



Bioterrorism: Where Do We Stand?

While acts of bioterrorism have been the subject of discussion for some time, they were always perceived as a possibility rather than a reality. Recent events have shown the threat of bioterrorism can be very real.

By John M. Embil, MD, FRCPC, and Lindsay E. Nicolle, MD, FRCPC

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Bioterrorism involves the deliberate or intentional release of biologic agents by terrorists into civilian populations.¹ Germ warfare has been used in the past during times of war. Unlike bombs, which also can destroy buildings and the environment, biologic weapons are solely targeted at humans — to make them sick or kill them.

In 1979, reports of an accidental release of anthrax from a military microbiology laboratory in Sverdlovsk, USSR, identified 66 related deaths from within 4 km downwind of the release point.² The reported incubation period ranged from one to 43 days, demonstrating the serious and devastating consequences of such agents in the environment.²



Dr. Embil is associate professor, departments of medicine and medical microbiology, University of Manitoba, and consultant, infectious diseases, University of Manitoba teaching hospitals. He also is director, infection prevention and control unit, HSC, Winnipeg.



Dr. Nicolle is professor and consultant, infectious diseases, University of Manitoba teaching hospitals, Winnipeg, Manitoba. She also is editor-in-chief, *Canadian Journal of Infectious Diseases*.

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This article has been prepared to heighten awareness about the possibility of bioterrorist activities. While acts of bioterrorism have been discussed for some time, they were always perceived as more of a possibility than a reality. Recent events in the news have highlighted the threat of bioterrorism. Physicians are likely the first individuals to detect an unusual disease/infection, and report it to the public health department.³ Physicians will also be involved in providing care for victims of bioterrorist activities.⁴ It is the intent of this article, therefore, to discuss bioterrorism and the agents that may be used for bioterrorist activities.

Germs For War and Terrorism?

In addition to illness and death from the release of a biologic agent, there are psychological and

social responses that may occur within a population. Individuals and communities may display horror, anger, panic, fear of bacteria and viruses, as well as fear of invisible agents and infectious diseases; anger at terrorists, the government or both. They may also experience symptoms of paranoia, social isolation and loss of faith in social institutions, such as government and health care.⁵

There may be “copycats” who alarm the public by phoning in threats or mailing alleged agents of bioterrorism. Each of these incidents, when reported in the media, creates additional fear and panic among the population. Consequently, the perpetrators achieve their goal of disrupting society.

In anticipation of potential biological warfare, modelling has been undertaken to estimate the

Summary

Bioterrorism: Where Do We Stand?

- Physicians are likely the first individuals to detect an unusual disease/infection, and report it to the public health department.
- Physicians will also be involved in providing care for victims of bioterrorist activities.
- Many agents cause disease and disability in humans, but selected attributes determine whether an agent may be suited for bioterrorist activity. These attributes include the mode of transmission, stability in nature and ease of distribution in nature.
- A number of agents common in nature have been considered potential bioterrorist agents. Although naturally occurring, they seldom cause human disease. The exception is smallpox.
- Smallpox is an infection caused by the variola virus. Humans are the only known hosts and reservoirs.
- Plague is caused by the gram-negative bacillus, *Yersinia pestis*. Rodents are the usual reservoirs, and plague is transmitted from rodents to humans by fleas.
- Anthrax is an infectious disease most frequently seen in livestock. It is caused by a gram-positive, spore forming bacteria, *Bacillus anthracis*.
- If a cluster of patients with an unusual disease occurs, it is possible that this represents an act of bioterrorism.
- If an act of bioterrorism is suspected, contact the local police department's non-emergency phone number and the local public health department.

potential consequences of the release of certain biologic agents into a population. It has been speculated that an aircraft's release of 50 kg of the following agents along a 2 km stretch upwind from a population of 500,000 could have the associated consequences:

- Rift Valley Fever Virus: Could reach 1 km downwind, leaving 400 dead and 35,000 incapacitated.
- *Coxiella burnetii*: The agent responsible for Q fever could reach 20 km downwind, leaving 150 dead and 125,000 incapacitated.
- *Bacillus anthracis*: Could travel 20 km downwind, killing 95,000 and incapacitating 125,000.^{6,7}

Should an attack of this nature ever occur, the consequences could be grave, particularly if an agent with human-to-human transmission is used. In this scenario, the opportunity for a propagated outbreak could occur with significant morbidity and mortality, as well as a rapid depletion of available health-care resources.

