preissle, 1993; Patton, 1990). This study employs purposeful sampling, which is conventionally used in grounded theory research (Glaser & Strauss, 1967; Strauss & Corbin, 1990). The goal of using purposeful sampling in this qualitative study was to ascertain the representativeness or typicality of the rural settings and the individuals. An additional objective was to compare the settings and individuals.

Purposeful sampling is a strategy in which particular settings, persons, or activities are selected deliberately in order to provide information that cannot be gotten as well from other choices. This study used what Weiss (1994, p 17) explains as the use of panels-“people who are uniquely able to be informative because they are expert in an area or were privileged witness to an event.” In this study, physicians were selected purposefully from rural counties in North Central Florida to explain their current perceived emergency preparedness and the perceived impediments to bioterrorism preparedness. This purposeful sampling was performed to aid the grounded theory development and the grounded theory coding process or as, Strauss and Corbin (1990) state: “for verifying the story line, relationships between categories, and for filling in poorly defined categories” (p 187).

Physician participants were recruited from several rural counties in North Central Florida. The counties included were Levy County, Gilchrist County, Dixie County, Bradford County, and Putnam County. This was done to select cases that illustrate or highlight diverse variations and to identify what is typical, normal and common regarding rural physicians’ perceptions of emergency bioterrorism preparedness and the perceived barriers. Although the degree of experience and medical specialty varied, each

participant selected to participate in this inquiry was a physician from a rural county practicing medicine in a rural setting in North Central Florida. These physicians were selected from county departments of health, medical clinics, and community health centers. All of the participant physicians were from federally-designated metropolitan statistical areas that were classified as rural in 2003 and 2004.

The educational background and, more importantly, the particular professional specialty of the participants are important because the main purpose of this research is to describe and understand the perceptions of physicians' emergency bioterrorism preparedness. Additionally, the fact that these physicians were from rurally designated areas is important. Physicians in rural communities play an essential role in the safety net in the event of a bioterrorist attack (Office of Rural Health Policy, 2002). If a bioterrorist attack were to occur in an urban area, the evacuation of the urban area could result in a mass exodus of people migrating into the rural communities, with many needing medical care. Also, the converse is true as rural health providers may be called upon to enter the urban areas to lend support to the physicians there in order to meet all the needs of the victims. Thus, it is essential that physicians practicing in hospitals, and also those in private practice, be well trained and able to respond in the event of a bioterrorist attack (Gerberding et al., 2002). In prior research studies in which physicians were interviewed to gain information regarding their emergency bioterrorism preparedness, the data generated revealed that physicians felt more prepared to deal with infectious disease outbreaks and natural disasters than emergency bioterrorism events (Alexander & Wynia, 2003; Chen et al., 2002).

Participants were interviewed at their place of employment. Each participant had either a medical doctorate (M.D.) or a doctorate of osteopathic medicine (D.O.) and had practiced medicine prior to September 11, 2001 and five of the six had practiced medicine at the same site prior to September 11, 2001. Physician participants were from primary care specialties including family medicine, internal medicine, pediatrics, and emergency medicine. This was done for several reasons. It was performed because in many of these rural areas there was only one physician and it was also employed to identify and search for important common patterns across diverse variations.

Demographic Information

Six physicians from the rural North Central Florida counties of Levy, Gilchrist, Dixie, Bradford and Putnam Counties were recruited to participate in this study. This number of participants has been successful in previous qualitative research examining family physicians and patients' perceptions and personal experiences with pain (Miller, Crabtree, Addison, Gilchrist, and Kuzel, 1994). This number of participants allows the researcher to gather an ample amount of data to obtain validity, while at the same time limiting the amount of data generated so that the researcher can provide in-depth descriptions of the participants' perceptions (Crabtree & Miller, 1999; Merriam, 1995; Patton, 1990). Patton (1990, p 185) further states "the validity, meaningfulness, and insights generated from qualitative inquiry have more to do with the information-richness of the cases selected and the analytical capabilities of the researcher than with sample size." Of the six participants, five had a M.D. degree and one had a D.O. degree. Two participants were from county Departments of Health (Levy and Dixie), and the others were from rural health clinics (Fanning Springs, Shands at Starke, Trenton Medical Center, and Putnam Family Medical and Dental). Three physicians were trained and

practiced as family practitioners, one was trained and practiced as an internal medicine physician, one was trained and practiced as a pediatrician, and one was trained as a preventive medicine or public health physician and also practiced emergency medicine.

Background information describing each of the participants was important when seeking their perception of emergency bioterrorism preparedness and barriers to emergency bioterrorism preparedness because any similarities or differences between participants may have influenced how they viewed the world. Background information was collected from each participant during the interview (See Appendix A: Interview Questions). Table 3-1 shows basic demographic information from each of the participants. Each of the physicians had unique medical experiences with bioterrorism emergency preparedness. Each physician, save one, was employed and practicing medicine at the site prior to September 11, 2001, and prior to the bioterrorism anthrax attacks in October of 2001. One physician was practicing medicine, but at a different location. Table 3-2 shows clinical background information for each physician, including degree, specialty, years practicing medicine, years practicing medicine at the facility, and rural county. Pseudonyms were used for each physician participant to protect their identity (Table 3-1 and Table 3-2 contain the pseudonyms).

TABLE 3-1: Participant Demographic Information

Participant	Age	Gender	Ethnicity	County
Doctor Williams	46	Male	Caucasian	Gilchrist/Levy
Doctor Smith	42	Male	Caucasian	Levy
Doctor Davis	48	Male	Caucasian	Bradford
Doctor Jones	35	Male	Caucasian	Gilchrist
Doctor Brown	49	Male	Caucasian	Putnam
Doctor Phillips	38	Female	Asian-American	Dixie

TABLE 3-2: Clinical Background Information

Participant	Degree	Specialty	Years in Medical Field	Years at Medical Site
Doctor Williams	M.D.	Family Medicine	12	12
Doctor Smith	D.O.	Internal Medicine	16	3
Doctor Davis	M.D.	Public Health/ Preventive Medicine and Emergency Medicine	21	21
Doctor Jones	M.D.	Family Medicine	9	2
Doctor Brown	M.D.	Family Medicine	23	4
Doctor Phillips	M.D.	Pediatrics	12	4

Data Collection

Data collection consisted of participant semi-structured interviews. The specific strategies used to collect data through these means are described in the following section.

My Role in the AHRQ 1 U01 HS14355-01 Grant

I became a member of the research team when asked to participate by the principal investigator in early 2004. One of my roles was to assist with the interviewing of key participant respondents. My other role in the research project was to assist with the coding of the participant transcripts using the software program ATLAS.

I chose to compose this study using this data because of my interest in both physician emergency preparedness and because of the loss of a friend and physician colleague as a result of the September 11, 2001, terrorist events. Further, as a physician, I am naturally interested in how physicians perceive their preparedness regarding public health emergencies.

Interviews

The methods selected for data collection should take into consideration the fact that it is not the researcher's perception that is of interest (Moustakas, 1994; Seidman, 1991). In qualitative research, a common approach is to use open-ended semi-structured interviews to gather data from participants (Kvale, 1996; Moustakas, 1994; Seidman, 1991). Interviews are the primary source of data in constructivist research because, if structured properly, they allow the researcher to gather data while simultaneously reducing the influence of researcher bias (Moustakas, 1994; Seidman, 1991).

Research interviews vary on a series of dimensions. This study employs a semi-structured interview format. Such a format facilitates an a priori sequence of interview question formulations, yet also embraces flexibility during the interview session to focus on topics of importance for the participants. According to Kvale (1996), interviews also differ in their openness of purpose. In this qualitative study, the interviewers explained the purpose and posed direct questions from the inception of the interview.

The interview questions asked of each participant were brief and simple. Many of the types of questions that are considered useful by qualitative researchers (Kvale, 1996; Seidman, 1991) in semi-structured interviews were included. For instance, the types of interview questions asked included introducing questions, probing questions, specifying questions, structuring questions, direct questions, and indirect questions (Kvale, 1996).

The interview objective was to elicit a physician's perceptions of preparedness by asking the types of organic and mental health conditions likely to be encountered following a bioterrorist event and the risk factors associated with developing medical or mental health conditions. The interview questions also elicited the perceived impediments a rural physician or the physician's patients may encounter in accessing healthcare and whether these would be exacerbated during or following a bioterrorist attack. The questions probed into the level of perceived education and training that is important and appropriate regarding bioterrorism agents and preparedness.

Representative interview questions included (1) What types of physical conditions do you think you would be likely to see in patients following a terrorist attack? (2) What types of mental health disorders do you think you would be likely to see in patients following a terrorist attack? (3) Are you aware of any risk factors for developing medical problems following a bioterrorist attack? (4) Are you aware of any risk factors for developing mental health problems following a bioterrorist attack? (5) What kinds of things can get in the way of accessing healthcare for people served at this clinic? and (6) How important is it for healthcare providers to receive training for bioterrorism? Appendix A contains the complete list of interview questions.

Prior to each interview a one page summary of the intent and objectives of the grant awarded from the Agency for Healthcare Quality and Research was mailed to each of the clinic's administrators. Two academic faculty members conducted each interview, with one member asking questions and the other member recording field notes and reflections. To help the participants feel comfortable, each interview was conducted at the clinic in the physician's personal office. One of the interviews was conducted at a physician's

office which was not located on the physical clinical site. Two of the interviews were conducted with two respondents, a physician and a healthcare administrator, present during the interview; while the other interviews were conducted with only a physician respondent. Each interview was audio recorded and transcribed verbatim by a transcriptionist. After, the transcriptions were completed the researcher compared samples of the interview transcriptions with the audio recordings side-by-side to assess accuracy.

The interviewers began each interview, prior to the audio recording, with a briefing or verbal explanation of the intent and research objectives of the study. This was performed not only to explain the intent of the interview and the project but also to develop rapport with each respondent prior to engaging in the interview. Each candidate agreed to participate in the study voluntarily, potential benefits and anticipated risks were explained, and each signed an informed consent form. Each respondent was assured that the interview would remain confidential. Monetary compensation of twenty-five dollars was provided to each participant's clinic or health center. This was provided as a token of appreciation and was not viewed as payment for participating. The University of Florida Institutional Review Board granted approval for the study.

The interviews ranged from forty-five minutes to one hour in duration, which is within the 60 minute duration suggested by Seidman (1991). The duration is suggested for two reasons. First, if the interview is too long the participant and/or the researchers may tire and become inattentive. Second, the duration enabled the busy physicians to schedule a reasonable amount of time. The intent was for each research interview to proceed like a normal conversation yet have a specific purpose and structure (Kvale,

1996). Each participant was asked at the conclusion of the interview session if there were any additional information that the respondent would like to add to the interview. Several of the physician respondents asked how the research data would be utilized. In general, the respondents were engaging and eager to discuss preparedness and their previous experiences.

Data Analysis

This section describes the specific strategies that were employed to analyze the data collected through the semi-structured interviews. This study uses grounded theory to analyze the relationships between rural physicians and their social structure that pose theoretical and practical concerns with respect to their perceptions of bioterrorism preparedness.

Grounded theory method is a set of flexible analytic guidelines that enable researchers to focus their data collection and to build inductive middle range theories through successive levels of data analysis and conceptual development (Charmaz, 2005). Grounded theory studies emerge from wrestling with data, noting similarities, making comparisons, developing categories, and integrating an analysis (Charmaz, 2005). Grounded theory entails developing increasingly abstract ideas about research participants' meanings, actions, and their world, as well as seeking specific data to fill out, refine, and check the emerging conceptual categories (Charmaz, 2005). Data and ideas are not merely objects that one passively observes and compiles (Holstein & Gubrium, 1995). Rather, data results from an analytic interpretation of a participant's world and from the processes constituting how this world is constructed (Charmaz, 2005).

Charmaz (2005) explains that the entire research process is interactive because one brings past interactions and current interests into the research and one interacts with his/her empirical materials and emerging ideas. Grounded theory methods locate subjective and collective experience into larger structures and increase understandings of how these structures work (Clarke, 2003, 2004; Maines, 2001, 2003). Thus, grounded theory method offers integrated theoretical statements that ultimately will lead to an increased understanding of how rural physicians' perceived bioterrorism preparedness develops, changes, or continues.

Glaser (2002) treats data as something separate from the researcher and implies that data are untouched by a competent researcher's interpretations. If researchers interpret their data, then according to Glaser (2002), these data are rendered objective by looking at several cases. However, a limitation of both qualitative and quantitative research is that no analysis is neutral because researchers do not come to their studies uninitiated (Denzin, 1994; Morse, 1999; Schwandt, 1994, 2000). Charmaz (2005) argues what one knows shapes, but does not necessarily determine, what one finds.

A constructivist grounded theory (Charmaz, 1990, 2000, 2003; Charmaz & Mitchell, 2001) adopts grounded theory guidelines as tools but does not subscribe to objectivist or positivist assumptions. Positivism can be characterized as a world composed of observable, measurable facts and it implies that measurable reality exists external to people (Glesne, 1999). Constructivists, instead, portray a world in which reality is socially constructed, complex, and ever-changing (Glesne, 1999). So, a constructivist approach emphasizes the studied phenomenon rather than the methods of studying it and close attention is given to empirical realities and our collected renderings

of them as well as locating oneself in these realities (Charmaz, 2005). Charmaz (2005) explains that it does not assume that data simply await discovery in an external world or that methodological procedures will correct limited views of the studied world. Charmaz further explains that it does not assume that impartial observers enter the research scene without an interpretive frame of reference. Rather, what observers see and hear depends upon their prior interpretive frames, biographies, and interests as well as the research context, their relationships with research participants, and modes of generating and recording empirical materials (Charmaz, 2005). Thus, constructivist grounded theory places an emphasis on participants' experiences. In this view, subjective meanings emerge from experience, and they change as experience changes (Reynolds, 2003). Charmaz (2005) explains that no qualitative method rests on pure induction rather the questions that are asked of the empirical world frame what one knows and one shares in constructing what one defines as data. In a similar fashion, the conceptual categories arise through our interpretations of data rather than from them or from our methodological practices (Glaser, 2002). Thus, the theoretical analyses are interpretive renderings of a reality, and not merely an objective reporting of it (Charmaz, 2005).

In this study, constructivist grounded theory offers a systematic approach to health services research that fosters integrating subjective experience with social conditions in the analyses. An interest in health services research and, more specifically, bioterrorism preparedness and barriers facing rural physicians and their patients means attentiveness to ideas and actions concerning perceptions of preparedness, perceptions of barriers to being prepared for bioterrorism, education and training, and previous experience with disasters. It signifies thinking about rural areas, scarce resources and healthcare personnel, and the

threats posed to rural healthcare settings. It prompts an assessment and a reassessment of the preparedness perceptions and roles of physicians in rural healthcare settings. Thus, it requires looking at both perceptions and realities. Therefore, contested meanings of “shoulds” and “oughts” come into play (Charmaz, 2005). Unlike positivists, constructivists openly bring their shoulds and oughts into the discourse of inquiry (Charmaz, 2005).

Coding and Memos

Coding is the first step in taking an analytic stance toward the data in grounded theory. The initial coding phase in grounded theory forces the researcher to define the action in the data statement (Charmaz, 2005). Standard grounded theory practice uses active, immediate, and short codes focusing on defining action, explicating implicit assumptions, and seeing processes (Charmaz, 2005). By engaging in line-by-line coding, the researcher makes a close study of the data and lays the foundation for synthesizing it (Charmaz, 2005). This is what was performed in this study on each of the participants. Charmaz (2005) explains that coding gives a researcher analytic scaffolding on which to build. So each interview can inform earlier data. This means in essence that a researcher can discover a lead through developing a code in one interview and can then go back through earlier interviews and take a fresh look as to whether this code sheds light on earlier data (Charmaz, 2005). This was performed on each interview in this study and consequently ensures the data has multiple readings and renderings.

According to Glaser (1978, p 55), “Coding gets the analyst off the empirical level of fracturing the data, then conceptually grouping it into codes that then become the theory which explains what is happening in the data.” The coding practices will help to uncover our assumptions, as well as those of our research participants (Charmaz, 2005).

Rather than raising our codes to a level of objectivity, one can raise questions about how and why one developed certain codes (Charmaz & Mitchell, 2001; Glaser, 1978, 1992, 2001; Strauss & Corbin, 1990, 1998). This was performed by the use of memos attached to the coded interview transcripts and with regular colleague input. Memos assist in the development of thoughts. According to several qualitative researchers, memos assist principally by getting your thoughts down as they occur, no matter how preliminary or in what form (Glaser & Strauss, 1967; Glesne, 1999). Memo writing also frees your mind for new thoughts and perspectives (Glesne, 1999). Regular colleague input is another way to break open our assumptions, that is, to ask colleagues to engage in the coding (Charmaz, 2005). This was performed by asking multiple health service researchers and healthcare professionals for their input into the coding process. Each professional brought divergent experiences to the open coding and their responses to the data at times called for scrutiny of my own coding. The use of multiple researchers is a form of triangulation. Triangulated findings contribute to credibility and validity (Glesne, 1999; Denzin, 1970).

I read the interview transcripts on several occasions. They were also read by a colleague as well as members of the research committee. The grounded theory analysis process consisted of three main levels of coding analysis: open coding, axial coding and selective coding. I used open coding to develop a list of codes. The codes used for analysis were derived from the participants' actual words. In some instances, researcher-imposed codes were used to identify lengthy segments of text that was related to the individual code. Codes were attached to the smallest section of text that was related to

the individual code. Coded sections ranged in size from individual words to entire paragraphs of text, depending on the richness and depth of the description.

Axial coding is the process of looking for relationships between categories of data, that is, the connecting phase of analysis (Crabtree & Miller, 1999; Glaser & Strauss, 1967). After the individual interviews were coded, the codes were transferred onto codesheets to look for connections between the codes. After the codes were transferred to the codesheets, they were reviewed to eliminate any redundancy. Thus, the codes were reduced to a list of non-overlapping terms and then the data was put back together by making connections between the codes. Axial coding then was used to compile the open codes onto the codesheets and to examine them for connections between a category and subcategories, (i.e., similarities or differences). The axial codes were used to construct individual textural descriptions of the experience. When constructing these descriptions, I returned to the text of the interview transcripts to ensure that the descriptions were accurate and to include all pertinent quotations to add to the richness of the descriptions. Lastly, selective or focused codes were developed. Selective codes use initial codes that reappear frequently to sort large amounts of data. Thus, this type of coding is more directed (Charmaz, 1983, 1995; Glaser, 1978). This part of the analysis was performed by developing selective codes and then connecting these codes with a particular category. Appendix B contains the coded transcriptions. These codes account for most data and categorize them most precisely (Charmaz, 2005). Making explicit decisions about selecting codes gives us a check on the fit between emerging theoretical framework and the empirical reality it explains (Charmaz, 2005). The constant comparative method was

used throughout the process to compare data from the six physician interviews and to compare categories developed with other categories.

Constant Comparative Method

Grounded theory is a comparative method in which the researcher compares data with data, data with categories, and categories with categories (Charmaz, 2005).

Grounded theory is based on a general method “of comparative analysis as a strategic method for generating theory” (Glaser and Strauss, 1967, p 21). Glaser and Strauss (1967, p 35) state that “the elements of theory that are generated by comparative analysis are, first, conceptual categories and their conceptual properties; and second, hypotheses or generalized relations among the categories and their properties.” Charmaz (2000, 2002) explains that constructivist grounded theory involves an interactive nature with the data with an emphasis on the participants’ experiences.

To understand the nature of constructed realities, qualitative researchers interact and talk with participants about their perceptions (Glesne, 1999). Thus, a number of grounded data theorists have collected rich data when relying primarily on interviews (Baszanger, 1998; Biernacki 1986; Charmaz, 1991, 1995). In this study, the constant comparative method was employed to compare the interview data from each of the six rural physicians. Each participant’s interview comments provided insight into his/her perceptions regarding bioterrorism preparedness and the comparisons between the rural physicians’ revealed salient similarities and differences.

Theory Building

Glaser (1978, p 5) explains that “grounded theory arrives at relevance, because it allows core problems and processes to emerge.” Glaser (1978, p 16) states that “grounded theory is a detailed grounding by systematically analyzing data sentence by

sentence by constant comparison as it is coded until a theory results.” The theory emerges as a result of the coding process. “The result sought in grounded theory is a small set of highly relevant categories and their properties connected by theoretical codes into an integrated theory” (Glaser, 1992, p 42). The selective codes thereby form the foundations for theory, and the theory illustrates the relationships between the selective codes. The progression through these stages led the researcher to a description of the perceptions of rural physicians’ perception of bioterrorism preparedness and the barriers they perceive and their patients face regarding preparedness. For the doctoral study, I completed all of the stages of grounded theory analysis as evidenced by the descriptions provided in Chapter 4 as well as the coding categories which may be found in Appendix B and the sample coded transcripts which may be found in Appendices C-H.

Validity and Consistency

The differences in approach to social science research have been documented by many scholars (Cicourel, 1964; Crabtree & Miller, 1999; Patton, 1990). Several researchers corroborate that what is required is a specification of each of the approaches or traditions that make up a paradigm or approach, a description of the rules or canons of evidence used in each, and an account of its success or failure in persuading the reader of its goodness (Altheide & Johnson, 1994; Creswell, 1998; Mays & Pope, 1995b). Traditions such as grounded theory (Strauss & Corbin, 1990) as well as the method of interviews (McCracken, 1988) have canons of evidence for researchers to follow. There have been numerous discussions in the clinical health and medical research literature about these canons of evidence (Elder & Miller, 1995; Inui & Frankel, 1991; Kuzel, Engel, Addison, and Bogdewik, 1994; Kuzel & Like, 1991; Mays & Pope, 1995a), with some common agreement that verification and validation procedures include tactics such

as peer debriefing, thick description, member checking, external audits, and searching for confirming and disconfirming cases (Creswell, 1998; Kuzel & Like, 1991). The goal of all of these procedures is to provide checks and balances on the accuracy and trustworthiness of the data and analysis (Creswell, 1998). Creswell (1998) suggests that at least two of these should be present in any given study. But the ultimate test is that the report carries “sufficient conviction to enable someone else to have the same experience as the original observer and appreciate the truth of the account” (Mays & Pope, 1995b, p 111).

Questions posed to qualitative researchers reflect concerns with the validity and reliability of the research findings. These questions reflect legitimate concerns about the rigor of qualitative research; they also reflect philosophical assumptions underlying a quantitative or positivist worldview and are thus inappropriate for assessing the rigor of a qualitative study (Angen, 2000; Maxwell, 2005; Merriam, 1995). Rigor is as valid a concern in qualitative research as in any other kind of research, but qualitative researchers employ different means to ensure validity and reliability in a study. Qualitative researchers argue that validity and reliability need to be examined from a qualitative or interpretive worldview (Angen, 2000; Maxwell, 2005; Merriam, 1995). When evaluating the validity of qualitative research, the accuracy of the findings, or truthfulness, is what is being evaluated (Angen, 2000; Merriam, 1995; Wolcott, 1990). Qualitative research persuades through its “classical strengths” of “concrete depiction of detail, portrayal of process in an active mode, and attention to the perspectives of those studied (Firestone, 1987, p 19-20). In this study, I am examining how rural physicians from North Central Florida perceive their bioterrorism preparedness and the barriers to

preparedness. Notions of validity and reliability must be addressed from the perspective of the paradigm out of which the study has been conducted (Merriam, 1995).

Qualitative researchers have approached rigor from several angles (Merriam, 1995). A few qualitative researchers explain the standard, positivist threats to validity and reliability made famous by Campbell and Stanley (1963) and Cook and Campbell (1979) to demonstrate how qualitative research addresses these threats. History, maturation, observer effects, selection and regression, mortality, and spurious conclusions can be addressed from a qualitative research perspective as demonstrated by several studies (Goetz & LeCompte, 1984; Guba & Lincoln, 1981). Yet, more commonly, writers make the case that qualitative research is based on different assumptions regarding reality, thus demanding different conceptualizations of validity and reliability (Angen, 2000; Lincoln & Guba, 1985; Maxwell, 2005; Merriam, 1995; Miles & Huberman, 1994; Richardson, 2000).

