

**AN ASSESSMENT FOR THE NEED OF A BIOTERRORISM PREPAREDNESS PLAN
AT HOSPITAL XYZ IN MINNESOTA.**

By

Cindy A. Diadoo

A Research Paper

Submitted in Partial Fulfillment of the
Requirements for the
Master of Science Degree
with a Major in

Risk Control

Approved: 3 Semester Credits

Brian Finder
Research Advisor

The Graduate College
University of Wisconsin - Stout
December 1999

**The Graduate College
University of Wisconsin - Stout
Menomonie, WI 54751**

ABSTRACT

Diadoo	Cindy	A.	
(Writer) (Last Name)	(First)	(Initial)	
An Assessment for the Need of a Bioterrorist Emergency Preparedness Plan at Hospital XYZ in Minnesota.			
(Title)			
Risk Control	Brian Finder	12/99	51
(Graduate Major)	(Research Advisor)	(Month/Year)	(No. of Pages)
Publication Manual of the American Psychological Association			
(Name of Style Manual Used in this Study)			

Bioterrorism is the use of microorganisms (bacteria, virus, and fungi) or toxins to produce death or disease in humans, animals, and plants. Biological agents have been used in warfare for over 2,500 years and continue to be a threat to humans. The ease and low cost of producing an agent, the difficulty in detecting its presence and protecting (and treating) its intended victims, and the potential to selectively target humans make defense against this class of weapon difficult. Common examples of biological agents include Smallpox, Plague, Anthrax and Botulism.

The purpose of this study was to identify risk factors at Hospital XYZ, which may pose threat to health care employees due to bioterrorism. This study examines exposures of risk and what is currently being done at Hospital XYZ to prevent and/or reduce exposures to risk.

Businesses today must be concerned with insurance stipulations, media attention, public pressure, employee health and safety, liability, and government regulations. Health care employees are depended upon to care for patients, allocate “limited” medical resources, and bring order to a disconcerted environment. Unfortunately, there is a lack of education and training among the health care employees for bioterrorism response.

Hospital XYZ is aware of the potential threat of bioterrorism to the facility but believes the need for preparedness is not as critical compared to other issues more likely to occur. Emergencies can and do occur, and when they do, our natural instinct is to protect ourselves, others, and property. The only effective and logical way to do this is to prepare in advance for events. Currently, the hospital has emergency plans for weather, medical, child abduction, bomb, and internal and external disasters. Unfortunately, there is no established bioterrorist emergency preparedness plan at the facility. Therefore, due to the size, location of the facility, and the lack of emergency preparedness, the employees are posed to the potential threat from bioterrorism. Recommendations are made to be used as a guide for the development of a bioterrorist emergency preparedness plan at Hospital XYZ to reduce risk to employees.

ACKNOWLEDGEMENTS

I would like to thank my research advisor, Brian Finder, Assistant Professor in Risk Control, for his encouraging support, guidance, and patience. In addition, I would like to thank the employees at all the facilities, who provided support and information needed to complete this study. To the graduate students who took time out of their busy schedules to also provide guidance. Finally, to the special people in my life, I extend my deepest gratitude for your encouragement and support as I completed this research study.

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CHAPTER 1

Statement of the Problem

Introduction

Emergency departments always seem busier during a full moon despite evidence to the contrary. Tonight was no exception. Over a six hour period, it seemed that almost half of the patients presented had similar complaints of high fever, cough, shortness of breath, and generalized ill feeling. Five young, previously healthy individuals required incubation and mechanical ventilation for severe respiratory distress. Strangely, most of the patients knew each other from work. The only other community hospital in the area went on diversion because all of their intensive care unit (ICU) beds were full and need for mechanical ventilators was at a critical level. The public officer on call was not aware of any recent infectious outbreak from a biologic agent (U.S. Army Medical Research Institute of Infectious Diseases Course, 1999, p. 4). The above scenario reflects a likely event for a covert biological attack on the U.S. in a medical facility. Biological agents have been used in warfare for over 2,500 years and continue to be a threat to humans. Due to the physical and psychological effects of an attack on humans, the most likely place victims will be taken after an incident are hospitals and clinics for medical attention (U.S. Army Medical Research Institute of Infectious Diseases Course, 1999).

Biologic agents occur naturally in the environment, but many have been refined and could be made more resistant to controls in laboratories. Microorganisms (bacteria, viruses, and fungi) or toxins from living organisms have been used by terrorist groups to produce death or disease in humans, animals, and plants. Consequently, the use of these microorganisms or toxins in this manner constitutes a biological weapon. (U.S. Army

Medical Research Institute of Infectious Diseases Course, 1999). The ease and low cost of producing an agent, the difficulty in detecting its presence and protecting (and treating) its intended victims, and the potential to selectively target humans, make defense against this class of weapon difficult (U.S. Army Medical Research Institute of Infectious Diseases, 1996).

Common examples of biological agents include Anthrax Botulism, Plague and Smallpox (APIC, 1999).

Whether an incident of a biologic attack is intentional or natural, the risks to humans remain. On April 1995, a hospital laboratory worker from Zaire developed an acute onset of fever and bloody diarrhea. In April 14, other hospital employees began developing similar symptoms. By May 17, ninety-three suspected cases of Viral Hemorrhagic Fever (Ebola) were reported, ninety-two percent were fatal. Due to the limited data on bioterrorist attacks available to the public, the Viral Hemorrhagic Fever (Ebola) case study serves as an example of how an emerging disease may be similar to a biological attack. Biological weapons are unique in their ability to inflict large numbers of casualties over a wide area due to the ease of being ingested or inhaled in minute quantities (U.S. Army Medical Research Institute of Infectious Disease Course, 1999). After a terrorist attack, it is probable that all victims will be taken to emergency departments regardless of the institution's level of preparedness (U.S. Army Medical Research Institute of Infectious Disease Course, 1999).

Health care workers are depended upon to alleviate suffering, allocate "limited" medical resources, and bring order to a chaotic environment. Few health care providers have been trained to recognize and treat victims of biological agent attacks (U.S. Army Medical Research Institute of Infectious Disease Course, 1999). In 1996, the "Defense Against Weapons of Mass Destruction Act," more commonly known as the Nunn-Lugar-Domenici legislation, was passed.

This bill recognizes the lack of preparedness of most first responders and provides the necessary funding and authority to train cities to respond safely to acts of terrorism.

Hospital XYZ is a large non-profit hospital and premier health care provider in the mid-western metropolitan area. In 1994 and 1995 it was selected as one of the top 100 acute-care hospitals in the United States. Each department operates under a general emergency plan for fire, bomb, child abduction, medical, tornado, internal (e.g., loss of power) and external disasters (e.g., plane crash). Unfortunately, the facility lacks a specific emergency preparedness related plans for a bioterrorist attack. Therefore, employees at the hospital pose potential risk of illness and/or injury due to bioterrorism. Due to the legal as well as the loss potential with not being prepared to deal with a bioterrorist-related incident, Hospital XYZ must protect its employees from risk by understanding the urgency for the preparation from such an event. This risk needs to be assessed and if required, further controlled for their safety and wellness.

Purpose of the Study

The purpose of the study is to identify risk factors at Hospital XYZ which may impose threat to the employees due to bioterrorism.

Goals of the Study

The objectives of the study include the following:

1. Determine current exposures, which may induce potential risk upon health care employees due to bioterrorism.
2. Identify what is currently being done to prevent and/or reduce possible risk exposures.

Background and Significance

Bioterrorism is distinguished not only by its mode of killing, but also the potential scale of destruction-thousands of times as many people as could be killed by a typical car bomb. The potential has caught the attention of the U.S. government (Taylor, 1996). During the 1991 Persian Gulf War, the threat of biological warfare against American soldiers increased the public awareness of the possibility of a potential biological attack against U.S. cities. The reality of this threat gained credence in 1996 when two high ranking Iraqi military officials revealed that during the war, Iraq had produced and prepared to use 19,000 liters (L) of botulinum toxin and 8,500 L of anthrax (U.S. Army Medical Research Institute of Medical Research, 1996). Both Anthrax and Botulism would eventually cause respiratory failure in exposed humans (APIC, 1999).

