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BIOTERRORISM

Bioterrorism (BT) refers to the threat of terrorists using biological agents against civilian and/or military populations. There is a broad range of potential biological agents that include bacteria, viruses and toxins. Common characteristics of this diverse group of agents include the ability to disperse them in aerosols of 1-5 micron particles so that they could be delivered from a line source (e.g., airplane) to infect large numbers of people.

The following are the most likely agents of bioterrorism. Each is discussed in detail with regard to description of the agent and patient care issues in subsequent sections.

Agent	Type	Incubation	Clinical symptoms	Diagnosis
Anthrax	<i>Bacteria</i>	2-60 days	Cutaneous: raised papule; fills with fluid within 1-2 days & ruptures into a painless ulcer with black center. Inhalational: Nonspecific viral syndrome followed in 2-5 days by severe respiratory distress, mediastinitis, shock and death.	Inhalational: Widened mediastinum on CXR Blood, pleural fluid, CSF, wound culture
Plague	<i>Bacteria</i>	2-3 days	Acute onset of fever, cough with bloody sputum; may develop respiratory failure.	Blood and sputum culture to confirm
Tularemia	<i>Bacteria</i>	3-5 Days	Pneumonic: fever, nonproductive cough, pleuritic chest pain, substernal tightness, chills, headache, malaise, anorexia & fatigue. Systemic: nondescript febrile illness; more common in persons with chronic disease. Oropharyngeal/Glandular: enlarged lymph nodes & skin lesions.	Pleural fluid: >1000 wbc/mm ³ , CXR: ± infiltrates Lymphocytosis Cultures of blood, ulcer, sputum, pharyngeal exudate; requires special media
Q- Fever	<i>Rickettsia</i>	2-14 days	Fever, nonproductive cough, severe headache, fatigue and myalgias.	Serology
Smallpox	<i>Virus</i>	7-17 days	Acute onset fever; followed in 2-3 days by macules progressing to pustules - most on extremities and face and synchronous stage of development.	Pharyngeal swab Scab material PCR/DFA or culture (reference lab only)
Viral Hemorrhagic Fever	<i>Virus</i>	5-42 days	Fever, myalgia, prostration, conjunctival, hypotension, flushing, petechial hemorrhages, shock and generalized hemorrhage.	Clinical signs/symptoms Serology
Botulism	<i>Toxin</i>	1-5 days	Blurred vision, diplopia, dry mouth, ptosis, symmetrical, descending paralysis.	Clinical signs/symptoms Serology

Other possible agents/diseases include Brucellosis, Cholera, Glanders, viral encephalitis, or contact with ricin, mycotoxins, or Staphylococcal enterotoxin B. Any suspected cases of disease with, or exposure to, a biological agent must be reported **immediately** to **YNHH Hospital Epidemiology** (688-4634, after hours-call page operator 688-4242), the **CT Department of Public Health** (860-509-7994, after hours 860-509-8000) and the **local health department**. YNHH Occupational Health Services must be notified immediately in the event of any healthcare worker exposure (688-2462). The laboratory must be notified **prior** to sending any specimens for processing.

PROCEDURE

- I. Detection of a bioterrorism attack:
 - A. Announced attack:
 1. In an announced attack, persons are warned that an event has occurred. Notification and preparation should proceed, as per the YNHH Emergency Preparedness Plan, until the attack is ruled a "hoax" by the proper authorities (law enforcement, CT Department of Public Health, and YNHH Administration).
 - a. The Incident Command System will be activated.
 - 1) Key staff will be notified to begin implementation of departmental disaster plans.
 - 2) Security personnel will secure all hospital exits and entrances with the exception of the ED ambulance entrances. All employees, medical staff and contractual workers will be required to wear their picture ID badges. Only persons with proper identification will be allowed to enter the hospital during this emergency.
 - 3) A designated area will be assigned for the media.
 - 4) All elective admissions and procedures will be canceled until authorities rule out an actual attack.
 - 5) Patient informational material and home care instructions for the most likely biological agents to be used in an attack are available on the electronic Infection Control Manual (accessible on the clinical workstations). Additional materials are can be obtained from the CDC (www.cdc.gov).
 - b. The ED Decontamination Room will be prepared for use if the bioterrorist agent necessitates decontamination. Exposed persons will be triaged to the ED Decontamination Room by the ED staff.
 - 1) Clothing of exposed persons should be removed at the decontamination site and placed in an impervious bag by staff wearing appropriate personal protective equipment (PPE), labeled, and placed in a secure area.
 - 2) The FBI may request clothing as evidence in their investigation.
 - B. Covert Event:
 1. Due to the rapid progression to illness and the methods of dissemination of biological agents, prompt identification and response is necessary. Healthcare workers should be alert to the possibility of a bioterrorism attack with the recognition of certain high risk symptoms/scenarios:
 - a. An unusual increase in the number of persons seeking care with fever, respiratory or gastrointestinal complaints;
 - b. A rapidly increasing incidence (hours to days) of disease in a normally healthy population;
 - c. An unusual pattern to a rapidly emerging endemic disease;
 - d. An endemic curve which rises and falls during a short period of time;
 - e. Clusters of persons arriving from the same locale;
 - f. Large numbers of rapidly fatal cases;
 - g. Lower attack rates among people who had been indoors;
 - h. Persons presenting with a relatively uncommon disease that has bioterrorism potential (e.g. pulmonary anthrax, pneumonic plague, smallpox, tularemia).
 2. Upon suspicion that a covert bioterrorist event has occurred, YNHH Administration, YNHH Hospital Epidemiology and the CT Department of Public Health are to be notified immediately.
 3. YNHH Administration, in consultation with YNHH Hospital Epidemiology, will determine when to initiate the Incident Command System and other procedures as outlined under

"Announced Attack". Decontamination, if necessary, will proceed as described under "Announced Attack".