Are All Biologic Agents Useable For Bioterrorism?

Many agents cause disease and disability in humans, but selected attributes determine whether an agent may be suited for bioterrorist activity. These attributes include the mode of transmission, stability in nature and ease of distribution in nature. Factors that facilitate widespread use include:

- Availability for acquisition or production;
- Ease of aerosolization;
- Ability to be easily dispersed over a wide area;
- Resistance to sunlight, drying, heat and cold;
- Potential for serious or lethal infections;
- Potential for person-to-person transmission; and

- Lack of effective therapy or preventive treatments.

Although contaminated letters have been mailed recently — causing illness in a few and potential exposure in many — this is an inefficient method for the distribution of biologic agents in that it only targets a small number of individuals. This technique, however, has a significant psychologic impact, with a strong terrorist effect. Dissemination of an agent either in air or water is potentially more effective, as the number of potentially affected individuals is greater.^{6,8,9}

Selected attributes determine whether an agent may be suited for bioterrorist activity. These attributes include the mode of transmission, stability in nature and ease of distribution in nature.

What Agents Are Used For Bioterrorism?

A number of agents common in nature have been considered potential bioterrorist agents. Although naturally occurring, they seldom cause human disease. This is because they are primarily agents harbored by, or that cause disease in, animals. The exception is smallpox, which was declared eradicated from the human population in 1980.¹⁰ The agents most likely to be used in a bioterrorist attack are shown in Table 1. In addition to agents that may harm or kill humans,

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Table 1

Characteristics of Biologic Agents Used For Bioterrorism

| Agent | Disease | Infectious Aerosol Dose | Incubation Period (days) | Clinical Presentation | Other Clinical Manifestations |
|---|-------------------------|-------------------------|--------------------------|---|--|
| <i>Bacillus anthracis</i> | Anthrax | 8,000 to 50,000 spores | 1 to 5 | Pneumonia | Cutaneous, gastrointestinal. |
| Variola virus Severe | Smallpox | 10 to 100 virus | 7 to 17 particles | Umbilicated pustules | Variola major: condition. Variola minor: Less severe condition. |
| <i>Brucella spp</i> | Brucellosis | 10 to 100 bacteria | 5 to 60 | Fever, chills, malaise | Cough, arthritis, osteomyelitis, hepatitis, endocarditis. |
| <i>Yersinia pestis</i> | Plague | 100 to 500 bacteria | 2 to 3 | Pneumonia | Bubonic, primary septicemic plague. |
| <i>Coxiella burnetii</i> | Q fever | 1 to 10 bacteria | 10 to 40 | No single symptom is characteristic of Q fever. Hepatitis, endocarditis, arthritis, fevers, chills and malaise can be manifestations of Q fever. | |
| <i>Francisella tularensis</i> | Tularemia | 10 to 50 bacteria | 2 to 10 | Depends upon site of inoculation: ulceroglandular, glandular, oculoglandular, oropharyngeal, pneumonic, typhoidal, septic. | |
| <i>Clostridium botulinum</i> | Botulism | 0.001 µg/kg (type A) | 1 to 5 | Flaccid paralysis, with bulbar symptoms specifically blurred vision, diplopia ptosis, photophobia dysarthria, dysphonia and dysphagia. Descending symmetrical muscle paralysis and progressive respiratory failure. | |
| Eastern, Western Venezuelan, equine encephalitis | Viral encephalitis | 10 to 100 viruses | 2 to 14 | Encephalitis, fever, headache, myalgia, loss of consciousness. | |
| Ebola, Rift Valley Fever, Korean Hemorrhagic and Yellow Fever viruses | Viral-hemorrhagic fever | 1 to 10 viruses | 4 to 21 | Fever, chills, myalgia, prostration, petechial hemorrhages, shock, mucosal membrane hemorrhages. | |

Modified from references 3,4,10.

anti-crop agents, such as rice blast, rice stem rust and wheat stem rust, have been considered dangerous because they can damage or destroy crops and result in famine.⁶

There are many agents that can be used for bioterrorism. The most frequently encountered are summarized in this article. Anthrax has gained public attention because of the recent letters mailed in the U.S. contaminated with anthrax spores. Other agents that may be used for bioterrorist activity include plague, smallpox and a number of naturally occurring bacteria. These agents are summarized in the following paragraphs and in Table 1.

What Is Plague?