Hospital XYZ was selected as one of the top 100 acute-care hospitals in 1994 and 1995 based on a study comparing 4,000 acute-care hospitals in the areas of clinical, operational and financial performance. Major areas of provided services by the facility include birth, cardiac, pulmonary, oncology and behavioral health. It employs 3,300 employees and 1,200 physicians located in a congestive city area. The area contains significant business facilities and a flowing body of water.

For the purpose of preparation for biological terrorism and consideration for a local attack, Hospital XYZ participated in an emergency drill performed in 1998. The preparedness drill concluded that Hospital XYZ is limited in its participation for such an event. The results concluded the following:

- A. They do not have adequate staffing for such an emergency.
- B. Are not set up for decontamination.
- C. Lack proper equipment and funds for proper preparation.

The hospital is aware of the need to prepare for bioterrorism. Currently, the facility has a committee for emergency preparedness. Unfortunately, there is no planning for a bioterrorist attack. Hospital XYZ had a staff member pioneering efforts to prepare the hospital for bioterrorism, but she is no longer an employee of the facility. Therefore, efforts for bioterrorism preparedness have come to a halt. Since Hospital XYZ is a premier health care provider, it is critical to take action for preparation of a bioterrorist attack. This should be done to prevent and/or reduce exposures to risk upon employees.

Limitations

This study is limited to specific deficiencies of Hospital XYZ. Therefore, recommendations may be applicable for only this medical facility.

Assumptions

It is assumed information given by all facilities and organizations are accurate.

Definition of Terms

Anthrax - An acute infectious disease caused by *Bacillus anthracis*, spore forming, gram-positive bacillus.

Assessment - The process of evaluation of the types of risks the employees may be vulnerable to.

Bacteria - Small free-living organisms, of which may be grown on solid or liquid culture media.

Biologic agent - A microorganism (or a toxin derived from it) which causes disease in man, plants, or animals or which causes the deterioration of material.

Biological warfare - The employment of biological agents to produce casualties in man or animals and damage to plants or material.

Biological weapon - An item of material which projects, disperses, or disseminates a biological agent, including anthropod vectors.

Bioterrorism - The use of biological agents by terrorist acts to bring fear and bedlam to human beings.

Botulism - An anaerobic gram-positive bacillus that produces a potent neurotoxin, botulinum toxin.

Decontamination - Physical process of removing harmful substances from skin, clothing, and other areas.

Emergency preparedness - A plan to provide a guide to the response of an immediate disaster/crisis.

Fungi - Primitive plants which do not utilize photosynthesis, are capable of anaerobic growth, and draw nutrition from decaying vegetable matter. Fungal diseases may respond to various antimicrobials.

Infectious outbreak - A sudden rise in incidence of a disease capable of spreading rapidly.

Plague - An acute bacterial disease by the gram-negative bacillus *Yersinia pestis*.

Preparedness Plan - The phase of an emergency plan development that establishes a plan of action, prior to an emergency, through policies and procedures.

Recovery - A shift in the disaster response phase to return a facility back to its normal routine and functional state.

Risk - The variation of outcomes during a certain situation/time and the likelihood of occurrence.

Smallpox - An acute viral illness caused by the variola virus.

Toxin - A poisonous substance produced or derived from living plants, animals, or microorganism.

Terrorist(s) - Person or group which use unlawful force or violence against persons or property to intimidate or coerce a government or civilian population in the furtherance of political or social objectives.

Virus - Organisms which require living cells in which to replicate. They are dependent upon the cells of a host which they infect and produce diseases.

(Definitions were provided by APIC, 1999; FEMA, 1998; and U.S Army Medical Research Institute of Infectious Disease, 1999, 1998 and 1996.)

CHAPTER II

Review of Literature

Introduction

The purpose of this chapter is to analyze and evaluate literature relevant to the risk of bioterrorism exposure to health care employees. The literature review is divided into several categories:

1. Profile of bioterrorism
2. Bioterrorism attack and current threat incidence
3. Identification of bioterrorism exposure risk

Profile of Bioterrorism

Bioterrorism is the use of microorganisms (bacteria, viruses and fungi) or toxins by terrorist groups to produce weapons which cause death and disease among humans. Terrorism is the unlawful use of force or violence against person or property to intimidate or coerce a government or civilian population in the advancement of political or social objectives (U.S. Army Medical Research Institute of Infectious Disease, 1999). Most nations have the capability to make biological weapons. Some 18 nations are believed to have done so, including the former Soviet Union and several nations the State Department lists as supporting terrorism (CDC, 1999).

Producing biological weapons can be inexpensive and inconspicuous (CDC, 1999). A terrorist needs to go no further than his/her nearest Internet connection to download the appropriate "recipe." Ingredients are cheap and easy to obtain. These weapons are difficult to detect (tasteless and odorless) and disseminated via air. A high index of suspicion should be present when a large number of the population has similar

symptoms. Enclosed spaces provide ideal targets, particularly those that draw large crowds such as sporting events. The numbers of terrorist acts worldwide has actually decreased over the last few years, but the lethality acts has increased (U.S. Army Medical Research Institute of Infectious Disease Course, 1999).

History of Bioterrorism

The uses of biological weapons have been recorded numerous times in history. Two of the earliest reported uses occurred in the 6th century BC. In 1346, plague broke out in the Tartar army during its siege of Kaffa (at present day Feodosia in Crimea). The epidemic forced defenders to surrender, and some infected people who left Kaffa may have started the Black Death pandemic which spread through Europe. There is evidence that during World War I, German agents contaminated animals with biologic agents before they were shipped to France. A post World War II investigation revealed that numerous organisms had received Japanese research attention, and experiments were conducted on prisoners of war (U.S. Army Medical Research of Infectious Disease, 1998).

In 1943, the United States began research into the offensive use of biological agents. Almost thirty years later, the United States and many other countries signed the Convention on the Prohibition of the Development, Production and Stockpiling of Bacteriological (biological) and Toxin Weapons and on Their Destruction, (commonly called the Biological Weapons Convention). This treaty prohibits both stockpiling and research into offensive military purposes. However, despite this historic agreement research continues to flourish in many countries hostile to the United States. In 1997, the

Secretary of Defense singled out Libya, Iraq, Iran, and Syria as countries "aggressively seeking" biological weapons (U.S. Army Medical Research of Infectious Disease, 1998).

Types of Biological Agents and Medical Aspects of Threat

Microorganisms such as bacteria, viruses, fungi and toxins are various types of possible bioterrorism agents. Despite the very different characteristics of these microorganisms, biologic agents used as weapons share common characteristics (U.S. Army Medical Research of Infectious Disease, 1998). For example, they can be dispersed in aerosol form to spread and contaminate humans. Taxonomic classification of biological agents is important to the medical services in terms of detection, identification, prophylaxis, and treatment. Biological agents which may be used as weapons can be classified as follows:

Bacteria. Small free-living organisms which may be grown on solid or liquid culture media.

Viruses. Organisms which require living cells in which to replicate. They are dependent upon the cells of a host which they infect and produce diseases.

Rickettsiae. Microorganisms which have characteristics of both bacteria and virus.

Chlamydia. Chlamydia are obligatory intracellular parasites incapable of generating their own energy source.

Fungi. Primitive plants which do not utilize photosynthesis, are capable of anaerobic growth, and draw nutrition from decaying vegetable matter.

Toxins. Poisonous substances produced and delivered from living plants, animals or microorganisms (U.S. Army Medical Research of Infectious Disease, 1998).