II. Patient Management:

- A. All patients, regardless of diagnosis or possible exposure to a bioterrorist agent, are to be cared for using **Standard Precautions**:
1. Hand hygiene before and after contact with every patient;
 2. Gloves are to be used when contact with blood, body fluids, secretions, excretions (except sweat) and/or non-intact skin is anticipated;
 3. Gowns to protect clothing and skin during procedures likely to generate splashes;
 4. Face shields or masks and eye protection are to be worn when splashes may be generated during procedures;
 5. Contact, Droplet, and/or Airborne Precautions may be required in addition to Standard Precautions. Information regarding pathogen specific requirements can be found in the electronic Infection Control Manual (accessible on the clinical workstations).
 6. Appendix 1 - Bioterrorism; Infection Control Practices for Patient Management
- B. For a large scale event, triage procedures will be necessary as described in the YNHH Emergency Preparedness Plan.
1. Cohorting patients presenting with the same symptoms/syndrome may be necessary. Contact Hospital Epidemiology for guidance.
- C. Environmental cleaning will follow the principles of Standard Precautions as documented in the electronic Infection Control Manual.
1. Exceptions are noted in the "Bioterrorism - Infection Control Practices for Patient Management" section of the electronic Infection Control Manual.
- D. Clinical laboratories, pathology, Medical Examiner's Office and mortuaries must all be informed of the potential infectious outbreak prior to submitting specimens for examination or disposal.
1. Specimen packaging and handling must be coordinated with the CT Department of Public Health and the FBI (if considered possible evidence). A chain of custody document must accompany the specimen from time of collection. For specific instruction on specimen transport contact the CDC Emergency Response Office, Bioterrorism Emergency, (770) 488-7100.
 2. Infection control guidelines for post-mortem care are noted in the "Bioterrorism - Infection Control Practices for Patient Management" section of the electronic Infection Control Manual.

III. Responsibility

- A. Bioterrorism preparedness and management is a multidisciplinary effort which includes YNHH Administration, Nursing, Hospital Epidemiology, Emergency Department, Occupational Health, Pharmacy, Laboratory Services, and others as needed.
- B. Hospital Epidemiology has authority to make final decisions regarding patient placement and infection control measures.

IV. Reporting

- A. Suspected bioterrorism events must be reported immediately to Hospital Epidemiology (688-4634, 688-4242 after hours), CT Department of Public Health (860/509-7994, 860/509-8000 after hours)/local health department, CDC, and FBI (203/777-6311).

AGENT SPECIFIC RECOMMENDATIONS

I. ANTHRAX

A. Etiology

Anthrax is an acute infectious disease caused by *Bacillus anthracis*, a spore forming, gram-positive bacillus. Associated disease occurs most frequently in sheep, goats, or cattle, which acquire spores through ingestion of contaminated soil. Humans can become infected through skin contact, ingestion, or inhalation of *B. anthracis* spores from infected animals or animal products (as in “wool sorter’s disease”). **Person-to-person transmission does not occur, even with inhalational disease.** Direct exposure to secretions of cutaneous anthrax lesions may, however, result in secondary cutaneous infection.

B. Clinical Features

Human anthrax infection can occur in three forms: pulmonary, cutaneous, or gastrointestinal, depending on the route of exposure. Clinical features for each form of anthrax include:

Pulmonary (Inhalational Anthrax)

- Non-specific prodrome of **flu-like symptoms** follows inhalation of infectious spores.
- Differentiating pulmonary (inhalational) anthrax from influenza:

Symptom	Pulmonary Anthrax	Influenza
Shortness of breath	80%	6%
Pleuritic chest pain/discomfort	60%	35%
Sore throat	20%	64-84%
Rhinorrhea	10%	79%
Nausea/vomiting	80%	12%

- Possible brief interim improvement; however illness can be continuous.
- Two to four days after initial symptoms, **abrupt onset of respiratory failure** and hemodynamic collapse, possibly accompanied by thoracic edema and a **widened mediastinum on chest radiograph** suggestive of mediastinal lymphadenopathy and hemorrhagic mediastinitis. Pleural effusions are common. Infiltrates were seen in addition to the above in the series of cases from October to November 2001.
- Chest CT reveals **enlarged hyperdense nodes with mediastinal edema.**
- Meningitis can occur in up to 50% of late cases.
- Gram-positive bacilli on blood culture, usually after the first two to three days of illness. Blood cultures are usually positive within the first 24 hours of incubation. CSF and pleural fluid gram stain and culture are helpful if obtained before antibiotic treatment. Nasal and sputum cultures are *not* helpful in diagnosis.
- Nasal cultures are performed *only* as part of an epidemiologic investigation that may be ordered by Hospital Epidemiology, Occupational Health Service,

and/or the CT Department of Public Health. The laboratory will be notified by Hospital Epidemiology in the event that nasal swabs are required as part of an epidemiologic investigation.

- Treatable in early prodromal stage. Mortality historically has been high, 80-90%; 2001 cases, mortality rate 45%.
- Appendix 2 - Clinical Evaluation of Ill Persons with Respect to Possible Inhalational Anthrax

Cutaneous

- Local skin involvement after direct contact with spores or bacilli.
- Commonly seen on the head, forearms or hands.
- Localized itching, followed by a papular lesion that turns vesicular, and within 2-6 days develops into a depressed black eschar.
- Usually non-fatal if treated with antibiotics.

Gastrointestinal

- Abdominal pain, nausea, vomiting, and fever following ingestion of contaminated food, usually meat.
- Bloody diarrhea, hematemesis.
- Gram-positive bacilli on blood culture, usually after the first two or three days of illness.
- Usually fatal after progression to toxemia and sepsis.

C. Modes of Transmission

The spore form of *B. anthracis* is durable and can survive for long periods of time in the environment. As a bioterrorism agent, it could be delivered as an aerosol. The modes of transmission for anthrax include:

- *Inhalation of spores.*
- *Cutaneous contact with spores or spore-contaminated materials.*
- *Ingestion of contaminated food.*

D. Incubation Period

The incubation period following exposure to *B. anthracis* ranges from 1 day to 8 weeks (average 5 days), depending on the exposure route and dose:

- *2-60 days following pulmonary exposure.*
- *1-7 days following cutaneous exposure.*
- *1-7 days following ingestion.*

E. Period of Communicability

Transmission of anthrax from person to person is unlikely. Airborne transmission does not occur, but direct contact with skin lesions may result in cutaneous infection.

