

Biowarfare and Bioterrorism

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KEYWORDS

• Bioterrorism • Mass casualty • Bioweapon • Anthrax • Smallpox • Critical care

KEY POINTS

- Bioweapons have been used for centuries, and bioterrorism remains a risk for the foreseeable future.
- Critical care physicians play a major role in the recognition of and response to a bioterrorism attack.
- Critical care clinicians must be familiar with the diagnosis and management of the most likely bioterrorism agents, and also be adequately prepared to manage a mass casualty situation.

BACKGROUND

Overview

In the minds of many critical care physicians, particularly those new to the profession, biowarfare and bioterrorism may seem a product of the unrest in the world punctuated by the 2001 anthrax attacks in the United States^{1,2} after the World Trade Center attacks. Although it is understandable why some might hold this view, as this article outlines in the epidemiology section, biowarfare and bioterrorism have been practiced since prehistoric times. Despite efforts to restrict the use of biological weapons with the 1972 Conventions on the use of biological weapons, they need to remain a concern, particularly for critical care physicians of the future.

Definitions of what bioterrorism is vary from source to source and have been evolving over time. In the 1990s, definitions focused primarily on bacterial or viral biological

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weapons and their potential use by states with the consideration of use by nonstate actors (eg, terrorists).³ More recent definitions of bioterrorism include both a broader range of potential biological agents as well as considering more diverse groups of potential targets and impacts of biological weapons. Spencer⁴ defines bioterrorism as “the use of micro-organisms as weapons of catastrophic effect which can be described as: the category or method of use of a weapon system that results in a significant negative impact on a nation’s physical, psychological or economic well-being, thereby causing a major modification of routine activity.” This definition highlights several key points. First, it highlights that a wide range of microorganisms must be considered and that their impact is not merely physical but may also include psychological and economic factors. Spencer further elaborates on his definition of bioterrorism by stating “bioterrorism is best described as the use of micro-organisms (pathogens) or the products of living organisms (toxins) to inflict harm on a wider population, including animals and crops.”⁴ The elaboration on his original definition highlights that not only are humans directly vulnerable to bioterrorism but we are vulnerable through indirect attacks on our livestock or crops, which has also been termed agroterrorism.^{5,6} Other investigators broaden the definition further to not only include microorganisms and biotoxins but also larger organisms, specifically insects.⁶

As with many other medical issues that intensivists face in their busy clinical and academic practices, pressured by ever-increasing time and budgetary restraints, there is a necessity to prioritize efforts and resources toward the most common and higher-impact concerns. It is difficult to provide a clear-cut answer as to where bioterrorism should be prioritized on this list. Although some experts state that the risk of a large-scale bioterrorist attack is low,⁷ in a more recent analysis, US Senators Graham and Talent quote their conclusion from the Commission on the Prevention of Weapons of Mass Destruction Proliferation and Terrorism in 2010, which stated “unless the world community acts decisively and with great urgency, it is more likely than not that a [biologic] weapon of mass destruction will be used in a terrorist attack somewhere in the world by the end of 2013.”⁸ Anthrax in particular remains such a concern, because of both the lethality of the agent and also the potential availability given the number of governments that produced weaponized anthrax in the past.⁹ The later issue is of concern because of both the availability of expertise as well as the risk of residual caches of anthrax in failed states that are vulnerable for misappropriation. In addition, it may require less expertise to develop aerosolizable anthrax than previously believed.^{8,9} **Box 1** lists the capabilities required of any organization, whether

Box 1**Capabilities required of any organization to conduct and deliver a bioterrorist attack**

1. Organizational capabilities
2. Adequate finances
3. Logistical support
4. Sufficient knowledge and necessary skills
5. Access to materials and technology
6. Ability to culture and propagate the organism
7. Capacity to weaponize and deliver the agent

Adapted from Spencer RC. Potential bio-terror agents. *J Hosp Infect* 2007;65(Suppl 2):19–22; with permission.

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