Specific Agents

Diseases produced by the offensive use of biological agents can be lethal and/or disabling. It may be entered through different means and contaminate humans. In order to control the exposure, through decontamination or means of treatment, the agents must be specifically identified (U.S. Army Medical Research Institute of Infection Diseases, 1998). The following information provides clinical information to assist in the recognition, diagnosis and management of selected diseases, which are well recognized for their potential as biological weapons. While it is not intended to be comprehensive or should it be interpreted as a sanctioned "threat list." The following are some examples of likely agents provided by U.S. Army Medical Research Institute of Infectious Diseases (1996):

Anthrax. Anthrax is a zoonotic disease caused by *Bacillus anthracis*. Under natural conditions, humans become infected by contact with infected animals or contaminated animal products. Human anthrax is usually manifested by skin lesions. A biological warfare attack with anthrax spores delivered by aerosol would cause inhalation anthrax, an extraordinarily rare form of the naturally occurring disease (U.S. Army Medical Research Institute of Infectious Diseases, 1996, p. 3).

Anthrax disease begins after an incubation period varying from 1-6 days, presumably dependent upon the dose of inhaled organisms. Onset is gradual and nonspecific, with fever, bodily discomfort and fatigue. Often it occurs in association with a nonproductive cough and mild chest discomfort. In some cases, there may be a short period of improvement. The initial symptoms are followed in 2-3 days by the abrupt development of severe respiratory distress. Shock and death usually follow within 24-36 hours of respiratory distress onset (U.S. Army Medical Research Institute of Infectious Diseases, 1996, p. 3).

Botulinum toxins. Botulism is caused by intoxication with the any of the seven distinct neurotoxins produced by the bacillus, *Clostridium Botulinum*. A biological warfare attack with botulinum toxin delivered by aerosol would be expected to cause symptoms similar in most respects to those observed with food-borne botulism (p.5). Symptoms of inhalation botulism may begin as early as 24-36 hours following exposure or as late as several days. Initial signs and symptoms include prolapse of an organ, generalized weakness and dizziness. Sore throat or urinary retention may also occur. Motor symptoms usually are present early in the disease. This is followed by a progressive weakness of the extremities along with weakness of the respiratory muscles. Development of respiratory failure may be abrupt (U.S. Army Medical Research Institute of Infectious Diseases, 1996, p. 5).

Plague. Plague is a zoonotic disease caused by *Yersinia Pestis*. Under natural conditions, humans become infected as a result of contact with rodents, and their fleas. The transmission of the gram-negative coccobacillus (bacterium) is by the bite of the infected flea, *Xenopsylla Cheopis*, the oriental rat flea, or *Pulex Irritans*, the human flea. Under natural conditions, three types of plague are recognized: bubonic, primary septicemic, or pneumonic. In a biological warfare scenario, the plague bacillus could be delivered via contaminated vectors (fleas) causing the bubonic type or, more likely, via aerosol causing the pneumonic type (U.S. Army Medical Research Institute of Infectious Diseases, 1996 p. 13).

In bubonic plague, the incubation period ranges from 2 to 10 days. The onset is acute with bodily discomfort, high fever, and one or more tender lymph nodes. Bubonic plague may progress spontaneously to the septicemic form with organisms spread to the central nervous system, lungs (producing pneumonic disease), and elsewhere. The

mortality is 50 percent in untreated patients with the terminal event being circulatory collapse, hemorrhage, and blood clots. In primary pneumonic plague, the incubation period is 2 to 3 days. In untreated patients, the mortality is 100 percent with the terminal event being respiratory failure, circulatory collapse, and a bleeding diathesis (U.S. Army Medical Research Institute of Infectious Diseases, 1996, p.13).

Smallpox. Smallpox virus, an orthopoxvirus with a narrow host range confined to humans, was an important cause of morbidity and mortality in the developing world until recent times. Eradication of the natural disease was completed in 1977 and the last human cases (laboratory infections) occurred in 1978. The virus exists today in only 2 laboratory repositories in the U.S. and Russia. Appearance of human cases outside the laboratory would signal use of the virus as a biological weapon. Under natural conditions, the virus is transmitted by direct (face-to-face) contact with an infected case, by fomites, and occasionally by aerosols. Smallpox virus is highly stable and retains infectivity for long periods outside of the host. A related virus, monkeypox, clinically resembles smallpox and causes sporadic human disease in West and Central Africa (U.S. Army Medical Research Institute of Infectious Diseases, 1996, p. 6).

The incubation period for smallpox is typically 12 days (range, 10-17 days). The illness begins with a prodrome lasting 2-3 days, with generalized bodily discomfort, fever, headache, and backache. This is followed by loss of body heat and the appearance of a typical skin eruption characterized by progression over 7-10 days of lesions. The case fatality rate is approximately 35% in unvaccinated individuals and permanent joint deformities as well as blindness may follow recovery. Vaccine immunity may prevent or modify illness and fully immune individuals exposed to the virus by the respiratory route

may develop fever, sore throat, and conjunctivitis (contact fever) lasting several days (U.S. Army Medical Research Institute of Infectious Diseases, 1996, p. 7).

Bioterrorism Attack and Current Threat Incidence

Biological agents have been used in warfare for thousands of years and continue to harm humans (U.S. Army Medical Research Institute of Infectious Diseases Courses, 1999). In 1972, an American Fascist group, the “Order of the Rising Sun,” used 30 to 40 kilograms of typhoid to contaminate the Chicago and St. Louis water supplies (U.S. Army Medical Research Institute of Infectious Diseases Course, 1999). After communism in the U.S.S.R collapsed Boris Yeltsin admitted that the anthrax came from an illegal biological weapons plant (Stern, 1998). According to World Health Organization, a city of 500,000 could see as many as 95,000 dead and 125,000 incapacitated in an anthrax attack (Neus, 1998). In 1984, the “Red Army Faction” is alleged to have tried to use botulism toxin in Paris. Two years later, 715 people became ill in Oregon when the Bhagwan Cult poisoned salad bars with salmonella. In 1995, a member of the Aryan Army was arrested for ordering plague from a supply house in Maryland. Two members of the Minnesota Patriots Council were convicted for planning to use ricin in an assassination attempt (U.S. Army Medical Research Institute of Infectious Diseases Course, 1999). In 1998, the FBI investigated 100 terrorist threats, of which more than half involved the use of germs (FBI, 1998). The following is a list by W. Seth Carus of the National Defense University of the attempts at biological terrorism:

- 1) Date/group: April 1997 / Counter Holocaust Lobbyists of Zion

The attack or threat: Sent a petri dish labeled "anthrachs" to Washington B'nai B'rith. The dish was filled with strawberry gelatin.

- 2) Date/group: April 1980-March 1995 / Aum Shinrikyo

The attack or threat: Made at least nine attempts to spread botulinum and anthrax.

- 3) Date/group: Mid-1980s / Tamil secessionist group in Sri Lanka

The attack or threat: Threatened to infect humans and crops with pathogens.

- 4) Date/group: November 1980 / Red Army Faction

The attack or threat: A French revolutionary group that allegedly tried to manufacture botulinum toxin.

- 5) Date/group: June 1976 / "B. A. Fox"

The attack or threat: Threatened to mail tickets infected with pathogens.

- 6) Date/group: November 1970 / Weathermen

The attack or threat: Planned to poison a city's water supply with germ weapons. Planned to steal the germs from Ft. Detrick, Md., allegedly by blackmailing a gay officer into helping them (Carus, 1998).

The threat of a bioterrorism attack exists and touches a lot of people who otherwise have little reason to talk to each other - hospital presidents, FBI agents, firefighters, county health departments and police. These individuals are often needed to provide care to individuals involved in emergencies, such as a bioterrorist attack. Proper preparation must be delegated and pre-established in order to reduce the potential loss an attack might convey. This year the U.S. Department of Health and Human Services will provide \$158 million to help in preparedness (Beil, 1999, p. 1).

