

Bioterrorism attacks at Mass Gathering Events

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- On 11 December 2024, the Federation Internationale de Football Association (FIFA) announced the 2026 Games will be held in three countries of the North American continent: Mexico, USA and Canada. The 2026 tournament will redefine the concept of hosting by covering the ENTIRE region of North America.

Introduction to Bioterrorism

- Bioterrorism can be broadly defined as the deliberate use of microbial agents or their toxins as weapons and are considered weapons of mass destruction. Biological agents are considered weapons of mass destruction (WMD) because, as with certain conventional, chemical, and nuclear weapons, their use can result in Mass Incidents large-scale morbidity and mortality.
- The Convention on the Prohibition of the Development, Production, and Stockpiling of Biological and Toxin Weapons and on their Destruction (BWC) was ratified in 1972, formally banning the development or use of biological weapons and assigning enforcement responsibility to the United Nations..

Introduction to Bioterrorism

- Despite this, we the accidental release of anthrax spores from a biological weapons plant in the Soviet Union in 1979; intentional contamination of salad bars with Salmonella in Oregon, in 1984; the 1995 of biological weapons discovered during the first Gulf War; and the anthrax attacks by mail in the United States in 2001.
- The scope of worldwide terrorism, exemplified by the massive attacks on New York City and Washington, DC, on September 11, 2001, coupled with mounting geopolitical tensions and the willingness of terrorist organizations to acquire and deploy biological weapons, constitute ample evidence that the specter of bioterrorism continues to pose a global threat.

WHO model of Bioterrorism attack

- A World Health Organization (WHO) model based on the hypothetical effects of the intentional release of 50 kg of aerosolized anthrax spores upwind from a population center of 500,000 (i.e., a midsized metropolitan area) estimated that the agent would disseminate in excess of 20 km downwind and that nearly 200,000 people would be killed or injured by the event.⁶ Biological weapons possess unique properties among WMD.
- The U.S. Strategic National Stockpile maintains the three vaccines and the antivirals tecovirimat and cidofovir for rapid deployment in the case of an outbreak.

Developing the ideal bioterrorism agent

1. Clinical latency period of days to weeks.
2. Diagnostic challenges- Detection is difficult with currently available technology.
3. Human-to-human spread. amplifying the attack and making control difficult.
4. Early detection is critical because specific antimicrobial therapy and vaccines are available for the treatment and vaccines.
5. Psychology of a terrorist of a biological attack and its occult and insidious nature provokes fear and anxiety—“terror”—disproportionate to that seen with other threats.

Management principles and missteps of a bioterrorism attack

1. Bioterrorism management is unique in its synergistic approach - Crisis response and Infectious Diseases expertise infectious diseases principles: disease surveillance, diagnosis, infection control, antimicrobial therapy, post-exposure prophylaxis, and mass vaccinations.
2. Owing to latency/incubation period- Physicians are likely first responders to bioterrorism and will be expected to be resources. Failure for to maintain heightened clinical vigilance/knowledge of presentations of CAT 1 pathogens can be

Management principles and missteps of a bioterrorism attack

3. Agent and the manifestation of signs and symptoms may be days to weeks; thus early detection will require heightened clinical vigilance.
4. After initial victims have been diagnosed, communications among hospitals and other health care institutions on a local, regional, national, and international level in real-time communications is critical to help define the epidemiology and identify possible exposures. Surge capacity in hospitals is a concern. This can help determine the nature of the event - is a malicious attack or emergent from nature.

Management principles and missteps of a bioterrorism attack

5. We must be weary of the misinformation/disinformation 'infodemic' which can be often politically mediated.
6. Bioterrorism is an active area of research, the however the development of field-ready and highly predictive rapid screening tests for many agents of bioterrorism have not reached the point of approval by the FDA and availability in a point-of-care format. Even when the technical capabilities for accurate diagnostics exist, shortages of essential components in the testing supply chain such as swabs, transport media, reagents

Management principles and missteps of a bioterrorism attack

6. Treatment and prevention challenges include the absence of effective therapies for many forms of viral hemorrhagic fevers; shortages in the availability of multivalent antitoxin for botulism; projected shortages in the availability of mechanical ventilators to manage a large-scale botulism attack; lack of human data regarding the use of antiviral agents in smallpox; and the unfavorable toxicity profiles of some currently available smallpox vaccines.