Internal validity seeks to address how congruent one's findings are with reality. Merriam (1995) explains that there are interpretations of reality; in a sense the researcher offers his or her interpretation of someone else's interpretation of reality. Just as in quantitative research there are things that a researcher can do (such as control for extraneous variables) to ensure that findings are valid according to that paradigm's notion of reality, so too in qualitative research (Merriam, 1995).

External validity or generalizability is the extent to which findings can be applied to other situations. In quantitative research external validity is an important criterion for valid research, but there are limitations with this approach. In quantitative research, random sampling may have been used, but generalizations are made within certain levels

of confidence where outliers ordinarily become part of the variance. Furthermore, when dealing with human beings it is extremely difficult to apply statistically-based generalizations to individual persons. Qualitative research rarely selects a random sample which is required in order to generalize to the population from which the sample was selected. Thus, generalizability is seen within cases in qualitative data but not across samples. This distinction is what Maxwell (1992) explains as internal versus external generalizability. Maxwell (1992) explains that internal generalizability refers to the generalizability of a conclusion within the setting or group studied, while external generalizability refers to its generalizability beyond that setting or group (Maxwell, 2005). External generalizability is often not a crucial factor for qualitative studies whereas internal generalizability is embraced as a salient validity criterion for qualitative research. This is because qualitative researchers study a single setting or a small number of individuals or sites, using theoretical or purposeful sampling rather than probability sampling, and they rarely make explicit claims about the generalizability of their accounts (Maxwell, 2005). Thus, the objective of qualitative research is to understand the particular in depth rather than finding out what is generally true of many.

Yet this does not mean that qualitative studies are never generalizable beyond the setting or informants studied (Maxwell, 2005). According to Maxwell (2005), qualitative studies often have what is known as face generalizability, which means that there is no obvious reason not to believe that the results apply more generally. Furthermore, the generalizability of qualitative studies is usually based not on explicit sampling of some defined population to which the results can be extended, but on the development of a theory that can be extended to other cases (Becker, 1991; Ragin, 1987; Yin, 1994).

Hammersley (1992, p 189-191) and Weiss (1994, p 26-29) listed a number of features that lend plausibility to generalizations from non-random samples, including respondents' own assessments of generalizability, the similarity of dynamics and constraints to other situations, and the presumed depth or universality of the phenomenon studied. Maxwell (2005) explains that these characteristics can provide credibility to generalizations from qualitative studies.

Some qualitative researchers may view external validity as reader or user generalizability. Merriam (1995) explains that in this view of external validity, people in those situations determine the extent to which findings from an investigation can be applied to other situations. It is not up to the researcher to speculate how the findings can be applied to other settings; it is up to the consumer of the research.

Reliability is concerned with the question of the extent to which one's findings will be found again (i.e., the results can be replicated). In the physical sciences, reliability revolves around repeated measures of a phenomenon, and the more times a study can be replicated, the more reliable the phenomenon is thought to be. However, in the social sciences the notion of reliability in and of itself is problematic. Studying people and human behavior is not the same as studying inanimate matter because human behavior is never static (Merriam, 1995). Cronbach (1975, p 123) notes "an actuarial table describing human affairs changes from science into history before it can be set in type." Moreover, the scientific notion of reliability assumes that repeated measures of a phenomenon, which produce the same results thereby, establish the truth of the results. But Merriam (1995) explains that measurements and observations can be repeatedly wrong, especially where human beings are involved. Scriven (1972) further explains that

a lot of people experiencing the same thing do not necessarily mean that their accounts are more reliable than that of a single individual.

Qualitative research seeks to understand the world from many perspectives and the many possible interpretations of those in the world. Thus, “there is no benchmark by which one can take repeated measurements and establish reliability in the absolute sense” (Merriam, 1988, p 170). Replication of a qualitative investigation will not yield the same results as it may in quantitative research. In qualitative research both sets of results stand as two interpretations of the phenomenon. Lincoln and Guba (1985, p 288) explain that instead of reliability one can strive for “dependability” or “consistency.” They suggest that the real question for qualitative researchers is not whether the results of one study are the same as the results of a second or third study, but whether the results of a study are consistent with the data collected. Therefore, consistency can be ensured by the use of a peer examination and an audit trail.

As previously discussed, qualitative research uses several strategies to strengthen validity and consistency. This study will employ peer or colleague examinations, audit trails, investigator triangulation, member checks, and a statement of the researcher’s experiences in a subjectivity statement. These strategies were used to augment the trustworthiness or research validity of this study. Peer review enables external reflection and input on one’s work. Audit trails involve an outside person examining the research product through auditing the analytic coding (Glesne, 1999). The purpose of investigator triangulation is not “the simple combination of different kinds of investigators, but the attempt to relate them so as to counteract the threats to validity identified in each” (Berg, 1995, p 5). Member checking is important because it provides an opportunity to share

interview transcripts with research participants to make sure their ideas are represented accurately (Glesne, 1999). A clarification of researcher bias is a reflection upon the researcher's own subjectivity and how it will be used and monitored in the research (Glesne, 1999).

Each of the aforementioned strategies of increasing validity and trustworthiness and how they were implemented within this study warrants discussion. Peer examination provides a check that the investigator is plausibly interpreting the data so someone else can be asked whether the emerging results appear to be consistent with the data collected (Merriam, 1995). Peer or colleague examination involves asking peers or colleagues to examine the data and to comment on the plausibility of the emerging findings (Frankel, 1999). Peer reviews (Frankel, 1999; Lincoln & Guba, 1985) were employed during this study to reduce bias in the data analysis whereby all stages of the research project were shared with members of the research committee. I asked peers and colleagues to externally reflect and examine the data findings.

An audit trail suggested by Guba and Lincoln (1981) operates on the same premise as when an auditor verifies the accounts of a business. In order for an audit to take place, the investigator must describe in detail how data were collected, how categories were derived, and how decisions were made throughout the inquiry (Merriam, 1988). Goetz and LeCompte (1984, p 216) suggest that the audit trail should be so detailed "that other researchers can use the original report as an operating manual by which to replicate the study." An audit trail was performed explicating the methods and steps of participant selection criteria and procedures, demographic information, data collection, transcriptions, and data analysis.

Triangulation may be broadly defined as involving varieties of data, investigators, and theories, as well as methodologies (Denzin, 1970). Triangulation may be more narrowly defined as multiple investigators collecting information (Maxwell, 2005; Denzin, 1970). This study employed triangulation of investigators while collecting the data and during the data analysis process to help validate and achieve greater trust in the study. As previously described in this chapter, during the collection of data, each interview consisted of two investigators: one posing the interview questions and the other recording field notes. Also, during the open coding of the data analysis process, the codes were created and scrutinized by multiple investigators.

According to numerous qualitative researchers, respondent validation or member checks involve taking data collected from study participants and the tentative interpretations of these data back to the people from whom they were derived and asking if the interpretations are plausible, or if they “ring true” (Bryman, 1988, pp 88-90, Lincoln & Guba, 1985; Maxwell, 2005; Merriam, 1995). Member checking is considered a very important way of ruling out the possibility of misinterpreting the meaning of what participants say and do and the perspective they have on what is going on, as well as being an important way of identifying the researcher’s biases and misunderstandings of what was stated (Maxwell, 2005). Member checking is used in many methods of qualitative research and is important when describing constructivist perspectives (Merriam, 1995). I assessed the truthfulness of the data collected from the participants by using member checks (Bryman, 1988; Lincoln & Guba; 1985; Merriam, 1995) throughout the data analysis process. The information was shared with the participants following the transcription process. The participants were asked to review the transcripts

for any disparities and the audio tapes were reviewed again to ensure transcription authenticity. Thus, the participants were given the opportunity to correct any misconceptions or misunderstandings. Upon review, the participants found no disparities with their verbal account and the audio recordings.

A subjectivity statement is a statement of the researcher's experiences, assumptions, and biases, which enable the reader to better understand how the data might have been interpreted in the manner in which they were interpreted. A subjectivity statement explains the author's education, prior knowledge, values and beliefs to better understand the author's affective reactions to the data that will be examined and analyzed (LeCompte & Preissle, 1993; Merriam, 1995; Richardson, 2000). I included a self-reflexivity or subjectivity statement, which describes a clarification of my own experiences, biases, and assumptions as a primary care physician.

Subjectivity Statement

The subjectivity statement is provided so that all related experiences of the researcher are presented transparently. This ensures that the reader can critically examine the truthfulness of the research as being bias free, which contributes to the validity of the research. The explicit incorporation of identity and experience in your research has gained wide theoretical and philosophical support (Berg & Smith, 1988; Denzin & Lincoln, 2000; Jansen & Peshkin, 1992). As a researcher engaging in a constructivist study of rural physicians and healthcare providers' perceptions of emergency preparedness and the barriers to preparedness, I have life experiences as a physician and at times in rural settings. Although I have limited experience specifically in emergency bioterrorism preparedness, my views of physician emergency preparedness must be bracketed in order to study the perceptions from a novel perspective. I am a Caucasian

male who has lived in the state of Florida for the last four years where the primary data has been collected. In addition to residing in the state, I have practiced medicine in the state, albeit not in an area that would be classified as rural.

Prior to beginning my doctoral program at the University of Florida in the Department of Health Services Research, Management and Policy, I practiced clinical primary care medicine and have been a healthcare consultant. In those roles, I have been responsible for coordinated acute and chronic patient care involving general internal and family medicine, and emergency medicine in the hospital, nursing homes, and outpatient settings. I also have experience in creating and instituting disease protocols in chronic disease management and conducting healthcare consulting research serving as a medical writer and editor for an alternative and complementary medicine firm.

In addition to clinical experience as a physician and a healthcare consultant, while at Harvard I was formally educated on disaster management through didactic courses and seminars and created with the assistance of another physician colleague a public health/bioterrorism website on Nuclear Disaster Management entitled “Chernobyl: Anatomy of a Disaster.” Recently, as an adjunct faculty member at the University of Central Florida, I created and instruct a course entitled, “Health Issues in Disaster Preparedness.” This course focuses on disaster preparedness and related mental and physical health issues for natural catastrophic events-such as hurricanes, earthquakes; and induced or human-caused disasters-such as bioterrorism and chemical terrorism.

Beyond professional activities, I have personal life experiences that are noteworthy and unfortunately have been touched by terrorism. I unfortunately lost a colleague, and more importantly a dear friend, whom I worked with at the United States Department of

Health and Human Services. He was present on one of the airplanes that departed from Washington, D.C., on September 11, 2001, and was subsequently hijacked and crashed.

Limitations

This study has several limitations. According to a positivist perspective, there is a limitation regarding external validity with qualitative research and therefore of this study. Yet, qualitative research has alternative conceptions of external validity and generalizability (Maxwell, 2005). Another potential limitation is that the sample is of participants limited to the rural areas in North Central Florida, and may therefore be difficult to externally generalize these findings to clinicians in urban sectors of the country. This study does have multi-site designs, but it has the limitation of not having multiple participant physicians at each site, often from necessity because there was only one physician at a rural site. A strategy to improve qualitative external validity is to use several participants from several sites to represent the variation, which may allow the results to be applied to a greater range of other similar situations. Another possible limitation of this study is a selection problem, which is known as “key informant bias” by Pelto & Pelto (1975, p 7). This study used key informant interviews of six physicians located in rural areas to describe their perceived preparedness and the barriers. This is a limitation principally because when one relies on a small number of informants for a significant part of the data it may not guarantee that the selected informants’ views are typical (Maxwell, 2005).

This study has another limitation involving investigator subjectivity, although subjectivity may be considered both a limitation and an asset. Several well-known researchers have challenged the notion of subjectivity as something negative (Denzin & Lincoln, 1994; Glesne, 1999; Oleson, 1994; Peshkin, 1988; Wolcott, 1995). Qualitative

researchers recognize that subjectivity is always a part of research from deciding on the research topic to selecting frames of interpretation (Glesne, 1999). However, subjectivity can be monitored to ensure more trustworthy research and subjectivity itself can contribute to research (Angen, 2000; Glesne, 1999). Glesne (1999) explains that part of being attuned to one's subjective lenses is being attuned to your emotions. One's emotions help to identify when subjectivity is being engaged. Instead of being suppressed, one's feelings should be used to inquire into perspectives and interpretations and to further shape questions through re-examining assumptions (Glesne, 1999). According to Kleinman & Copp (1993, p 33), "Ignoring or suppressing feelings are emotion work strategies that divert our attention from the cues that ultimately help us understand those we study." Thus although subjectivity is embraced by the qualitative research community, it is also considered a limitation by others and something to note from one's research. As a physician, I am invested in the search for a better understanding of how prepared rural physicians perceive themselves to be for a catastrophic event. After losing a colleague during the September 11, 2001, terrorist attacks, my researcher bias regarding the need for greater catastrophic emergency physician preparedness is declared within my subjectivity statement. Thus, my attachment as a member of the medical profession introduces a limitation.

Another limitation regards the data collection and transcription. The interviews are vulnerable to self-report bias by a participant. Another limitation is that I did not conduct each interview personally, although the principal investigators were present and conducted each and every participant interview. Furthermore, I did not transcribe the tape recorded interviews. Naturally, the most accurate rendition of what occurred is on

the recorded tape (Bogdan & Biklen, 1998). Transcription of audio taped interviews and conversation has become the norm in most qualitative research (Sandelowski, 1994). How content is both heard and perceived by the transcriptionist and the form and accuracy of its transcription play a key role in determining what data are analyzed and with what degree of dependability (MacLean, Mayer, and Estable, 2004). I listened to each of the taped interviews performing a process known in the qualitative literature as spot checking (MacLean et al.). Moreover, I personally edited the transcriptions to ensure verbatim transcription. Verbatim transcription has been cited as critical to the reliability (Seale & Silverman, 1997) and to the validity and trustworthiness (Easton, McComish, and Greenberg, 2000) of qualitative research. Yet this is still a limitation because transcribed text can never totally capture the complexity of the interaction nor be completely error-free (Sandelowski, 1994).

The grounded theory data analysis and coding represents another limitation. Previous researchers have stated that qualitative research employing grounded theory analysis is limited because reports are not as straightforward as their authors report them to be (Richardson, 1994). Conrad (1990) and Riessman (1990) suggest that fracturing the data in grounded theory research might limit understanding because grounded theorists aim for analysis rather than the portrayal of subjects' experiences in its fullness. From a grounded theory perspective, fracturing the data means creating codes and categories as the researcher defines themes within the data. This was performed on the data and is a limitation because fracturing the data may lead to separating the experience from the experiencing subject. Yet Glaser and Strauss (1967) explain that this strategy is important because it helps researchers avoid the tendency to remain immersed in

anecdotes or stories. Furthermore, it prevents researchers from becoming immobilized or overwhelmed by voluminous data and it creates a way for the researcher to organize and interpret data (Glaser & Strauss).

CHAPTER 4 FINDINGS

This chapter will highlight the central findings regarding the principal research question of rural physicians' perceived preparedness for a bioterrorist event. Additionally, it will expound on the second research question involving the perceived difficulties or impediments confronting rural physicians' and their preparedness. The chapter proceeds by sharing the rich descriptions of six rural physician participants' perceptions of their bioterrorism preparedness and its associated elements: cognitive preparedness, clinical preparedness, expectation preparedness, simulation preparedness and resource preparedness. The components related to the patient's mental and medical condition and the patient's perception of their own morbidity and mortality will be illustrated. The chapter follows by explaining the perceived component barriers related to a bioterrorist event that impedes the physician-patient relationship. It concludes by illustrating the dynamic of physician medical interventions such as treatment or therapy for patients in the midst of a perceived bioterrorist event with physician-patient barriers.

This section begins by providing an introduction explaining the conceptual diagram illustrated in Figure 4-1. The individual components in Figure 4-1, as well as their relationships and interrelationships will be examined to explicate the connections between the figure and the qualitative data. The summary of Figure 4-1 is followed by a more extensive discussion in conjunction with data examples of the study's findings.

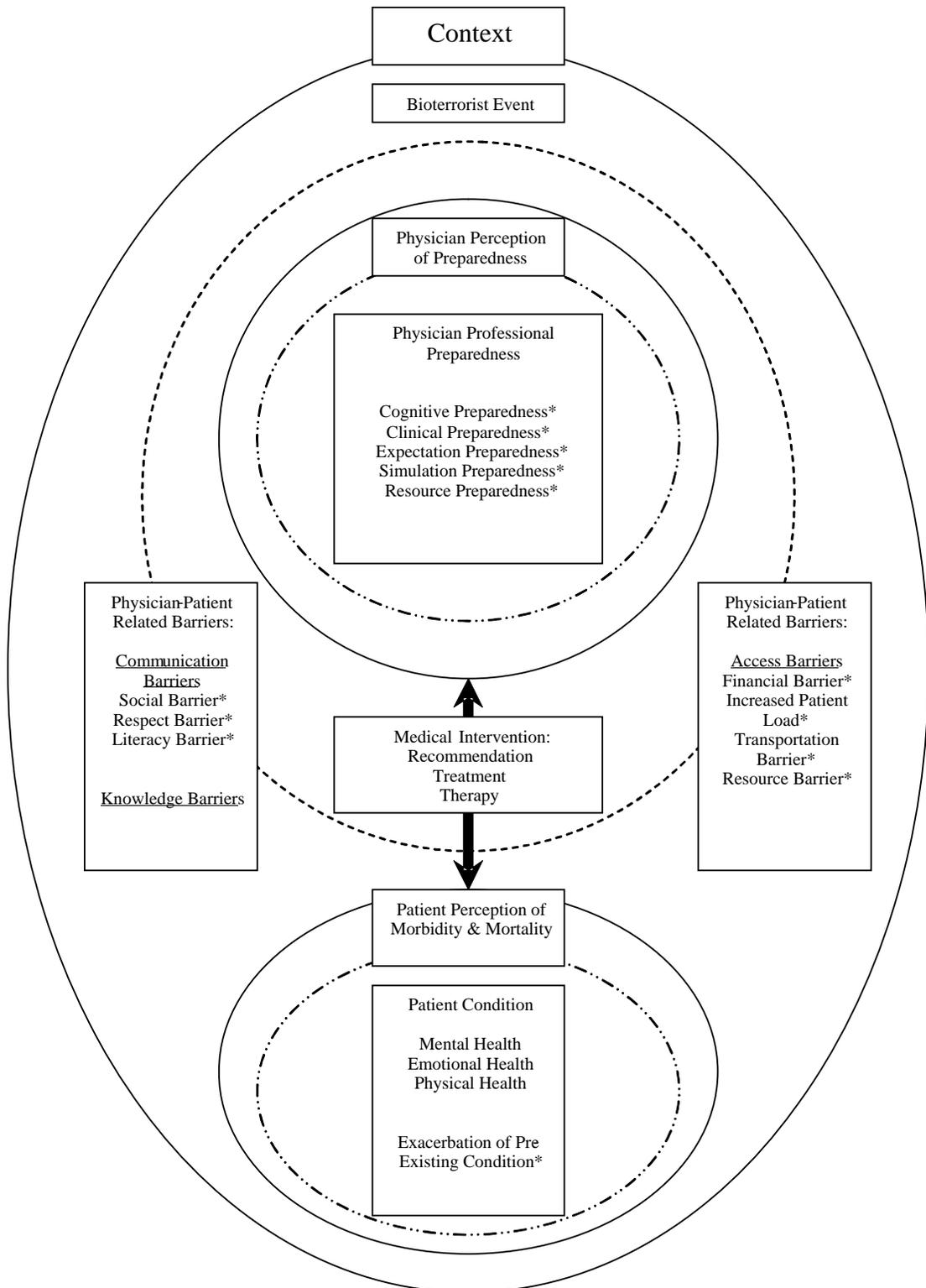


Figure 4-1: Rural Physician-Patient Bioterrorism Preparedness
 The asterisks (*) represent axial codes.

Figure 4-1 is a conceptual diagram illustrating a contextual situation of a bioterrorist event. When describing bioterrorism preparedness, there is the *context* (outermost circle) and the specter of a *bioterrorist event* (second outermost circle) which thereby influence physicians' perceptions of their professional preparedness, as well as rural patients and their associated medical conditions. Physicians possess a personal perception of professional or medical preparedness which is shaped by their context in a rural demographic setting and the threat of a possible bioterrorist event. The *physician perception of preparedness* (i.e., in Figure 4-1 represented with a spherical line pattern of two dots and a dash surrounding physician professional preparedness) explains how an individual physician perceives his/her preparedness for a bioterrorist event. It includes a physician's cognitive perceptions and perceived expectations that he/she will rely on medical experts' assistance in the advent of a bioterrorist attack in divulging overt physical and mental signs, patient symptoms, and corresponding treatments. Thus, a physician's perception of preparedness is the sphere that surrounds, interacts and thereby influences perceived elements of a physician's professional preparedness.

Although perceived emergency bioterrorism preparedness and actual emergency bioterrorism preparedness are inextricably linked and intertwined they may or may not be comparable or equal to one another. Actual preparedness involves tangible clinical training and experience along with corresponding medical education related to bioterrorism and its associated infectious agents. Perceived preparedness involves many of these very same elements, as well as the individual physician's perception of his/her preparedness. A physician may have had actual training and education and yet still not perceive himself/herself as being prepared, merely because he/she has not experienced a

tangible real-life clinical experience. In contrast, a physician may have performed actual mock emergency bioterrorism simulation exercises, received actual clinical educational training and perceive himself/herself as prepared yet have the perception and the expectation that an actual bioterrorist event may occur as rare in probability. The identification of these individual perceptions is important because perception is a powerful arbiter of actions that may influence preparedness. Several physician participants have not professionally experienced catastrophic events; nevertheless, they have perceptions, expectations, and anticipations of emergency preparedness and the possible impediments that they may encounter in the event of a bioterrorist attack. Other physician participants may have professionally experienced actual catastrophic events such as September 11, 2001, and the subsequent anthrax dissemination and they have pragmatic responses and explanations regarding preparedness and the impediments to the physician-patient relationship. Moreover, these physician participants will also have perceptions regarding future event impediments and preparedness. These findings concentrate on describing and explaining rural physicians' perceived professional or medical preparedness and the perceived impediments.

The *physician professional preparedness* is influenced by several interrelated elements: cognitive preparedness, physician sensitivity to symptoms and the condition of the patient or clinical preparedness, expectation preparedness, simulation preparedness, and resource preparedness. Each of these elements is illustrated in the diagram and represented by axial codes that together comprise the selective code of physician professional preparedness. How mentally prepared a physician perceives himself or herself may be explained as cognitive preparedness. Yet cognitive preparedness involves

additional complexity beyond merely personal perceived mental preparedness that an event may occur. It also involves a scientific and educational knowledge, as well as an analytical reasoning acumen coupled with the corresponding confidence to identify bioterrorist agents from more pedestrian, ubiquitous clinical infectious diseases such as the common cold virus or the influenza virus. Although the symptoms of the influenza virus may be similar to the symptoms caused by a bioterrorist infectious agent, cognitive preparedness involves a physician realizing an entire contextual sphere and the consequent event-dependent situation. Thus, cognitive preparedness involves a physician being able to discern between a clinical manifestation of a verifiable medical infectious disease condition related to a bioterrorist agent such as smallpox or anthrax from the common and yet often similar or related symptoms of organic and/or mental illness.

Clinical preparedness involves medical doctors being aware, sympathetic, and empathetic to patient symptoms and consequent conditions. It also is closely aligned with cognitive preparedness. A physician must be aware of the possibility of a bioterrorist event, mentally prepared if such an event occurs, as well as sensitive to patient symptoms and the corresponding overt and covert medical signs if such an event has occurred.