Identification of Bioterrorism Exposure Risk Conditions

Health care workers, by the very nature of their work, have hazards in the workplace environment. Many of these hazards are obvious, as diagnosed contaminated blood, while others are difficult to recognize (Charney, 1999). For instance, biological agents can be dispersed in aerosols of particle size one to five micrometers (microns), which may remain suspended for hours and if inhaled will penetrate into distal bronchioles and terminal alveoli of victims causing disease. Other routes include oral, by intentional contamination of food and water and percutaneous (skin). This method of disbursement makes these agents difficult to identify (U.S. Army, 1998). Risk involved is also due to the insidious nature of developed illnesses and the lack of warning of a bioterrorist attack (U.S. Army Medical Research Institute of Infectious Diseases course, 1999). Precise diagnosis of biological agent casualties in a biological environment is difficult. Signs and symptoms of biological agent infection or intoxication are common to many diseases. Biological warfare casualties may coexist with conventional, nuclear and/or chemical warfare casualties. Also, adequate or appropriate laboratory facilities may not be available (U.S. Army, 1998). Therefore, healthcare workers dealing with biological agents present an array of risks. In light of the above issues, healthcare workers dealing with biological agents are most likely at the greatest risk of exposure than any other group in society

Risk from person-to-person spread may exist for individuals not directly involved in patient care. For example, lab technicians may be exposed to materials soiled by patient secretions and excreta, as well as samples for diagnostic laboratory study. Similarly, invasive medical and surgical procedures pose potential risks. For example, patients showing signs of pneumonic plague generally should be considered hazardous, because some are likely to disperse plague bacilli by aerosol through either coughing or sneezing. Although cutaneous transmission of anthrax may result from contact with blood or other body fluids contaminated with vegetative anthrax bacilli, exposure of health care providers to open lesions or blood from anthrax patients does not pose a risk of inhalation

anthrax. Bacilli exposed to air, however, will become spores (after a period of hours). This will pose a subsequent theoretical risk for inhalation anthrax and contaminate victims. On the other hand, vegetative forms of plague bacilli may be dangerous, since, under some circumstances, they are known to cause aerosol infections. Therefore, postmortem examinations of victims of transmissible biological agents should be performed using universal precautions, by wearing personal protective equipment (e.g., gloves, gowns, and masks), with appropriate consideration given to specific respiratory protection (U.S. Army, 1998).

Due to the physical and psychological effects of an attack on humans, the most likely place victims will be taken after a bioterrorist incident are hospitals and clinics for medical attention (U.S. Army Medical Research Institute of Infectious Diseases Course, 1999). Healthcare workers are depended upon to care for the suffering, allocate restrained medical resources, and bring order to a disordered environment. Unfortunately, there is a lack of education and training among health care workers to recognize and treat victims of biological agent attack (U.S. Army Medical Research Institute of Infectious Diseases Course, 1999).

The 1990's have seen an increase in terrorist incidents. Facilities are becoming more aware of the potential of terrorism and have begun developing emergency preparedness plans for prompt response to threats. Several areas noted to contribute to the vulnerability of threat to terrorism include targets of terrorism, environmental factors, and organizational exposures, such as major products available at the facility. Targets (general) of terrorism would be controversial businesses, historic sites, infrastructure system, place of assembly, public buildings, and/or symbolic targets (FEMA, 1998). Examples of environmental factors relevant to assessing vulnerability to terrorism may include the following:

- 1) What size city or town the facility is located in.

- 2) The facility's proximity to nearest school.
- 3) The facility's proximity to nearest residential area.
- 4) The facility's proximity to major transportation routes and/or airport

(Fleming, 1998).

Emergency Preparedness Components

Emergencies can and do occur, and when they do, our natural instinct is to protect ourselves, others, and property. The only effective and logical way to manage emergencies is to prepare in advance for such events. Beyond the obvious are other legitimate, intelligent reasons for developing an emergency preparedness plan within any organization. Businesses today must be concerned with insurance stipulations, media attention, public pressure, employee health and safety, liability, and government regulations (Kelly, 1989). A bioterrorism attack has the potential for mass casualties and a crime scene all in one. There would be a widespread psychological impact, and emergency medical services and hospitals may become overwhelmed. Policies and procedures should be developed, exercised, and followed to ensure a safe and effective emergency response. Realistically, the actions of medical personnel are not influenced by whether the incidence is intentional (terrorist) or accidental. In both cases, appropriate medical intervention will need to be delivered. It is essential that the facility be prepared to deliver this care in a manner that protects the medical worker (U.S. Army Medical Research Institute of Infectious Disease Course, 1999).

Emergency preparedness pertains to all activities that are necessary to prepare people and organizations to respond to emergencies. These activities seek to facilitate the response to save lives and minimize damage to property in the event of an emergency

(Kelly, 1989). As a result of terrorist threats, the United States has made efforts in preparation of a bioterrorist attack. For example, on May 22 and 23, 1999, 500 Twin Cities military, fire, police, and health-care personnel and other emergency responders participated in a disaster exercise. The exercise was part of a nationwide effort, coordinated by the U.S. Justice Department, to help health and safety agencies in 125 major cities prepare for the threat of chemical and biological terrorism. It gave participants a chance to test their disaster plans and resources when placed with a mass casualty incident. More than 200 simulated victims were decontaminated and "treated" at area hospitals (Emerson, 1999). Although there are other areas of emergency preparedness the above exercise reveals a glimpse of an activity, which may be done to prepare for a bioterrorist attack.

A number of reasonable adequate guides were available for the development of an emergency plan in a health care facility, but most do not address the issue of bioterrorist emergency preparedness. The guides evaluated for components of bioterrorism emergency preparedness include those developed by the U.S. Army Medical Research the Institute of Infectious Disease, Infectious Diseases Physicians, Inc., the Association for Professionals in Infection Control and Epidemiology (APIC), and the U.S. Department of Health and Human Services - Office of Emergency Preparedness. Other books and pamphlets were evaluated on emergency response. Although the guides varied slightly in content and organization, numerous components within them show reasonable consistency.

Components for a General Health Care Facility Bioterrorism Readiness Plan

Identification of potential agents. Identification is done for the purpose of assisting in the recognition, diagnosis, and management of selected diseases as potential biological weapons. Anthrax, Botulism, Plague and Smallpox are examples of potential agents, which may be defined through characteristics, classification, dissemination, symptoms and treatments (APIC, 1999).

Detection of outbreaks. Bioterrorism may occur as covert events, in which events occur unknowingly and an outbreak is suspected only upon recognition of unusual disease clusters or symptoms. It might also occur as the result of announced events, in which advance warning is given. A health care facility's Bioterrorism Readiness Plan should include details for management of both types of scenarios (APIC, 1999).

Reporting requirement and contact information. Health care facilities may be the initial site of recognition and response to bioterrorism events. If bioterrorism is suspected the emergency response system should be activated. Notification should immediately include local infection control personnel and health care facility administration, as well as prompt communication with the local and state health departments, FBI, police, Center for Disease Control and Prevention, and Emergency Medical Services. Each facility should have a list of contact information which includes department, person and phone number (APIC, 1999).

Isolation precautions - All patients in the health care facilities, including symptomatic patients with suspected or confirmed bioterrorism-related illnesses, should be managed utilizing universal precautions. These precautions prevent direct contact with all body fluids, secretions, excretions, non-intact skin, and mucous membranes. These practices include the following: hand washing, personal protective equipment

(gloves, gown and masks) and collective protection (isolation units) (U.S. Army Medical Research Institute of Infectious Disease, 1996).

Patient placement - When the number of patients in a health care facility is too large to allow routine triage and isolation, it will be necessary to apply practical alternatives. Designated sites should be chosen in advance based on patterns of airflow and ventilation, availability of adequate plumbing and waste disposal and capacity to hold large numbers of patients (APIC, 1999, p. 6).

Patient transport. Procedures should be established for transporting patients to casualty collection points and other medical treatment facilities (U.S. Department of Health and Human Services-Office of Emergency Preparedness, 1999).

