



EMERGING INFECTIOUS DISEASE AND BIOTERRORISM

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ABSTRACT

The emerging infectious disease is the undesirable condition in public health. However, there are several new emerging infectious diseases within the former decade. The consideration of the global epidemic of the new emerging infectious disease is batched. A fascinating situation is the tendency of bioterrorism applying the new emerging infectious pathogen. This subject will be better explained in this editorial.

KEYWORDS: *Emerging; Infection; Bioterrorism*

INTRODUCTION

Infectious disease disasters are events that involve a biological agent/disease and that result in mass casualties, such as a bioterrorism attack, a pandemic, or an outbreak of an emerging infectious disease. Infectious disease disasters are different from other types of disasters because they increase the risk of communicable disease spread during and after the incident. Subsequently, they involve the need for specialized mitigation, planning, and response interventions to prevent and control the spread of disease. As experts in the fields of surveillance, epidemiology, and prevention of communicable disease spread, infection preventionists play a critical role in emergency management of infectious disease disasters at the personal, hospital/healthcare facility, and community level. Emergency management of infectious disease disasters is a multidepartment and multi agency endeavour that encompasses the four principles of emergency management: mitigation, preparedness, response, and recovery

KEY CONCEPTS

- Infectious disease disasters consist of biological terrorism, emerging infectious disease outbreaks, and pandemics.
- Infectious disease disasters pose unique challenges to infection preventionists and disaster planners.

- There are a broad range of potential bioterrorism agents, including bacteria, viruses, and toxins (of microbial, plant, or animal origin). Common characteristics of this diverse group of agents include:
 - The ability to be dispersed in aerosols of 1 to 5 micron-sized particles, which can penetrate the distal bronchioles
 - The ability to deliver these aerosols with simple technology
 - The feasibility of these agents, if delivered from a line source (e.g., an airplane) upwind from the target, to infect large numbers of the population
 - The ability to spread infection, disease, panic, and fear.
- Infectious diseases continuously emerge and/or re-emerge, resulting in epidemics of varying sizes and scope.
- Pandemics pose the biggest potential threat to the public's health in terms of morbidity and mortality, and there is a high likelihood of a pandemic occurring in the future.
- Infection preventionists must undertake preparedness activities to ensure that they and their healthcare facilities and communities are better prepared to effectively recognize and respond to an infectious disease disaster.
- Infectious disease disaster preparedness is an ever-evolving process that addresses the four principles of emergency management:



mitigation, preparedness, response, and recovery.

BIOTERRORISM

Bioterrorism refers to the use of biological agents on civilian or military populations, animals, or crops. A combination of factors have all raised concerns about the actual use of bioterrorism agents, including the breakup of the former Soviet Union and the concomitant dispersal of scientists and agents involved in bioterrorism research, the rise of radical groups focused on destroying what they believe to be evil forces, and the discovery of Iraq's stockpiled anthrax, botulinum toxin, and other biological warfare agents.

There are a broad range of potential bioterrorism agents, including bacteria, viruses, and toxins (of microbial, plant, or animal origin). Common characteristics of this diverse group of agents include (1) the ability to be dispersed in aerosols of 1 to 5 mm particles, which can penetrate the distal bronchioles; (2) the ability to deliver these aerosols with simple technology; (3) the feasibility of these agents, if delivered from a line source (e.g., an airplane) upwind from the target, to infect large numbers of the population; and (4) the ability to spread infection, disease, panic, and fear.

The most likely route of dissemination is an aerosolized release of 1- to 5-mm particles. Other methods of dissemination include oral (intentional contamination of food/water supply), percutaneous, infected animal vector (e.g., release of infected fleas), and human-to-human spread (individual infected with communicable disease walking among a crowd of healthy people). As the anthrax attacks of 2001 proved, even physical objects, such as letters, can be used to help spread biological agents.

Identification of an Infectious Disease Disaster

Morbidity and mortality related to many agents that could be involved in an infectious disease disaster can be decreased if treatment, isolation, and prophylaxis are provided as soon as possible. A rapid response depends on the foundation of the plan that is in place before the event occurs and the participants' familiarity with the emergency management plan.

When even a single case of an unusual disease is suspected or identified, bioterrorism or an emerging infectious disease should be considered. Groups of nonspecific illnesses clustered in time or place should also be strongly considered for bioterrorism or an outbreak of an emerging infectious disease. This includes the clustering of flulike syndrome in patients. All cases of unusual disease, including even a single case of any of the diseases mentioned in this chapter, should be reported

immediately to local public health officials; if cases are recognized during evenings or weekends, after-hours or emergency numbers should be used [1].