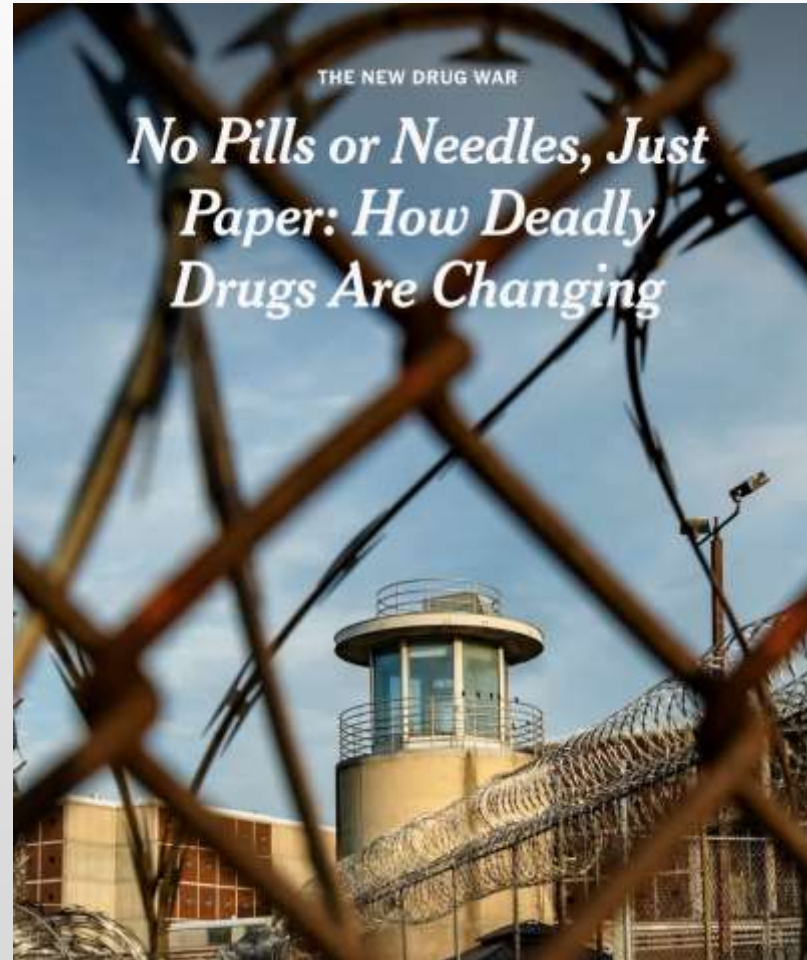
Management principles and missteps of a bioterrorism attack (cont.)

8. Novel infectious agents will require the rapid development of new vaccines and therapeutics and the need to create coordinated plans for equitable distribution and methods to combat vaccine hesitancy.⁵⁷ In addition, scarce and uneven distribution of PPE, testing supplies, and vaccines during the COVID-19 pandemic.
9. Emerging molecular techniques capable of producing genetically altered pathogens with “designer” phenotypes, including antimicrobial or vaccine resistance, combined with advances in artificial intelligence, machine learning, robotics, and tracking of individual data make the specter of highly targeted biological warfare a very real possibility.

Clinical Vignette



A love letter to Jennifer Lopez opened on
9/19/2001



Smallpox

- The last known naturally acquired case of smallpox occurred in Somalia in 1977; in 1980, as the culmination of a 12-year, intensive campaign by the Donald Henderson an epidemiologist and director of the WHO, smallpox became the first and only disease to be eradicated as a scourge of humans. However, because of concerns that variola virus stocks may have either been removed from or sequestered outside of their WHO-designated repositories, smallpox is considered to be a potential agent of bioterrorism. The suspicion of a single smallpox case should prompt immediate notification of local public health authorities and the hospital epidemiologists
- It is stable in aerosol form with a low infective dose; case fatality rates approach 30%; secondary attack rates among unvaccinated close contacts are 37–88% and are amplified, especially in healthcare settings; and much of the world's population is susceptible.