Expectation preparedness is another type of physician professional preparedness. It is also similar to cognitive preparedness, particularly with respect to the need for mental keenness and awareness. A physician must anticipate the possibility of a catastrophic event such as a bioterrorist event and be prepared mentally for the aftermath of such an event which may be manifested by a patient's altered condition and behavior. So, expectation preparedness involves physicians not only anticipating, but also accepting the

reality that a bioterrorist attack may indeed occur within their area. Expectation preparedness involves physicians accepting that a bioterrorist event will affect both them and their healthcare facility. It also encompasses a physician possessing the clinical judgment to consider such an event when patients present with symptoms of an infection that may or may not be related to a bioterrorist agent.

Simulation preparedness is a type of physician professional preparedness which is also related to the other types of preparedness. It involves the actual training pertinent to bioterrorism. Simulation preparedness may include educational clinical training through continuing medical education preparatory seminars, as well as learning performed on an individual basis by physicians through the reading of pertinent medical journals. Simulation training also may incorporate relevant training drills and simulation exercises depicting possible bioterrorist scenarios. The objective of simulation training is to assist physicians in their preparation for a possible bioterrorist event by offering on-site pragmatic, hypothetical clinical experiences of such catastrophic events.

Resource preparedness involves a rural physician being able to rely on other healthcare facilities during a catastrophic event. It also includes a rural physician being able to rely on other healthcare providers such as mental health specialists (i.e., psychiatrists and psychologists) during a crisis. Thus, it involves rural physicians having the perception that there will be enough healthcare facilities such as clinics, private medical offices, and hospitals as well as enough healthcare practitioners available to respond during a bioterrorist attack. Resource preparedness also consists of the perception that these healthcare facilities and practitioners will have extended hours to accommodate the increased number of patients.

The outermost dotted line in Figure 4-1, which surrounds the sphere enclosing physician perception of preparedness and the sphere encompassing physician professional preparedness, serves a filtering function. The filtering function denotes the barriers impeding perceived physician professional preparedness and the obstacles hindering physicians from administering medical interventions intended to help allay patient conditions. Thus, *the physician-patient related barriers* hinder patients from receiving salient medical interventions from physicians. A *medical intervention* may include medical recommendations, medical treatments such as pharmaceuticals, and medical therapy such as counseling and psychotherapy. These interventions are performed by the physician with the objective to alleviate or ameliorate the patient's infirmed condition. However, the physician-patient related barriers pose difficulties and thereby hinder patients from receiving appropriate interventions. Thus, patients will have greater difficulty recovering from exacerbations of pre-existing conditions or from recently contracted illnesses in the event of a bioterrorist attack in rural contextual settings. These physician-patient impediments include three major types: *access barriers, communication barriers, and knowledge barriers*. Access barriers (i.e., selective code) consist of financial barriers, increased patient load barriers, transportation barriers, and resource barriers (i.e., axial codes). Communication barriers (i.e., selective code) include obstacles such as social barriers, literacy barriers, and respect barriers (i.e., axial codes). Knowledge barriers may involve physicians who lack relevant medical knowledge and/or appropriate treatment knowledge or patients who have not received information or knowledge pertinent to the bioterrorist event. Each barrier adversely affects the physician-patient relationship.

The patient perception of morbidity and mortality is influenced by several elements. Rural patients' perceptions of morbidity and mortality are influenced by their rural context, the speculative or precipitating bioterrorist event, their perception of physicians' professional preparedness, and the physician-patient related barriers impeding proper medical interventions. Patients may perceive their own medical pre-existing conditions as worsening with the possibility of a bioterrorist event. Patients may also perceive the introduction of nascent, incurable afflictions arising from infectious etiological agents with the distinct possibility of mortality as a likely outcome in the context of a bioterrorist event. Thus, the patient condition which comprises the mental, emotional, and physical state of a patient will be influenced and altered. In addition, patients with previous health conditions may experience an exacerbation of their pre-existing physical and mental conditions. A catastrophic event such as a bioterrorist event may precipitate a worsening of a patient's chronic medical condition such as a previously stable condition of asthma or hypertension. Or it may affect a patient's chronic mental condition such as a previously stable condition of generalized anxiety disorder or depression.

Physician Professional Preparedness and its Associated Elements: Cognitive

Preparedness, Clinical Preparedness, and Expectation Preparedness

Professional preparedness involves the physician's sensitivity to patient symptoms and cognitive preparedness of the perceived risk factors, health disorders and treatments in the expectation of such an event. Physician professional preparedness or, more specifically, the elements of cognitive preparedness and expectation preparedness involves the steps that physicians perceive and anticipate can be performed to assist

patients in both the immediate aftermath and in the ensuing months that follow a bioterrorist attack.

It may be argued that following a bioterrorist event the number of rural patients visiting rural healthcare facilities will dramatically increase for a number of reasons. It can further be argued that some of these patients will have been afflicted with bonafide organic illnesses or mental illnesses while others will have self-perceived illnesses. Bioterrorist agents such as anthrax or smallpox can induce infectious diseases which require medical attention. Consequently, some patients will present with a significant worsening of a pre-existing medical condition such as an exacerbation of their chronic obstructive pulmonary disease. Other individuals will be affected by such a traumatic catastrophic event and present to healthcare facilities with mental health symptoms such as generalized anxiety. Previously stable and well-medicated patients will have a worsening of their mental health conditions and will present to healthcare facilities with an exacerbation of their post-traumatic stress disorder (PTSD), anxiety, or depression. Moreover, there will be another group of patients that visit a healthcare facility without any medically relevant or medically identifiable condition. This group of patients will simply react to the adverse event replete with emotions of concern and excessive worrying which may foster a self-perceived illness which compels them to visit a healthcare facility. These patients may be identified as the worried-well. As stated, they may not have any true medical condition, but in the advent of a catastrophic event concomitant with the sensational media attention devoted to the subject, they perceive their own morbidity and even possibly their own mortality and seek medical services.

Mental and Emotional Health

Two of the physician participants reported a significant increase in the number of patients after the September 11, 2001, and subsequent anthrax dissemination terrorist incidents. Three other physician participants speculated that there would be an increase in the number of patients with mental health conditions following a bioterrorist event. Doctor Smith explains that after September 11, 2001, he witnessed an increasing number of patients presenting with exacerbations of pre-existing mental health conditions, most notably depression and anxiety. This increased patient load is an illustration of an access barrier. This is principally because an increased patient load adversely affects two components of healthcare access—the availability of healthcare services and the accommodation of patients seeking healthcare services. Consequently, Dr. Smith was inundated with an increased number of patients with actual illnesses and other patients with self-perceived illnesses, which exacerbated the physician-patient accessibility impediments and thereby imposed additional pressures on the rural medical infrastructure. Doctor Smith explains that many of these patients had been previously stable on medications, but they were personally affected by the terrorist incidents, having lost family members or friends. Thus, one may infer that patients with previously stable conditions deteriorated consequent to 9/11 and there was an increase in the number of patient visits to healthcare facilities. Many of these affected patients presumably asked physicians if they had been exposed to infectious diseases and if they could be tested for various possible conditions and diseases. This presumably diminished the availability of resources and the accommodation by medical personnel.

The increasing number of patients presenting to healthcare facilities would presumably include patients afflicted with authentic illnesses and patients presenting with

self-perceived illnesses. Doctor Davis infers that with a bioterrorist event the number of anxious patients presenting to the emergency room would probably increase as well as the number of “people that think they are infected.” This physician participant captures the essence of perceived illness and its consequences. In the event of a bioterrorist attack, Dr. Davis perceives that the patient load would increase because the number of healthy patients who are concerned that they may be sick would increasingly present to the emergency room. This commensurate increase in patients who are otherwise healthy but who perceive that they are ill would serve to exacerbate previous barriers to accessing healthcare and thereby further adversely affect the ill individuals who truly need healthcare services from the emergency room.

When Doctor Williams was queried regarding the kinds of mental health problems that a physician may encounter after a terrorist attack, such as the WTC bombing or an infectious disease outbreak such as anthrax dissemination, he responds “post-traumatic stress disorder, anxiety, and substance abuse would probably flare more.” Doctor Williams perceives a worsening of mental health illnesses due to the traumatic stressors incurred by a bioterrorist event. He states that depression would increase, but probably not until later and especially if people knew they had been directly affected by a bioterrorist agent. Depression is a clinical condition that insidiously develops and may originate as a result of an adverse event which deleteriously affects an individual’s life. Depression is a profound feeling of sadness and hopelessness that is often also accompanied by physical symptoms. Thus, a bioterrorist event would exacerbate pre-existing mental illnesses such as depression, as well as chronic medical conditions such as pulmonary disorders. It may be argued that patients who previously were medically

stable on psychotropic medications and were receiving appropriate psychotherapy would suffer setbacks in their medical illnesses. Doctor Jones corroborates other participant's comments by articulating that after a bioterrorist event he would anticipate an increasing "exacerbation of most people's anxieties." Doctor Jones explains that he perceives that mental illnesses such as PTSD would increase after an event. Post-traumatic stress disorder is a psychiatric disorder that can occur following the experience or witnessing of life-threatening catastrophic events such as natural disasters or terrorist incidents. Most survivors of trauma return to normal after a period of time. However, some individuals will have stress reactions that do not disappear on their own, or may even get worse over time. These individuals may develop PTSD. People who suffer from PTSD often relive the experience through nightmares and flashbacks, have difficulty sleeping, and feel detached or estranged; these symptoms can be severe enough and last long enough to significantly impair an individual's daily life. Post-traumatic stress disorder is also marked by clear biological changes as well as psychological symptoms. This disorder is complicated by the fact that it frequently occurs in conjunction with other related mental health conditions such as depression, substance abuse, problems of memory and cognition, and other problems of physical and mental health. The disorder also may be associated with impairment of an individual's ability to function in social or family life, including occupational instability and marital strife. The increase in exacerbations of pre-existing mental health conditions, along with newly formed mental health conditions following a bioterrorist event, would augment the patient load presenting to healthcare facilities and thereby overwhelm extant healthcare personnel and resources.

It may be argued that patients perceive their own morbidity and mortality-mentally, emotionally and physically-when confronted with the specter of a bioterrorist event. During a catastrophic event, many patients will be replete with emotions of anxiety, distress and trepidation regarding their perceived health condition. Doctor Smith comments that there was an increase in the number of patients expressing difficulties sleeping and feelings that the “world is going to end.” This quote helps to explain the patient condition in the event of a bioterrorist attack. It may reflect an emerging mental health condition such as depression or anxiety or a resurfacing of pre-existing conditions such as PTSD. So, many rural patients will reflect on the fragility of their life and consequently express apocalyptic feelings during such an event. Doctor Jones explains that it would “depend on the kind of bioterrorist event.” The magnitude of the event, that is, the size of the event and the number of people affected, would be critical. If an event affects a small number of individuals, the pervasive perception may be that it is unusual and probably will not affect them personally. However, a large event that affects a significant number of individuals will evoke widespread feelings of fear, anger, and bereavement. Moreover, the type of bioterrorist infectious agent released during an event and the location of the bioterrorist event may be important. It may be inferred that rural residents perceive that geographical isolation may preclude them from the vicissitudes of urban life. But, if a catastrophic event were to occur in a rural area or if there were a tangibly perceived threat in a rural setting, it may evoke a submerged unease among rural residents that no place is safe. Doctor Davis is a physician who is employed in an emergency room. He reiterates what several other physician colleagues stated regarding the importance of the magnitude of the bioterrorist attack. He articulates that it “depends

on how big the event is and how many people are involved.” So, Dr. Davis perceives that the larger the event then the greater the ensuing emergency room patient load. An adverse event would mandate the need for additional access to a healthcare facility. Yet many rural healthcare facilities may already lack adequate access due to patients’ geographical isolation, transportation difficulties, and financial constraints. Thus, a deleterious catastrophic event could thereby further cripple rural emergency room access.

In contrast with the other physician participants, Dr. Brown articulates that how the bioterrorist event is handled will affect rural residents’ health. Although Dr. Brown does corroborate with each of the other physician participants by explaining that a bioterrorist event “can also create hysteria and anxiety,” he markedly differs from other participants regarding his perception of the importance of the management of the catastrophic event. He explains that, depending on how a bioterrorist event was handled, it may transform an individual into a type of depressive disorder patient whereby this individual will express sentiments of hopelessness and helplessness. Thus, one may presume that if patients perceive a catastrophic event is being adeptly managed, they will not have the same degree of perceived hysteria and anxiety-provoking mental ill health effects. This is significant because it further highlights the central role of perceived physician professional preparedness. If patients perceive physicians to be professionally prepared then one may presume that patients will not exhibit as many adverse emotional and mental health symptoms.

Physical Health

It may be argued that the physical health disorders manifested in patients following a bioterrorist event would depend on the infectious agent. In general, infectious agents will induce constitutional symptoms such as general malaise, fever, diarrhea, and muscle

pain. If the infectious agent were anthrax, one would expect a manifestation of these constitutional symptoms as well as other symptoms contingent on the type of anthrax. There are several variants of anthrax: cutaneous, gastrointestinal, oropharyngeal, and inhalational. Each type of anthrax would elicit different physical symptoms in patients. Cutaneous anthrax would affect the integumentary system. Gastrointestinal and oropharyngeal anthrax would affect the gastrointestinal system while oropharyngeal and inhalational anthrax would affect the respiratory system. If the infectious agent were smallpox one would expect systemic symptoms such as severe muscle aches, lethargy, abdominal pain, and vomiting, as well as a rash with associated smallpox lesions. Smallpox affects the respiratory and gastrointestinal systems.

Many bioterrorist agents are transmitted by respiratory vectors, thus a physician would expect respiratory structures to be adversely affected. Respiratory structures include the mucous membranes or the linings of the mouth and nasal cavity along with the other associated respiratory anatomical structures—the sinuses, pharynx, auditory canals, Eustachian tubes, bronchi, and the lungs. Doctor Williams explains that he perceives the physical health problems most likely to be encountered would “depend totally on what the agent is.” He believes that physical health problems would be affected by the type of bioterrorist infectious agent. Respiratory bioterrorist agents would induce respiratory symptoms, while neurotoxic bioterrorist agents would elicit neurological symptoms. When queried regarding anthrax or a nerve agent specifically, he explains that “I don’t know the findings that well.” In a similar fashion, Dr. Phillips also perceives that physical health problems likely to be encountered “depends on the kind of event.” She also corroborates with Dr. Williams’ comments by explaining: “if it

were a respiratory event, we would look for respiratory symptoms, so it is dependent.” Doctor Brown explains that several physical signs would be present. He explains that mucous membranes would be affected, as well as the gastrointestinal and respiratory systems. Similarly, Dr. Brown perceives that the physical health problems encountered would “depend on what the attack entailed”. He explains that we may see respiratory symptoms or other physical symptoms, but that the clinical presentation of physical symptoms encountered would be predicated on the event. Thus, each physician explains that the medical symptoms and corresponding illnesses would be contingent on the type of infectious bioterrorist agent. Doctor Brown further elaborates by explaining that when “you think of bioterrorism, you think of agents that are physically capable of affecting morbidity and mortality rates.” Bioterrorist agents are perceived by physicians as life-altering and life-threatening and mandating appropriate attention. Although patients may lack the scientific knowledge regarding bioterrorist agents, they appreciate the grave and solemn danger of infectious bioterrorist agents. Patients appreciate the high degree of correlation between infectious bioterrorist agents and the associated morbidity and mortality. This awareness highlights and substantiates patients’ underlying self perceptions regarding their own mental, emotional, and physical health conditions. Patients increasingly perceive their own illnesses and possible morbidities when there is uncertainty and/or fear of the unknown. This uncertainty or trepidation is further exacerbated by a lack of knowledge and a lack of pertinent information.

It has been argued that in the advent of a bioterrorist incident, the number of patients presenting with bonafide medical conditions will increase, as well as the number of patients presenting with feigned conditions. One may also argue that many infectious

diseases manifest clinically with similar symptoms. Many infectious agents induce similar constitutional symptoms—fevers, nausea, vomiting, and muscle aches.

Consequently, it may be difficult to discern one infectious disease from another. Doctor Jones comments that you will have a plethora of patients presenting with “all the symptoms-real or thought up.” Dr. Jones states that there will be an increase in patients who truly need care and patients who are worried about their perceived own morbidity and possible mortality and therefore perceive that they need medical attention.

Doctor Jones explains that “if you look at anthrax, you get a fever, cold and cough.”

“How many people do we have that have that?” He explains that with many of the respiratory bioterrorist-induced illnesses the early symptoms mimic the common cold.

This statement underscores the importance of physician professional preparedness from several elements: cognition, expectation, and sensitivity to symptoms. Physicians need to be cognitively prepared to be able to discern commonly encountered patient symptoms emanating from common infectious agents from other similarly encountered patient symptoms from rarer bioterrorist infectious agents. Physicians need to have bioterrorist expectation awareness and contextual awareness to consider bioterrorist-induced infectious agents as a possibility among presenting patients to a healthcare facility. And physicians need to be sensitive to patients presenting descriptions of their symptoms.

Risk Factors for Mental Illness or Physical Illness

Risk factors are tenets that predispose one to medical conditions. Many mental illnesses and physical illnesses possess non-modifiable risk factors. Non-modifiable risk factors are elements that cannot be altered such as age, gender, family history, and ethnicity. For instance, in general, risk factors for contracting mental illness include a previous personal history of mental illness or a family history of mental illness. Many

medical and mental health conditions possess non-modifiable risk factors contingent on age, gender, and family history.

It may be argued that there are few known risk factors regarding how to prevent bioterrorist induced illnesses. The best preventive steps often include vaccinations against infectious agents. Doctor Williams explains that he is not familiar with the risk factors or clinical manifestations of certain biological infectious agents or of neurotoxic agents. He specifically explains, "I would think for biological, obviously impaired immune status, so anything that does that, and old age being a big one, and multiple chronic diseases being another one, certain medications." Impaired immune status is a risk factor for any patient who is older or has suffered from chronic medical conditions. Thus, each of those risk factors is interrelated. Occasionally, prescribed medications may predispose a patient to a condition that otherwise would not have been caused without the medication. When asked about risk factors for developing mental disease, Dr. Williams responds "I can guess what some might be, but I don't know any studies or research on that." This lack of knowledge would be classified as a knowledge barrier and would affect this physician's perception of preparedness as well as his cognitive preparedness for such an event. It would also affect his sensitivity to patient symptoms because he may not be able to detect early or novel symptoms associated with stress or mental anxiety. This lack of detection may adversely alter his choice of medical interventions and thereby deleteriously affect the patient's condition. In a similar fashion when Dr. Smith is asked of his awareness regarding risk factors, he states: "I think that there are risk factors. I can't quote an article. Anyone who has a pre-existing illness, there is no questioning that an event like that is going to impact on their consciousness and could

make things worse.” Again, there is a knowledge barrier present with this physician as well. This knowledge barrier will once again affect the perceptions and the elements of professional preparedness. Doctor Brown, similar to the other physician participants, is not aware of any risk factors for developing mental health problems following a bioterrorist attack. He says: “I think using some common sense that past history of post-traumatic stress disorder or any type of involvement in war, criminal, or stress-related issues that come from senses of loss of control and co-morbidities, like anxiety, depression.” This physician participant responds with uncertainty, but formulates an educated perception of precipitating or predisposing factors.

In contrast, two of the physicians declare with conviction predisposing risk factors. When Dr. Davis is queried regarding risk factors he confidently explains, “I know that depression will be. I will go back to the type of event, how closely it hit home, family or workplace. It will vary for everybody involved.” This physician participant perceives that the type and size of the event will affect the preparedness and impediments to preparedness. He perceives that all rural inhabitants will be affected by such an event. He further perceives that each rural inhabitant will be affected in a multitude of settings. In essence, rural residents will have their familial life as well as their occupational life affected by such an event. Thus, Dr. Davis perceives that rural residents will be affected socially, emotionally, mentally, and physically by a bioterrorist event. Doctor Jones also discusses risk factors with greater certainty: “If you have anxiety, you will have problems with anxiety. I think that the people that already have a diagnosis will be at risk for worsening.” If you have pre-existing mental health condition, the inherent stress associated with a bioterrorist event will precipitate an exacerbation of your condition.

There are several salient interpretations that may be formulated from the findings regarding the question of what types of health disorders does a physician anticipate or expect after a bioterrorist attack. This question and the corresponding findings unearth a physician's perception of pending illness and their perceived professional preparedness for such as illness. It certainly may be argued based on the findings that after such a traumatic event the number of patient visits to physicians would increase. These patients would explain to the physician that since the event they have been experiencing a constellation of newly-acquired symptoms or an exacerbation of previous medical problems. So, a patient with a previously stable heart condition may react to such a bioterrorist event with increased chest pain (i.e., an exacerbation of their medical condition). Or, a patient stable on medication for generalized anxiety disorder may report increased feelings of nervousness, difficulty performing daily tasks or with general functioning during the day, difficulty sleeping, or perhaps feelings of uncertainty and doom which are therefore inhibiting their mental acumen, lifestyle and productivity. Patients may also complain of mental stress coinciding with physical symptoms such as anxiety concomitant with an increased heart rate and labored or difficulty breathing.

Traumatic events are well publicized by the media through sources such as the television, newspapers, the Internet, and myriad other media outlets. Although some rural residents may not have all of these modes of transmission, most have at least one mode of telecommunication; thus, the media may influence and thereby affect their daily lives. After rural residents observe catastrophic events or hear from media outlets of a possible looming threat of bioterrorism, it adversely affects their emotional, mental, social, and physical functioning. Consequently, it contributes to patients seeking

healthcare services and the increased patient loads at these rural healthcare facilities. Many residents will decide to visit rural health clinics and hospitals to ascertain their own health status in light of such an event. Patients want accurate and reliable information and knowledge, as well as reassurance regarding their health status and conditions. In this study, the knowledge barriers most often manifested are regarding physicians not being aware or certain of risk factors surrounding medical and mental health illness in the advent of a bioterrorist agent. This lack of knowledge by physicians is demonstrated by a lack of cognitive professional preparedness. The knowledge barrier may deleteriously affect medical intervention choices by physicians thereby affecting their patients' health outcomes.

Four physicians expected or witnessed an increase in the number of patients visiting healthcare facilities. Doctors Davis and Jones, unlike some of the other physicians, also explained that there will be an increase in the number of people who think they are infected (i.e., the number of patients who presume themselves to be sick, when in reality they may not be sick). These patients comprise what may be known as the worried-well. Or these patients who presume sickness may actually have tangible physical symptoms attributable to a common malady (e.g., a common cold) and yet presume they have contracted some rare infectious disease reported on the television or in the newspapers that presents with similar symptoms. Thus, these patients may truly believe they have been afflicted with a bioterrorist agent such as smallpox or anthrax. This heightened arousal and trepidation facilitates these individuals to seek medical care and attention and thereby further increases the patient load on rural health clinics and physicians. Many of the physicians expect and anticipate that the increase in real or self-

perceived medical disorders would be contingent on the size of the event and the number of individuals affected by the event.

Physician Professional Preparedness and its Associated Elements: Simulation Preparedness, Expectation Preparedness, and Resource Preparedness

Simulation experience preparedness and resource preparedness are other poignant components of physician professional preparedness. These elements of preparedness were examined and assessed by questions such as, Have you had an opportunity to learn about biological terrorist agents? and, What level of importance should be placed on receiving bioterrorism training? These questions also further divulge an individual physician's expectation preparedness regarding a possible bioterrorist event.

It may be argued that physicians need to be trained regarding bioterrorism as they are trained regarding other medical conditions. Training should consist of both pragmatic and educational components. Thus, the training should include simulations and exercise drills depicting mock bioterrorist events. Physicians need to attend continuing medical education seminars which incorporate both a mental health and a physical health didactic component to maintain medical recertification. Lastly, training should include individual studying of peer-reviewed medical journals with occasional examinations for medical recertification. This individual studying will compel physicians to remain aware of disaster preparedness updates and to consult with renowned infectious disease experts at federal centers such as the CDC for salient advice. Doctor Smith explains that he believes that a presentation regarding bioterrorism was performed at the health department site, but "I didn't get to attend it." He explains that "I attended some of the web meetings for the department of health put on regarding smallpox and bioterrorism. It has come up in seminars that I have been to for medical education in the last couple

years.” It may be argued that recently there has been a larger emphasis placed upon bioterrorism training at continuing medical education seminars. These educational seminars are conducted by both state and national medical societies. These continuing medical education seminars typically consist of discussions by renowned medical experts in the medical discipline of infectious disease sharing information regarding clinical presentation and treatment options for bioterrorist infectious agents. Doctor Smith states that “we were involved in the smallpox vaccination campaign and we had to make a presentation to the community, to the police, to the emergency operations center.” Vaccinations for smallpox and bioterrorism presentations performed by physicians benefit local emergency personnel and provide reassurance to the public. This type of local effort certainly can allay fears and concerns among non-medical emergency personnel and among rural residents’ who may see, hear, or read about such presentations and feel or perceive that their community is prepared for such a catastrophic event.