Plague is caused by the gram-negative bacillus, *Yersinia pestis*. Rodents are the usual reservoirs, and plague is transmitted from rodents to humans by fleas. With pneumonic plague, the infection is rarely transmitted directly between humans.¹⁰⁻¹² The three clinical presentations of plague are as follows:

- **Bubonic plague** results in swollen regional lymph nodes (bubo) as a result of bacterial proliferation after being bitten by an infected flea. The affected nodes are exquisitely tender and there is associated fever, chills and weakness. Most patients with bubonic plague do not have other skin lesions, while some



Although pneumonic plague has a poor outcome if left untreated, early interventions with antimicrobial therapy lowers mortality.

become septicemic as a consequence of an overwhelming infection.

- **Septicemic plague** results in septicemia without a bubo, as compared to bubonic plague with secondary bacteremia.
- **Pneumonic plague** results from the hematogenous spread of bacteria from the bubo of bubonic plague. This condition is highly contagious by airborne transmission. Radiographically, a bronchopneumonia may be observed, and the sputum yields *Y. pestis* in culture. The outcome of pneumonic plague is

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Table 2

Investigation & Management of Biologic Agents Used For Bioterrorism

| Agent | Laboratory Diagnosis† | Isolation Precautions†† | Post-exposure Prophylaxis††† | Therapy††† |
|-------------------------------|---|---|--|--|
| <i>Bacillus anthracis</i> | Gram's stain and culture of sputum exudate and tissue. | Routine | <u>Adults</u> (including pregnant women): ^{¥Σ} ciprofloxacin 500 mg po bid or doxycycline 100 mg po bid. <u>Children</u> : ciprofloxacin 15-20 mg/kg po q 12 h or doxycycline. ^{¥Σ} | Ciprofloxacin 400 mg IV q 8-12h or doxycycline 200 mg IV, then 100 mg IV q 12 to 12h or penicillin 2 million units IV q 2h & streptomycin 30 mg/kg IM q d (or gentamicin). |
| Variola virus | Pustular material for electron microscopy and virus isolation. | Airborne. | Vaccinia immunoglobulin 0.6 mL/kg, IM within 3 days of prophylaxis (limited supply). Vaccination if > 3 years since last vaccination. | None at present. |
| <i>Brucella spp</i> | Culture of blood, bone marrow. Acute and convalescent serology. | Standard precautions, contact isolation if draining lesions. | Doxycycline and rifampin for 3 weeks. | Doxycycline 200 mg po od and rifampin 600-900 mg/day for 6 weeks. |
| <i>Yersinia pestis</i> | Culture of blood, sputum, lymph node aspirates. Serology. | Droplet precautions for pneumonic plague until 2 days of treatment. | Tetracycline 500 mg po. | Streptomycin 30 mg/kg IM daily in 2 divided doses, for 10 days (or gentamicin) or doxycycline 200 mg IV followed by 100 mg IV q 12h for 10 to 14 days or chloramphenicol 1 gm IV q 6h for 10 to 14 days for meningitis and sepsis. |
| <i>Coxiella burnetii</i> | Serology. | Routine. | Start 8 to 12 days post-exposure: | Tetracycline 500 mg po q 6h for 5 to 7 days or doxycycline tetracycline or 100 mg po q 12h for 5 to 7 doxycycline for 5 days. |
| <i>Francisella tularensis</i> | Culture of blood, tissue, pus, sputum. Serology. | Routine. | Doxycycline 100 mg po q 12 h for 14 days or tetracycline 2 g/day po for 14 days. | Streptomycin 30 mg/kg IM daily for 10 to 14 days or gentamicin 3-5 mg/kg IM daily for 10 to 14 days. |

Continued on next page

Table 2 (cont'd)

Investigation & Management of Biologic Agents Used For Bioterrorism Cont'd

| Agent | Laboratory Diagnosis [†] | Isolation Precautions ^{††} | Post-exposure Prophylaxis ^{†††} | Therapy ^{†††} |
|---|---|--|--|---|
| <i>Clostridium botulinum</i> | Inhalation: Lab investigations unhelpful. Ingestion: Toxin may be detected in gastric aspirates. | Routine. | Equine antitoxin. | Equine antitoxin. |
| Eastern, Western, Venezuelan, equine encephalitis | Virus isolation: Cerebrospinal fluid. Serology: Blood and cerebrospinal fluid. | Routine. | None. | None. |
| Ebola, Rift Valley Fever, Korean Hemorrhagic and Yellow Fever viruses | Virus isolation: cerebrospinal fluid. Serology. | Contact and droplet precautions. Airborne precautions if pneumonia. | None. | Ribavirin may be of benefit in some cases; immunoglobulin also may be of benefit. |

*Modified from references 3,4,10.