F. Infection Control Practices for Patient Management

Symptomatic patients with suspected or confirmed infections with *B. anthracis* should be managed according to current guidelines specific to their disease state.

1. Isolation Precautions

Standard Precautions are to be used for the care of patients with infections associated with *B. anthracis*. Standard Precautions include hand hygiene before and after patient contact as well as the routine use of gloves for contact with blood, body fluids, secretions, excretions and for contact with non-intact skin, including rashes and skin lesions. Patients with large skin lesions that cannot be covered may be placed on Contact Precautions at the discretion of Hospital Epidemiology.

2. Patient Placement

Private room placement for patients with anthrax is NOT necessary. **AIRBORNE TRANSMISSION OF ANTHRAX DOES NOT OCCUR.** Skin lesions may be infectious, but requires direct skin contact.

3. Patient Transport

Standard Precautions should be used for transport and movement of patients with *B. anthracis* infections.

4. Cleaning, Disinfection, and Sterilization of Equipment/Environment

Principles of Standard Precautions should be generally applied for the management of patient-care equipment and for environmental control. In the event of large volume contamination of patient care equipment or surfaces, decontamination should be accomplished with a **0.5% hypochlorite solution** (1 part bleach, 9 parts water) with a contact time of 10-15 minutes or with an EPA-registered, facility-approved **sporicidal/germicidal** agent if available.

5. Laboratory Specimens

The laboratory must be notified by the ordering physician **prior** to sending specimens for culture. Biosafety level 2 practices should be followed.

6. Discharge Management

No special discharge instructions are indicated. Home care providers should be taught to use Standard Precautions for all patient care (e.g., dressing changes).

7. Post-Mortem Care

Standard Precautions should be used for post-mortem care. Standard Precautions include wearing appropriate personal protective equipment, including masks and eye protection, when generation of aerosols or splatter of body fluids is anticipated.

G. Post Exposure Management

1. Decontamination of Exposed Persons/Environment

The risk for re-aerosolization of *B. anthracis* spores appears to be extremely low in settings where spores were released intentionally or were present at low or high levels. In situations where the threat of gross exposure to *B. anthracis* spores exists, cleansing of skin and potentially contaminated fomites (e.g. clothing or environmental surfaces) may be considered to reduce the risk for cutaneous or gastrointestinal forms of disease. Decontamination should take place in the Emergency Department decontamination area for persons significantly exposed to anthrax. The procedure includes the following:

- *Instruct person to remove contaminated clothing and store in labeled, plastic bags.*
- *Handle clothing minimally to avoid agitation.*
- *Instruct person to shower thoroughly with soap and water.*
- *Instruct treating healthcare workers regarding Standard Precautions and the use of appropriate barriers (e.g. gloves, gown, and respiratory protection) when handling contaminated clothing or other contaminated fomites.*
- *Decontaminate environmental surfaces with a **0.5% hypochlorite solution** (one part bleach to nine parts water) or an EPA-registered, facility-approved **sporicidal/germicidal** agent if available.*

2. Prophylaxis and Post-Exposure Immunization

- a. In the event that a healthcare worker has a large volume exposure to *B. anthracis* (e.g. laboratory accident) the procedure outlined above in G.1. should be followed. In addition:
 - Notify supervisor immediately.
 - The supervisor is to notify the Emergency Department that a healthcare worker sustained an exposure and will need to be evaluated for decontamination and post exposure prophylaxis.
 - Supervisor to notify Occupational Health Services of exposure.
 - Supervisor to notify Hospital Epidemiology.
 - Contact investigations are conducted by Hospital Epidemiology.
 - Healthcare workers are subsequently notified by Occupational Health Services of their possible exposure and need for evaluation.
- b. Prophylaxis should be initiated upon confirmation of an anthrax exposure and should continue until *B. anthracis* exposure has been excluded or up to 60 days depending on the type of exposure.
- c. Recommendations for prophylaxis are subject to change. Up-to-date recommendations should be obtained in consultation with Occupational Health Services, the CT Department of Public Health and CDC.

- d. Persons placed on prophylaxis will receive information sheets regarding the signs and symptoms of anthrax as well as antibiotic side effects.
 - Regular follow-up will be arranged by the Occupational Health Service to monitor health status during the period of prophylaxis.
 - Any exposed individual who manifests signs or symptoms of anthrax will be immediately referred to the YNHH Emergency Department for further evaluation.
- e. Appendix 3 – Algorithm for Management of Possible Anthrax Exposure

H. Healthcare Worker, Patient, and Visitor Information

Fact sheets describing disease epidemiology, clinical symptoms, diagnosis and treatment are available on the electronic Infection Control Manual (accessible on the clinical workstations). (Appendix 5; Anthrax - Quick Reference)

II. PLAGUE

A. Etiology

Plague is an acute bacterial disease caused by the gram-negative bacillus *Yersinia pestis*, which is usually transmitted by infected fleas, resulting in lymphatic and blood infections (bubonic and septicemic plague). A bioterrorism-related outbreak may be expected to be airborne, causing the pulmonary variant, pneumonic plague.

B. Clinical Features

Clinical features of pneumonic plague include:

- *Fever, cough, chest pain.*
- *Hemoptysis.*
- *Muco-purulent or watery sputum with gram-negative rods on gram stain.*
- *Radiographic evidence of bronchopneumonia.*

C. Modes of Transmission

- Plague is normally transmitted from an infected rodent to human by infected fleas.
- Bioterrorism-related outbreaks are likely to be transmitted through dispersion of an aerosol.
- Person-to-person transmission of pneumonic plague is possible via large aerosol droplets.

D. Incubation Period

The incubation period for plague is normally 2 - 8 days if due to fleaborne transmission. The incubation period may be shorter for pulmonary exposure (1-3 days).