Cleaning disinfection, and sterilization of equipment and environment. Each facility should have in place adequate procedures for the routine care, cleaning, and disinfection of environmental surfaces, beds, bedrails, bedside equipment, and other frequently touched surfaces and equipment. Universal precautions should be applied for the management of patient-care equipment and environmental control (APIC, 1999).

Discharge management. Considerations should be given to developing home-care instructions in the event that large numbers of persons exposed prohibit admission of all infected patients (APIC, 1999).

Post-mortem care. Pathology departments and clinical laboratories should be informed of a potentially infectious outbreak prior to submitting any specimens for examination and disposal (APIC, 1999).

Decontamination of patients and environment. Procedures should be made for reducing the extent of further contamination. Facilities should consider available

locations and procedures for patient decontamination prior to entering the facility (APIC, 1999).

Prophylaxis and post-exposure immunization. Prophylactic immunization is the only means of providing continuous protection against bioterrorism threats (US Army Medical Research Institute of Infectious Disease, 1996). Facilities should ensure that policies are in place to identify and manage health care worker exposed to infectious patients (APIC, 1999).

Triage and management of large scale exposure and suspected exposures. Procedures should be established for the management of a large scale exposure of a bioterrorist attack (APIC, 1999).

Psychological aspects of bioterrorism. The psychological impact of bioterrorism may produce horror, panic and collapse of morale. Control of panic and misinformation assumes a significant role. Thus, procedures should be made for the management of psychological impacts of a bioterrorist attack. (U.S. Army Medical Research Institute of Infectious Disease, 1996).

Laboratory support and confirmation - obtaining diagnostic samples. Labs should be notified of potential risk of handling samples. Sampling should be handled using universal precautions (APIC, 1999).

Laboratory support - transport requirements. Procedures should be established for specimen packaging and transport. Advance planning may include identification of packaging material and transport media in collaboration with the clinical laboratory at individual facilities (APIC, 1999, p. 10).

Patient, visitor and public information. Clear, consistent, understanding information should be provided to patients, visitors and the general public. During a bioterrorism outbreak visitation may be strictly limited. Plans should be made known in advance as to the methods and channels of communications to be used to inform the public (APIC, 1999, p. 10).

Prevention Plan Elements. The following elements are brief suggestions made by Infectious Diseases Physicians, Inc., 1998 for more efficient and effective response to bioterrorism:

Emergency Preparedness Committee. A committee should be created to uphold the continuous improvements to be made in preparation for bioterrorism.

Education. Emergency responders should have proper education for preparation of a bioterrorist attack for the purpose of proper and prompt response.

Training. Emergency responders should have training in preparation for responding to bioterrorism for the purpose of establishing competency and prompt response during a bioterrorist incident.

Inspection and maintenance. Proper care of equipment and tools should be performed to maintain capabilities during emergencies.

Inventory. Therapeutic modalities, equipment, tools and services should be checked to assure capabilities during a bioterrorist incident.

Readiness drills. Exercises should be established and conducted for proper preparation of a bioterrorist attack.

Summary

Bioterrorism date back hundreds of years and continue to be critical issue today. There are several agents which may be used to produce biological weapons. Each have their own characteristics but the means of disbursement are the same. Whether an incident is intentional or natural healthcare employees must perform the same procedures for their safety. Within their job functions there are many risks involved when faced with a bioterrorist attack. These risks arise through care of victims. Few health care workers have been trained to properly respond to a bioterrorist threat. Using biological agents as weapons are dangerous and measures should be taken to preserve the health and well-being of the employees of a health care facility. Controls may be utilized through establishing a pre-established plan. The plan may be compromised of elements to assist in proper and prompt response to a bioterrorist threat. Elements may include policies and procedures to be established and conducted. These may include ways to identify the specific nature of threat and procedures employees must take to prevent and/or reduce risk. To assure control of risk, continuous improvements should be maintained by the facility.

CHAPTER III

Methodology

Introduction

The purpose of this study was to identify risks at Hospital XYZ which may expose employees to mordant consequences due to bioterrorism.

Method of Study

A review of literature was completed to identify possible risks to healthcare employees. The factors examined were current threat of bioterrorism and potential risks to healthcare employees. These included conditions of the work environment and policies and procedures to be performed for emergency preparedness. The information was obtained from the U.S. Army Medical Research Institute of Infectious Disease, the Infectious Diseases Physicians, Inc., the Association for Professional in Infection Control and Epidemiology (APIC), and the U.S. Department of Health and Human Services - Office of Emergency Preparedness. Other books and pamphlets were also evaluated on emergency response.

Face-to-face interviews were conducted using a select group of Hospital XYZ employees. A written guide of questions was used to direct the interview process. A guide of questions is provided in Appendix B. The interviews were used to 1) assess the risk at Hospital XYZ due to bioterrorism 2) determine policies and procedures in place for a bioterrorist attack 3) determine what is currently being conducted to prevent and/or reduce risk to employees. The results of the interviews were analyzed to determine the factors of perceived and actual risk and to assess the current methods being used to control the bioterrorism-based risk to employees at hospital XYZ.

Population Sample

The sample population in this study consisted of current employees at Hospital XYZ. The sample population includes males and females, 40 to 50 years of age, with bachelor level degrees, who also possess expertise in infection control, safety, and risk management. This sample is also comprised of professionals familiar with the possible risk of bioterrorism and the current policies and procedures in place. Due to their knowledge and expertise, these individuals were chosen to voluntarily participate in the interview. Telephone calls to the Risk Management department at Hospital XYZ were made to arrange interviews to be held in December of 1999. The population sample were verbally addressed concerning the purpose and procedures of this study. They were asked to read the consent form, which addresses confidentiality, withdrawing from the study, and the anonymous nature of the study.

Data Collection Techniques

Personal interviews were conducted using open-ended questions to enable more efficient and effective information gathering. Interactive-based interviews allowed for probing to gather more in-depth information. These questions are formatted to attain information on the potential risk exposures of bioterrorism and what is currently being done to control these exposures at the hospital. Due to lack of organizational representatives with experience and education on bioterrorism, and current policies and procedures at the facility, only four interviews were conducted.

Procedures Followed

The following steps were performed to conduct this study.

1. Permission was given from Hospital XYZ in the Risk Management department in mid - September of 1999, to study the possible risk exposures of bioterrorism to Hospital XYZ.
2. Informal discussions were conducted with Risk Management and the emergency committee to determine the need for the study and procedures to be followed for completion of the study.
3. A review of literature was performed. From this data the content and format for interviewing were formulated.
4. The interview questions were revised by the graduate college research services in early November.
5. Appointments for interviews were made via phone.
6. A consent form was developed.
7. The interviews were given in late December to several employees at the Hospital.
8. Notes were taken during the interviews. The interviews followed a pre-established question content and format; however probing questions were utilized in some areas for more in-depth and accurate data.
9. Data analysis was completed in December of 1999.

Method of Analysis

Analysis was completed by comparing data gathered at Hospital XYZ and literature on current methods utilized for prevention and/or reduction of bioterrorist risk exposures in health care facilities. Data gathered at Hospital XYZ were current deficiencies, which may impose risk upon employees and current methods being used to

control these exposures. Literature review was done on emergency preparedness plans for a bioterrorist incident in health care facilities. The validity and reliability of the data were justified by comparing answers from different interviewers through a pilot test performed prior to conducting the actual interviews.

CHAPTER IV

The Study

Introduction

The purpose of Chapter Four is to analyze the data gathered in face-to-face interviews with four current employees at Hospital XYZ. The sample was chosen based on expertise and current knowledge of bioterrorism and emergency preparedness in relation to the hospital. The representatives consisted of a Safety Manager, Infection Control Practitioner, Quality Project Specialist, and the Admitting Site Supervisor/ Emergency Preparedness Coach.