Smallpox



Smallpox management

- In 2018, the antiviral agent tecovirimat (TPOXX) was approved by the FDA for treatment of smallpox. Antiviral drugs cidofovir and brincidofovir have also been shown to be effective in animal trials but have not been approved by the FDA for treatment of smallpox in humans.
- Smallpox vaccines have allowed for global immunization efforts and ultimately the eradication of naturally occurring smallpox. The two currently approved smallpox vaccines in the United States are ACAM2000 and JYNNEOS (also known as Imvamune or Imvanex). Additionally, the Aventis Pasteur Smallpox vaccine may be used in a smallpox emergency under Emergency Use Authorization or Investigational New Drug application.

Botulism

- Botulism is an acute neurologic disease resulting from intoxication with *Clostridium botulinum* that occurs sporadically and in focal outbreaks throughout the world.
- Aerosol forms of the toxin, a rare mode of acquisition in nature, have been weaponized for use in bioterrorism although their actual use has never been documented. Botulinum toxin is considered to be the most toxic molecule known; it is lethal to humans in minute quantities and acts by blocking the release of the neurotransmitter acetylcholine from presynaptic vesicles, thereby inhibiting muscle contraction.
- Botulism presents with the clinical features of an acute, afebrile, symmetric, descending, flaccid paralysis without mental status or sensory changes.

- Owing to the need for mechanical ventilation may be prolonged in these patients, the finite resource of ventilators would be rapidly overwhelmed in the event of a large-scale bioterrorism event using botulism toxin, even though these devices are part of the Strategic National Stockpile in the USA for such incidents. New developments in ventilator technology may mitigate some of the predicted shortfalls. Treatment with an equine antitoxin is available in limited supply from the CDC.

Plague

- Plague, a systemic disease caused by the gram-negative pathogen *Yersinia pestis*. Plague is endemic in parts of South East Asia, Africa and the western USA. While naturally acquired disease results from a variety of exposure modes, bioterrorism carried out using aerosolized preparations of the agent would likely result in cases of primary pneumonic plague occurring outside of endemic areas.
- Primary pneumonic plague classically presents as an acute, febrile, pneumonic illness with prominent respiratory and systemic symptoms; gastrointestinal symptoms, purulent sputum production or hemoptysis occur variably.³⁵ Chest roentgenogram typically shows patchy, bilateral, multilobar infiltrates.
- Untreated or inappropriately treated patients progress rapidly to develop respiratory failure, vascular collapse, purpuric skin lesions, necrotic digits and death.

Plague (cont.)

- The diagnosis may be suggested by observing the characteristic small, gram-negative, coccobacillary forms in sputum specimens with bipolar or 'safety pin' pattern uptake of Giemsa stain. Culture confirmation is necessary to confirm the diagnosis; the microbiology laboratory should be notified in advance if plague is suspected, as special techniques and precautions must be employed to prevent inadvertent transmission to laboratory personnel.