[†]Laboratory diagnosis: Prior to submitting specimens in which any of these agents is suspected, notify the laboratory staff because specific biologic safety precautions are required to work with these agents.

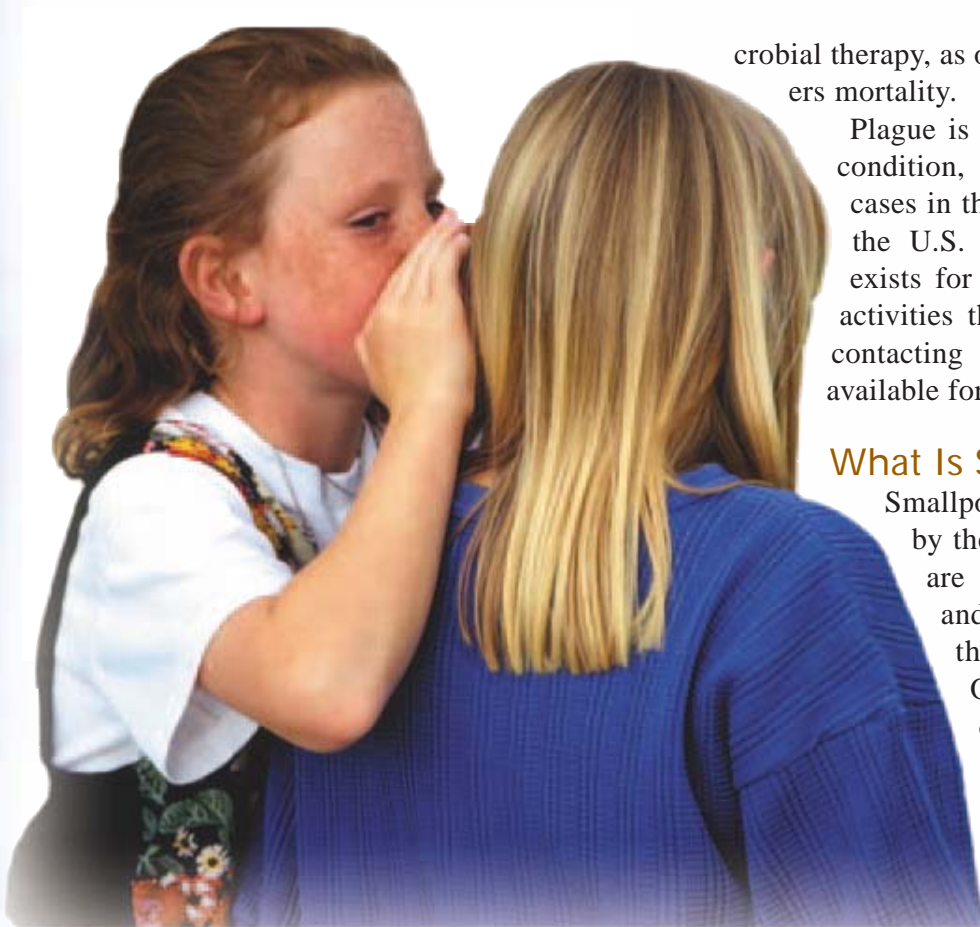
^{††}Prior to initiation of isolation precautions, check with local infection control personnel to ensure current recommendations are being followed. (*i.e.*, routine precautions: single room generally not required; airborne precautions: single room with negative pressure ventilation required; droplet precautions: ideally single room; contact precautions: a single room is preferable).

^{†††}Post-exposure prophylaxis and/or therapy: Prior to initiating prophylaxis or therapy, contact local health officials to ensure that prescribed regimen is in compliance with current local recommendations

[‡]If susceptibility testing indicates penicillin susceptibility, amoxicillin (adult dose: 500 mg po tid; pediatric dose: 80 mg/kg po q 8h) should be substituted for either ciprofloxacin or doxycycline and continued for 45 to 60 days (modified from references 4 and 18).