It may also be argued that many physicians now place a greater level of importance on bioterrorism education and training in the aftermath of 9/11 and the subsequent anthrax bioterrorist attacks. When discussing the importance of bioterrorism training, Dr. Brown states “I think that it is. There is certainly a place for it. We all recognize that. It was lower in the list before 9/11. It is the world in which we live in. I think we all recognize that. Do we see anthrax everyday? No, but it does come up. I have never seen a case of smallpox. But, nonetheless, we know what it looks like. Is it something we have studied? No, but we are all aware of it.” This physician participant expresses the sentiment that bioterrorism training is important, but tempers the importance by stating that it is not a pathological condition that is seen every day. Doctor Brown also exposes

that many healthcare professionals lack the pertinent information and knowledge regarding bioterrorism. This exemplifies the knowledge barrier existing among physicians regarding bioterrorist agents. However, he tempers the knowledge barrier by expressing that physicians are aware of bioterrorist agents. It may be argued that continuing medical education places a priority on bioterrorism education and training. It is consistently being updated and transmitted to rural physicians. Thus, one may argue a pertinent question is whether these physicians are viewing and/or studying this transmitted information. Doctor Brown also exposes the component of physician professional preparedness known as expectation preparedness. This expectation preparedness is expressed by his perception that a bioterrorist attack is possible and certainly more possible after September 11, 2001. Thus, although the probability of a bioterrorist-induced illness is significantly lower than the probability of other medical illnesses, it is imperative for physicians to be prepared for the possibility of a bioterrorist event.

Doctor Phillips also responded similarly to the other physician participants when she explained of opportunities to learn about bioterrorism through training programs. She explained that she had read medical journals on her own regarding bioterrorism. Doctor Phillips states: “A lot of time depending on what the situation or crisis is. They will have issues or discussions about them.” When asked if it is important for healthcare providers to receive training regarding bioterrorism, she responds, “Yes. As the public gets information, if they want information, I am sure their questions will be directed to the health department. It is important for our people to know what information and answers to give. They need to be consistent in information.” This physician participant

explains the important connection between physicians and patients. Patient's perceptions of their own physical morbidity or mortality will be shaped by their physician's professional preparedness, or at least by how that patients perceive their physician's preparedness. If a patient perceives a physician as being unprepared for a possible bioterrorist event, it may adversely affect that patient's overall health status. Furthermore, if a patient perceives a physician as being unprepared, it also may affect whether the patient chooses to comply with the physician's recommendations. A patient may feel that an unprepared physician may erroneously diagnose their condition and fail to provide the proper treatment. Thus, a patient's perception of the medical communities' preparedness coupled with proper communication and information dissemination is critical to bioterrorism preparedness.

When Dr. Davis is asked about bioterrorism training services that have been offered, he explains that he has attended "lots of them." Doctor Davis articulates "we have done some drills. From a bioterrorism standpoint about mechanics of hazmat, we have had classes here and there. I will get our people prepared to handle the actual event itself. There are small group discussions. There's a lot of asking what if, how do we handle such and such? The first wave of people that we will see will be the mental health people. The people who truly have an exposure to the event will probably remain on the scene." Dr. Davis also explains: "We did a physician continuing education day with a fair amount of bioterrorism stuff. We were talking about smallpox and anthrax." In contrast to some of the other physician participants, it appears that this physician participant feels quite confident and well-prepared to respond to a bioterrorist event. He has attended numerous medical and non-medical educational seminars regarding

bioterrorism preparedness with simulation training involving mock exercises and drills. He further elaborates that there has been significant integration with other emergency county officials during the educational seminars and the simulation training experiences. This physician participant perceives that rural residents afflicted with mental illnesses will probably be the first to present to the emergency room. One may interpret that patients afflicted with mental illnesses will experience exacerbations of their pre-existing illnesses and thereby deteriorate rapidly during a bioterrorist event. Thus, these mentally unstable patients will present to the emergency room for medical care before emergency workers directly involved with the incident. It appears from this physician participant's perspective that the emergency center is prepared to handle a major crisis such as a bioterrorist event.

Doctor Jones also explains of opportunities to learn about bioterrorist agents. He states: "Yes, we have had opportunities. Have we taken advantage of those opportunities? No. The last time we did something was two years ago." Unlike other participants, this physician explains that opportunities to become better acquainted with bioterrorism have been available, but not utilized. Thus, it may be interpreted that this physician perceives or feels less prepared for such an event. Doctor Jones says "it is important" for healthcare providers to receive training for bioterrorism or other public health emergencies. He explains: "relative to other things, a five or a seven [on a scale of 1-10]. Some people would ask why not a ten? Bioterrorist acts may happen and can happen, but the everyday realities of dealing with people's problems happen every day. You have so many hurdles to get there that you need to make choices. You need to decide if you are going to train on mental health or the in-services you need. We need

and are prepared.” This physician perceives a need for bioterrorism preparedness through education and training but with the caveat that ordinary, common medical complaints are not sacrificed in the priority process. There are difficult choices- choices between devoting resources to alleviate chronic medical conditions or to the looming threat of a possible bioterrorist event. Healthcare resources are finite and often needed for competing interests—physical health maintenance of common medical conditions, or mental health maintenance, or bioterrorism preparedness. Presumably, it may be argued that resources need to be allocated to each of these sectors. However, the proportion of resources devoted to each sector is also important. It may be interpreted that a significant proportion of healthcare resources should be designated to common medical and mental health conditions. Thus, bioterrorism preparedness appears to be lower on the priority list than these other issues. Nevertheless, despite the limited resources and the conspicuous reality of difficult decisions, it is imperative for physicians to be adequately educated and trained or, in other words prepared for a possible bioterrorist event.

Physician-Patient Related Barriers

There are three major physician-patient related barriers identified in this study that affect rural physicians’ professional preparedness and their ability to dispense of proper medical interventions to improve rural patients’ health conditions. The physician-patient related barriers include access barriers, communication barriers, and knowledge barriers.

Access Barriers

Several physician participants mention barriers that individuals may encounter in accessing medical care to improve health conditions. Access to healthcare may be thought of as a concept that describes the fit between the patient and the healthcare system. Access to healthcare may include elements such as affordability, availability,

accommodation, and accessibility. Barriers to accessing healthcare will adversely affect patients' entry into or use of the healthcare system and one or more of these elements. There are four types of access barriers discussed in these findings: financial, increased patient load, transportation and resource barriers.

Patient financial difficulties are inextricably linked to healthcare access barriers. A rural patient's disposable personal income is an important element in determining affordability of healthcare services and subsequently an important determinant regarding personal access of medical care. Doctor Williams explains, "Finances become bigger because they're willing to do it, but they may have a harder time affording it. Taking the costs of medicine becomes a problem. That is a problem with psychiatric medicines, too, but it's a bigger problem with physical ones." In essence, patients who wish to adhere to the treatment regimen prescribed by their physician may fail to comply because they cannot afford the cost of their medications. Affordability includes a patient's existing health insurance and prescription drug coverage and the physician's health insurance requirements. Thus, a patient without the ability to pay for healthcare services or a patient without adequate and appropriate health insurance will encounter financial barriers that impede access to healthcare.

Doctor Brown mentions that "there are so many blocks to access of care." Another example of an access to care barrier is an increased patient load. An increased patient load refers to the fact that during a disaster such as a bioterrorist event the perception and expectation is that the number of patients frequenting physicians would dramatically increase. Consequently, a healthcare facility and the associated physicians would be inundated with an increased number of patients with actual illnesses and patient-

perceived illnesses. An increased patient load adversely affects both the availability of healthcare services and the accommodation of patients seeking healthcare services. An increased patient load affects the availability of healthcare services by altering the relationship between the volume and type of existing services and resources with the increased patient volume and the increased needs of these patients. The increased patient load would affect the accommodation of patients by altering the relationship by which the supply of resources is organized to accept patients. This supply would be disrupted because appointments would be delayed and hours of operation at the clinic and physician hours would need to increase. In addition, an increased load would affect patients' ability to accommodate to these elements as well as the patients' perceptions of their appropriateness. Furthermore, whether a bioterrorist event is merely perceived or actually does indeed happen, patients will seek physicians and healthcare which will increase the patient load and consequently diminish access to healthcare physicians and healthcare resources. This may serve to further exacerbate the other physician-patient related impediments by augmenting communication barriers and subsequently imposing additional stresses on the rural medical infrastructure.

Transportation difficulties and impediments also may be thought of as an access to care barrier. When asked what kinds of things can get in the way of people accessing healthcare at rural clinics, Doctor Jones explains "We are seeing that more with the cost of gas. A lot of families have only one vehicle. If dad is at work, the mom may have the child, but there is no way to get here. A lot of people around here also have cars that are older and less efficient." Transportation barriers include issues such as the lack of a reliably performing automobile, or the lack of an automobile entirely, or the prohibitively

high expense associated with gasoline and transportation costs. Doctor Smith explains that “My patients cannot get transportation. They have a doctor’s appointment two months in advance and then their ride falls through and they cannot make it.”

Consequently, patients facing transportation barriers often fail to receive timely and appropriate medical care. Transportation barriers thereby affect the accessibility of healthcare services. Accessibility may be thought of as the relationship between the location of patients and the location of physicians and healthcare facilities. It must account for patient transportation resources, travel time, distance between the patient and the facility, and cost.

Resource barriers are yet another type of access barrier that adversely affect many of the components of access to healthcare services. Resource barriers limit the availability to use the service-producing capacity of resources. Thus, resource barriers include a lack of medical infrastructure such as a lack of hospitals within close proximity to rural inhabitants, a paucity of adequately trained healthcare personnel (e.g., generalist physicians, specialty physicians, and nurses), a dearth of medical equipment, and a scarcity of facility exam rooms and infectious disease isolation and quarantining rooms.

It may be argued that access to specialty physicians is especially difficult for rural patients. Doctor Jones explains that the most significant obstacle he encounters involving his rural patients is accessing specialty medical care. He states “Our biggest barrier to specialized care is being able to get people in. Any specialty care-insurance is a big hurdle.” This difficulty in accessing specialty care may be interpreted by a number of different explanations. One may interpret that there is merely a lack of specialty care physicians residing in rural settings. Or, it may be that specialty care physicians are quite

particular regarding what type of health insurance they accept from their clients. Another interpretation is that specialty care physicians may be geographically isolated from rural residents. Thus, it may relate to or further buttress other access barriers such as transportation difficulties.

Primary care physicians are considered to be the frontline physicians. Primary care physicians include family practitioners, general internists, preventive medicine physicians, and pediatricians. Broadly speaking, all other physicians would be considered specialty physicians. Thus, specialty physicians would include psychiatrists and infectious disease physicians. It can be argued that psychiatrists and infectious disease specialists would assume a greater prominence in the event of a bioterrorist attack. Psychiatrists would be needed to treat refractory mental health disorders while infectious disease specialists would be required to assist with the management of patients afflicted by bioterrorist-induced infectious agents.

Many of the physicians articulated several of the physician-patient related barriers—financial, excessive patient load, transportation, and resources—that severely hinder access to healthcare services. In sharp contrast to each of the other physician participants, when Dr. Davis is queried regarding barriers to accessing care for his patients, he states “I hope not. Insurance status is not—we take everything. We pride ourselves on having good access.” Unlike the other rural physician participants, one may interpret that Dr. Davis perceives access by patients to rural physicians and to the emergency room as open and available. Although Dr. Davis does temper his comments by stating that he hopes there are not any impediments; he explicitly declares that health insurance is not an impediment. One may interpret that there are limited financial barriers, at least related to

health insurance, because this physician is employed in the emergency room. However, as previously discussed, access is a complicated concept that involves myriad elements including financial affordability, patient load and consequent healthcare availability and accommodation, a means to transportation and accessibility and resource availability. Thus, in essence, one may interpret that if a patient can physically arrive at the emergency center by some mode of transportation then the patient will receive the necessary medical care.

Communication Barriers

Another set of physician-patient related barriers includes communication barriers. There are three types of communication barriers identified in this study: social, respect and literacy barriers. Social barriers adversely affect the physician-patient dynamic and include geographical isolation, a lack of telecommunication, and a lack of social support. One physician expressed communication barriers as presenting an impediment to administering medical care. Doctor Smith states that “people who do not have a good support system through communication and people who are more isolated would tend to have more trouble coping with something like that because they are not able to talk about that as much with others. People in rural areas would have more difficulties with those things. A lot of my patients don’t even have telephones. They just see what is in the papers or maybe what they see on the T.V.”

In rural areas, patients, physicians, and healthcare facilities may not be concentrated or within a close proximity to one another, which may hinder means of communication. Geographical isolation also may preclude a physician from being able to reach a patient by conventional telecommunication methods such as through the use of telephones, facsimiles, or electronic mail. Thus, geographical isolation may lead to a

lack of timely information which may adversely affect a patient's condition.

Geographical isolation can also further affect access barriers. For example, geographical isolation may slow delivery of vital healthcare resources or personnel from other clinical sites during a crisis. Thus, geographical distance and isolation may not only lead to communication barriers, but also contribute to transportation and access difficulties. Social barriers may preclude patients from having a support system (i.e., family or friends) to assist them to emotionally cope with stressful events. This lack of a social support system may further adversely affect a patient's mental and physical condition. Consequently, social barriers engender feelings of isolation and highlight difficulties encountered among rural residents when they attempt to communicate with other community members. It appears that many rural patients encounter numerous social barriers and that these will only worsen in the advent of a bioterrorist event.

Literacy and respect barriers also reside under the auspice of communication barriers. Doctor Smith elaborates on barriers in communication that exist between the physician and the patients by stating that "you can't use really big words sometimes. I have had some complaints from patients about them not getting it, but not many. It is real important for them not to feel like someone is looking down at them." Literacy barriers are illustrated by patients not understanding the medical rhetoric or jargon of physicians. Physicians need to appreciate that each rural patient has a differing level of education. Some patients may need physicians to explain medical conditions slowly, repeatedly, or in a simplified and easy to understand fashion. Thus, it is important to evaluate each patient's cognitive ability and subsequently convey information in a comprehensible manner. Yet it is equally important for physicians to explain medical

terminology and conditions in a respectful fashion to patients. Physicians need to honor a patient's autonomy and intelligence. Respect barriers involve patients expressing or exhibiting sentiments of resentment if they feel that physicians are disparaging or condescending. If patients feel that the physician is talking down to them, they may feel disrespected and this may affect a patient's compliance with medical interventions suggested by the physician.

Knowledge Barriers

The final type of physician-patient related barrier which affects medical care and subsequent interventions to patients is a knowledge obstacle. Knowledge barriers specifically address a physician's knowledge related to bioterrorism. Yet these barriers also adversely affect a patient because if a physician is uncertain regarding bioterrorist infectious agents then the patient may suffer by receiving the wrong clinical diagnosis or worse yet an improper or unnecessary medical intervention. Such an improper or unnecessary medical intervention may lead to an iatrogenic outcome (i.e., an unnecessary intervention performed by the physician with an adverse outcome deleteriously affecting the patient). Knowledge barriers may also include a physician being unaware or lacking the knowledge regarding the clinical manifestations of an infectious bioterrorist agent. This dearth of knowledge may lead to a failure to differentiate a bioterrorist agent causing an illness from perhaps a more common, yet similarly presenting infectious illness. Or these knowledge barriers may include a physician's lack of knowledge regarding the risk factors or the recent scientific research data and the standards of care to employ when treating bioterrorist-induced infectious diseases. These knowledge barriers may also include elements such as a physician's lack of knowledge regarding which expert to contact or consult to discuss clinical manifestations of a possible infectious outbreak.

Each of these knowledge barriers adversely affects a physician's acumen and choice of medical interventions and possibly their patient's condition. Several physicians—Doctors Smith, Williams, Phillips, and Brown expressed knowledge barriers. Doctors Smith and Williams expressed a dearth of knowledge regarding appropriate prevention measures and treatments. These two physicians also expressed their lack of knowledge related to recent medical research concerning bioterrorist inducing infectious agents. One physician, Dr. Brown explained that “I have never seen a case of smallpox.” Several physicians expressed uncertainty regarding mental health and physical health risk factors for a bioterrorist agent.

Every physician participant illustrated barriers impeding physicians from administering medical interventions to rural patients. Each participant discussed elements such as financial obstacles, increased patient load during a crisis, transportation barriers, and resource barriers. Notably, one physician, Dr. Davis, employed in the emergency room, commented that his patients do not encounter difficulties with accessing healthcare. One physician participant discussed communication barriers such as social barriers, literacy barriers, and respect barriers as adversely influencing patient care. Many physician participants commented on their own lack of knowledge regarding bioterrorism-induced maladies, associated risk factors, and valid scientific research studies. This lack of knowledge poses a formidable barrier to both medical or professional preparedness and medical interventions. If rural physicians lack the necessary knowledge regarding bioterrorism, it will affect their perceptions of their personal preparedness and consequently may affect their actual preparedness. This lack of knowledge perception may also be observed by their patients. Or, it may be

unintentionally conveyed by physicians to their patients. Thus, patients then may perceive a greater sense of their own morbidity and possible even their own mortality. This perception by patients will probably affect their patient condition. It may cause an exacerbation of a previously stable mental illness or a worsening of a chronic physical illness. These exacerbations will deleteriously affect patients' physical, mental, emotional and/or social states or conditions. It also may adversely affect how a patient interprets a physician's medical interventional advice. If a patient perceives that a physician is ill-prepared for a catastrophic event he/she may lose faith in the physician's assessments or recommendations regarding treatment. Consequently a patient may fail to comply with the interventional regiment outlined by the physician thereby further adversely affecting their health condition.

Ideally, if there were not any barriers within this catastrophic event context, there would be substantial overlap between both the spherical line surrounding physician perceptions of preparedness and the spherical line surrounding patient perceptions of mortality and morbidity. Presumably, a physician's perception of his/her preparedness for a catastrophic event would more closely coincide with a patient's perceptions of his/her own morbidity and mortality. So, physician professional preparedness and medical interventions to facilitate improvements in patient conditions would be unhindered. This would presumably lead to an improved physician-patient dynamic and contribute to considerably more ideal and successful medical interventions and health outcomes.

Medical Interventions

Each physician was also asked what they perceive to be the best treatment options for patients following a bioterrorist attack. These questions not only examine appropriate

medical interventions, but they also further expose a physician's professional preparedness and the associated elements. Medical interventions may include pharmaceutical treatment, counseling therapy, preventive therapy, or medical recommendations. The principal objective of medical interventions is to improve the patient's health and condition. Thus, specific questions addressing medical interventions focus on the tasks performed by the physician to ameliorate patient suffering following a catastrophic event. Each physician was questioned regarding what immediate steps could be performed after a bioterrorist event and how would a physician monitor a patient's mental health and medical care following a bioterrorist attack in the longer term. Medical interventions often bridge the important connection between the physician and the patient's health condition. If a patient perceives a physician as unprepared for a bioterrorist event, it adversely affects a patient's compliance with the medical interventions outlined by the physician. This lack of preparation by the physician may manifest to patients as the physician lacking knowledge regarding bioterrorist-induced agents or as the physician lacking pertinent or timely information regarding a catastrophic bioterrorist event.

Mental Health Interventions

Several physician participants acknowledged that counseling should be the salient method of mental health intervention. Doctor Phillips explains that the best treatment options following a bioterrorist attack would be: "counseling, on a long term basis." She states that "it depends on how much understanding you have about the situation." Several of the physicians also expressed sentiments of sensitivity to the patient's symptoms and condition. When asked regarding steps to monitor patients in the weeks or months that follow an attack, Dr. Phillips responds, "It depends on what kind of bioterrorism attack is

there. A lot of it would be reassurance. If you do not have these symptoms chances of you getting sick is less. A lot of them will have a fear of dying.” This physician participant also expresses the common theme that the type of bioterrorist agent is especially important. This sentiment was expressed by many of the physicians when questioned regarding how to prepare for physical health problems that may be encountered following a bioterrorist event. This physician also expresses that the type of infectious agent is important with regards to medical intervention as well. Doctor Williams responds, “I guess education. Just let them know it is a tough time and its stress on people and response to that stress on people can get them mentally out-of-shape. And, there’s help if they need it. And, there’s nothing wrong with them if they are having responses they don’t understand.” Although this physician expresses a sentiment of uncertainty, he also expresses sensitivity and empathy to a patient’s symptoms and condition. These are examples of physicians whose professional preparedness can allay mental stressors and assist in mitigating a patient’s symptoms and deteriorating condition.

It may be argued that prevention is a necessary tenet of emergency bioterrorism preparedness. Prevention may include resources such as vaccines, isolation rooms, and educational literature regarding bioterrorist agents. One physician expressed the need for prevention as a method of physician medical intervention preparedness for a bioterrorist event. Doctor Williams states that “acute intervention is very important. There is also bound to be some preventative stuff that can be done. I don’t know what it is, but I bet someone has a darn good idea. We’d try to look at what can be done. I’m sure something can be done that would diminish the impact and diminish future problems, but I don’t know what those approaches would be.” This physician participant articulated the

importance of acute and rapid intervention and prevention as a method of physician preparedness, but with uncertainty regarding what prevention was needed to avert bioterrorism-induced illnesses. This is an exemplification of a knowledge barrier regarding medical intervention. Thus, it may be argued that rural primary care physicians need advice from infectious disease medical specialists regarding the preventive measures and treatment interventions needed to improve patients' mental health conditions. Doctor Williams also expressed that he would monitor a patients mental healthcare in the weeks or months following a bioterrorist attack by "asking about it much more." This conveys the elements of cognitive and expectation preparedness on the part of an astute physician. Such an astute physician is one who will assist patients in feeling at ease when discussing their symptoms after a catastrophic event. When patients' feel comfortable and witnesses the compassion and sensitivity of the physician, they are more apt to discuss mental health symptoms related to an event.

Doctor Smith articulates the need for counseling intervention by stating: "We can have an open house to talk about it, have a group therapy. Talk on the telephone might work. Sending letters to the ones, but some cannot read and some cannot read well." This physician participant expresses some of the communication barriers that adversely affect the physician-patient dynamic in rural settings. Consequently, many medical interventions may be impeded by lack of telecommunication methods. Patients in rural settings may not have telephones or may not be literate. Furthermore, mailing letters may delay treatment options for patients who need expedient medical care and counseling. Doctor Smith explains that post-9/11, "When they came out to talk about it, we would try to make sure that they were knowledgeable about what's happening. If they have lots of

facts, it's going to ease their mind and then we try and answer their questions. In rural areas, there are lots more isolation, lots more barriers to communication. One person communicating to a mass audience is very difficult. It is not real feasible." This physician participant explains post-September 11, 2001 there were open dialogues with patients despite physician-patient related barriers such as knowledge and social barriers. This doctor explains that he lacks the knowledge of how to communicate regarding a catastrophic event to a large number of rural residents within a rural context.

Geographical isolation is yet another type of communication barrier that affects social relations. It can adversely affect medical interventions because of the difficulty in disseminating information and knowledge. Geographical isolation also precipitates access barriers such as transportation difficulties. This is because many patients do not possess automobiles or cannot afford gasoline to drive their automobiles. These barriers impede physician-patient encounters and hinder the medical interventions suggested by the physicians for their patients.