E. Period of Communicability

Patients with pneumonic plague may have coughs productive of infectious particle droplets. Droplet precautions, including the use of a surgical-type mask when coming within 3 feet of the patient, should be implemented until the patient has completed 72 hours of effective antimicrobial therapy.

F. Preventive Measures

1. Immunization Recommendations

A formalin-killed vaccine exists for bubonic plague, but has not been proven to be effective for pneumonic plague. It is not currently available in the United States. Routine vaccination requires multiple doses given over several weeks and is not recommended for the general population. Post-exposure immunization has no utility.

G. Infection Control Practices for Patient Management

Symptomatic patients with suspected or confirmed plague should be managed according to current guidelines. Recommendations for specific therapy are beyond the scope of this document. For up-to-date information and recommendations for therapy, contact the CT Department of Public Health or the CDC.

1. Isolation Precautions

For pneumonic plague, **Droplet Precautions** should be used in addition to **Standard Precautions**. Droplet Precautions are described in detail in the electronic Infection Control Manual accessible on the clinical workstations.

- Droplet Precautions are used for patients known or suspected to be infected with microorganisms transmitted by large particle droplets, generally larger than 5 microns in size, that can be generated by the infected patient during coughing, sneezing, talking, or during respiratory-care procedures.
- Droplet Precautions require that all persons wear a surgical-type mask if within 3 feet of the infected patient. *It is prudent to wear a mask upon entering the room of a patient on Droplet Precautions to avoid any inadvertent exposure.*
- Droplet Precautions should be maintained until the patient has completed 72 hours of effective antimicrobial therapy.
- A CCSS order for Droplet Precautions must be initiated when implementing Droplet Precautions. The order must be removed in CCSS when precautions are no longer necessary.

2. Patient Placement

Patients suspected or confirmed to have pneumonic plague require **Droplet Precautions**. Patient placement recommendations for Droplet Precautions include:

- Place infected patient in a private room.
- Place Droplet Precautions sign on the door.

- Enter order for Droplet Precautions in CCSS.
- Cohort symptomatic patients with similar symptoms and the same presumptive diagnosis (i.e. pneumonic plague) when private rooms are not available. Consult with Hospital Epidemiology.
- Maintain spatial separation of at least 3 feet between infected patients and others when cohorting is not achievable.
- Avoid placement of patient requiring Droplet Precautions in the same room with an immunocompromised patient.

Special air handling is not necessary and doors may remain open.

3. Patient Transport

- Limit the movement and transport of patients on Droplet Precautions to essential medical purposes only.
- Minimize dispersal of droplets by placing a surgical-type mask on the patient when transport is necessary.
- Notify receiving department prior to transport that patient is on Droplet Precautions.

4. Cleaning, Disinfection, and Sterilization of Equipment/Environment

Principles of Standard Precautions are applied to the management of patient-care equipment and for environmental control.

5. Laboratory Specimens

The laboratory must be notified by the ordering physician **prior** to sending specimens for culture. Biosafety level 2 practices should be followed.

6. Discharge Management

Generally, patients with pneumonic plague are not discharged until they are no longer infectious (completion of 72 hours of effective antimicrobial therapy). No special discharge instructions required if the patient is no longer infectious. If a patient must be discharged before they are non-infectious, they should be instructed to remain at home and practice Droplet Precautions until non-infectious. A supply of surgical-type masks should be given to the patient.

7. Post-Mortem Care

Standard Precautions and Droplet Precautions should be used for post-mortem care.

H. POST EXPOSURE MANAGEMENT

1. Decontamination of Exposed Persons/Environment

The risk for re-aerosolization of *Y. pestis* from contaminated clothing of exposed persons is low. In situations where there may have been gross exposure to *Y. pestis*, decontamination of skin and potentially contaminated

fomites (e.g. clothing or environmental surfaces) may be considered to reduce the risk for cutaneous or bubonic forms of the disease. Decontamination of significantly exposed persons should be performed in the Emergency Department decontamination area and includes the following:

- *Instruct exposed person to remove contaminated clothing and store in labeled, plastic bags.*
- *Handle clothing minimally to avoid agitation.*
- *Instruct exposed person to shower thoroughly with soap and water.*
- *Instruct treating healthcare workers regarding Standard Precautions and the use of appropriate barriers (e.g. gloves, gown, face shield) when handling contaminated clothing or other contaminated fomites.*
- *Decontaminate environmental surfaces with an EPA-registered, facility-approved disinfectant or a 0.5% hypochlorite solution (one part bleach to nine parts water).*

2. Prophylaxis

Recommendations for prophylaxis are subject to change. Occupational Health Services, the CT Department of Public Health and the CDC should be consulted regarding post-exposure prophylaxis. Post-exposure evaluation and prophylaxis should be considered following a confirmed or suspected bioterrorism related *Y. pestis* exposure, and for post-exposure management of healthcare workers and others who may have had unprotected face-to-face contact with symptomatic patients.

3. Management of Large Scale Exposures/Potential Exposures

In the event that a healthcare worker has a large volume exposure to *Y. pestis* (e.g. laboratory accident) or unprotected face-to-face contact with an infected patient, the procedure outlined above in H.1. should be followed. In addition:

- Notify supervisor immediately.
- The supervisor is to notify the Emergency Department that a healthcare worker sustained an exposure and will need to be evaluated for decontamination and post exposure prophylaxis.
- Supervisor to notify Occupational Health Services of exposure.
- Supervisor to notify Hospital Epidemiology.
- Contact investigations are conducted by Hospital Epidemiology. Occupational Health Services notifies healthcare workers of their possible exposure and need for evaluation.
- Prophylaxis should be initiated upon confirmation of a plague exposure and should continue until plague exposure has been excluded or 7 days whichever comes first.

- Recommendations for prophylaxis are subject to change. Up-to-date recommendations should be obtained in consultation with Occupational Health Services, the CT Department of Public Health and CDC.
- Persons placed on prophylaxis will receive information sheets regarding the signs and symptoms of plague as well as antibiotic side effects.
 - Regular follow-up will be arranged by the Occupational Health Service to monitor health status during the period of prophylaxis.
 - Any exposed individual manifesting signs or symptoms of plague will be immediately referred to the YNHH Emergency Department for further evaluation.