An analysis of the interviews was conducted to determine current bioterrorism exposures and to identify what is currently being done to prevent and/or reduce possible exposures that may pose risk upon health care employees. The interview questions were developed using information gathered in the literature regarding current threat and risk upon healthcare workers. The results of the interviews were analyzed to determine guidelines for a bioterrorist emergency preparedness plan. The plan is to guide Hospital XYZ in preparation for more efficient and effective response to bioterrorism. Through establishing policies and procedures, employees should be more prepared to recognize a bioterrorist incident, treat victims, and protect themselves from risk. The remaining elements of Chapter Four discusses the questions and answers asked of the four hospital employees.

Objective One: Risk Exposures

The first objective was to determine if there were any current exposures which may pose potential risk upon health care employees due to bioterrorism. The following

information provides insights of the current status of Hospital XYZ in relation to possible bioterrorist risk exposures.

Number of employees (company of contract) at the facility. Question one identified the number of individuals currently working at Hospital XYZ. There is a total of 4,500 employees at the facility. This question shows the number of employees potentially at risk in a possible bioterrorist incident.

Size/population of city or town the facility is located in. The current population of the city the facility is located in is approximately 300,000. This question identifies the potential casualty the hospital may be partially responsible for in a bioterrorist incident.

Hospital proximity to nearest possible terrorist targets. The hospital is less than one mile from possible areas which terrorist groups might choose to use biologic agents in order to produce mass casualties. Refer to the responses covered in Table 1:

Table 1. Hospital XYZ Proximity to Possible Terrorist Targets

Possible Terrorist Targets	Hospital XYZ Proximity
School	< 1 mile
Government building	< 1 mile
Entertainment facility	< 1 mile
Large body of water	< 1 mile
Medical facility	< 1 mile
Residential area	< 1 mile
Major transportation routes and/or airports	< 1 mile

Facility completed a risk assessment of the potential threat of bioterrorism.

Hospital XYZ was involved in a large simulated bioterrorist emergency preparedness drill in 1999. The drill was a nationwide effort to prepare for chemical or biological terrorism. The exercise concluded the following:

- A. Hospital XYZ does not have adequate staffing for such an emergency.
- B. They are not set up for decontamination.

C. They lack proper equipment and funds for proper preparation.

Facility has been involved in a bioterrorist incident. As of now, the facility has not been involved in any type of bioterrorist incident.

Believe facility may have potential risk due to bioterrorism. All of the interview respondents agreed the facility has potential risk due to bioterrorism. The level of risk will be based on whether or not warning is given for a bioterrorist incident. If warning is not given the risk is greater due to the lack of established emergency preparedness procedures available at the facility. If warning is given, the facility can depend on the Minnesota Department of Health and Center for Disease Control and Prevention to respond to the warned incident. The timing in a bioterrorist incident response will determine the level of loss to the facility. The conclusions of the potential risk of bioterrorism at Hospital XYZ, due to timing, will be further discussed in chapter 5.

Objective Two: Prevention and Reduction of Risk Exposures

The second objective was to identify what is currently being done to prevent and/or reduce possible exposures that may pose risk upon health care employees. Currently, the facility has emergency plans for fire, bomb, child abduction, medical, weather, and internal and external disasters. The elements provided in the emergency plans are specific to those occurrences. There is no emergency preparedness plan specifically for a bioterrorist incident. The facility is currently relying on the Minnesota Department of Health and Center for Disease Control and Prevention and other organizations to help during the response of a bioterrorist incident. The following information provides insights on the current status of Hospital XYZ in relation to established policies and procedures.

Established policies and procedures at Hospital XYZ. The elements covered in Tables 2 indicate the policies and procedures not in place at the facility. Although some of these elements may be available for other types of emergencies, they are not organized in an emergency preparedness plan specifically for bioterrorism for prompt and effective response. Refer to the responses covered in Table 2:

Table 2. Hospital XYZ Policies and Procedures

Bioterrorism Emergency Preparedness Plan Elements	Hospital XYZ Policies and Procedures
Description of biologic agents	None
Description of symptoms	None
Treatments	None
Therapeutic modalities	None
Detection of outbreak indicators	None
Laboratory support and confirmation	None
Reporting	None
Emergency contact information	None
Chain of command list	None
Contact information	None
Universal precautions	None
Cleaning, disinfecting, and sterilization	None
Personal protective equipment	None
Isolation precautions	None
Decontamination	None
Patient placement	None
Discharge management	None
Evacuation	None
Patient, visitor, and public information	None
Post-mortem care	None
Psychological aspects	None

Activities the facility participated in. The simulated bioterrorist emergency preparedness drill, which Hospital XYZ participated in, provided limited training and education for some of the employees at the facility. Although some employees have had exposure to emergency preparedness, continuous education or training is not being mandated or required as company policy. Refer to Table 3 to see responses:

Table 3. Hospital XYZ Participated Activities

Bioterrorism Emergency Preparedness Activities	Hospital XYZ Participation
Drill	Yes
Educates employees on bioterrorism	No
Educates employees on bioterrorist emergency preparedness	No
Trains employees	No
Conducts inspection of equipment	No
Conducts maintenance of equipment	No
Conducts inspection of therapeutic modalities	No

Current capabilities of Hospital XYZ. Currently, the facility has a hazardous material response team to respond to emergencies, but this team is not capable to respond to a bioterrorist event. The hospital capabilities for tools, equipment, and therapeutic modalities are available but limited for mass casualties.

Table 4. Current Capabilities of Hospital XYZ

Bioterrorism Emergency Preparedness Elements	Hospital XYZ Capabilities
Emergency response team	NO
Emergency preparedness committee	YES
Available equipment for mass casualties	LIMITED
Available personal protective equipment	LIMITED
Available therapeutic modalities	LIMITED
Self-contained unit	YES
Decontamination	NO
Long term care beds	LIMITED
Control of ventilation system	YES

Level of priority for bioterrorist emergency preparedness planning at Hospital XYZ.

The facility is aware of the need to prepare for an event, which may produce severe loss for the facility. Due to the low level of importance to prepare for bioterrorism - related situations, sufficient funds are not available. The hospital has put a higher priority on things which it feels are more likely to occur. The current perspective at the facility is that the possibility of a bioterrorist incident is remote, but the threat is growing.

Summary

Hospital XYZ is a facility with 3,300 support - related employees and 1,200 physicians. It is located in a large metropolitan area surrounded by several possible terrorist target areas. Although the hospital is aware of the possible risk of a bioterrorist incident, it does not have a bioterrorism emergency preparedness plan, and is limited in its capabilities to respond to a bioterrorist incident. Currently, the facility believes the priority for developing a bioterrorist emergency preparedness plan is not significant, due to the low probability of an occurrence and the lack of funding.

CHAPTER V

Summary, Conclusions, & Recommendations

Restatement of the Problem

Bioterrorism is the use of microorganisms (bacteria, virus, and fungi) or toxins to produce death or disease in humans, animals, and plants. Biological agents have been used in warfare for over 2,500 years and continue to be a threat to humans. Healthcare workers are depended upon to alleviate suffering, allocate “limited” medical resources, and bring order to a chaotic environment. Few health care providers have been trained to recognize and treat victims of biological agent attacks. These businesses today must be concerned with insurance stipulations, media attention, public pressure, employee health and safety, liability, and government regulations. Emergencies can and do occur, and when they occur, our natural instinct is to protect ourselves, others, and property. The only effective and logical way to do this is to prepare in advance for events.

The purpose of the study is to identify risk factors at Hospital XYZ which may impose threat to the employees due to bioterrorism. The objectives of the study include the following:

1. Determine current exposures, which may pose potential risk upon health care employees due to bioterrorism.
2. Identify what is currently being done to prevent and/or reduce possible risk exposures.

Methods and Procedures

A review of literature was performed and used to develop interview question guidelines. Permission was asked to the Risk Management department at Hospital XYZ

to conduct the study and interviews. The interviews were conducted with four current employees in Safety, Risk Management, Infection Control, and Admitting, at Hospital XYZ in December. The interview questions consisted of current bioterrorism risk exposures of bioterrorism at Hospital XYZ and what is currently being done to prevent and/or reduce the exposures.