Mental and Physical Health Interventions

Chronic physical health maladies may cause mental health symptoms such as anxiety and depression. Moreover, mental health maladies like chronic stress may precipitate organic illnesses. Two physicians introduce an important and distinct corollary regarding treatment. Medical interventions should include treatments targeted at both the mental and physical health status of a patient. Although each of these physicians maintains that counseling is the integral treatment component of mental health disorders in the advent of a bioterrorist event, both physicians believe that an integration of mental healthcare with medical care is vitally important. Thus, interventions should consist of simultaneous treatment by the primary medical care physician coupled with the

mental healthcare physician to improve the patient's overall condition. Doctor Brown, similar to other colleagues, explains that following an attack the best treatment option "would be one-to-one and group counseling. Access to mental health counseling is extremely important. Dove-tailing that with discussion with and treatment by their primary care physician is also very important. And, integration of their primary care provider with the counseling." He further explains that the "first step is reassurance that this is what is going on and that there are some stable things here. I think that medication can be important." Thus, this physician expresses that counseling, medications and other relevant physical interventions should be integrated. In a similar fashion, Doctor Jones explains when asked about treatment options for mental disorders following a bioterrorist attack that "I think counseling is our only choice. You have depression and anxiety after an attack." He further comments when asked regarding steps to monitor a patient after an attack, "It has to be on the forefront. You have to have a screening question. You have to look at blood sugar, blood pressure, anxiety, depression. It will worsen all of them. Stress itself is not healthy for the body." A screening question is imperative to divulge a possible mental health disorder. Screening questions may assist in revealing depression, substance abuse, anxiety, and other conditions. They often open the door for a dialogue regarding symptoms and reassurance. It is also important to order laboratory assays to examine pertinent physiological parameters (i.e., blood sugar and blood pressure) which are essential to expose the physical status component. Physiological parameters may reveal an underlying disorder such as diabetes or hypertension. An integration of mental and physical health components may lead to improved medical interventions and corresponding patient conditions.

Physical Health Interventions

Many physician participants believe that the manifestation of physical symptoms is highly contingent on the infectious agent. Consequently, medical interventions would be dependent on the physician's knowledge, experience, the type of infectious agent, and the presenting signs and symptoms of the patient. When Dr. Williams is asked regarding treatment options of patients with medical conditions, he responds "Whatever experts recommend. I'd have to look up and see what they'd say which symptoms merit what treatment and who to monitor." This highlights the knowledge barrier which has also been expressed by several other physician participants regarding medical management and treatment. Yet, in contrast with some of the other knowledge impediment explanations, this quote expresses a different sentiment. This physician's comments may be interpreted as an individual who does indeed lack sufficient knowledge, but would be willing to learn from other medical experts and use the pertinent information during an incident.

Physicians need to anticipate possible infectious agents, be aware of pending patient signs and symptoms and be prepared to conduct appropriate medical interventions. Doctor Phillips mentions that to assist a patient on a long-term basis after a bioterrorist attack that "you would have a whole list of things to keep an eye out for." This exemplifies the vast number of mental signs and physiological parameters that necessitate careful monitoring. This reinforces several of the important elements of perceived emergency bioterrorism preparedness: a physician's sensitivity to patient symptoms, cognitive preparedness and expectation preparedness.

Doctor Davis explains, "If an event occurred then the people we see in the ER for chest pain, nausea, headaches, those would have to be looked at in a different light. You

just don't know where that is coming from. We would rely heavily on family practices in the area. We may see a lot of people that may have work-related injuries. They may not be sleeping well." In contrast with other participants, Dr. Davis explains that common physical symptoms may be derived from an underlying mental disorder. They may be manifestations of acute mental stress or precipitated by a bioterrorist agent that induces respiratory or gastrointestinal symptoms. He also comments regarding the unknown source. One may interpret this statement as testimony that this physician is cognitively prepared and at least would perceive or anticipate the possibility that a patient presenting to the emergency room may have been exposed to a bioterrorist-induced infectious disease. Resource preparedness is essential and the emergency room would depend on local family practitioners for assistance and possibly information related to a bioterrorist event. Patients may not be sleeping probably because of the imposed mental stress and anxiety of such an event. This overwhelming anxiety and distress would probably lead to an increased number of patients presenting to healthcare facilities and a worsening of physician-patient related barriers.

In summary, each of these physician participants explains that counseling therapy would be the best option for mental health disorders. Prior to such therapy, a screening question should be required to divulge the underlying anxiety, fear and stress followed by a discussion elaborating on the magnitude and the type of bioterrorist event. The treatment would require physicians providing reassurance during the counseling sessions and possibly medications to select patients. The principal objective of the counseling is to allay patients' mental and emotional stressors. However, three of the physician participants mention the importance of integration between the mental health intervention

components and the physical health components. This integration between the mental health practitioner (e.g., psychiatrist) and the primary care physician is important to improve the patients' overall health condition. So treatment should include therapeutic medications if physiological health parameters are abnormal following laboratory assays performed by primary care physicians. Thus, this cross-referencing of healthcare to encompass the physical, mental and emotional health components can assist with the overall medical interventions to thereby improve both the immediate and the long-term condition of the patient following a bioterrorist event.

CHAPTER 5 DISCUSSION AND CONCLUSIONS

This chapter includes a discussion of the salient themes emerging from this study along with their health policy implications. The chapter is organized in the following fashion. First, there is a recapitulation of the problem and the corresponding research inquiry rationale is discussed. Next, study findings are interpreted and discussed in terms of three principal discussion points. This is followed by implications and possible health policy intervention options. Chapter five concludes with suggestions for future research.

Salient Points for Discussion

The principal objectives of this study are to provide a more thorough description and understanding of rural physicians' perceived preparedness regarding public health emergencies such as bioterrorist events than those published previously. Two specific research questions were addressed:

- What is the perceived bioterrorism preparedness among rural physicians?
- How do the perceived impediments hinder rural physicians' preparedness?

The study addressed these research questions through the use of semi-structured interviews to elicit detailed information regarding perceived bioterrorism preparedness among rural physicians. Preparedness was unearthed by questioning rural physicians regarding components such as the physical and mental health signs and symptoms and the risk factors most likely to be encountered, as well as the possible corresponding therapeutic medical interventions. Upon examination of these components a more complete picture of perceived bioterrorism preparedness is formulated. Perceived

preparedness also was examined by querying physician participants regarding the importance that each physician placed on bioterrorism education and training, as well as from the perspective of the availability of bioterrorism training and educational opportunities. Few studies prior to the current research had examined any components related to bioterrorism preparedness (Gershon et al., 2004). Thus, the findings from this study should provide relevant information to researchers particularly in the areas of health services research, health policy and rural medicine concerned with catastrophic events and bioterrorism preparedness and the perceived impediments preventing appropriate preparedness.

The principal findings emerging from this study may be summarized as follows:

1. The rural physicians do not perceive themselves as medically or professionally prepared for a bioterrorist event from several perspectives. The clinicians perceive themselves as unprepared in five specific facets: cognitive preparedness, clinical preparedness, expectation preparedness, simulation preparedness and resource preparedness.
2. The rural physicians perceive the rural healthcare system as being unprepared. It is perceived that system preparedness has two principal elements: providers and patients. Providers link their own lack of bioterrorism preparedness to the overall rural healthcare system's lack of clinical preparedness. This link between rural physician preparedness and system preparedness entails limitations on the number of available physician specialists, healthcare facilities, and a lack of timely and effective communication to be prepared.

3. The second part of rural healthcare system preparedness involves patients. The patient aspect of system preparedness includes the rural patients and their access to transportation, their fiscal capacity to pay for medical care, their knowledge about their own needs, and their confidence in the medical professionals.

Each of the above points will be discussed in greater detail below.

Key Findings Regarding Rural Physicians' Professional Preparedness

A significant finding emerging from this study was the lack of professional preparedness among rural physicians. Previous literature had shown that physicians felt better prepared to respond to other disasters such as natural disasters and infectious disease outbreaks than to bioterrorist events (Alexander & Wynia, 2003; Chen et al., 2002). It had also been shown in previous research that community clinicians are often the first to identify potential bioweapon victims; yet they were inadequately prepared from a clinical perspective to address such events (Mc Fee, 2002; Pesik et al., 1999; Sniffen & Nadler, 1999; Varkey et al., 2002). One previous research study demonstrated that the current generation of physicians perceived themselves as being unprepared in their knowledge base and with respect to their confidence levels to deal with potential biological terrorism and its consequences (Rose & Larrimore, 2002).

According to the findings reported in this study, it appears that rural physicians do not perceive themselves to be fully prepared for bioterrorist events on several fronts. By describing rural physicians' perceived professional medical preparedness on these dimensions, the study elaborated on current understanding while providing new knowledge of nuance and detail.

Medical or professional preparedness was examined from the elements of cognitive preparedness, clinical preparedness or sensitivity to patient symptoms and/or conditions, expectation preparedness, simulation preparedness, and resource preparedness.

Cognitive preparedness encompasses the physician's scientific and educational knowledge, as well as analytical reasoning acumen. Cognitive preparedness involves a physician being able to discern between clinical manifestations of medical infectious disease conditions related to a bioterrorist agent such as smallpox or anthrax and the common and, yet often similar, symptoms of other infectious illnesses. Clinical preparedness involves a physician being aware, sympathetic, empathetic, and sensitive to patient symptoms along with the corresponding overt and covert medical signs if such an event has occurred. Expectation preparedness is similar to cognitive preparedness, particularly with respect concerning the need for mental keenness and awareness. A physician must anticipate the possibility of a catastrophic event such as a bioterrorist event as realistically feasible and consequently be prepared professionally for such an event. So, expectation preparedness involves a physician not only anticipating, but also accepting, the reality that a bioterrorist attack may indeed occur within his/her geographical area.

Simulation preparedness involves the actual training pertinent to bioterrorism. Simulation training includes relevant training drills and mock exercises depicting possible bioterrorist scenarios. Simulation preparedness may also involve educational clinical training through continuing medical education preparatory seminars, as well as individual directed study learning by physicians through the reading of pertinent medical journals. Resource preparedness involves a rural physician believing there are ample

healthcare resources in the rural community at his/her disposal. More specifically, it involves rural physicians having the perception that there will be enough access to healthcare facilities such as clinics, private medical offices, and hospitals, as well as enough healthcare practitioners available to respond during a bioterrorist attack.

Physician participants expressed a lack of bioterrorism preparedness along all five of these dimensions. The rural physicians in this study expressed that their perceived professional preparedness was highly dependent on the type of bioterrorist agent involved in the catastrophic event. They expressed that they felt or perceived themselves as being especially unprepared regarding the signs and symptoms of specific bioterrorist agents. For example, research participants indicated that they were not sure they would recognize the signs and symptoms of a bioterrorist induced infectious disease if faced with a patient who had been exposed. Furthermore, respondents articulated that they felt unprepared regarding relevant risk factors and appropriate medical intervention options for patients afflicted by bioterrorist-induced infectious agents. For instance, rural physicians indicated that they were uncertain of risk factors. The participants expressed a need for greater overall cognitive and clinical preparedness. In essence, the findings demonstrate that rural physicians in this study were unaware of the pertinent mental and physical health signs and symptoms of bioterrorist-inducing agents, the relevant risk factors, and the appropriate treatments. This lack of knowledge was particularly evident with reference to physical health symptoms, risk factors, and therapeutic interventions. The participants did express some confidence that patients afflicted with pre-existing mental and/or physical illnesses would presumably suffer from an exacerbation of their conditions.

Rural physicians described their individual expectation preparedness regarding the likelihood that a bioterrorist event would occur as low or not deeming immediate priority relative to the degree of other medical illnesses. They simply did not believe that a bioterrorist event was as likely as many other contingencies that they considered comparably important. This finding of low expectation preparedness among rural physicians is worrisome because professional preparedness requires an ever-present anticipation of the possibility of such an event transpiring. A physician's anticipatory behavior regarding any medical condition, common or uncommon, is essential to medical preparedness. Thus, physicians who perceive the threat of bioterrorism as a distinct possibility will presumably devote greater attention to detail and remain more clinically astute, presumably resulting in better professional preparedness. Rural physicians further explained that although simulation exercises and corresponding training opportunities existed, few had availed themselves of these endeavors. This consequence may be attributable to the low expectation preparedness. The last element of professional medical preparedness involves rural physicians' perceptions of their resource preparedness. A dearth of supportive resources, specifically a lack of specialty physicians, was cited by the rural physicians. In fact, this paucity of specialty physicians was perceived by one participant as the most significant barrier affecting professional preparedness and presumably hindering patient access to the medical services that might be necessitated by a bioterrorist event. Thus, the rural physicians in this study felt less than fully prepared professionally, intellectually, and pragmatically for a bioterrorist event.

A few previously published reports provided evidence of knowledge gaps, as well as a high level of interest in bioterrorism-related training among physicians (AMA, 2001; Heun, 2002; Sigmon & Larson, 2002). Previous research also demonstrated that when physicians are provided continuing medical education and training regarding bioterrorism, they perceived themselves as better prepared to respond to a public health emergency such as a bioterrorist attack (Alexander & Wynia, 2003; Chen et al., 2002; Cherry et al., 2003; Croasdale, 2002; Gerberding et al., 2002; Gershon et al., 2004).

Physicians in this study stressed the importance of, as well as the need for continuing medical education seminars and simulation preparatory training related to bioterrorism. Moreover, the physician participants described numerous available opportunities to become better educated regarding bioterrorism agents. Yet, despite these educational opportunities, the rural physicians in this study expressed that they often did not attend the seminars. Thus, this study has discovered that, although there are knowledge gaps in physicians' bioterrorism education and training, these gaps are attributable to a significant degree to their personal choice and discretion. Interestingly, the rural physicians in this study expressed an interest in appearing prepared or in being perceived by others as being prepared. This seemingly paradoxical finding presumably indicates that rural physicians perhaps do not have as high a level of interest in actually participating in bioterrorism training and education as they profess or as other previous studies (Alexander & Wynia, 2003; Chen et al., 2002; Heun, 2002; Sigmon & Larson, 2002) have documented. Previous studies (Blair et al., 2004; McHugh et al., 2004), along with preparedness-funding directives, have been focused predominantly on urban areas and physicians and not on rural areas or rural physicians. Thus it may be as one rural

doctor in this study explained that rural physicians are motivated to attend bioterrorism preparedness educational seminars, but they deem seminars pertinent to other facets of their practice as more important. Rural physicians may believe that a bioterrorist event has a greater likelihood of occurring in an urban area. Consequently, rural physicians have chosen to instead attend medical education seminars highlighting more-commonly encountered medical conditions. The findings of this study suggest that rural physicians believe it is important to be prepared for a possible bioterrorist event, but not at the expense of being prepared to prevent or respond to more common illnesses and more likely events.

In contrast to the other rural physicians in this study, one physician participant expressed the perception of feeling quite prepared for a bioterrorist event. This doctor explained that part of his employment duties included attending county emergency preparedness meetings and educational seminars. As a consequence, this physician participant felt more prepared than others because he had not only requested additional educational opportunities, but he had actually attended numerous medical and non-medical educational seminars, met with county emergency officials, and participated in numerous small group discussions regarding bioterrorism preparedness.

Health Policy Options and Implications Regarding Physician Preparedness

Health policies include decisions made by different levels of government—federal, state and local—which affect or influence groups or classes of individuals (such as physicians, rural inhabitants) or types or categories of organizations (such as hospitals, health departments, and rural healthcare clinics). Health policies may take any of several forms. Some policies are decisions made by legislators that are codified in the statutory language of enacted legislation. Others are the rules and regulations established to

implement legislation or to operate government. Still others are judicial decisions related to health. All of the various forms of health policies fit into one of two basic categories- allocative or regulatory (Longest, 2001). Allocative policies are designed to provide net benefits to some distinct group or class of individuals or organizations, often at the expense of others, in order to ensure that the public objectives are met. Such policies, in essence, are mechanisms through which policymakers seek to alter demand for or supplies of particular products and services or to provide access to products and services for certain people. Regulatory policies are designed to influence the actions, behaviors, and decisions of others through directive approaches. The government establishes regulatory policies for the purpose of ensuring that public objectives are met (Longest).

This study substantiates that there appears to be a significant need to take additional decisive steps that are more effective than the current strategies to encourage rural physicians to improve their bioterrorism preparedness. One important device for such improvement is continuing medical education. This study demonstrates, however, that the simple existence of such educational opportunities is not sufficient to induce participation. According to the findings from this study, there appears to be a perceived demand among rural physicians for improved bioterrorism preparedness knowledge, specifically regarding the pertinent signs and symptoms, the associated important risk factors and the possible therapeutic medical interventions of infectious bioterrorist agents. Thus, this study's findings and the identification of this problem suggest there should be an emphasis on improving the linkage between education, training, and research in bioterrorism disaster preparedness.

Academic training programs should be developed which recognize the importance of disaster mental and physical health. The scientific and medical knowledge base regarding mental health needs greater attention, inquiry, and research. Providers of continuing education should offer increased opportunities in human-induced disaster preparedness. Medical professionals involved in providing healthcare services in human-induced disasters should broadly disseminate and publish their pragmatic experiences while also providing careful attention to the identification of areas where further research is needed.

Following the identification of policy options, it is important to consider implementation methods. It may be particularly valuable to explore the option of providing financial incentives to rural physicians to increase and facilitate their participation in bioterrorism preparedness programs. Yet it may also be argued that financial resources would be better served if applied to other endeavors such as improving rural technological infrastructure rather than to encourage participation in preparedness seminars among rural physicians.

A different implementation option may include focusing on altering physician behavior. Such an option may involve a directive through the use of a state imposed regulatory policy. The implementation of such a regulatory policy may lead to improved bioterrorism preparedness among physicians. An educational directive involving bioterrorism preparedness could be incorporated into both medical school academic curricula and residency training programs to encourage assimilation of pertinent preparedness knowledge among young physicians. Although it is a more stringent solution than voluntary physician participation with financial incentives, another state

imposed regulatory policy could be applied to community physicians. Such a policy might require participation among practicing rural physicians by mandating bioterrorism preparedness continuing medical education seminar completion as a contingency to procuring medical licensure recertification. This would increase a physician's professional knowledge base, training experiences, and clinical preparedness. Consequently, rural physicians would be prepared, would perceive themselves as being better prepared, and would be perceived by others as better prepared.

Key Findings Regarding the Rural Healthcare System's Preparedness

Another salient theme emerging from this study involves the clinical aspects of the healthcare system. The findings of this study suggest rural physicians perceive the overall clinical healthcare system as unprepared for a bioterrorist event and they believe the rural segments of that system to be especially unprepared. It is perceived that system preparedness has two principally linked elements involving both physicians and patients. Physicians appear to link their own lack of bioterrorism preparedness to the overall healthcare system's lack of preparedness. This perceived link between rural physician preparedness and the components of system preparedness entails two salient impediments. The perceived system barriers confronting rural physicians hinder them from feeling prepared. Furthermore, the findings reported in this research also revealed that rural physicians believe that these perceived barriers will hinder their professional preparedness by impeding their capacity to deliver appropriate medical care interventions intended to allay patient suffering.

This perception that the system is itself unprepared is principally centered on the findings expressed by the rural physicians regarding the need to address healthcare system impediments to the effective delivery of care. The impediments identified in this

study include the lack of healthcare resources and dearth of effective and efficient means of communication. More specifically, the rural physicians cite a need for increased clinical healthcare resources such as additional primary care physicians, specialty physicians (i.e., mental health and infectious disease specialists), a greater number of nurses, and more healthcare clinical facilities adequately equipped with isolation and infectious disease quarantining space, along with additional laboratories and equipment. The physicians also perceive inadequate telecommunication technology as an impediment to system preparedness and their professional preparedness. It is particularly interesting that participants in this study appear to believe that if there were additional clinical resources then merely the increased volume of healthcare resources would in and of itself result in better professional preparedness. Yet none of the rural physicians seem to acknowledge that many of these increased resources may sit idle in the absence of a bioterrorist event. Nevertheless, the talents and abilities of a suitable healthcare workforce cannot be overestimated in assessing preparedness.

An adequate healthcare workforce constitutes one of the basic resources needed to provide health services. The rural physicians in this study commented that the perceived resource barriers served as impediments to their professional preparedness. According to the findings in this study these perceived impediments would adversely affect patient access to care. The individual components comprising access to healthcare have previously been explained by Penchansky (1981) as availability, accessibility, accommodation, affordability, and acceptability.

Availability is used by Donabedian (1973) to refer to the service-producing capacity of resources. Resource barriers may involve a lack of medical infrastructure

such as a lack of hospitals within close proximity to rural residents, a lack of adequately trained healthcare personnel (e.g., generalist physicians, specialty physicians, and/or nurses), a scarcity of clinical exam rooms, a dearth of needed medical equipment, and/or a paucity of infectious disease isolation and quarantining rooms. Physician participants mentioned concerns regarding each of these components. This study was focused on the immediate concern regarding the perceived current state of rural physician preparedness given the existing level of resources. Yet, it appears from this study that the rural physicians link their professional and clinical bioterrorism preparedness to the healthcare system's preparedness and the available supply of healthcare resources.

Health Policy Options and Implications Regarding System Preparedness

The rural healthcare system's infrastructure faces major challenges today. The September 11, 2001, terrorist attacks and the dissemination of anthrax in the United States subsequently imposed even greater expectations and burdens on rural healthcare systems and their associated elements (i.e., facilities and physicians) to develop expanded emergency response systems. This increased burden has been further exacerbated by the known critical shortage of healthcare providers in rural areas (Escarce, Polsky, Wozniak, and Kletke, 2000; Knapp & Hardwick, 2000; Seago, Ash, Spetz, Coffman, and Grumbach, 2001).

If bioterrorism response services are to function optimally, the structural aspects of the healthcare system should be examined. There appears to be a need for stable organizational and political structures to support and nurture preparedness initiatives. In the past, scant support has been provided to rural public health emergency preparedness efforts. National efforts operate through the states, and state officials often have many competing priorities. Unfortunately, unless a state experiences the threat of frequent

disasters, planning and preparedness for such public health emergencies is often an ancillary consideration. According to a report released from Trust for America's Health (TFAH), the state of Florida was one of only two states to achieve a score of nine out of ten regarding state public health preparedness for bioterrorist attacks and other health emergencies (TFAH, 2004). It appears that Florida's previous experience with natural disasters, or more specifically hurricanes, may have also assisted with the state's bioterrorism preparedness efforts. The TFAH report and the increasing threat of human-induced disasters, suggests that there should be greater attention devoted to state public health emergency preparedness along with a renewed emphasis on rural health policy priorities.

The findings of this study would substantiate that state governments should consider employing both allocative and regulatory policies to assist rural healthcare systems in their overall preparedness for bioterrorist events. State governments might also employ regulatory policies as a method to assist with the removal of extant impediments to thereby assist rural physicians to become better prepared or at least to perceive themselves as being better prepared to combat bioterrorist agents.

Organizations funding bioterrorism and human-induced disaster research should place a high priority on proposals seeking to explore topics related to preparedness and prevention. Organizations funding disaster preparedness research should encourage research into the efficacy of various disaster mental health interventions and into the evaluation of disaster service programs. There appears to be a need for sound applied research and program evaluation to assess the efficacy of various medical interventions that are possible responses to various bioterrorist agents. Federal, state and local

organizations involved in providing services in human-induced disasters should disseminate and publish their experiences indicating where additional research inquiry is needed.

Additionally, health policies imposed by the state government can effectively alter the provision of resources by increasing financing mechanisms and increasing the number of healthcare personnel. A state policy response may include additional investments in the form of financial incentives provided to public medical schools and residency programs when their medical graduates agree to practice in rural areas for a specified duration of time. Such an incentive laden reward program would stimulate medical school institutions and academic medical centers to promote rural health to young physicians. An alleviation of healthcare resource barriers would presumably improve rural physician preparedness, as well as facilitate improved medical interventions and health outcomes. Furthermore, it may be argued that if physicians feel better prepared professionally then they would presumably know which additional healthcare resources would be most applicable for bioterrorism preparedness.