Specific diagnosis of the agents discussed in this chapter has historically relied heavily on the presence of appropriate epidemiologic exposure (e.g., exposure to infected animals during meat rendering for anthrax, ingestion of home-canned foods for botulism, or travel to an area where an emerging infectious disease is endemic). Dissemination of biological agents via an aerosol route will require diagnosis of these generally uncommon diseases without the aid of usual exposure history. Furthermore, many of these syndromes can only be diagnosed on the basis of clinical knowledge of presenting symptoms and expected disease progression. Maintaining a high level of suspicion and clinical knowledge about these diseases is essential to timely diagnosis. Assays/tests for bioterrorism agents and emerging infectious diseases are often only available in specific research laboratories (state public health laboratories, Centres for Disease Control and Prevention [CDC], or United States Army Medical Research Institute of Infectious Diseases [USAMRIID]).

BIOWATCH

BioWatch is an environmental monitoring program that is managed in coordination by the CDC, Environmental Protection Agency (EPA), and the United States Department of Homeland Security. This program uses air samplers to test for aerosolized biological agents around the United States, with the goal of rapidly identifying biological events. Rapid detection of an infectious disease disaster would help minimize morbidity, mortality, and costs. The BioWatch air samplers are located in undisclosed cities and monitor the air 24 hours a day, 7 days a week. The specimens collected by BioWatch are sent to the Laboratory Response Network (LRN) and tested for various agents. When biological particles are detected in the air, a report is sent to emergency managers and public health professionals in the communities in which the agents were detected. These reports are termed "BioWatch Actionable Results" (BARs).

Communities must decide how to respond to these BARs in terms of the extent to which an investigation is conducted or interventions are implemented. Although BioWatch has not detected a single bioterrorism attack (because no aerosolized attacks have occurred since the start of the program), BioWatch has been credited with strengthening the United States' existing bio surveillance program and enhancing coordination between public health agencies and healthcare systems as a means of increasing community resilience. BioWatch is currently considered a complementary system to



existing biosurveillance programs established in communities.

Is it Possible that the New Emerging Infectious Pathogen becomes the Bioterrorism Agent?

“Is it possible that the new emerging infectious pathogen becomes the bioterrorism agent?” is an interesting question. In fact, as a new disease, the limited knowledge can be expected; treatment and diagnosis might not be easy. According to the CDC report, “a new focus on emerging infectious diseases and bioterrorism” is mentioned [2]. Ashford et al. noted that “bioterrorism preparedness should emphasize education and support of this frontline as well as methods to shorten the time between outbreak and reporting [3].” The well-known “BioWatch” is a good project to correspond to bioterrorism and emerging infection [4].

How to Fight and Manage Bioterrorism using New Emerging Infection?

As noted, it is no doubt that the terrorist scientist team might use the new emerging infectious pathogen as a tool for performing bioterrorism. The first thing is to investigate any new emerging infection to answer whether this is a natural or intended outbreak [5,6]. Radosavljevic and Belojevic recently reported the use of new scoring system that might be useful for such discrimination [5]. In case that the bioterrorism is approved, the standard infection control must be applied. To set a preventive action, setting of the public free available online database of the new pathogen is the new action to fight with the possible bioterrorism [7]. Setting of the good “public health legislation” to the possible episode is also needed [8].

REFERENCES

1. Ohkusa Y, Sugawara T, Masuda K, Nadaoka Y, Kamiya N, et al. (2010) [Enhanced surveillance for US presidential visit to Japan]. *KansenshogakuZasshi* 84: 708-713.
2. Koplan J (2001) CDC's strategic plan for bioterrorism preparedness and response. *Public Health Rep* 116 Suppl 2: 9-16.
3. Ashford DA, Kaiser RM, Bales ME, Shutt K, Patrawalla A, et al. (2003) Planning against biological terrorism: lessons from outbreak investigations. *Emerg Infect Dis* 9: 515-519.
4. Institute of Medicine (US) and National Research Council (US) Committee on Effectiveness of National Biosurveillance Systems: *Biowatch and the Public Health System* (2009) *Effectiveness of National Biosurveillance Systems: BioWatch and the Public Health System: Interim Report*. National Academies Press (US), Washington (DC).
5. Radosavljevic V, Belojevic G (2012) Unusual epidemic events: a new method of early orientation and differentiation between natural and deliberate epidemics. *Public Health* 126: 77-81.
6. Dembek ZF, Kortepeter MG, Pavlin JA (2007) Discernment between deliberate and natural infectious disease outbreaks. *Epidemiol Infect* 135: 353-371.
7. National Research Council (US) Committee on Genomics Databases for Bioterrorism Threat Agents (2004) *Seeking Security: Pathogens, Open Access, and Genome Databases*. National Academies Press (US), Washington (DC).
8. Howse G (2004) Managing emerging infectious diseases: Is a federal system an impediment to effective laws? *Aust New Zealand Health Policy* 1: 7.