G. Healthcare Worker, Patient, and Visitor Information

Fact sheets describing disease epidemiology, clinical symptoms, diagnosis and treatment are located on the electronic Infection Control Manual (accessible on the clinical workstations). (Appendix 5; Plague - Quick Reference)

III. TULAREMIA

A. Etiology

Tularemia is a zoonotic disease typically acquired by humans after skin or mucous membrane contact with infected animals. Ticks, deer flies and mosquitoes can also transmit infection. Less commonly, inhalation of contaminated dust or ingestion of contaminated food or water may result in clinical disease. Exposure to as few as 10-50 aerosolized organisms may cause infection.

B. Clinical Features

Tularemia may present as one of six indistinct overlapping clinical syndromes: pneumonic, systemic, ulceroglandular, oculoglandular and oropharyngeal. The symptoms range from asymptomatic to acute sepsis leading to rapid death.

- **Pulmonary**

Most likely presentation of a bioterrorism-related event; includes abrupt onset of fever, chills, malaise, anorexia, cough, myalgias, pleuritic chest pain, and substernal tightness. Hemoptysis is rare.

- **Systemic**

Febrile illness with typical clinical features of other forms of tularemia. Nondescript symptoms include fever, chills, myalgias, sore throat, nausea, anorexia, vomiting, abdominal pain and diarrhea. This is more common in persons with chronic disease and may lead to rapid death or protracted illness.

- **Oro-pharyngeal:**

Symptoms usually present after exposure to contaminated food or water. Symptoms include sore throat with exudative tonsillitis and pharyngitis with ulcer formation.

- **Ulceroglandular**

Symptoms include enlarged, local tender lymph nodes. Skin lesions may appear before or after lymphadenopathy. Skin lesions begin as red painful papules that progress to necrotic painful ulcers with raised borders.

- **Glandular**

Same as ulceroglandular without the skin lesions.

- **Oculo-glandular**

Results from inoculation of organisms into the eye. Symptoms include photophobia and excessive lacrimation, swollen eyes, painful conjunctivae and yellowish conjunctival ulcers.

C. Modes of Transmission

Contact with infected animals or inhalation of contaminated dust or ingestion of contaminated food or water. Person-to-person transmission does **not** occur.

D. Incubation Period

The average incubation period is 3-5 days.

E. Infection Control Practices for Patient Management

1. Isolation Precautions

Standard Precautions are recommended for the care of patients with infections associated with tularemia. Standard Precautions include hand hygiene before and after patient contact as well as the routine use of gloves for contact with blood, body fluids, secretions, excretions and for contact with non-intact skin, including rashes and skin lesions. In addition to Standard Precautions, **Contact Precautions** are recommended for patients with *ulceroglandular* or *oculoglandular* type of tularemia if lesion drainage cannot be contained with a dressing.

2. Patient Placement

Private room is not required. Patients with ulceroglandular or oculoglandular tularemia may require Contact Precautions in addition to Standard Precautions, as described above.

3. Patient Transport

Standard Precautions should be used for transport and movement of patients with tularemia infections.

4. Cleaning, Disinfection, and Sterilization of Equipment/Environment

Principles of Standard Precautions should be generally applied for the management of patient-care equipment and for environmental control.

5. Laboratory Specimens

The laboratory must be notified by the ordering physician **prior** to sending specimens for culture. Biosafety level 2 practices should be followed.

6. Discharge Management

No special discharge instructions are indicated. Home care providers should be taught to use Standard Precautions for all activities with a sick person.

These may include the following:

- *WASH YOUR HANDS FREQUENTLY before you eat or drink, after using the bathroom and after contact with the sick person.*
- *Wear gloves when you have contact with sick person's blood or body fluids. Wash your hands after removing and discarding gloves.*
- *Give person plenty of fluids to avoid complications with diarrhea. Give solid foods as tolerated.*
- *Change the sick person's clothes and bed linens frequently especially if soiled with blood or body fluids.*
- *Wash soiled clothes and linens in warm water using any commercial laundry product.*
- *Disinfect bathroom and kitchen with a disinfectant (e.g. Lysol) every day or if surfaces become soiled with blood or body fluids.*

7. Post-Mortem Care

Standard Precautions should be used for post-mortem care. Standard Precautions include wearing appropriate personal protective equipment, including masks and eye protection, when generation of aerosols or splatter of body fluids is anticipated.

F. Post Exposure Management

1. Prophylaxis and Post-Exposure Immunization

Recommendations for prophylaxis are subject to change. Up-to-date recommendations should be obtained in consultation with Occupational Health Services, the CT Department of Public Health and CDC. Given the short incubation period of tularemia and incomplete protection of current vaccines against inhalational tularemia, vaccination is not recommended for post-exposure prophylaxis.

2. Post-Exposure Management

An exposed person is defined as a person who has been exposed to the release of *Francisella tularensis*-containing aerosol or possibly a healthcare

worker who has sustained a large volume exposure to *F. tularensis* (e.g. laboratory accident).

- Potentially exposed healthcare workers are to notify their supervisor immediately.
- The supervisor is to notify Occupational Health Services (or the Emergency Department off hours) that a healthcare worker sustained an exposure and will need to be evaluated for post exposure prophylaxis.
- Supervisor to notify Hospital Epidemiology.
- Contact investigations are conducted by Hospital Epidemiology. Occupational Health Services notifies healthcare workers of their possible exposure and need for evaluation.
- Exposed individuals will be instructed to maintain a daily body temperature log and to monitor for symptoms.
- Any individual developing fever will receive prophylaxis.
- Recommendations for prophylaxis are subject to change. Up-to-date recommendations should be obtained in consultation with Occupational Health Services, the CT Department of Public Health and CDC.
- Exposed individuals placed on prophylaxis will receive information sheets regarding symptoms of tularemia and antibiotic side effects.
- Regular follow-up at the Occupational Health Service will be arranged in order to monitor health status during the period of prophylaxis.
- Any exposed individual who manifests a clinical illness compatible with tularemia will be immediately referred to the YNHH Emergency Department for further evaluation.