Major Findings

Objective One: Risks Exposures

Hospital XYZ is a large metropolitan health care facility employing 3,300 employees and 1,200 physicians located in a city populating approximately 300,000 people. The facility is located within a mile of a school, government building, large entertainment facility, medical facility, residential, major transportation routes, and a large running body of water. All of the interview respondents agreed the facility has potential risk due to bioterrorism. Due to the lack of a bioterrorist emergency preparedness plan, the timing in a bioterrorist incident response will determine the level of loss to Hospital XYZ.

Objective Two: Prevention and Reduction of Risk Exposures

Currently, the facility has emergency plans for fire, bomb, child abduction, medical, weather, and internal and external disasters. The elements provided in the emergency plans are specific to those occurrences. There is no emergency preparedness plan for bioterrorism. A risk assessment performed concluded that the hospital does not have adequate staffing for a bioterrorist incident, is not set up for decontamination, and lacks proper equipment and funds for proper preparation. Consequently, the hospital is limited in its capabilities to respond to bioterrorism.

Although the facility is aware of the need to prepare for bioterrorism, there is no emergency preparedness plan specifically for a bioterrorist incident. The facility is currently relying on the Minnesota Department of Health and Center for Disease Control and Prevention and other organizations to help during the response of a bioterrorist incident. Due to the lack of funds available and the low probability of a bioterrorist event occurring the need to prepare for is currently not significant for Hospital XYZ.

Conclusions

Being a large health care facility, in a large city, with over four thousand employees, and surrounded by major terrorist target areas, places Hospital XYZ at potential risk to bioterrorism. Target areas consist of locations where terrorist groups are most likely to use a biological weapon to produce mass destruction, since these areas are usually populated with large amounts of people. In addition to the population density issue, some of these target areas (e.g., government buildings, sports arenas, airports, schools, and medical facilities) are known to be occupied with significant and important figures. The level of loss to hospital XYZ in a bioterrorist incident will be determined by the timing of response. Due to the inconspicuous nature of the biologic agents detection is made difficult. Biological agents are odorless, colorless, and tasteless. Without proper warning, the first signs of a possible bioterrorist attack will be human illness. Unfortunately, when symptoms have occurred, the possibility of treating victims to full recovery is improbable. Therefore, it might be one day or two days before a possible bioterrorist incident has been recognized. Even more threatening to the facility is the lack of an established emergency preparedness plan for prompt and effective response to bioterrorism.

Recommendations

The community looks to health care facilities for assistance and information. Although a facility may be in poor condition due to a disaster, it must respond to events of emergencies by continuing to serve the community with as little impairment as possible. This can only be achieved through comprehensive, coordinated planning prior to an emergency. A carefully and successfully implemented emergency plan is the key to saving lives by improving the efficiency and effectiveness of response. The facility must be prepared for excessive or unusual demands on its resources (Chaff, 1994). For example, a bioterrorist incidence may result in mass casualties, which could exhaust a facility's capabilities by requiring excessive amounts of space for patients, therapeutic modalities, equipment, and extra staff. Although elements of an emergency preparedness plan may vary from different facilities, research provides general elements to be provided in a preparedness plan for bioterrorism. Recommendations specific to Hospital XYZ and for further study will be suggested.

Recommended guidelines for hospital XYZ. The current emergency preparedness plan at Hospital XYZ include plans for fire, operation, child abduction, medical, weather, and internal and external disasters, but no established plan for bioterrorism. Being a health care facility located in a congestive city area, the lack of an emergency preparedness plan with regard to bioterrorism presents risks to the facility and employees. Recommendations for preparing the facility for bioterrorism include the following guidelines provided from various literatures:

1. Establish policies and procedures for identifying potential agents for the purpose of assisting in the recognition, diagnosis, and management of selected diseases as

potential biological weapons. Anthrax, Botulism, Plague and Smallpox are examples of potential agents, which may be defined through characteristics, classification, dissemination, symptoms and treatments for proper recognition, diagnosis, and management of diseases. Examples include unusual number of people seeking care, clusters of patients arriving from a single locale and large numbers of rapidly fatal cases (APIC, 1999).

2. Establish policies and procedures for detecting outbreaks. Examples for detection include recognizing disease patterns in patients, steady and increasing stream of patients entering the health care facility, mass casualties, and unusual characteristics with patients. Bioterrorism may occur as covert events, in which persons are unknowingly exposed and an outbreak is suspected only upon recognition of unusual disease clusters or symptoms. It might also occur as announced events, in which warning is given. A healthcare facility's Bioterrorism Readiness Plan should include details from management of both types of scenarios (APIC, 1999).

3. Establish policies and procedures for reporting requirements and contact information. Healthcare facilities may be the initial site of recognition and response to bioterrorism events. If bioterrorism is suspected the emergency response system should be activated. Notification should immediately include local infection control personnel and healthcare facility administration, and prompt communication with the local and state health departments, FBI, police, Center for Disease Control and Prevention, and Emergency Medical Services. Each facility should have a list of contact information which includes department, person and phone number (APIC, 1999).

4. Establish policies and procedures for suspected bioterrorism - related illnesses isolation precautions. All patients in the healthcare facilities, including symptomatic patients with suspected or confirmed bioterrorism-related illnesses, should be managed utilizing universal precautions. These precautions prevent direct contact with all body fluids, secretions, excretions, non-intact skin, and mucous membranes. Recommended practices include hand washing, the use of appropriate personal protective equipment (gloves, gowns and masks), and collective protection (isolation units) (U.S. Army Medical Research Institute of Infectious Disease, 1996).

5. Establish policies and procedures for patient placement. When the number of patients in a healthcare facility is too large to allow routine triage and isolation, it will be necessary to apply practical alternatives. Designated sites should be chosen in advance based on patterns of airflow and ventilation, availability of adequate plumbing and waste disposal and capacity to hold large numbers of patients (APIC, 1999, p. 6).

6. Establish policies and procedures for patient transport. This should be established for transporting patients to casualty collection points and other medical treatment facilities. In general, transport and movement of patients with bioterrorism - related infections should be limited to movement that is essential to provide patient care, thus reducing the opportunities for transmission of microorganisms within health care facilities (U.S. Department of Health and Human Services-Office of Emergency Preparedness, 1999, p. 6).

7. Establish policies and procedures for cleaning disinfection, and sterilization of equipment and environment of a bioterrorist incident. Each facility should have in place adequate procedures for the routine care, cleaning, and disinfection of environmental

surfaces, beds, bedrails, bedside equipment, and other frequently touched surfaces and equipment. Universal precautions should be applied for the management of patient-care equipment and environmental control (APIC, 1999).

8. Establish policies and procedures for discharge management. Usually, patients with bioterrorism - related infections will not be discharged from the facility until they are deemed noninfectious. Although, considerations should be given to developing home-care instructions in the event that large numbers of persons exposed prohibit admission of all infected patients. Depending on the exposure and illness, home care instructions may include recommendation for the use of appropriate barrier precautions, hand washing, waste management, and cleaning and disinfection of the environmental and patient care items (APIC, 1999, p. 7).

9. Establish policies and procedures for post-mortem care. This would include requiring that the pathology departments and clinical laboratories be informed of a potentially infectious outbreak prior to submitting any specimens for examination and disposal (APIC, 1999).

10. Establish policies and procedures for decontamination of patients and environment. Procedures should be made for reducing the extent of further contamination. Facilities should consider available locations and procedures for patient decontamination prior to their entrance into the facility (APIC, 1999).

11. Establish policies and procedures for prophylaxis and post-exposure immunization. Prophylactic immunization is the only means of providing continuous protection against bioterrorism threats (US Army Medical Research Institute of Infectious Disease, 1996). Facilities should ensure that policies are in place to identify and manage

health care workers exposed to infectious patients. In general, maintenance of accurate occupational health records will facilitate identification, contact, assessment, and delivery of post - exposure care to potentially exposed health care workers (APIC, 1999, p. 8).