Policies also should be directed toward improving the technological means of communication in rural settings. Technology may be thought of as the application of science to the pursuit of health. Technological advances result in better methods of communication (e.g., Internet scientific and clinical updates, e-mails, telemedicine). However, large capital investments would be required to create rural healthcare system information technology. Moreover, widespread adoption of information technology may require behavioral adaptations on the part of physicians and organizations. Nevertheless, funding for the research and development that leads to informational technology

advancements is an important way that health policy can affect the pursuit of preparedness.

Communication barriers as a result of geographical isolation were cited in this study as an obstruction to perceived medical preparedness. Improved or unencumbered communication would facilitate the dissemination of applied knowledge, experience, and information. The principal methods to improve communication should focus on improving access to the Internet, as well as encouraging professional consultation. The Internet can be used to improve preparedness by utilizing applications such as incident reporting, videoconferencing among public health officials during bioterrorism emergency situations, epidemiology and disease surveillance, and delivery of alerts to rural physicians. Moreover, Internet access along with national consultation can help mitigate communication barriers by enabling the sharing of medical specialists' thoughts, experiences and wisdom with rural physicians to thereby further expand their knowledge base. Thus, improved information technology and the concomitant expanded means of telecommunications represent an important healthcare resource investment that presumably would have a significant impact on rural physicians' preparedness and on the rural healthcare systems' preparedness.

Key Findings Regarding Physician Perceptions of Rural Patient Factors

Another important theme emerging from this study involves the rural physicians' perceptions regarding the non-clinical aspects of the healthcare system. This may be classified as the second part of the rural healthcare system preparedness and it includes the perceived link between the system and patients. The patient aspect of this link with system preparedness involves the rural physician participants' perceptions of the rural patients. More specifically, this aspect includes the physicians' perceptions regarding

their patients' accessibility to transportation, their capacity to pay for medical care, and their perceived confidence in medical professionals. The rural physicians of this study viewed these non-clinical dimensions as impediments to preparedness. However, additional inquiry is warranted because it is not clear from this study whether this view represents concerns about the current situation or some notion that these non-clinical dimensions would be altered in the event of a bioterrorist attack.

An important determinant of health preparedness is the availability of and access to health services. Health services can be preventative, acute, chronic, restorative, or palliative in nature (Longest, 2001). The production and distribution of health services require a vast set of resources including finances, people, and technology. Health services are provided through the healthcare system, which is composed of organizations that transform these resources into health services and distribute them to patients. The findings of this study exposed rural physicians' perceptions of the impediments that are imposed by the rural healthcare system on patients. These impediments limit rural patients' access to care. Thus, the physician participants expressed access (e.g., financial or means of transportation) as a formidable perceived impediment to both system and patient bioterrorism preparedness.

Access may be thought of as a general concept that summarizes a set of more specific dimensions describing the fit between the patient and the healthcare system (Penchansky, 1981). Access barriers preclude physicians from administering salient medical care and appropriate interventions to patients. As noted by Penchansky, the specific dimensions of access include: affordability, availability, accommodation, accessibility, and acceptability. This study demonstrated that rural physicians perceive

access barriers will adversely affect rural patients' entry into or use of the healthcare system along one or more of these dimensions. Freeborn and Greenlick (1973, p 68) seemingly refer to a number of these dimensions when describing access, such as accessibility, accommodation, and availability, when they say that "individuals should have access to the system at the time and place needed, through a well-defined and known point of entry. A comprehensive range of personnel, facilities and services that are known and convenient should be available." These five dimensions represent closely-related phenomena which explain why they have been seen as part of a single concept: access (Penchansky).

Rural physicians expressed financial barriers or the lack of affordability as a perceived impediment to bioterrorism preparedness. Fein (1972) emphasizes personal income as a key to affordability and as a major determinant of access to care. Affordability is the relationship of prices of healthcare services and physician's insurance requirements to the patients' income, ability to pay, and existing health insurance (Penchansky, 1981; Bice, Eichhorn, and Fox, 1972). Availability may be defined as the relationship of the volume and type of existing services and resources to the patients' volume and types of needs. Penchansky explains that it refers to the adequacy of the supply of physicians, of healthcare facilities such as clinics and hospitals, and of specialized care such as mental health and emergency care. According to Penchansky, accommodation is the relationship between the manner in which the supply of resources is organized to accept patients, the patients' ability to accommodate these elements, and the patients' perceptions of their appropriateness. The supply of resources includes such elements as appointment systems, hours of operation, walk-in facilities, and telephone

services (Penchansky). Accessibility is the relationship between the location of supply and the location of patients, taking account of client transportation resources and travel time, distance, and cost (Penchansky; Bice et al.).

According to the findings in this study, access barriers affect rural physicians, the rural patients, and the rural healthcare system in a multitude of ways. Access barriers alter physicians' personal and professional perceptions with respect to clinical preparedness, resource preparedness, and their confidence. However, access barriers do not only affect physicians, but they also affect rural patients. Irrespective of whether a bioterrorist event is perceived or actually does happen, patients will seek physicians and medical care. Yet if an incident is perceived or does indeed happen, this will inevitably cause an increase in the number of patients presenting to healthcare facilities. This increased patient load will overwhelm the rural physicians and affect their professional preparedness. In addition, this inundation of patients presumably will further diminish timely access to physicians and pertinent healthcare resources.

Rural patients' perceived confidence in their medical professionals is affected by physicians' perceived knowledge deficiencies. Physician knowledge deficiencies include rural doctors lacking relevant education, training, and professional preparedness. Regrettably, rural physicians in this study appear to lack the medical acumen and preparedness to properly diagnose, evaluate and treat patients afflicted with bioterrorist-induced infectious agents. These deficiencies may be reflected and manifested by pervasive feelings of uncertainty or unease on the part of the rural physician. Unfortunately, this uncertainty and unease often is inevitably transparent to patients. According to this study, these readily visible feelings of uncertainty and unease

encumbering physicians adversely affect patients' perceptions of their physicians. This lack of preparedness only serves to precipitate more patient unease. Consequently, patients perceiving a physician's lack of professional preparedness may begin to feel less confident in their physician. This is particularly troublesome because patients may decide not to heed a physician's advice and clinical recommendations. Patients may begin to doubt the need and the efficacy of the medical interventions proposed by the physician. The findings of this study further explain that patients with pre-existing chronic physical conditions presumably will feel worse in the advent of a bioterrorist event. This is perceived to be principally true because patients may have a fear of the unknown and the subsequent chaos and disorder which accompanies a disaster.

Moreover, individuals afflicted with mental illnesses emanating from past traumatic experiences will probably become clinically unstable. And many individuals without any ostensible organic conditions may seek medical care, if for no other reason than simply for professional reassurance. So, despite the fact that some individuals may not have been personally affected by the incident, these patients may wish to nevertheless ensure that they are still healthy. These patients who worry if they are well will therefore seek medical services which will further affect access to care by exacerbating patient loads and imposing additional burdens on the rural medical infrastructure.

Health Policy Options and Implications Related to Patient Factors

Health, whether of individuals or populations, is a function of several determinants (i.e., genetic endowment; physical, sociocultural, and economic environments; lifestyles and behaviors; and health services). Health policy directly affects each of these determinants and, consequently, health (Longest). Health policies strategically influence the nature of the health services available to patients through their impact on the

resources required to produce the services, as well as on the healthcare system through which the services are organized, delivered and paid for (Longest, 2001). As a result, health policies play a direct and formative role regarding medical preparedness efforts and tangibly influence the health of the American populace.

Rural physicians in this study identified access barriers as a central impediment to the rural healthcare system and to rural patient preparedness. Access to care may be affected by broad health policies. One policy intervention option may include mobilizing physicians and other healthcare personnel on a locum tenens basis from neighboring areas during a bioterrorist incident. Although a transient increase in the number of medical professionals may temporarily improve patient access to medical care, it is probably not a viable long-term solution. Health policy decisions that increase the allocated financial resources devoted to eradicating access barriers would collectively assist rural physicians, patients and the healthcare system's perceived preparedness for bioterrorism. Yet, to increase allocated financial resources to rural healthcare necessitates removing resources from somewhere else. Thus, it is imperative to devote considerable attention and thought to the many parameters surrounding such options before embracing policy decisions and subsequent implementation.

Policy decisions related to bioterrorism preparedness will need to account for several current trends that ostensibly will affect the rural healthcare system and patients. It may be speculated that disasters, natural and human-induced, will continue with regularity, as well as transparency because of electronic media transmitting and relaying live photographs of disasters throughout the world. It also appears that public expectations regarding the health service delivery capacities of hospitals and clinics in

disaster situations will increase. Yet, budgetary cuts in the public sector will also probably continue, as will further benefit cuts in health insurance packages. Thus, the capacity of local rural public health departments and physicians to fulfill their responsibility to their communities in times of disasters will be severely tested. Many of these problems do not have any readily available transparent solutions. However, identification of these problems may assist policymakers considering future health policy decisions.

Future Research Questions

The 1979 Institute of Medicine (IOM) panel defined the field of health services research in the following manner: “Health services research is inquiry to produce knowledge about the structure, processes or effects of personal health services” (IOM, 1979, p 14). Health policy analysis applies this knowledge in defining problems and evaluating policy alternatives. More recently, a committee convened by the Academy of Health Services Research and Health Policy (now known as AcademyHealth) in 2000 defined health services research as “the multidisciplinary field of scientific investigation that studies how social factors, financing systems, organizational structures and processes, health technologies, and personal behaviors affect access to healthcare, the quality and cost of healthcare, and ultimately our health and well-being. Its’ research domains are individuals, families, organizations, institutions, communities, and populations” (Lohr & Steinwachs, 2002, p 8).

Qualitative research is a form of inquiry that is particularly valuable at identifying and describing problems. So this study did not focus on empirical testing, but instead qualitatively explored the degree to which rural physicians considered themselves to be prepared for bioterrorist events. More specifically, this study exposed that increased

preparedness among rural physicians appears to be needed and that there are impediments which appear to be hindering such medical preparedness. In summary, this study identified and described the problem of rural physicians' need for increased bioterrorism preparedness. It also identified the causes of this problem, that is, the barriers suggested by this study which prevent rural physicians, patients, and the rural healthcare system from being prepared. Lastly, this study raised interpretative findings which are suggestive of some of the possible remedial policy options. The logical progression would be to further examine some of these policy options by implementation with subsequent evaluation. The problem of what works in health policy has long been of interest—to governments, health professionals, researchers and decision makers (Lin & Gibson, 2003). Thus, there is a need to collect evidence to substantiate and warrant policy decisions because the absence of credible evidence has been used in the health sphere to question or discredit competing theories or practices.

This study raises several interesting future public health and health services research questions. One fundamental question that remains unexplored involves examining why rural physicians fail to attend bioterrorism preparedness educational seminars. This study focused on the current perceived state of rural physician preparedness given the level of pre-existing healthcare resources. Yet, another interesting question provoked from this study involves whether rural physicians view their own professional bioterrorism preparedness as simply an issue of requiring a greater number of resources for the healthcare system. Future inquiry could further explore the present concern, irrespective of current healthcare resource capacity, and address how we can best ensure that we are as prepared as we can be for a possible bioterrorist event.

This may also be directed at examining the current state of bioterrorism preparedness in other states from both urban and rural perspectives. This may be accomplished by performing survey research of physicians from designated settings in other states.

If state and/or federal governments wish to consider allocative policies by providing subsidies to rural physicians to improve preparedness, then measures to examine the effectiveness of such policies should also be examined. Thus, a further exploration utilizing quantitative studies involving cost-benefit and cost-effective analyses to help guide future policy directions would be justified to ponder the ramifications of devoting a larger number of financial resources to improving rural healthcare versus other endeavors.

Conclusion

Any bioterrorism event or the threat of an event is both an important public health and community issue requiring the medical community to assume a substantial leadership role. Physicians have a dual responsibility to educate the community and to professionally prepare for such an event. Although only a few physicians would likely recognize the sentinel case in a bioterrorist event, the overall public health management response might very well involve every physician. Consequently, physicians must be particularly astute and knowledgeable to accurately address questions from patients, colleagues, officials, and others. Furthermore, every physician must be prepared to take an active role should a bioterrorist event surface within his/her community. Thus, each physician has a significant role to assume in our nation's defense against bioterrorism.

Bioterrorist agents can cause a vast array of signs and symptoms with severity ranging from mild to those that result in mortality. Bioterrorist agents also significantly impact mental health status, specifically by invoking or exacerbating fear, anxiety,

depression, acute stress disorder, and other mental health conditions. With fewer colleagues and attenuated professional networks it is especially important for rural physicians to achieve a high level of individual bioterrorism preparedness regarding organic and mental health conditions, risk factors, and possible medical interventions. Thus, when rural physicians encounter the conspicuous and the covert signs and symptoms of conditions that may reflect bioterror manifested in their patients; they should be able to discern and diagnose the conditions expediently and with efficacy.

Broader public health aspects of bioterrorism preparedness, including primary prevention measures, are important areas for informed action by physicians. Medical education and training curricula must include information on salient potential agents of bioterrorism, and medical professionals, especially those such as primary care physicians who are most likely to see patients affected by a biological weapon require continuous education in this area. Moreover, physicians from other specialties need sufficient knowledge of the likely clinical features of potential biological agents in order to recognize patients presenting with a compatible illness (Gerberding et al., 2002; Karwa et al., 2003, Karwa et al., 2005).

Bioterrorism preparedness requires physicians to be aware of the possibility of bioterrorism at any time (Gerberding et al., 2002, Inglesby et al., 2000). Plans to circumvent or be adequately prepared for bioterrorist incidents can only be implemented effectively if physicians are aware of the possibility of bioterrorism, suspect and recognize an event when it occurs, notify authorities promptly upon suspicion of such an event, and institute appropriate medical interventions and management protocols.

APPENDIX A INTERVIEW QUESTIONS

Questions one and two describe background information of the participants whereas questions three through thirteen will be examined with grounded theory.

1. What is your position here?
2. What is the size of your patient load?
3. What types of mental health conditions do you think you would be likely to see in patients following a terrorist attack?
4. Are you aware of any risk factors for developing mental health problems following a bioterrorist attack?
5. Are you aware of any risk factors for developing medical problems following a bioterrorist attack?
6. What types of medical conditions do you think you would be likely to see in patients following a terrorist attack?
7. What do you think are the best treatment options for people who develop mental health conditions following a bioterrorist attack?
8. What do you think are the best treatment options for people who develop medical conditions following a bioterrorist attack?
9. What steps could be taken to help patients immediately after an event?
10. How would you monitor patients' mental health and medical care in the weeks and months following a bioterrorist attack?
11. What kinds of things can get in the way of accessing healthcare for people served at this clinic?
12. Have you had an opportunity to learn about biological agents and resulting medical needs in ways such as courses or in-services at other institutions or reading on your own?
13. How important is it for healthcare providers to receive training for bioterrorism?

APPENDIX B
QUALITATIVE INTERVIEW CODING CHART

<u>ATA EXAMPLES</u>	<u>OPEN CODES</u>	<u>AXIAL CODES</u>	<u>SELECTIVE CODES</u>
Depends on kind of event	Depends on kind of event	Event dependent	Context dependent
If it were a respiratory event, look for respiratory symptoms	Hypothetical Respiratory Scenario	Event dependent	Context dependent
	Preparedness for Respiratory Symptoms	Cognitive Preparedness	Physician Professional Preparedness
Depend on what the attack entailed	Depend on what attack entailed	Event dependent	Context dependent
If we are looking at someone running into a fertilizer plant, then you are looking at respiratory problems	Hypothetical Respiratory Scenario	Event dependent	Context dependent
	Preparedness for Respiratory Symptoms	Cognitive preparedness	Physician Professional Preparedness
If we are crop dusted with Anthrax, you look at respiratory problems	Hypothetical Scenario	Event dependent	Context dependent
	Preparedness for Respiratory Symptoms	Cognitive preparedness	Physician Professional Preparedness

Here it is a little harder because we are not as concentrated	Not as Concentrated	Social Barrier	Communication Barrier
You will have all the symptoms whether they are real or thought up	Preparedness for all types of symptoms	Cognitive preparedness	Physician Professional Preparedness
If you look at Anthrax, you get a fever, cold, and cough.	Hypothetical Scenario	Event dependent	Context dependent
	Preparedness for Respiratory Symptoms	Cognitive Preparedness	Physician Professional Preparedness
For a lot of the airborne stuff, the early symptoms are similar to the common cold.	Preparedness for Respiratory Symptoms	Cognitive Preparedness	Physician Professional Preparedness
It depends on what it is	It depends on what it is	Event dependent	Context dependent
Those physical symptoms will explode	Preparedness of increase in physical symptoms	Cognitive preparedness	Physician Professional Preparedness
It depends totally on what the agent is	Depends on the agent	Event dependent	Context dependent
Smallpox type rash	Agent provoking symptoms	Cognitive preparedness	Physician Professional Preparedness
Smallpox Skin lesions	Agent provoking symptoms	Cognitive preparedness	Physician Professional Preparedness
Drawing a blank	Drawing a blank	Lack of Knowledge	Knowledge Barrier
Don't know the findings that well	Do not know the findings	Lack of Knowledge	Knowledge Barrier

Whatever experts recommend	Whatever experts recommend	Rely on Expertise	Perception of Preparedness
Have to look it up	A need for additional knowledge	Lack of Knowledge	Knowledge Barrier
See what experts say which symptoms merit what treatment and who to monitor	Expert evaluation of what to do	Rely on Expertise	Perception of Preparedness
We had 9/11, and I saw a lot of anxiety	9/11 and anxiety as an outcome	Clinical Preparedness	Physician Professional Preparedness
People stable on medication for anxiety and depression coming with exacerbations	Exacerbation of anxiety and depression	Exacerbation of pre-existing mental conditions	Exacerbation of pre-existing condition
People who were previously diagnosed having exacerbation	Exacerbation of previous diagnosis	Exacerbation of pre-existing physical condition	Exacerbation of pre-existing condition
New patients coming in	New patients	Increased patient load	Access Barrier
People complaining of insomnia, cannot sleep	Insomnia	Clinical Preparedness	Physician Professional Preparedness
Very nervous thinking	Nervous thinking	Clinical Preparedness	Physician Professional Preparedness
World is going to end	End of world	Fear of Uncertainty	Perception of Morbidity and Mortality
Mostly anxiety and depression	Anxiety as an outcome	Clinical Preparedness	Physician Professional

			Preparedness
Exacerbation of peoples' anxieties	Exacerbation of anxiety	Exacerbation of pre-existing mental condition	Exacerbation of pre-existing condition
Depends on what kind of bioterrorism	Kind of bioterrorism	Event dependent	Context dependent
Deal with post-traumatic stress disorders	Deal with PTSD	Exacerbation of pre-existing mental condition	Exacerbation of pre-existing condition
Component of stress and shock	Stress and shock	Fear of uncertainty	Perception of Morbidity and Mortality
Being in fear will wear on them, we all noticed that after 9/11	9/11 and fear	Fear of uncertainty	Perception of Morbidity and Mortality
Increase in people in the ER	Increased visits	Increased patient load	Access Barrier
Asked if there was exposure	Asked if they were exposed	Fear of possible exposure	Perception of morbidity and mortality
Patients asking if they could be tested for things	Asking to be tested	Clinical Preparedness	Physician Professional Preparedness
Post-traumatic stress disorder	PTSD as an outcome	Clinical Preparedness	Physician Professional Preparedness
Anxiety	Anxiety as an outcome	Clinical Preparedness	Physician Professional Preparedness
Substance use would probably flare more	Increase in Substance use as an outcome	Clinical Preparedness	Physician Professional Preparedness
Depression	Depression as an outcome	Clinical Preparedness	Physician Professional Preparedness

Extra fuel on the fire for people with chronic problems	Extra fuel on the fire for Chronic problems	Exacerbation of pre-existing physical conditions	Exacerbation of pre-existing condition
Anxious people	Anxious	Clinical Preparedness	Physician Professional Preparedness
People that think they are infected	Suspicious of infection	False Interpretation of illness	Perception of Morbidity and Mortality
Can't quote an article	Cannot quote a medical journal article	Lack of Knowledge	Knowledge Barrier
Can't write an article	Not confident to write an article on bioterrorism	Lack of Knowledge	Knowledge Barrier
Person who is sneezing and knows it is Anthrax instead of the flu	Anthrax	False Interpretation of illness	Perception of morbidity and mortality
Those that have a stomach virus and think it is botulism or salmonella poisoning	Botulism or Salmonella	False Interpretation of illness	Perception of morbidity and mortality
Depression	Depression as an outcome	Clinical Preparedness	Physician Professional Preparedness
Depends on how big the event is	Event size	Event dependent	Context dependent
How many people are involved	Number involved	Event dependent	Context dependent
Some of the schizophrenics and people that have psychosis probably need a little bit of understanding and	Schizophrenia and Psychosis Mental Health Disorder	Clinical Preparedness	Physician Professional Preparedness

help in dealing			
Panic attack	Panic Attack as an outcome	Clinical Preparedness	Physician Professional Preparedness
Anxiety disorders	Anxiety disorder as an outcome	Clinical Preparedness	Physician Professional Preparedness
Generalized anxiety	Generalized Anxiety as an outcome	Clinical Preparedness	Physician Professional Preparedness
Think of bioterrorism, you think of agents that are physically capable of morbidity and mortality	Bioterrorism agents	Perception of illness	Perception of morbidity and mortality
Skin and mucous membranes, gastrointestinal, and airborne kinds of things.	Skin and mucous membranes, gastrointestinal, and airborne	Clinical Preparedness	Physician Professional Preparedness
Hysteria	Hysteria as an outcome	Clinical Preparedness	Physician Professional Preparedness
Anxiety	Anxiety as an outcome	Clinical Preparedness	Physician Professional Preparedness
Depending on how it is handled	Depends on situation	Event dependent	Context dependent
Can turn into depressive type of disorders	Depression as an outcome	Clinical Preparedness	Physician Professional Preparedness
Hopelessness	Hopelessness	Clinical Preparedness	Physician Professional Preparedness
Helplessness	Helplessness	Clinical Preparedness	Physician Professional

What am I to do?	Hopelessness	Clinical Preparedness	Preparedness Physician Professional Preparedness
Would be the same in any type of disaster scenario	Type of Disaster scenario	Event dependent	Context dependent
Impaired immune status	Impaired immune status	Clinical Preparedness	Physician Professional Preparedness
Sensitive to Old age	Sensitive to Old age	Clinical Preparedness	Physician Professional Preparedness
Multiple chronic diseases worsening	Chronic diseases worsening	Pre-existing physical health condition	Exacerbation of pre-existing health condition
Certain medications	Medications	Physician aware of treatment	Physician Professional Preparedness
Pre-existing mental illness	Pre-existing mental illness	Pre-existing mental health condition	Exacerbation of pre-existing condition
Bioterrorist Event is going to impact on their consciousness and could make things worse	Bioterrorist event could make health worse	Clinical Preparedness	Physician Professional Preparedness
Can't write an article but I think	Cannot write a medical article	Lack of Knowledge	Knowledge Barrier
People who do not have a good support system through communication	Lack of support system	Social Barrier	Communication Barrier
People who are more isolated have	Trouble Coping	Social Barrier	Communication Barrier

more trouble coping			
People in rural areas would have more difficulties with those things	Rural setting	Social Barrier	Communication Barrier
Little better off for some because of the internet and communication	Internet	Social Barrier	Communication Barrier
A lot of my patients do not even have telephones	No telephone	Social Barrier	Communication Barrier
Just see what is in the papers	Newspaper information only	Social Barrier	Communication Barrier
Maybe what they see on television	Possible Television information	Social Barrier	Communication Barrier
Lot of doom and gloom and that is upsetting a lot of people	Upsetting people	Perception of upsetting situation	Perception of morbidity and mortality
If you have anxiety, you will have problems with anxiety	Hypothetical mental health condition	Event dependent	Context dependent
	Preparedness for anxiety	Cognitive preparedness	Physician Professional Preparedness
If you have depression, you will have problems with depression	Hypothetical mental health condition	Event dependent	Context dependent
	Preparedness for depression	Cognitive preparedness	Physician Professional Preparedness
ADHD will be complicated	Hypothetical mental health	Event dependent	Context dependent

	condition		
	Preparedness for ADHD	Cognitive Preparedness	Physician Professional Preparedness
All of them will be complicated	Hypothetical mental health condition	Event dependent	Context dependent
	Preparedness for all complications	Cognitive Preparedness	Physician Professional Preparedness
People who already have a diagnosis will be at risk for worsening	Hypothetical worsening of condition	Event dependent	Context dependent
	Preparedness for worsening of condition	Cognitive Preparedness	Physician Professional Preparedness
Can guess what some risk factors might be	Can guess what some risk factors may be	Lack of knowledge	Knowledge Barrier
Don't know any studies or research on risk factors	Don't know any studies or research	Lack of knowledge	Knowledge Barrier
Prior mental illness	Prior mental illness	Pre-existing mental condition	Exacerbation of pre-existing condition
Family history of mental illness	Family history of mental illness	Pre-existing family history of mental condition	Exacerbation of pre-existing condition
Prior suicide attempts	Prior suicide attempts	Personal prior experience	Personal Patient Preparedness
Substance abuse could be a risk factor	Substance abuse as an outcome	Pre-existing mental condition	Exacerbation of pre-existing condition
Social isolation	Social isolation	Social Barrier	Communication Barrier
	Depression as	Clinical	Physician Professional