G. Healthcare Worker, Patient, and Visitor Information

Fact sheets describing disease epidemiology, clinical symptoms, diagnosis and treatment are available on the electronic Infection Control Manual (accessible on the clinical workstations). (Appendix 5; Tularemia - Quick Reference)

IV. Q-FEVER

A. Etiology

Q fever is caused by the rickettsia, *Coxiella burnetii*, and is common in animals such as cattle, sheep and goats. Animals do not develop clinical disease but can shed large numbers of organisms in placental tissue and in body fluids including milk, urine and feces. Humans normally acquire the disease by inhalation of *C. burnetii* that have been aerosolized from contaminated environmental reservoirs such as hay, straw, manure, dust or dirt.

A single inhaled organism may be positive for up to two weeks and viable organisms may be re-aerosolized into the environment from contaminated soil for up to 150 days.

B. Clinical Features

- Q-fever is generally a self limited febrile disease that lasts 2-14 days. Prominent symptoms include fever and severe headache (retroorbital pain).
- Other symptoms may include fatigue, chills, sweats, myalgias, nausea, vomiting, diarrhea and pleuritic chest pain.
- Pneumonia occurs in about 50% of persons infected with Q fever, but less than 30% of persons with pneumonia will have a cough (non-productive).
 - Pneumonia can be atypical, rapidly progressing or present with fever but no pulmonary symptoms.
 - Physical exam of the chest may be normal.
- About 33% of persons infected with Q fever may develop acute hepatitis with jaundice.
- Uncommon complications include chronic hepatitis, culture-negative endocarditis (with pre-existing valvular heart disease), aseptic meningitis, encephalitis, and osteomyelitis.

C. Modes of Transmission

Q fever transmission from person-to-person has been reported but is a **very** rare event. **Standard Precautions** apply to patient care, patient-care equipment, and the environment.

D. Incubation Period

10-40 days (varies with number of organisms inhaled).

E. Period of Communicability

Person-to-person transmission of Q fever is unlikely.

F. Infection Control Practices for Patient Management

1. Isolation Precautions

Standard Precautions are used for the care of patients with infections associated with Q fever. Standard Precautions include hand hygiene before and after patient contact as well as the routine use of gloves for contact with blood, body fluids, secretions, excretions and contact with non-intact skin, including rashes and skin lesions.

2. Patient Placement

Private room placement for patients with Q fever is **not** necessary.

3. Patient Transport

Standard Precautions should be used for transport and movement of patients with Q fever infections.

4. Cleaning, Disinfection, and Sterilization of Equipment/Environment

Principles of Standard Precautions should be generally applied for the management of patient-care equipment and for environmental control. In the

event of large volume contamination of patient care equipment or surfaces (e.g. laboratory accident), decontamination should be accomplished with a **0.5% hypochlorite solution** (1 part bleach to 9 parts water) with a contact time of 10-15 minutes or with an EPA-registered, facility-approved **sporicidal/germicidal** agent if available.

5. Laboratory Specimens

The laboratory must be notified by the ordering physician **prior** to sending specimens for culture. Biosafety level 2 practices should be followed.

6. Discharge Management

No special discharge instructions are indicated. Home care providers should be taught to use Standard Precautions for all patient care (e.g., dressing changes).

7. Post-Mortem Care

Standard Precautions should be used for post-mortem care. Standard Precautions include wearing appropriate personal protective equipment, including masks and eye protection, when generation of aerosols or splatter of body fluids is anticipated.

G. Post Exposure Management

1. Decontamination of Exposed Persons/Environment

Decontaminating persons significantly exposed to Q fever (see G.2. for definition of exposure) should be performed in the Emergency Department decontamination area and includes the following:

- *Instruct exposed person to remove contaminated clothing and store in labeled, plastic bags.*
- *Handle clothing minimally to avoid agitation.*
- *Instruct exposed person to shower thoroughly with soap and water.*
- *Instruct treating healthcare workers regarding Standard Precautions and the use of appropriate barriers (e.g. gloves, gown, and respiratory protection) when handling contaminated clothing or other contaminated fomites.*
- *Decontaminating environmental surfaces using an EPA-registered, facility-approved **sporicidal/germicidal** agent or a **0.5% hypochlorite solution** (one part bleach to nine parts water).*

2. Post-Exposure Prophylaxis

An exposed person is defined as a person who has been exposed to the release of *Coxiella burnetii*-containing aerosol or possibly a healthcare worker who has sustained a large volume exposure to *C. burnetii* (e.g. laboratory accident). Q fever is not transmitted person-to-person.

- Potentially exposed healthcare workers are to notify their supervisor immediately.
- The supervisor is to notify the Emergency Department that a healthcare worker sustained an exposure and will need to be evaluated for decontamination and post exposure prophylaxis.
- Supervisor to notify Occupational Health Services of exposure.
- Supervisor to notify Hospital Epidemiology.
- Contact investigations are conducted by Hospital Epidemiology. Occupational Health Services notifies healthcare workers of their possible exposure and need for evaluation.
- Recommendations for prophylaxis are subject to change. Up-to-date recommendations should be obtained in consultation with Occupational Health Services, the CT Department of Public Health and CDC.
- Antibiotic prophylaxis is very effective and will prevent disease if administered 8-12 days **after** exposure. Starting prophylaxis immediately after exposure can delay onset of the disease but does not prevent symptoms from occurring. Prophylaxis is given for 5 days.
- Exposed individuals placed on prophylaxis will receive information sheets regarding symptoms of Q fever and antibiotic side effects.
- Regular follow-up at the Occupational Health Service will be arranged in order to monitor health status during the period of prophylaxis.
- Any exposed individual who manifests a clinical illness compatible with Q fever will be immediately referred to the YNH Emergency Department for further evaluation.