[∑]Tetracyclines and fluoroquinolones may have adverse affects in children. The risks and benefits must be considered prior to initiating therapy. If their use is indicated, the dosing regimens are: ciprofloxacin 15-20 mg/kg po q 12h or doxycycline: > 8 years and > 45 kg: 100 mg po bid, *OR* > 8 years and < 45 kg: 2.2 mg/kg po bid, *OR* < 8 years: 2.2 mg/kg po bid. Contact local health officials for additional details (modified from references 4 and 18).

[∞]Tetracyclines are not routinely recommended in pregnancy, however, their use may be necessary. Prior to initiating therapy, contact local health authorities.



The major concern with smallpox as an agent of bioterrorism are its high transmissibility, current lack of population immunity and lack of therapy.

poor, with nearly all patients dying if therapy is delayed for more than one day.¹⁰⁻¹²

Plague was known as the “Black Death” because of purpuric lesions of the distal extremities, which became gangrenous as a consequence of vasculitis with small vessel occlusion, hemorrhage and subsequent necrosis.¹¹ Although pneumonic plague has a poor outcome if left untreated, early interventions with anti-

microbial therapy, as outlined in Table 2, lowers mortality.

Plague is considered to be a rare condition, but there are sporadic cases in the southwestern parts of the U.S. every year. A vaccine exists for individuals involved in activities that put them at risk of contacting *Y. pestis*, but it is not available for the general population.

What Is Smallpox?

Smallpox is an infection caused by the variola virus. Humans are the only known hosts and reservoirs.¹³ In 1980, the World Health Organization (WHO) declared smallpox had been eradicated, with the last naturally occurring case reported from Somalia in 1977.^{10,13} The virus is still stored in two laboratories in the world, the Centres for Disease Control and Prevention in Atlanta and at the Institute of Virus Preparations in Moscow, Russia. It is

believed that some countries may have maintained illegal stocks of virus.¹⁰ Routine childhood vaccination was discontinued in North America in 1972.

Smallpox was a disease of childhood that would either kill or leave its survivors with long-standing immunity. The disease is characterized by a high fever and myalgia, followed by macules that progress to papules and vesicles. This is

followed by the presence of pustules, which ultimately crust over a seven- to 14-day period. The incubation period is 12 to 14 days after inhalation of an infectious aerosol containing the variola virus.¹⁰ Unlike chickenpox, the lesions of smallpox begin on the face, oro-pharynx and arms, later involving the trunk and lower extremities. Lesions also may develop on the palms and soles.^{10,13} Approximately two weeks after its onset, the lesions heal, leaving scars. The lesions of chickenpox, in contrast, affect the trunk more frequently than the extremities. The lesions of smallpox are synchronous, such that they all develop and resolve in approximately the same time. Chickenpox on the other hand, has lesions at different stages next to each other.^{10,13}

Smallpox is most frequently transmitted through airborne droplets, but can be transmitted through direct contact.¹³ There are two forms of smallpox:

- The severe form, variola major, with a case fatality rate of approximately 30% in unvaccinated individuals; and
- The less severe form, variola minor, with a case fatality rate of approximately 1% and fewer lesions.¹³

Death is believed to occur from the “toxemia” associated with soluble variola virus antigens and circulating immune complexes.¹³

The major concerns with smallpox as an agent of bioterrorism are its high transmissibility, current lack of population immunity and lack of therapy. Vaccination may prevent or lead to a milder illness, and may be effective up to four days after being administered. Although mass vaccination could be undertaken, and sick individuals provided vaccinia immune globulin, these measures may be insufficient to adequately treat and arrest the spread within a community. There is controversy over the best management approach for smallpox. The suggested

techniques include:

- Vaccination of the entire population;
- Vaccination only if disease occurs; or
- Targeted vaccination and quarantine to contain virus in communities where it has become apparent.

Data from *in vitro* studies suggest that cido-

The most common means of anthrax infection are from direct contact with infectious materials, such as the tissues of animals dying from the disease.

fovir, currently used for treating cytomegalovirus, may be effective for smallpox. It is not known, however, whether it would be effective for human disease. Since smallpox is caused by a virus, antibiotics cannot be used to prevent or treat it. Smallpox is very contagious, but can be prevented by vaccination. Table 1 summarizes the characteristics of smallpox.^{10,13}

What Is Anthrax?

Anthrax is an infectious disease most frequently seen in livestock. It is caused by a gram-positive, spore forming bacteria, *Bacillus anthracis*.¹⁴⁻¹⁶ The spores are like small seeds that allow the bacteria to spread and survive in the environment. Human anthrax is uncommon, with sporadic human cases usually arising from contact with sick animals.