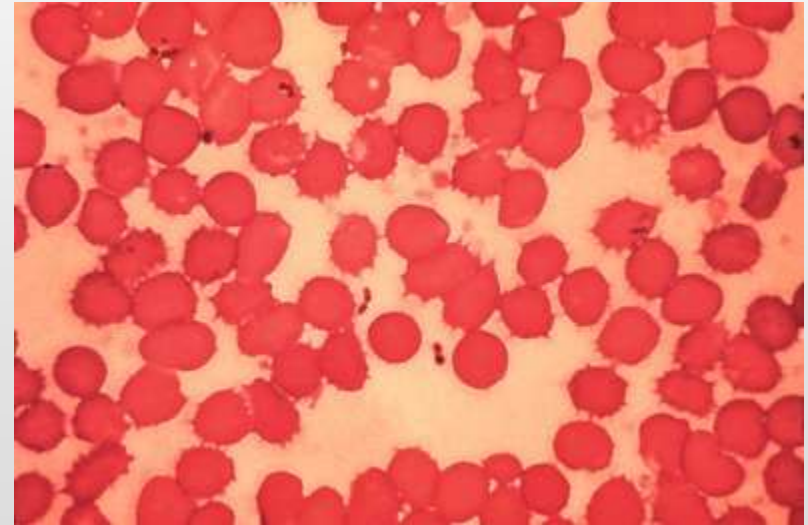
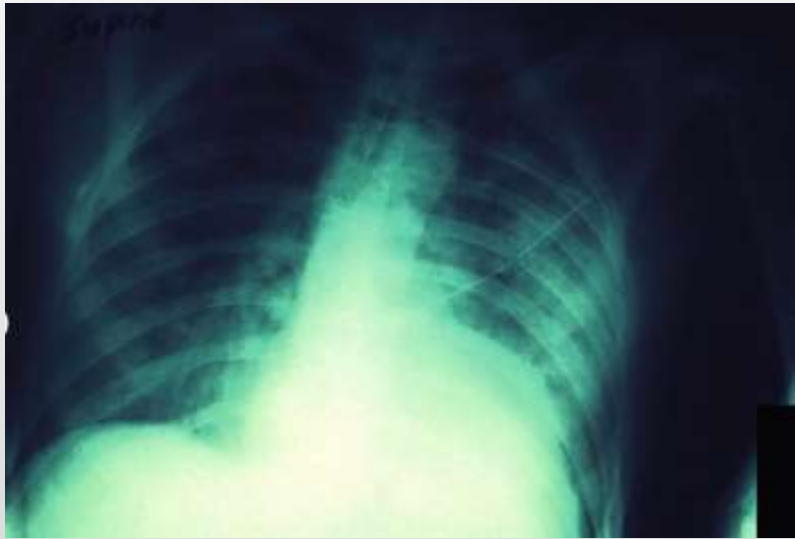
Plague (cont.)

- Chest X-ray, pneumonic plague, demonstrating multilobar infiltrates. Peripheral blood smear demonstrating bipolar uptake of stain, the so-called 'safety pin' appearance of *Yersinia pestis*. (Courtesy of CDC and Dr Jack Poland)

Plague (cont.)

- Treatment recommendations for plague is Streptomycin +/- a quinolone.
- Pneumonic plague can be transmitted from person-to-person by respiratory droplet nuclei, thus placing close contacts.
- Domestic cats may participate in maintaining a transmission chain during a bioterrorism event.
- Prompt recognition and treatment of cases, appropriate deployment of postexposure prophylaxis, and early institution of droplet precautions for infected individuals will interrupt secondary transmission of plague.

Plague (cont.)



Tularemia

- The causative agent of tularemia, *Francisella tularensis*, is another small gram-negative coccobacillus that would be predicted to cause a primary pneumonic illness if delivered as an aerosol in a bioterrorism event. In its zoonotic form, it causes ulceroglandular diseases.
- One of the most infectious pathogens known, as few as 10 to 50 inhaled organisms have been shown to be capable of producing disease.
- Pulmonic tularemia presents with the abrupt onset of a febrile systemic illness with prominent upper respiratory symptoms, pleuritic chest pain, and the variable development of pneumonia, hilar adenopathy, and progression to respiratory failure and death in approximately 30% of inappropriately treated patients.
- The diagnosis is generally established on clinical features and microbiologic data. Laboratory personnel should be notified in advance if tularemia is suspected, as the organism can be very infectious when manipulated in laboratory conditions.
- Treatment of tularemia is antibiotic-based. The preferred first-line choice of antibiotics for adults is streptomycin/gentamicin 5 mg/kg given IM or intravenously (IV).

Daily News Ebola



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Minimum standards and recommendations for medical teams responding to highly infectious disease outbreaks

EMERGENCY MEDICAL TEAMS