H. Healthcare Worker, Patient, and Visitor Information

Fact sheets describing disease epidemiology, clinical symptoms, diagnosis and treatment are located on the electronic Infection Control Manual (accessible on the clinical workstations). (Appendix 5; Q-Fever - Quick Reference)

V. SMALLPOX

A. Etiology

Smallpox is an acute viral illness caused by the variola virus. Smallpox is a bioterrorism threat due to its potential to cause severe morbidity in a nonimmune population and because it can be transmitted via the airborne route. A single case is considered a public health emergency.

B. Clinical Features

Acute clinical symptoms of smallpox resemble other acute viral illnesses, such as influenza. Skin lesions appear, quickly progressing from macules to papules to vesicles. Other clinical symptoms to aid in identification of smallpox include:

- 2-4 days of non-specific prodrome of fever, myalgias.
- Rash most prominent on face and extremities (including palms and soles) in contrast to the truncal distribution of varicella.

- Rash scabs over in 1-2 weeks.
- In contrast to the rash of varicella (chickenpox), which arises in “crops,” variola (smallpox) rash has a synchronous onset and course (all lesions are at the same stage of development).

C. Mode of Transmission

Smallpox is transmitted via both large and small respiratory droplets. Person-to-person transmission is likely from airborne and droplet exposure, and by contact with skin lesions or secretions. Persons are considered more infectious if coughing or if they have a hemorrhagic form of smallpox.

D. Incubation Period

The incubation period for smallpox is 7-17 days; the average is 12 days.

E. Period of Communicability

Unlike varicella, which is contagious before the rash is apparent, patients with smallpox become infectious at the onset of the rash and remain infectious until their scabs separate (*approximately 3 weeks*).

F. Preventive Measures

1. Immunization recommendations:

Since the last naturally acquired case of smallpox in the world occurred in the 1970's, routine public vaccination has not been recommended.

Vaccination against smallpox does not reliably confer lifelong immunity. Even previously vaccinated persons should be considered susceptible to smallpox.

G. Infection Control Practices for Patient Management

Symptomatic patients with suspected or confirmed smallpox should be managed according to current guidelines. The Infection control guidelines at YNH are as follows:

1. Isolation Precautions

For patients with suspected or confirmed smallpox, both **Airborne** and **Contact Precautions** should be used in addition to **Standard Precautions**. **Standard, Contact, and Airborne Precautions** are described in detail in the electronic Infection Control Manual accessible on the clinical workstations.

- **Airborne Precautions** are used for patients known or suspected to be infected by organisms spread via small airborne droplet nuclei (*particle size of 5 microns or smaller*) which can be dispersed by air currents.
- **Airborne Precautions** require anyone entering the patient's room to wear fitted N-95 respirators or the equivalent. The door must remain closed at all times.

- **Contact Precautions** are used for patients known or suspected to be infected or colonized with epidemiologically important organisms that can be transmitted by direct contact with the patient or indirect contact with potentially contaminated surfaces in the patient's care area. **Contact precautions** require healthcare workers and others to:
 - *Perform hand hygiene.*
 - *Wear clean gloves upon entry into patient room.*
 - *Wear gown upon entry into room. Gowns and gloves must be removed before leaving the patient's room.*
 - *Wash hands using an antimicrobial agent; an alcohol hand rub product is acceptable.*
- Orders for Airborne Precautions and Contact Precautions are to be entered into CCSS.

2. Patient Placement

- a) Patients with suspected or confirmed smallpox require placement in rooms that meet the ventilation and engineering requirements for **Airborne Precautions** which include:
 - *Negative air pressure in relation to the corridor and surrounding areas that must be monitored.*
 - *Air exchanges in the room must be 6 – 12 air exchanges per hour.*
 - *Appropriate discharge of air to the outdoors, or monitored high efficiency filtration of air prior to circulation to other areas in the healthcare facility.*
 - *Door to the room must always remain closed.*
 - *Location of rooms meeting these requirements at YNHH can be obtained from the Clinical Advisors. A listing is also available on the electronic Infection Control Manual accessible on the clinical workstations.*
- b) Patient placement in a private room is preferred. However, in the event of a large outbreak, patients who have active infections with the same disease (i.e., smallpox and no other epidemiologically significant organisms such as VRE or MRSA) may be cohorted in rooms that meet appropriate ventilation and airflow requirements for Airborne Precautions.
- c) Persons entering the room should be limited to essential caregivers only. Visitors should be limited to only those considered essential.
- d) *Patients are deemed non-infectious when all the scabs have separated.*
 - Contact Hospital Epidemiology **prior** to discontinuing Contact and Airborne Precautions.
 - Discontinue order for Contact Precautions and Airborne Precautions in CCSS once approved by Hospital Epidemiology.

3. Patient Transport

- Limit the movement and transport of patients with suspected or confirmed smallpox to essential medical purposes only. All movement of patients must be reviewed and approved by Hospital Epidemiology and the receiving department or unit prior to transport.
- When transport is necessary, minimize the dispersal of respiratory droplets by placing an N-95 respirator on the patient (has a tighter fit than a surgical mask). Do not place a respirator with an exhalation valve on the patient.

4. Cleaning, Disinfection, and Sterilization of Equipment/Environment

In maintaining Contact Precautions, careful management of potentially contaminated equipment and environmental surfaces must be performed.