Depression	an outcome	Preparedness	Preparedness
Will go back to the type of event	Type of event	Event dependent	Context dependent
How closely it hit home, family or workplace	How close to home and family	Personal prior experience	Patient Condition
Will vary for everybody involved	Varies	Event dependent	Context dependent
No risk factors and yes risk factors	Uncertainty of risk factors	Lack of Knowledge	Knowledge Barrier
Depending on how they were before	Previous health status	Personal prior experience	Patient Condition
Past experience	Past experience	Personal prior experience	Patient Condition
Family history	Family history	Family history experience	Patient Condition
No risk factors	No risk factors	Personal prior experience	Patient Condition
Past history of post-traumatic stress disorder	Post-traumatic stress disorder as an outcome	Exacerbation of pre-existing mental health condition	Exacerbation of pre-existing condition
Any type of involvement in war, criminal, and stress-related issues that come from senses of loss of control and co-morbidities like anxiety and depression	Previous Involvement	Personal prior experience	Patient Condition
Whole list of things to keep an eye out for	Awareness	Physician awareness	Physician Professional Preparedness
Counseling is our		Counseling	

only choice	Counseling	Treatment	Therapy
Depression and anxiety after an attack	Depression and anxiety as an outcome	Clinical Preparedness	Physician Professional Preparedness
Acute intervention is very important	Acute intervention	Acute Treatment	Treatment
Don't know exactly	Don't know	Lack of Knowledge	Knowledge barrier
Bound to be some preventive stuff	Some prevention	Prevention	Therapy
I don't know what those approaches would be	Don't know	Lack of Knowledge	Knowledge barrier
Something that would diminish the impact and future problems	Some approach to diminish impact and future problems	Lack of Knowledge	Knowledge barrier
Depends on the event	Depends on event	Event dependent	Context dependent
One on one counseling	Counseling	Counseling Treatment	Therapy
Medication adjustment	Medication adjustments	Medication Treatment	Treatment
Group setting	Group counseling	Counseling Treatment	Therapy
Stress debriefers	Debriefers	Counseling Treatment	Therapy
Everybody needs to have whatever he or she needs to deal with it	Needs to cope with situation	Personal experience	Patient Condition
There is no standard	No standard	Lack of Knowledge	Knowledge barrier
Counseling	Counseling	Counseling Treatment	Treatment
Depends on how much understanding you have about the	Understanding of situation	Physician awareness	Physician Professional

situation			Preparedness
One to one counseling	One-to-one counseling	Counseling Treatment	Therapy
Group counseling	Group counseling	Counseling Treatment	Therapy
Access to mental health counseling is extremely important	Mental Healthcare Counseling Access	Mental Healthcare Access	Access Barrier
Discussion with and treatment with their primary care physician	Primary Care physician counseling	Counseling treatment	Therapy
Integration with primary care provider with counseling	Primary care provider counseling	Counseling Treatment	Therapy
Reassurance	Reassurance	Treatment Recommendation	Recommendation
Medication can be important	Medication	Medication Treatment	Treatment
Making contact with the community	Community contact	Social Barrier	Communication Barrier
Open house to talk about it	Advice	Treatment Recommendation	Recommendation
Have a group therapy	Advice	Treatment Recommendation	Recommendation
Patients cannot get transportation	No Transportation	Transportation Barrier	Access Barrier
Difficult to reach them	Cannot Reach	Social Barrier	Communication Barrier
Talk on telephone might work	Maybe Telephone	Social Barrier	Communication Barrier
Sending letters, but some cannot read	Cannot read	Literacy Barrier	Communication Barrier
After 9/11, when they came out to	9/11 Knowledge	Reassurance	Recommendation

talk about it and try to make sure they are knowledgeable about what is happening		Treatment	
Have lots of facts to ease their mind	Advice	Reassurance Treatment	Recommendation
Try to answer their questions	Answer Questions	Reassurance Treatment	Recommendation
In rural areas, lots more isolation	Isolation	Social Barrier	Communication Barrier
In rural areas, lots more barriers to communication	Rural setting	Social Barrier	Communication Barrier
One person communicating to a mass audience is difficult	Difficulty with mass communication	Social Barrier	Communication barrier
Bioterrorism Education	Bioterrorism Education	Cognitive preparedness	Physician Professional Preparedness
Let them know it is a tough time	Advice	Reassurance Treatment	Recommendation
Stress on people and response to that stress can get people mentally out of shape	Stress and health response	Clinical Preparedness	Physician Professional Preparedness
There is help if they need it	Advice	Reassurance Treatment	Recommendation
Nothing wrong with them having responses they do not understand	Advice	Reassurance Treatment	Recommendation
People that we see in the ER would need to look at why the event occurred	Need to look at why event occurred	Cognitive Preparedness	Physician Professional Preparedness

For chest pain, nausea, and headaches; those would have to be looked at	Preparedness for physical health symptoms	Clinical Preparedness	Physician Professional Preparedness
Just don't know where that is coming from	Don't know	Lack of Knowledge	Knowledge Barrier
Rely heavily on family practices in the area	Reliance on Medical Family Practices	Resource Preparedness	Physician Professional Preparedness
An initial screen	Screening	Cognitive Preparedness	Physician Professional Preparedness
May not be sleeping well	Preparedness for physical health symptoms	Clinical Preparedness	Physician Professional Preparedness
See more domestic violence due to the event	Preparedness for physical health symptoms	Clinical Preparedness	Physician Professional Preparedness
See more accidents due to the event	Preparedness for physical health symptoms	Clinical Preparedness	Physician Professional Preparedness
Preparedness has to be put on the forefront	Importance of Preparedness	Cognitive Preparedness	Physician Professional Preparedness
Have to have a Screening question	Screening	Cognitive Preparedness	Physician Professional Preparedness
Think majority of people would look at a list of differentials	Evaluation of list of differentials	Cognitive Preparedness	Physician Professional Preparedness
Have to look at blood sugar, blood pressure, anxiety, and depression	Evaluation of physical symptoms	Clinical Preparedness	Physician Professional Preparedness
Will worsen all of the symptoms	Preparedness for all symptoms	Cognitive preparedness	Physician Professional Preparedness

Stress is not healthy for the body	Physical Health Symptoms	Clinical Preparedness	Physician Professional Preparedness
Psychiatrists and psychologists need to be available for referral	Availability of healthcare specialists	Resource Preparedness	Physician Professional Preparedness
Depends on what kind of bioterrorism attack	Depends of kind of bioterrorism	Event dependent	Context dependent
Reassurance	Reassurance Therapy	Reassurance Treatment	Recommendation
Tell them the facts	Tell them the facts	Reassurance Treatment	Therapy
Psychological Approach rather than physical or medical	Reassurance Therapy	Reassurance Treatment	Therapy
Have a fear of dying	Fear of dying	Fear of Uncertainty	Perception of Morbidity and Mortality
First identify that it is an issue by educating providers and staff	Education of providers	Cognitive Preparedness	Physician Professional Preparedness
Rearranging schedules of mental health counselors	Availability of healthcare specialists	Resource Preparedness	Physician Professional Preparedness
Increase awareness	Increase Awareness	Physician Awareness	Physician Professional Preparedness
Increase availability	Availability of healthcare specialists	Resource Preparedness	Physician Professional Preparedness
After hours and extended hours	Availability of healthcare specialists	Resource Preparedness	Physician Professional Preparedness
If we need more	Resource dependent	Resource	Physician

intensive care, we would include the hospital as well		Preparedness	Professional Preparedness
After 9/11, ask how are you doing	How is patient doing.	Physician Awareness	Physician Professional Preparedness
Validate the fact that they could feel bad about that	Validate feelings	Reassurance Treatment	Therapy
Could talk to me and discuss with me how they were doing	Discussion of how patient is doing	Reassurance Treatment	Therapy
try to put it in that context feelings you know could be having some kind of exacerbation would be like	Validate feelings	Reassurance Treatment	Therapy
Ask about symptoms	Ask about symptoms	Clinical Preparedness	Physician Professional Preparedness
Education regarding bioterrorism	Bioterrorism education	Cognitive Preparedness	Physician Professional Preparedness
Have monthly provider meetings	Monthly Providers meetings	Cognitive Preparedness	Physician Professional Preparedness
Get updates from the Department of Health	Educational Updates from DOH	Cognitive Preparedness	Physician Professional Preparedness
Vaccinate against smallpox	Smallpox vaccination	Cognitive preparedness	Physician Professional Preparedness
Talk about our disaster preparedness	Discuss Disaster Preparedness	Cognitive Preparedness	Physician Professional Preparedness
We plan for	Resource planning	Resource	Physician Professional

resources		Preparedness	Preparedness
Instrumental as far as medication	Medication importance	Medication Treatment	Treatment
Medical staff come in to clinic	Availability of healthcare specialists	Resource Preparedness	Physician Professional Preparedness
Transportation can be a problem	Lack of transportation	Transportation Barrier	Access Barrier
Stigma can be a problem	Stigma associated with mental health	Social Barrier	Communication Barrier
No medical infrastructure	No medical infrastructure	Lack of Resources	Access Barrier
Not enough Money	Lack of money	Financial Barrier	Access Barrier
Barriers in communication	Barriers in Communication	Social Barrier	Communication Barrier
Can't use really big words	Can't use really big words	Literacy Barrier	Communication Barrier
Important for them not to feel like someone is looking down at them	Not looking down at them	Respect Barrier	Communication Barrier
So many blocks to access of care	Blocks to access care	Lack of Access	Access Barrier
Lack of Transportation	Lack of Transportation	Transportation Barrier	Access Barrier
Funding issue	Lack of money	Financial Barrier	Access Barrier
Driving issues	Driving issues	Transportation Barrier	Access Barrier
Reluctant to travel	Reluctance to travel	Transportation Barrier	Access Barrier
Not enough Gas money	Not enough gas money	Financial Barrier	Access Barrier

No medical insurance	No medical insurance	Financial Barrier	Access Barrier
Transportation problems	Transportation problems	Transportation Barrier	Access Barrier
Cost of gas	Gas money	Financial Barrier	Access Barrier
Only have one vehicle, no way to get here.	Only have one vehicle, no way to get here.	Transportation Barrier	Access Barrier
Fixed incomes	Fixed Incomes	Financial Barrier	Access Barrier
Cars older and less efficient	Cars older and less efficient	Transportation Barrier	Access Barrier
Finance difficulty	Finance difficulty	Financial Barrier	Access Barrier
Harder time affording medicine	Harder time affording medicine	Financial Barrier	Access Barrier
Costs of medicine	Costs of medicine	Financial Barrier	Access Barrier
Access to specialists causes some problems	Access barrier to healthcare specialists	Lack of Access	Access Barrier
Didn't get to attend the bioterrorism seminar	Didn't get to attend the bioterrorism seminar	Lack of Knowledge	Knowledge Barrier
Several presentations regarding smallpox vaccination	Education regarding smallpox	Cognitive Preparedness	Physician Professional Preparedness
Attended several web meetings for the DOH regarding bioterrorism	DOH Web Educational Meetings	Cognitive Preparedness	Physician Professional Preparedness
Bioterrorism has come up in seminars for medical	Bioterrorism Education seminars	Cognitive Preparedness	Physician Professional

education the past several years			Preparedness
Read medical journals regarding bioterrorism	Read Medical Journals regarding bioterrorism	Cognitive Preparedness	Physician Professional Preparedness
A lot of time and discussions of bioterrorism	Discussions regarding bioterrorism	Cognitive preparedness	Physician Professional Preparedness
What you have to do as a private practitioner	What you have to do as a private practitioner	Cognitive Preparedness	Physician Professional Preparedness
Discussed acute mental health problems in seminar	Mental health education seminars	Cognitive Preparedness	Physician Professional Preparedness
Lots of in-service training opportunities	Training opportunities	Cognitive preparedness	Physician Professional Preparedness
Piles of in-service training opportunities	Training opportunities	Cognitive preparedness	Physician Professional Preparedness
State EMS meetings educate regarding bioterrorism	Bioterrorism Educational meetings	Cognitive Preparedness	Physician Professional Preparedness
Talking about bioterrorism and planning for it	Discussions regarding bioterrorism	Cognitive Preparedness	Physician Professional Preparedness
Met with county emergency management director	County Emergency Management meetings	Cognitive Preparedness	Physician Professional Preparedness
Done some drills	Drills	Simulation Preparedness	Physician Professional Preparedness
Classes regarding Hazmat	Hazmat classes	Cognitive Preparedness	Physician Professional Preparedness
I will get people prepared to handle	Get people prepared to handle the actual	Simulation Preparedness	Physician Professional

the actual event itself	event		Preparedness
Small group discussions	Discussion	Cognitive Preparedness	Physician Professional Preparedness
Lot of asking what if	Asking what if	Cognitive preparedness	Physician Professional Preparedness
How do we handle such and such	How do we handle	Cognitive preparedness	Physician Professional Preparedness
First wave of people will be the mental health people	Perception of Post BT Event Assessment	Cognitive Preparedness	Physician Professional Preparedness
People who truly have exposure to the event will probably remain on scene	Perception of Post BT Event Assessment	Cognitive Preparedness	Physician Professional Preparedness
People who show up at our door, get in their car and drive here we will absolutely know that they have had exposure	Perception of Post BT Event Assessment	Cognitive Preparedness	Physician Professional Preparedness
Physician Continuing education program was done regarding bioterrorism	Continuing education regarding bioterrorism	Cognitive Preparedness	Physician Professional Preparedness
Discussed smallpox and anthrax	Smallpox and Anthrax discussion	Cognitive Preparedness	Physician Professional Preparedness
Yes, there are opportunities to learn about bioterrorist agents, but have not taken advantage of them	Learning Opportunities regarding bioterrorist agents	Cognitive Preparedness	Physician Professional Preparedness
	Not taken advantage of learning	Lack of Knowledge	Knowledge Barrier

	opportunities regarding BT agents		
Some aspect of mental health education discussed	Mental Health Education focus	Cognitive Preparedness	Physician Professional Preparedness
It is important to discuss bioterrorism	BT discussion importance	Cognitive preparedness	Physician Professional Preparedness
Bioterrorist acts may happen and can happen	BT acts happen	Expectation preparedness	Physician Professional Preparedness
We are prepared	We are prepared	Expectation Preparedness	Physician Professional Preparedness
Would expect ER people would be a 9 out of 10 prepared	ER preparedness	Simulation preparedness	Physician Professional Preparedness
ER nurses a 9 or a 10	ER provider preparedness	Simulation preparedness	Physician Professional Preparedness
ER nurses may need to do stuff in the office with coordination of patients	ER provider preparedness	Simulation preparedness	Physician Professional Preparedness
Yes, providers need a level of awareness	Provider awareness	Physician awareness	Physician Professional Preparedness
Probably will not be first to treat a known event	Perception of Post BT Event Assessment	Cognitive Preparedness	Physician Professional Preparedness
It is important for doctors to know what information and answers to give	Knowledge to provide	Cognitive preparedness	Physician Professional Preparedness
Physicians need to be consistent with	Physician need to provide consistent	Cognitive preparedness	Physician Professional

their information	information		Preparedness
Certainly there is a place for bioterrorism training	BT training	Simulation Preparedness	Physician Professional Preparedness
Was lower in the priority list before 9/11	Post 9/11 priority	Physician awareness	Physician Professional Preparedness
Do we see Anthrax everyday, no, but it does come up.	Anthrax occurs	Expectation preparedness	Physician Professional Preparedness
Never seen a case of smallpox, but we know what it looks like	Smallpox symptoms	Clinical Preparedness	Physician Professional Preparedness
We are all aware of smallpox	Smallpox awareness	Physician awareness	Physician Professional Preparedness
Updates from the Department of Health to the providers	DOH updates	Cognitive preparedness	Physician Professional Preparedness
Recognizing trends in medical symptom patterns is talked about	Recognition of medical symptom trends	Clinical Preparedness	Physician Professional Preparedness

APPENDIX C
DOCTOR WILLIAMS INTERVIEW TRANSCRIPT

Interviewer 1: If you could start by telling me about your position at this clinic?

Respondent: I'm a family physician and I work there one day per week and have been there for 12 years, I guess. Although we're a family practice, we have a fairly narrow rank of patients, older for the most part, males and females, but a broad range of problems.

Interviewer 1: What is your estimate of your active patient load?

Respondent: Probably average about 15 or so per day.

Interviewer 1: So, now we're going to talk a little about the kinds of mental health problems that you might encounter in patients after a terrorist attack, such as the attacks on the World Trade Center, or perhaps a disease outbreak of an agent such as anthrax. What types of mental disorders do you think you'd be likely to see in patients following such an event?

Respondent: If it was in our area?

Interviewer 2: If it were directed here or they happened to be caught in the area where it happened.

Respondent: Well PTSD definitely. Anxiety and substance use would probably flare more. Depression, I think maybe later especially if people they knew were directly affected. And, it would throw extra fuel on the fire for people who had chronic health problems, like schizophrenia or bipolar.

Interviewer 1: What do you think are the best treatment options for people who develop mental disorders following a rural bioterrorist attack?

Respondent: I know acute intervention is very important. I don't know exactly what they do with those, but after Hurricane Andrew, it was real important to have acute mental health services available. And, there is bound to be some preventative stuff that can be done then. I don't know what it is, but I bet someone has a darn good idea. And, I would try to put that in, and if they weren't, we'd try to look at what can be done along those lines. I'm sure something can be done that would diminish the impact and diminish future problems, but I don't know what those approaches would be.

Interviewer 1: Are you aware of any risk factors of developing a mental health disorder following a mental health attack?

Respondent: I can guess what some might be, but I don't know any studies or research on that.

Interviewer 1: What steps do you think could be taken to help people immediately after the event, such as people who have had those risk factors?

Respondent: I guess education. Just to let them know it is a tough time and it is a stress on people and the response to that stress on people may cause them to get mentally out-of-shape and there's help if they need it. And there's nothing wrong with them if they're having responses they don't understand and that there's ways to help it.

I: What barriers can get in the way of people accessing mental healthcare following a bioterrorist attack?

Respondent: I think there'd be a lot more local stuff. Someone would set up some local things probably. Again, we'd be dependant on state action or federal relief. That would probably change. We'd probably all become more knowledgeable. We'd do a better job. They might be more reluctant to travel, after something like that. But, most of them can't get much more reluctant. Other barrier, gas money is a big problem for older people. Gas money to get to other places is a big, big problem. Actually gas money is usually a problem for young people, who are borderline poverty, and either just the husband is working, or the husband and wife are working, the family is large, and they have no medical insurance. They just don't have whatever it is, \$10 or \$15 once a week or twice a week to drive back and forth, and so it's a significant barrier for a number of people.

Interviewer 1: How would a bioterrorist attack change how you might monitor a patient's mental healthcare? Say in the weeks or months following.

Respondent: Ask about it much more.

Interviewer 1: So now I'm going to ask you about some kinds of physical health problems that you might encounter in patients following a terrorist attack or bioterrorist attack. What types of conditions do you think you'd be likely to see in patients following those kinds of events?

Respondent: Well, it depends totally on what the agent is.

Interviewer 1: What about if there was smallpox?

Respondent: Smallpox-type rash.

I: What about anthrax?

Respondent: Certain kinds of skin lesions that are typical. I'm drawing a blank, what else?

Interviewer 1: Nerve agent?

Respondent: Again, I don't know the findings that well, but I would think paralysis, alterations in consciousness in groups of people.

Interviewer 1: What do you think are the best treatment options for people who develop those kinds of conditions following a bioterrorist attack?

Respondent: Whatever experts recommend. I'd have to look up and see what they'd say: which symptoms merit what treatment and who to monitor.

Interviewer 1: Are you aware of any risk factors for developing these kinds of medical problems after a bioterrorist attack?

Respondent: Well, I would think for biological, obviously impaired immune status, so anything that does that and old age being a big one, and multiple chronic diseases being another one, and certain medications.

Interviewer 1: What steps do you think could be taken to help such patients immediately after those kinds of events?

Respondent: There'd definitely decontamination stuff, HAZMAT time. I don't know what to do for any of that.

Interviewer 1: What kinds of things can get in the way of accessing medical care for people served here? You mentioned distance, but are there other things, say for people with chronic conditions?

Respondent: I think finances become bigger, because they're willing to do it, but they may have a harder time affording it. Taking the costs of medicine becomes a problem. That is a problem with psychiatric medicines, too, but it's a bigger problem with physical ones. Easy access to specialists causes some problem there, but it's not nearly as big as the other.

Interviewer 1: How do you think these barriers might change following a terrorist attack?

Respondent: I doubt they'd change much.

Interviewer 1: How would you monitor patient's medical care in the months or weeks following a terrorist attack?

Respondent: Well, you'd have a whole new list of things to keep an eye out for.

APPENDIX D
DOCTOR SMITH INTERVIEW TRANSCRIPT

Interviewer 1: If you could describe your position here.

Respondent: My position is I am the medical executive director of the Health Department. Having that title, what I do here ninety percent of the time is see patients. About ten percent of the time I do administrative stuff.

Interviewer 1: What types of mental disorders do you think you would likely see in patients following such events?

Respondent: Well, I gained practice here in June 2001. So, it was after that, that we had 9/11. I saw a lot of anxiety. I saw people who were stable on medication for anxiety and depression coming in with exacerbations of illness. A lot of people had someone affected on that day or knew someone that was affected on that day or subsequently had somebody in the military. There was a family member whose career was affected by that day. I saw people who were diagnosed previously having an exacerbation and I also had some new patients coming and people complaining of insomnia, cannot sleep, very nervous thinking that the world is going to end. I saw those kinds of things. Mostly anxiety and depression were the two things that I saw the most.

Interviewer 2: How much of an increase do you think that you saw from what you usually see?

Respondent: It's strictly going to be like a gut level. I think off the cuff, I would guess probably a ten to twenty percent increase, very rough.

Interviewer 1: Are you aware of any risk factors for developing mental illness following these kinds of events?

Respondent: I think that there are risk factors. I can't quote an article. The thing that was between my ears any time first of all is anyone who has a pre-existing mental illness. There is no question that an event like that is going to impact on their consciousness and could make things worse. I think also, although, I can't write an article on it, but I think that people who do not have a good support system through communication. People who are more isolated would tend to have more trouble coping with something like that because they are not able to talk about that as much with others and those kinds of things. I was thinking about it and people in rural areas

would have more difficulties with those things. I think it's a little better for some because of the internet and communication, but a lot of my patients don't even have telephones. They just see what is in the papers or may be what they see on the T.V. It is a lot of gloom and doom that makes news and that is upsetting a lot of people.