Humans can develop several forms of anthrax, depending on the route of exposure.^{15,16} The most common means of infection are from direct contact with infectious materials, such as the tissues of animals dying from the disease (*i.e.*, hair, wool, hides or products made from them, which

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Table 3

Clues That An Act Of Bioterrorism May Have Occurred

- A cluster of people affected with an unusual infectious disease.
- A large number of people become sick with the same disease.
- A sudden increase in the number of people with unexplained disease or deaths.
- A single occurrence of an unusual disease, such as smallpox, viral hemorrhagic fever or pulmonary anthrax.
- Multiple, unusual or unexplainable conditions occurring in the same person without another explanation.
- A disease occurring out of its geographic or seasonal distribution.
- A sudden increase in an unusual disease presentation.
- Failure of conventional therapy for common diseases, suggesting a unique strain.
- People becoming ill in a defined geographic region and/or multiple sick people presenting to medical attention at the same time.
- An aerosol route of infection.
- Low illness attack rates for people working in areas with filtered air.
- Sudden death of sentinel animals of multiple species.
- Similar strain or genetic type of agents recovered from multiple sources at different times or locations.
- Unique properties of the agents recovered, suggesting genetic engineering.
- Simultaneous occurrence of similar illnesses in distinct geographic regions, both nationally and internationally.

Modified from reference 3.

may contain the spores). The typical lesions of cutaneous anthrax begin as an area of cellulitis at the site of trauma and inoculation of the spore. Within several days, a black eschar develops with surrounding gelatinous edema. This is the most common presentation.^{14,15}

Pulmonary anthrax results from inhalation of the spores. This was called “Woolsorters Disease,” and was associated with the industrial processing of hides, wool and bone.^{14,15} The gastrointestinal form of anthrax, the least com-

mon, results from the consumption of contaminated, undercooked meat. The death rate from untreated anthrax is inhalational, 97%; gastrointestinal, 25% to 60%; and cutaneous, 20%.^{13,15,16}

Table 2 lists recommended prophylactic and therapeutic interventions for anthrax from Health Canada, as well as suggestions from the U.S. Centres for Disease Control and Prevention.^{4,8,9,17}

Anthrax is not spread from person to person and has not been used as a bioterrorist weapon in Canada. There have, however, been countless reports of “white powder,” leading to numerous responses by local police and fire departments. If an environmental surface is believed to be contaminated with the spores from *B. anthracis*, a 1:10 solution of household bleach can be used.

Although *B. anthracis* is usually susceptible to penicillin, some strains show resistance. Doxycycline and ciprofloxacin, therefore, have been recommended for prophylaxis. Once the antimicrobial susceptibility profile of the micro-organism has been established, prophylaxis and therapy, if necessary, can be modified according to the susceptibility profiles.

What Other Agents Could Be Used For Bioterrorism?

Table 1 lists other agents considered potential bioterrorist agents.

Brucella species traditionally causes disease, known as undulant fever, in livestock.^{10,18} In humans, *brucella* species is associated with either an acute or insidious illness characterized by fever, malaise, sweating, arthralgia and hepatosplenomegaly. These symptoms are vague, difficult to evaluate and may be confused with an underlying malignancy.

Coxiella burnetii causes Q fever. This also presents with nonspecific signs and symptoms, as shown in Table 1.

Tularemia, caused by *Francisella tularensis* — such as brucellosis and Q fever — may be difficult to diagnose. Its manifestations may be vague and poorly differentiated.^{10,19} Tularemia may present as one of seven following different forms:

- **Ulceroglandular tularemia** is associated with an ulceration at the site of inoculation of the micro-organisms and swelling of the regional

lymph nodes. This is the most frequent form.^{10,19}

- **Glandular tularemia** is associated with painful lymphadenopathy without the presence of an ulceration.

The viral hemorrhagic fevers experienced heightened recent interest with the outbreak of ebola in Africa. Traditionally, these are transmitted to humans from infected animal reservoirs by arthropod vectors.