12. Establish policies and procedures for triage and management of large scale exposure and suspected exposures. Procedures should be established for the management of a large scale exposure of a bioterrorist attack. Examples include establishing networks of communication, sources able to supply vaccines, and planning for evaluation and discharge of patients (APIC, 1999, p. 8 - 9).

13. Establish policies and procedures for psychological aspects of bioterrorism. The psychological impact of bioterrorism may produce horror, panic and collapse of morale. Control of panic and misinformation assumes a significant role. Thus, procedures should be made for the management of psychological impacts of a bioterrorist attack. (U.S. Army Medical Research Institute of Infectious Disease, 1996). Examples include minimize panic by clearly explaining risk, offering careful but rapid medical evaluation/treatment, and treat anxiety in unexposed patients. Health care workers should be educated and trained to reduce bioterrorism related fears (APIC, 1999, p. 9).

14. Establish policies and procedures for obtaining diagnostic samples. Labs should be notified of potential contamination risk of handling samples. In all cases of suspected bioterrorism, an acute phase serum sample should be collected to be analyzed, aliquotted, and saved for comparison to a later sample. Sampling should be handled using universal precautions (APIC, 1999, p. 9 - 10).

15. Establish policies and procedures for transport requirements. Procedures should be established for specimen packaging and transport. Advance planning may include

identification of packaging material and transport media in collaboration with the clinical laboratory at individual facilities (APIC, 1999, p. 10).

16. Establish policies and procedures for patient, visitor and public information. Clear, consistent, understanding information should be provided to patients, visitors and the general public. During a bioterrorism outbreak visitation may be strictly limited. Plans should be made known in advance as to the methods and channels of communications (e.g., phone, radio, television, and Internet) to be used to inform the public (APIC, 1999, p. 10).

17. Establish policies and procedures for prevention plan elements. The following elements are brief suggestions made by Infectious Diseases Physicians, Inc., 1998 for more efficient and effective response to bioterrorism:

A. Emergency Preparedness Committee. A committee should be created to uphold the continuous improvements to be made in preparation for bioterrorism.

B. Education. Emergency responders should have proper education for preparation of a bioterrorist attack for the purpose of proper and prompt response.

C. Training. Emergency responders should have training in preparation for responding to bioterrorism for the purpose of establishing competency and prompt response during a bioterrorist incident.

D. Inspection and maintenance. Proper care of equipment and tools should be performed to maintain capabilities during emergencies.

E. Inventory. Therapeutic modalities, equipment, tools, and services should be checked to assure capabilities during a bioterrorist incident.

F. Readiness drills. Exercises should be established and conducted for proper preparation of a bioterrorist attack.

Recommendations for Further Study

An area to study as it relates to this topic could be to perform an assessment of bioterrorist risk of the property layout of Hospital XYZ.

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Appendix A

Consent Form

As a Graduate Student in the Risk Control program at UW-Stout, I am asking you to please answer the following interview questions. This is strictly voluntary and you may withdraw if necessary. I will use this information to help identify deficiencies which may impose risk upon employees and make recommendations which may improve the effectiveness and efficiency of hospitals to respond to the possible threat of bioterrorism. This research is pioneering efforts to potentially gaining grants for the purpose of preparing Hospital XYZ for bioterrorism. Your help will be greatly appreciated. This survey will only address healthcare facilities (hospitals). *Do not put your name on this survey, the source of this information will be kept anonymous.*

By participating in this interview you are giving informed consent as a participant volunteer in this study. You understand the source of this information and the facility will be kept anonymous. You also imply that you understand the nature of this study and agree that no risk is involved.

Appendix BEmergency Response to Bioterrorism Interview Questionnaire

Directions: Respond to the following items to the best of your knowledge.

1. Gender: _____a. Male _____b. Female

2. Years old: _____

3. Education level:
 - a. _____High School
 - b. _____Vocational/Technical Certificate or diploma
 - c. _____Bachelor's (BA, BS and RN)
 - d. _____Master's (MA, MS and RD)
 - e. _____Doctorate (Ph.D, MD and ED)

4. Position:
 - _____a. Nurse
 - _____b. Physician
 - _____c. Administrative
 - _____d. Supervisory
 - _____e. Security
 - _____f. Maintenance
 - _____g. Safety
 - _____h. Risk
 - _____i. other _____

5. Department _____

6. Facility: A B

7. Number of employees (company of contract)at the facility:
 - 500 or less
 - 501-1000
 - 1001-2000
 - 2001 or more

8. Size/population of city or town the facility is located in:

- 0-99,999
 - 100,000-499,999
 - 500,000-999,999
 - 1,000,000+
9. Facility proximity to nearest school:
- < 1mile
 - 1-2 miles
 - 2.1-5 miles
 - >5 miles
10. Facility proximity to nearest government building:
- < 1mile
 - 1-2 miles
 - 2.1-5 miles
 - >5 miles
11. Facility proximity to nearest large entertainment facilities (e.g. sports arenas, casinos, malls...):
- < 1mile
 - 1-2 miles
 - 2.1-5 miles
 - >5 miles
12. Facility proximity to nearest body of water:
- < 1mile
 - 1-2 miles
 - 2.1-5 miles
 - >5 miles
13. Facility proximity to other medical facilities:
- < 1mile
 - 1-2 miles
 - 2.1-5 miles
 - >5 miles
14. Facility proximity to nearest residential area:
- < 1mile
 - 1-2 miles
 - 2.1-5 miles
 - >5 miles
15. Facility close to major transportation routes and/or airports:
- Yes

- No
16. Facility completed a risk assessment of the potential threat of bioterrorism at this location:
Yes
No
17. Facility has been involved in a bioterrorist incident:
Yes
No
18. Believe facility may have potential risk due to bioterrorism:
Yes
No
19. In relation to bioterrorist emergency preparedness, **check the following** if the facility emergency plan procedures and policies **include** the following:
- _____ a. Description of biologic agent(s)
 - _____ b. Descriptions of symptoms for each agent
 - _____ c. Treatments for each agent
 - _____ d. Therapeutic modalities
 - _____ e. Detection of outbreak indicators
 - _____ f. Laboratory support and confirmation
 - _____ g. Reporting
 - _____ h. Emergency contact information
 - _____ i. Chain of command list
 - _____ j. Contact information for chain of command
 - _____ k. Universal precautions procedures
 - _____ l. Cleaning, disinfecting, and sterilization
 - _____ m. Personal protective equipment
 - _____ n. Isolation precautions
 - _____ o. Decontamination
 - _____ p. Triage
 - _____ q. Patient placement
 - _____ r. Patient transport
 - _____ s. Discharge management
 - _____ t. Evacuation
 - _____ u. Psychological aspects
 - _____ v. Patient, visitor, and public information
 - _____ w. Post-mortem care
20. In relation to bioterrorist emergency preparedness, **check the following** if the facility emergency plan **includes** the following:
- _____ a. Education

- b. Training
- c. Drills
- d. Emergency committee
- e. Response team
- f. Inspection/Maintenance

21. **Check** to following if the facility *participates* in these activities.

- a. Facility conducts evacuation drills:
- b. Facility has response team for bioterrorism:
- c. Facility conducts training for bioterrorism:
- d. Facility educates employees on bioterrorism
- e. Facility educates employees on bioterrorist emergency preparedness:
- f. Facility has committee for emergency preparedness:
- g. Facility has available medical equipment for mass casualties:
- h. Facility conducts inspection of equipment:
- i. Facility conducts maintenance of equipment:
- j. Facility conducts inspection of therapeutic modalities:
- k. Facility has available personal protection equipment:
- l. Facility has available therapeutic modalities for bioterrorism:
- m. Facility has self-contained unit:
- n. Facility capable of decontamination:
- o. Facility has long term care beds for mass casualty:
- p. Facility capable of controlling ventilation system:

Additional comments: