
Bioterrorism: An Imminent Public Health Threat

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Abstract

Bioterrorism is a planned and deliberate use of pathogenic strains of microorganisms such as bacteria, viruses or their toxins to spread life-threatening diseases on a mass scale in order to devastate the population of an area. Bioterrorism agents can be separated into three categories, depending on how easily they can be spread and the severity of illness or death they cause. Biological agents can be spread through the air, through water, or in food. Robotic delivery is also possible. Another technique, a nightmare for bioterror experts, is the use of "suicide coughers". To strengthen the area of biodefence, the US senate passed the 'Bioterrorism Act of 2002'. A highly effective public health system should make an important contribution to deter the threat by demonstrably diminishing the result of a potential attack. The strategies against bioterrorism involve prevention of an attack, detecting bioweapons, and quick relief in the event of biowar. The next step is the introduction of Bioterrorism related topics in the medical curriculum, so that the medical students should be encouraged to stay abreast of new developments as they continue their training and begin their practices.

REVIEW

Bioterrorism is a planned and deliberate use of pathogenic strains of microorganisms such as bacteria, viruses or their toxins to spread life-threatening diseases on a mass scale in order to devastate the population of an area. Biological warfare is the intentional use of microorganisms, and toxins (microbial, plant or animal origin), to produce disease and/or death in humans, livestock and crops.[1]

Bioterrorism agents can be separated into three categories, depending on how easily they can be spread and the severity of illness or death they cause. Category A includes organisms or toxins that pose the highest risk to the public and national security. They can be easily spread or transmitted from person to person, result in high death rates and have the potential for major public health impact. They might cause public panic and social disruption and require special action for public health preparedness. The Category A agents are anthrax, smallpox, plague, botulism, tularemia, and viral hemorrhagic fevers.

Category B are the second highest priority because they are moderately easy to spread, result in moderate illness rates and low death rates and require specific enhancements of CDC's laboratory capacity and enhanced disease monitoring. Category B includes typhus, brucellosis, cholera, etc.

Category C (examples: nipah virus, hantavirus and multi-

drug resistant Tuberculosis (MTB) are the third highest priority agents which include emerging pathogens that could be engineered for mass spread in the future because they are easily available, are easily produced and spread. They have potential for high morbidity and mortality rates and major health impact.[2]

Biological agents can be spread through the air, through water, or in food. Terrorists may use biological agents because they can be extremely difficult to detect and do not cause illness for several hours to several days. What is going to be more effective for the terrorist is innovative delivery systems of conventional bioterror agents. In an article on the subject in the Indian Journal of Medical Microbiology, a team of doctors from the Post Graduate Institute of Medical Sciences, Rohtak, has listed some of the mechanisms. For example, a car could roam around in a city emitting a germ aerosol through a fake tailpipe. Suitcases, backpacks, books, letters, umbrellas and remote control devices are some of the delivery methods listed. Robotic delivery is also possible. Small robots looking like rocks or wood could be programmed to act at a given time to release Biological Weapon (BW) agents or even stay underground for a long time. Another technique, a nightmare for bioterror experts, is the use of "suicide coughers" who have got self-inoculated with lethal strains of anthrax and smallpox and go into public gatherings to spread the diseases, causing mass

fatalities.[³]

Though there have been several incidents of bioterror in the past, The anthrax letter attacks in the US in October 2001 which killed five people, trigger a massive alarm in the security agencies. During the same year, the then Deputy Chief Minister of Maharashtra received an envelope having anthrax culture³. The Pneumonic plague attack in 1994 at Surat, Dengue hemorrhagic fever (1996) in Delhi, Anthrax (1999) in Midnapore, Mystery 'encephalitis' (2001) in Siliguri, are being suspected as an act of bioterrorism.

To strengthen the area of biodefence, the US senate passed the 'Bioterrorism Act of 2002'. According to this law, there is an essential element of national preparedness against bioterrorism and the focus is on safety of drugs, food and water from biological agents and toxins. However, in India such law on bioterrorism is still lacking.

In India, efforts have been put forward by the Department of Defence, through its arm called the Defence Research and Development Organisation (DRDO) to develop counter measures against bioterrorism. A few laboratories of the DRDO are active in this area of research. To prepare for nuclear, biological and chemical warfare these laboratories have developed protective systems and equipment for troops. [⁴]

To meet the challenge of bioterrorism, coordinated and concerted efforts of different agencies viz. the intelligence agency, the army, the BSF, SSB, law enforcement machinery, health departments and civil administration etc. would be required. [⁵]

In fact it would impose particularly heavy demands on the nation's public health and health care system because ultimately it will be the public health system that will be called on to mitigate and ameliorate the consequences of a bioterrorism attack.

A highly effective public health system should make an important contribution to deter the threat by demonstrably diminishing the result of a potential attack. The components like surveillance, assessment, medical management, information and education, etc. will be the primary responsibility of the public health system. The public health and medical response mechanism includes three components. First is surveillance and assessment (early detection or awareness) by epidemiological methods. Second is laboratory investigation for diagnosis and characterization/ sensitivity of the biological organism, and third is medical

management (preventive, promotive, and curative services) [⁵]. The preparation for and response to bioterrorism must be multifaceted and comprehensive. It must employ classic public health preparedness and activities at the state and local levels. These include revitalizing the capacity of local public health facilities, training of teams of 'first responders', developing and updating plans and guidelines for immediate responses at the local level, and providing for the availability of vaccines, antibiotics and other medical supplies for emergency deployment.[⁶]

The strategies against bioterrorism involve prevention of an attack, detecting bioweapons, and quick relief in the event of biowar. National stockpile of drugs, which are to be used against these biological agents, must be available. Personal awareness, readiness with drugs, and decontamination procedures are the fundamental steps towards preparedness against a bioterrorist attack.[⁷] Computer simulation models may be used to predict the staff and antibiotics requirement in case of a bioterrorist threat. In 2002, Hupert et al.[⁸] used one such model that simulates a patient's interactions with the resources, i.e. beds and medical staff. On the basis of the number of the patients, the model predicts staff requirement and physical layout of the facilities like antibiotic distribution centres.

The threat of bioterrorism have presented the biomedical research community with some new responsibilities. One of the most important will be educational, of actively informing the public and policymakers about the nature of the threats that confront us in an accurate and realistic manner [⁶]. The second one is the introduction of Bioterrorism related topics in the medical curriculum. In the medical school curriculum, education regarding Bioterrorism should be considered in the context of any threats that may result in mass casualties, including the use of biologic, chemical, physical, and radiological agents. The learning objectives and learning activities for medical students should reflect the need for a greater familiarity with potential WMD (Weapons of Mass Destruction) agents, as well as an understanding of their roles and responsibilities as physicians within the public health system. Because the science, scope, and context of WMD-related topics will continue to evolve, medical students must be encouraged to stay abreast of new developments as they continue their training and begin their practices [⁹].

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