- **Oropharyngeal tularemia** occurs after ingestion of contaminated food or water, or after inhalation of contaminated aerosols, resulting in gingivitis, pharyngitis or tonsillitis with or without ulceration.
- **Oropharyngeal tularemia** may be associated with abdominal pain, diarrhea and vomiting.
- **Oculoglandular tularemia** occurs when there is inoculation of micro-organisms into the conjunctival sack, resulting in conjunctivitis with associated regional lymphadenitis.
- **Typhoidal tularemia** is used to describe the systemic infection associated with fever and other constitutional symptoms without the cutaneous or lymph node abnormalities.
- **Pneumonic tularemia** results from the direct inhalation of micro-organisms and subsequent lung infection, or from hematogenous spread to the lung.
- **Tularemia sepsis** can present with nonspecific findings. It may be associated with multiple

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systemic manifestations, such as hypotension, signs of overwhelming sepsis, disseminated intravascular coagulation, adult respiratory distress syndrome and multiple organ failure.^{10,19}

Clostridium botulinum produces the neurotoxin, botulinum toxin, which could be used for bioterrorism. This toxin blocks the release of acetylcholine at the synapse. It is a very toxic agent, requiring only a small amount of toxin for effect.^{10,20} The characteristic finding is of a flaccid paralysis with prominent bulbar palsies.²⁰ The patient is afebrile and alert. An antitoxin may limit progression, but supportive management is frequently necessary because the patient may be profoundly debilitated, including weakness of respiratory muscles. The differential diagnosis of botulism includes Guillain-Barré syndrome, myasthenia gravis, poliomyelitis, Eaton-Lambert syndrome and tick-borne paralysis.⁵

The agents causing viral encephalitides — specifically those responsible for Western, Eastern and Venezuelan equine encephalitis — also may be used as bioterrorist or biologic warfare weapons. They can lead to encephalitis manifesting with fever, headache, decreased level of consciousness, ataxia, seizures and, possibly, death. There is no specific therapy and management is primarily supportive.¹⁰ Vaccines are in the development phases for several of the viruses responsible for equine encephalitis. These members of the genus Alphavirus usually are transmitted by mosquitoes, but may be highly infectious if inhaled. They are stable and can be easily airborne. In addition, they can lead to encephalitis manifesting with fever, headache, decreased level of consciousness, ataxia, seizures and, possibly, death.

The viral hemorrhagic fevers were of heightened recent interest with the outbreak of ebola in

Africa. These viruses cause a febrile illness, characterized by weakness, malaise, vascular permeability and damage to the vascular endothelial lining, causing hemorrhage. Traditionally, the viral hemorrhagic fever viruses are transmitted to humans from infected animal reservoirs by arthropod vectors.

These viruses are highly infectious by aerosols, as was witnessed in the recent outbreaks of ebola virus in Kikwit in 1995 and Gulu in 2000. In both of these outbreaks, there were many nosocomial deaths due to contact with respiratory secretions and other infectious materials. Supportive therapy is necessary and ribavirin may be of benefit for Lassa Fever, but not ebola. A highly effective Yellow Fever vaccine exists, but an effective vaccine is not yet available for preventing the other hemorrhagic fever viruses. For patients requiring hospitalization, appropriate isolation is essential to prevent nosocomial transmission.^{10,21}

What Clues May Signal An Act Of Bioterrorism?

Table 3 highlights the most likely hints that an act of bioterrorism may have occurred. It is important to note that if a cluster of patients with an unusual disease occurs, it is possible this represents an act of bioterrorism. One must not forget, however, a more likely explanation based upon local epidemiology in Canada. At press time, there have been no known cases of bioterrorism in Canada.

What Are Bioterrorism Hoaxes?

Since there is a major fear of infection with bioterrorism agents, false alarms concerning anthrax and other biologic agents will occur. In 12 reported “false alarms” in the U.S. during

1998 and 1999, where more than 200 people had to be evacuated or quarantined, the total number of individuals involved was 11,780.²² The fear and panic created in the communities in which it occurred was significant. Following these events in the U.S., there have been numerous “false alarms” throughout Canada.

What Should Be Done If Bioterrorism Is Suspected?

If an act of bioterrorism is suspected, contact the local police department’s non-emergency phone number and the local public health department. Physicians should refrain from establishing a diagnosis or initiate prophylaxis or treatment of a patient for a potential agent used in bioterrorism, unless they consult with the local public health department. The medical officer of health can provide consultation prior to initiation of diagnostic or therapeutic interventions, and prior to consulting an infectious diseases specialist. This will serve to establish the nature and risk of the exposure. CME

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5. www.usamriid.army.mil/education/bluebook.html
6. www.usps.com/news/2001/press/pr01_1010tips.htm
7. www.who.int/disease-outbreak-news/pdfs/Anthrax_Fact_sheet.pdf