Interviewer 1: What steps do you think could be taken to help these patients immediately after that kind of event?

Respondent: Well, I can suggest things and I can also see immediate barriers. I can say, well, we can have an open house to talk about it, have a group therapy. My patients cannot get transportation. They have a doctor's appointment two months in advance and then their ride falls through and they cannot make it. Actually reaching them unless some mass transit system is brought in for which it is feasible it is difficult to reach them. Okay, what are the other methods of communication? Talking on the telephone that might work. Sending letters to the ones, but some cannot read and some cannot read well. So that's going to be a problem. The only thing that I tried to do in the time after 9/11 occurred and we have had only a few days after the white powder scare and something like that is when they come out to talk about it to try to make sure that they are knowledgeable about what's happening. And, if they have lots of fact it's going to ease their mind and then we try and answer their questions. How do you do that on a mass level? I don't know how to do that. I don't have a solution for you if you are asking for one. I don't know how to do it. In rural areas there is lots more isolation, lots more barriers to communication. One person communicating to a mass audience is very difficult. It is not one-on-one. It is not real feasible.

Interviewer 1: So, it sounds like there are significant barriers that you mentioned transportation and such. What about stigma in terms of mental health?

Respondent: Well, there is some stigma. There is not so much in this county of the health department. I think, for instance, I worked in other county health departments. In a bigger county, for example, because people are assuming in the bigger county they are assuming you are walking in there and that you have a terrible disease that you probably contracted sexually and that is why you have to go there. This health department has an advantage over that because it is rural and out of the way. For many years, there was little to no medical infrastructure in this county. It was seen as a clinic or as a place you go for sore throats and for rashes and not just for sexually transmitted diseases for HIV and AIDS care. So, I don't think there is a big stigma walking through the door here. As far as receiving mental healthcare, no one knows when you are walking in what you are going to get. I don't think that there is a huge barrier, but it would

be in other counties. If I was sitting in a different county and you were asking me that question I would talk a bit more about the stigma because there is a little stigma in other counties.

Interviewer 1: Are there any other barriers besides those that you mentioned to people receiving care for mental health?

Respondent: We covered money; we covered transportation, some of the barriers in communication. I am not a mental health professional trained to do this, but you can't use really big words sometimes. I have had some complaints from patients about them not getting it, but not many. Most people get with the program and kind of get through it better. It is real important for them not to feel like someone is looking down at them and any good therapist should be able to pick up on them. I don't think it is big barrier out here. But off the top of my head, no I cannot think of anything else.

Interviewer 1: How do you think a bio-terrorist attack or other public health emergency would change how you monitor patient's mental healthcare in the weeks or months following such an event?

Respondent: Well, the big difference that I see is having a kind of active monitoring system or something like that. I don't have one. What I did do when things occurred back in 9/11 and in anthrax and in all that, the people who were coming in, I am asking how are you doing? There are a lot of things going on right now. I would try to, let me see the right word, I guess validate the fact that they could feel bad about that. They could talk to me and discuss with me how they were doing. I would try to put it in that context of the feelings that they could be having. It could be some kind of exacerbation of illness and what it would be like under those conditions.

Interviewer 1: Have you had any sort of staff education or in-services about bioterrorism or other public health emergencies?

Respondent: I know it seems to me [someone in the office staff] could tell you the answer to this. I know that at one point, although I didn't get to attend, there was a presentation here. I did not see it myself. I think that may have happened and may have been specifically about bioterrorism in general. So, if I had to give something on bioterrorism that we were involved with – the smallpox vaccination campaign. We had to make a presentation to the community, to the police, and to the emergency operations center. We had to do several of those. I attended some of their web meetings for the Department of Health put on regarding smallpox and bioterrorism. It has come up in seminars that I have been to for medical education in the last couple years. Things like that. As far as right here,

something I know of other than the Internet and satellite based stuff, I think they may have done one presentation, but I did not see it.

Interviewer 2: Just a quick follow up, have there been any discussions about chemical attacks or chemical weapons or a tanker spill or something?

Respondent: In this county, they got going on a kind of HAZMAT type of squad that works. They have some suits. We got some of that funding that came down after 9/11 for the biological the class A stuff. Yes, there has been some discussion. They have had a couple of exercises with hazmat teams on how to handle those things. We don't have anything here except the personal protection pack.

APPENDIX E
DOCTOR DAVIS INTERVIEW TRANSCRIPT

Interviewer 1: Could you fill me in on your role and activities?

Respondent: I am the emergency room director. I am also in charge of medical direction for four counties.

Interviewer 1: What is the size of your active patient load?

Respondent: It is hard to say because I work a lot with rescue and pre-hospital stuff. So, my shifts in the E.R. are limited to four or five a month.

Interviewer 1: What types of mental disorders do you think you would see in patients following a terrorist attack, like the attack on the World Trade Center or a disease outbreak?

Respondent: I think that you would see the anxious people. The people that think they are infected. The person who is sneezing and knows it is Anthrax instead of the flu. Those that have a stomach virus and think it is botulism or salmonella poisoning. You will see depression. It depends on how big the event is and how many people are involved. I imagine that some of the schizophrenics, some of the people that have psychosis, will probably need a little bit of understanding and help in dealing also.

Interviewer 1: Do you have any ideas on how you would deal with it in the E.R., this influx of people who think they are infected?

Respondent: I would imagine that we would get public health involved in some way. It depends on the size of the event and the type of the event. We would need counselors and places that we could put people. For an acute event where we were overrun, my guess is we would rely on some of the hospitals to offer us support in some way. It depends on the size.

Interviewer 1: How do you think you would identify people with a mental condition versus some kind of direct exposure?

Respondent: It might be tough, but by admission or transfer. If you had a fifty-year-old gentleman that complained of chest pain; it may turn out that he has a mental condition. People will have to be admitted. People with headache or diarrhea will have to be ruled out from physical causes in addition to the mental aspects.

Interviewer 1: What do you think are the best treatment options for people that might develop mental disorders after these kinds of events?

Respondent: Again, it depends on the event. Some of them will need one-on-one counseling. Some of them may need medication adjustment. Some of them will do well in a group setting. You have stress de-briefers, but there is controversy over that being the appropriate treatment. I think that everybody needs to have whatever he or she needs to deal with it. Some people may say that they will handle it themselves. There is no standard on how to react when someone dies. Some families want to be right there when they die. Some family members need a minute. Some people don't want to see them until they get to the funeral home.

Interviewer 1: Are you aware of any risk factors for developing mental disorders following these kinds of events?

Respondent: I know that depression will be. It will go back to the type of event, how closely it hit home, family or workplace. It will vary for everybody involved.

Interviewer 1: Any types of patients or demographic aspects that might increase the risk of developing a mental disorder?

Respondent: I think it depends on people's background.

Interviewer 1: How do you think a bioterrorist event would change how you assess, treat, or monitor people for mental health?

Respondent: If an event occurred, then the people that we see in the E.R., unless we can specifically attach a broken bone, we would need to look at why the event occurred. Chest pain, nausea, and headaches – those would have to be looked at in a different light. You just don't know where that is coming from. We would rely heavily on family practices in the area. An initial screen might be a little suspicious so we refer them back. We see a lot of people that may have work-related injuries. They may not be sleeping well. We would see more domestic violence and more accidents due to the event.

Interviewer 1: Do you see patients now who present with chest pain or shortness of breath and it is just anxiety?

Respondent: Yes. They come to us and we have to do a fair amount of screening. A lot of times, they might just want a general reassurance. But, we have to assume that it is the worst of the things. Someone who comes to the emergency room with chest pain will be treated as if they have underlying

coronary disease or lung disease or GI disease until we can prove otherwise. Unfortunately, a lot of anxiety, depression the minor neuroses are included in that. You will probably see a lot more alcoholics too. A lot more people will drink when they are pressured.

Interviewer 2: Have you been offered or gone to any in-services or other training about bioterrorism?

Respondent: Lots of them.

Interviewer 2: Have you gone to any of them?

Respondent: Piles of them.

Interviewer 2: In terms of these types of in-services or other discussions that you have had about bioterrorism, have you had interactions with family practitioners or others from the community, who aren't necessarily affiliated with the hospital?

Respondent: We have met with the county emergency management director. We have talked with the fire department. Just talking about it and planning. We have done some drills. My position allows me to attend a fair amount of the meetings. The state E.M.S. meetings educate me there. The [local] county puts a fair number of classes on. From a bioterrorism standpoint about mechanics of Hazmat, we have had classes here and there. I will get our people prepared to handle the actual event itself. There are small group discussions. There's a lot of asking what if, how do we handle such and such? The first wave of people that we will see will be the mental health people. The people who truly have an exposure to the event will probably remain on scene. The people that show up at our door will get in their car and drive here and will absolutely know that they have had exposure. A year ago October we had a continuing education program. Mr. D. was here from [the neighboring county]. We did a physician continuing education day. A lot of it was for the required stuff for licensing. Mr. D touched on a fair amount of the bioterrorism stuff. We were talking about smallpox and anthrax, and he covered them. We had ninety-five physicians out there. So we hit it all.

Interviewer 2: Are there any particular barriers to accessing care that your patients confront either the E.R. or the clinic?

Respondent: I hope not. Insurance status is not –we take everything. We pride ourselves on having good access.

Interviewer 2: What about being able to get medications for patients? Are there any particular barriers for getting medications for patients without insurance?

Respondent: Not really. I'm sure we try to get them samples. Some things you can't get in samples. Until it goes into generic, you can't get them. The majority of them you can get. In the emergency room, we may prescribe something. But, we give them a limited supply and an order to see someone else. You can go to the health department. There is a relationship between them and Eckerd's to get medications at a reduced rate.

Interviewer 2: How important do you think it is for healthcare providers to receive training about bio-terrorism or public health emergencies relative to other things they have to deal with (scale of 1-10)?

Respondent: I am a gray person. I would expect that our E.R. people would be a nine. Certainly our family practice stuff would be a three. Do I ask some of them to come and help with triage in an emergency if we are overwhelmed? That would be probably a five or six for him. Do I expect the surgeon to know? That is probably a two or three for him. It's not what he deals with. The E.R. nurses will be a nine or ten. The nurses on the floor will be a three to a four. They may need to do stuff in the office with coordination of patients. She can place things together better than me. People upstairs may not see what we are seeing. If there are four, one of them might pick up on it. Yes, they need a level of awareness, but are they going to treat it initially, probably not, especially with a known event.

FOOTNOTE:

Interviewer 2: Just one quick comment. At the end, I asked if the participant is from the local community. He lives in the area.

APPENDIX F
DOCTOR JONES INTERVIEW TRANSCRIPT

Interviewer 1: What is your position here?

Respondent: Medical director.

Interviewer 1: You also are involved in direct patient care?

Respondent: Yes.

Interviewer 1: About how many patients would you see in a week?

Respondent: We average from eighteen to nineteen a day in the summer and twenty-two to twenty-three a day in the winter.

Interviewer 1: How many would you personally see in a week?

Respondent: About one hundred to one hundred and ten. Our biggest barrier to specialized care is being able to get people in. Any specialty care-insurance is a hurdle. We get things back from Hospital X saying that they do not have the capacity to take care of them in a timely fashion. That is understandable because they are the referral center for everywhere. You get letters from Medicaid saying that they will not serve certain counties. If you are on Medicaid, you need to move to this county because you won't get specialty care in this county. We have some providers, but it is a stumbling block.

Interviewer 1: What kinds of things do you think you would be likely to see in patients after bioterrorist events?

Respondent: You will have an exacerbation of most peoples' anxieties. Depending on what kind of bioterrorism you are talking about, you might need to deal with post-traumatic stress disorders. It may not be long-term. There will be a component of stress and shock. Going through that type of situation or being in fear will wear on them. If you look, we all noticed that after 9/11. There was an increase in people in the E.R. They came in and asked if there was exposure or whether they could be tested for things.

Interviewer 1: What do you think the best treatment options are for people that develop mental disorders after a bioterrorist attack?

Respondent: I think counseling is our only choice. You will have depression and anxiety after an attack. I would put those under adjustment disorders.

Interviewer 1: Are you aware of any risk factors for developing mental health problems after these kinds of events? Do you think there are certain kinds of patients that are more likely to develop something?

Respondent: If you have anxiety, you will have problems with anxiety. If you have depression, you will have problems with depression. A.D.H.D. will be complicated. All of them will be complicated. I think that the people that already have a diagnosis will be at risk for worsening.

Interviewer 1: You mentioned that barriers can get in the way of accessing healthcare in general. Are there other things that get in the way?

Respondent: Yes, economic barriers and transportation. We are seeing that more with the cost of gas. A lot of families only have one vehicle. If dad is at work, the mom may have the child, but there is no way to get here. For people on fixed incomes we feel it, but it won't stop us from getting to our job or appointment. If you are making substantially less than that, it is a big increase in your budget. A lot of people around here also have cars that are older and less efficient.

Interviewer 1: Do you think that these barriers might change following an event?

Respondent: Yes. It depends on what kind of event we are talking about. If you have a major event, everything becomes more costly. I think that the resources and specialty care supply will go down.

Interviewer 1: What do you think could be done to get rid of some of these barriers?

Respondent: If you look at [another county], they are looking at a transportation service. I think that you will begin to see certain organizations provide services for people who do have Medicare/Medicaid and use transportation services. They are relatively affordable. Local and larger government agencies will look at that. There is no mystery to everybody that prevention is less expensive than treatment in the long run. The only problem is that it costs and the government only has so many resources. Do I think there will ever be a day where we will have socialized medicine? I do not think it will happen in the next twenty years. It may, but we will have to be good leaders of the programs we are in charge of. We need to minimize the hurdles.

Interviewer 1: How do you think a bioterrorist attack might change how you monitor patient's mental healthcare?

Respondent: You just have to move it to the front. It has to be on the forefront. You have to have a screening question. I think the majority of people would look at a list of differentials. You have to look at blood sugar, blood pressure, anxiety, and depression. It will worsen all of them. Stress itself is not healthy for the body.

Interviewer 1: What kind of physical health problems do you think you might encounter following a terrorist or bioterrorist attack?

Respondent: It would depend on what the attack entailed. If we are looking at someone running into the fertilizer plant, then you are looking at respiratory problems. If we are crop dusted with Anthrax, you look for respiratory problems. It would depend on the event. Here it is a little harder because we are not as concentrated. You will have all of the symptoms, whether they are real or thought up. If you look at Anthrax, you get a fever, cold, and cough. How many people do we have that have that? For a lot of the airborne stuff, the early symptoms are similar to the common cold. It depends on what it is. Those symptoms will explode. You need a way to triage them and move them on.

Interviewer 2: Are there any different barriers to accessing medical care for infectious diseases?

Respondent: The majority of them will be financial. It depends on if you have a payer. Next will be transportation. Those are the two biggest ones.

Interviewer 2: Have you had any opportunities or in-services to learn about bioterrorist agents?

Respondent: Yes we have had opportunities. But, have we taken advantage of the opportunities? No.

Interviewer 1: How important do you think it is for healthcare providers to receive training for bioterrorism or other public health emergencies?

Respondent: It is important. I would say that relative to the other things, a five or a seven. Some people will ask why not a ten. Bioterrorist acts may happen and can happen, but the everyday realities of dealing with people's problems happen every day. You have so many hurdles to get there that you need to make choices. You need to decide if you are going to train on mental health or the in-services you need. We need and are prepared.

Interviewer 1: We can close out by asking if there is anything else you would like to tell us?

Respondent: The biggest hurdles we face are financial and transportation. They go together. Specialty care is also a hurdle. It is a big hurdle. It is easy for

us to allow bioterrorism to drift back on the priority plate. It is good for people to bring it forward because it can happen. I think we will look at more of a natural disaster or explosion here. Somebody could always do something crazy at one of the high school events. We have done some kinds of discussion with the health departments about the disaster plan. If you could fix those barriers, that would be great.

Footnotes:

Interviewer 2: The physician who we interviewed was the first person to openly express concern about being taped. He indicated that it might impact the way he responded. I do not think that was the case. He seemed pretty open to me.

APPENDIX G
DOCTOR BROWN INTERVIEW TRANSCRIPT

Interviewer 1: What types of mental disorders do you think you would be likely to see following bioterrorist or terrorist attacks?

Respondent: Most of the time when you think of bioterrorism, you think of agents that are physically capable of morbidity and mortality. For instance, conditions affecting skin and mucous membranes, gastrointestinal, and airborne or respiratory kinds of things. It can also create hysteria and anxiety. Depending on how it is handled, it can turn an individual into a depressive type with feelings like hopelessness, helplessness, and a what am I to do type of environment. That would be the same as any other type of disaster scenario.

Interviewer 1: How would you manage patients that you suspected might have a mental disorder following these kinds of events?

Respondent: The first is education. We have monthly provider meetings. I do not care if it is anthrax or smallpox. We do vaccinate against smallpox. We get updates from the Department of Health. We talk about our disaster preparedness. We have our own clinical plan that would come into play. We plan for resources.

Interviewer 1: What do you think are the best treatment options for people who develop mental disorders following these kinds of events?

Respondent: The best would be one-to-one and group counseling. Access to mental health counseling is extremely important; dove tailing that with discussion with and treatment by their primary care physician is also very important or integration of their primary care provider with the counseling. Someone or an organization that they trust. The first step is reassurance that this is what is going on and that there are some stable things here. I think that medication can be important. On a larger scale, I remember the bioterrorism in Dallas with those people getting Salmonella poisoning. Also, it has been ten years since the train in Japan and since those people had the gas. It is all different types. 9/11 affected everybody here.

Interviewer 1: What kinds of things can get in the way of accessing healthcare for people served at this clinic?

Respondent: There are so many blocks to access of care. Transportation is certainly one. Funding is a big one.

Interviewer 1: Are you aware of any risk factors for developing mental health problems following a bioterrorism or terrorism event?

Respondent: No, I think using some common sense that past history of post-traumatic stress disorder or any type of involvement in war, criminal, and stress-related issues that come from senses of loss of control and co-morbidities, like anxiety and depression.

Interviewer 1: How do you think a bioterrorist attack change how you would monitor patient's mental healthcare in the weeks or months following the event?

Respondent: We would first identify that it is an issue by educating providers and the staff. That would be number one. Then, rearranging schedules for our mental health counselors that are in the community and the three centers by making them more available, increasing awareness, preparing for different schedules, after hours, and extended hours. We are lucky to have a pharmacy here. And because of the association with the other healthcare providers in the area, if we needed more intensive care we would include the hospital as well. The communication between us and [other clinics] would also be involved.

Interviewer 2: How important do you think it is for healthcare providers to receive training about bioterrorism or health emergencies relative about other things they may get educated or trained about?

Respondent: I think that it is certainly a place for it. We all recognize that. It was lower in the list before 9/11. It is the world in which we live in. I think that we all recognize that. Do we see Anthrax everyday? No, but it does come up. I have never seen a case of smallpox. But, nonetheless we know what it looks like. Is it something that we have studied? No, but, we are all aware of it. The way that we present the updates from the department of health to the providers probably goes in one ear and out the other. But, I think that enough is retained. Recognizing trends in patterns is talked about.

Interviewer 1: Is there anything else that you think we should talk about that we have not had a chance to bring up today?

Respondent: No.

APPENDIX H
DOCTOR PHILLIPS INTERVIEW TRANSCRIPT

Interviewer 1: If we could just ask a few questions about your position here. What is your position here and what kinds of activities are you involved in?

Respondent: I am a senior physician. I am mainly a clinical doctor. I do pediatrics here. I see patients; really hands on treating them. I treat them five days a week.

Interviewer 1: How would you estimate the size of your active patient load right now?

Respondent: I can give you a ballpark. If you base it on the number of patients a day, it depends on the season. But maybe, I would say twenty, at least twenty a day.

Interviewer 1: What types of mental disorders do you think you would be likely to see in your patients following such an event that is bioterrorism?

Respondent: Panic attack, anxiety disorders, and generalized anxiety.

Interviewer 1: What do you think are the best treatment options for children who develop mental problems after these kinds of events?

Respondent: Counseling on a long-term basis. It depends on how much understanding you have about the situation.

Interviewer 1: Are you aware of any risk factors for developing mental health problems after these kinds of events?

Respondent: No, and yes, depending on how they were before. There are a lot of situations in life and how they react to that one. Past experience can tell me if it's going to be a bad reaction again this time. Family history is important also. Some teenagers, especially, they mimic what the parent does. If it runs in the family, there is a high probability that the children will have similar symptoms.

Interviewer 1: How do you think a bioterrorist attack might change how you monitor patients' mental healthcare in the weeks or months following the event?

Respondent: How do I think it would affect me?

Interviewer 1: How would it change how you would monitor patients' mental healthcare?

Interviewer 2: Would you do anything different perhaps?

Respondent: Yes. It depends on what kind of bioterrorism attack is there. A lot of it will be reassurance,

Interviewer 1: So, you would be more inclined to use some kinds of psychological education or reassurance?

Respondent: Psychological and medical, in terms of these are the kinds of things to look for. A lot of them will have a fear of dying.

Interviewer 1: What type of medical conditions would you be on the lookout for following these kinds of events?

Respondent: It depends on the kind of event. If it were a respiratory event, we would look for respiratory symptoms, so it is dependent.

Interviewer 1: What about with smallpox?

Respondent: We would look for a rash and a fever.

Interviewer 1: Have you had any opportunities to learn about bioterrorism? Have you had in-services and training?

Respondent: Yes.

Interviewer 1: Have you done any reading on your own?

Respondent: Yes, the journals, the medical journals. A lot of time reading them, depending on what the situation or crisis is. They will have issues or discussions about them. It is not coming from the public health point of view. It is coming from the American Academy of Pediatrics, what you have to do as a private practitioner. It is more on that aspect rather than on the public health point of view.

Interviewer 1: Do you think it is important for healthcare providers to receive training for bioterrorism or public health?

Respondent: Yes, as the public gets information, if they want information, I am sure they will be directed to the health department. It is important for our people to know what information and answers to give. They need to be consistent in information.

Interviewer 1: Is there anything else that you would like to tell us about physical, mental health conditions in relation to bioterrorism?

Respondent: I am just curious what will this research end up producing. They are cutting down the existing resources. The doctors are so overwhelmed. The number of cases has increased, but the number of providers has not.

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BIOGRAPHICAL SKETCH

As a health services researcher engaging in a constructivist study of rural physicians and healthcare providers' perceptions of emergency preparedness and the barriers to preparedness, I have personal experiences as a physician and at times in rural settings. I am a native Floridian, who returned to the state of Florida four years ago. In addition to residing in the state where the primary data have been collected, I have practiced medicine in the state, albeit not in an area that would be classified as rural.

Prior to beginning the doctoral program at the University of Florida several years ago in the Department of Health Services Research, Management and Policy, I practiced primary care medicine and have been a healthcare consultant. In those roles, I have been responsible for coordinated acute and chronic patient care involving general internal and family medicine, and emergency medicine in the hospital, nursing homes, and outpatient settings. I also have experience in creating and instituting disease protocols in chronic disease management and conducting other healthcare consulting research serving as a medical editor for an alternative and complementary medicine firm.

In addition to clinical experience as a physician and as a healthcare consultant, while at Harvard University, I was formally educated on disaster management through didactic courses and seminars. While at Harvard, I created with the assistance of another physician colleague a public health/bioterrorism website on Nuclear Disaster Management entitled "Chernobyl: Anatomy of a Disaster." Recently, as an adjunct faculty member at the University of Central Florida, I created and currently instruct a

course entitled “Health Issues in Disaster Preparedness.” This course focuses on disaster preparedness and the related mental and physical health issues for natural catastrophic events—such as hurricanes and earthquakes—as well as human-caused disasters—such as bioterrorism.

Beyond professional activities, I have personal life experiences that are noteworthy and related to disasters. I, unfortunately, lost a colleague and more importantly a dear friend with whom I worked at the United States Department of Health and Human Services. He was present on one of the airplanes that departed from Washington, D.C., on the morning of September 11, 2001, and was subsequently hijacked and crashed.