- *When possible, noncritical patient care equipment should be dedicated to a single patient (or cohort of patients with the same illness).*
- *If use of common items is unavoidable, all potentially contaminated, reusable equipment may NOT be used for the care of another patient until it has been appropriately cleaned and reprocessed. An EPA approved hospital disinfectant (quaternary ammonia product) or a 0.5% hypochlorite solution (1 part bleach to 9 parts water) are appropriate.*

5. Laboratory Specimens

- Diagnosis requires transport of clinical specimens to the CDC for identification using biosafety level 4 facilities. Transport of specimens must be coordinated through the CT Department of Public Health and the CDC.
- The Clinical Virology Laboratory, and other laboratories, must be notified by the ordering physician **prior** to sending any specimens.
- See Clinical Virology Laboratory policy "Specimen Handling and Laboratory Testing of Patients at Risk for Smallpox" for directions for specimen transport and handling (Appendix 4).
- Safety recommendations:
 - Wear personal protective equipment.
 - Use safety blood-collection equipment, if possible.
 - Do not use glass vials or tubes, if possible.
 - Promptly dispose of sharps in sharps disposal container.
 - Seal all specimens with Parafilm.
 - Hand transport all specimens in double, sealed, plastic zip-lock bags.
- Pustule/vesicle specimen collection:
 - Open the top of a vesicle or pustule with a scalpel.
 - Express fluid from the vesicle or pustule onto a clean microscope slide and allow to air dry. Place the slide into a dry, plastic slide holder and seal.

- Alternately, swab the base of the vesicle or pustule with a dry swab. Place the swab into a plastic, capped container.
- Obtain at least 3 slides or swabs. Label each slide or swab.
- Do not place the slides from more than one patient in the same container.
- Scabs specimen collection:
 - Remove scab with the blunt edge of a scalpel blade.
 - Deposit at least 12 scab specimens in a clean, dry, plastic tube containing no preservative and label.
- Blood specimens:
 - Place 10 cc of blood in a labeled, red or marbled-topped tube.
 - Allow blood to clot then separate serum from the clot.
 - Remove serum from collection tube and pour into a plastic, clean, screw-topped vial.
 - If a plastic serum separator tube is used, serum may be left in the tube.
- Label:
 - Label the specimen container with the patient's name, medical record number, date, and time specimen was collected, physician's name and telephone number.

6. Discharge Management

- In general, patients with smallpox will not be discharged from a healthcare facility until it is determined that they are no longer infectious.
- The practice of Standard Precautions should be reinforced for care givers at home. Bathrooms, kitchens, and other surfaces should be disinfected (e.g. Lysol[®]) daily or more often if soiled with blood or body fluid.
- Consider wearing a mask covering mouth and nose when within 6 feet of the patient.
- Visitors should be discouraged until the patient is non-infectious.
- Isolation should continue until all scabs separate (considered non-infectious).

7. Post-Mortem Care

Airborne and Contact Precautions should be used for post-mortem care.

H. Post Exposure Management

1. Decontamination of Exposed Persons/Environment

- Decontamination of persons after exposure to smallpox is not indicated.
- Items potentially contaminated by infectious lesions should be handled using Contact Precautions. *Linens and laundry should be carefully bagged and either autoclaved prior to laundering or washed in hot water with bleach without sorting. Laundering instructions will be discussed by*

Hospital Epidemiology with the laundry contractor prior to sending laundry off site.

2. Prophylaxis and Post-Exposure Immunization

- a) An exposed person is defined as a person who has been in close personal contact with a patient with suspected or confirmed smallpox. Close personal contact includes persons residing in the same household with the case patient or persons with face-to-face contact with the patient *after* the patient developed fever.
- b) Recommendations for prophylaxis are subject to change. Post-exposure immunization with smallpox vaccine is effective. Vaccination alone is recommended if given within approximately 3 days of exposure. Passive immunization (vaccinia immune globulin) with smallpox vaccine is recommended if greater than 3 days have elapsed since exposure.
- c) Contact Hospital Epidemiology (688-4634) and Occupational Health Services (688-2462) immediately in the event of a potential exposure.
 - Potentially exposed healthcare workers are to notify their supervisor immediately.
 - The supervisor is to notify Occupational Health Services (or the Emergency Department off hours) that a healthcare worker sustained an exposure and requires immediate evaluation for post exposure prophylaxis.
 - Supervisor to notify Hospital Epidemiology.
 - Contact investigations are conducted by Hospital Epidemiology. Occupational Health Services notifies healthcare workers of their possible exposure and need for evaluation.
 - Regular follow-up at the Occupational Health Service will be arranged in order to monitor health status following vaccination or post-exposure period if the vaccine is contraindicated.
 - All exposed persons are to be placed on strict quarantine with respiratory isolation for 17 days after last contact with suspect or confirmed smallpox case. Quarantine at home, as opposed to in-patient, should be considered; consult with the CT Department of Public Health and local health department.
 - Alternatively, contacts may be asked to check their temperature daily. Any fever above 38⁰C (101⁰F) during the 17-day period following exposure to a confirmed case would suggest the development of smallpox. Immediate isolation, preferably at home, until smallpox is either confirmed or ruled out. Isolation should continue until all scabs separate (considered non-infectious).
 - Any exposed individual who manifests a clinical illness compatible with smallpox will be immediately referred to the YNHH Emergency Department for further evaluation if too ill to be cared for at home. Airborne Precautions and Contact Precautions should be used in the ED until smallpox is ruled out.

- Newly vaccinated healthcare workers may continue to have patient contact, including contact with immunosuppressed patients, as long as the vaccination site is covered with a water-tight seal at all times.
 - Cover the vaccination site with gauze dressing reinforced with a semi-permeable dressing (e.g. Tegaderm[®]) during the work shift. Remove the semi-permeable dressing at the end of the work shift.
 - *Practice meticulous hand hygiene before contact with all patients.* Hands should be thoroughly washed after contact with fluid or pus that may accumulate under the semi-permeable dressing.

H. Triage and Management of Large Scale Exposures/Potential Exposures

1. Patient Placement

- a) In the event of large numbers of patients with smallpox requiring hospitalization, a patient care unit (e.g. 9-5; all rooms compatible with Airborne Precautions) may be designated as a cohort unit. This designation will be made by Hospital Epidemiology in conjunction with YNH Administration.
- b) All healthcare workers entering the cohort unit are to be vaccinated.
- c) Patient transport from the cohort unit must be for emergent procedures only and coordinated with Hospital Epidemiology and the receiving department **prior** to transport (G.3).

2. Vaccination

- a) Depending on vaccine availability, priority will be given to healthcare workers caring for patients with smallpox.
 - All healthcare workers in the Emergency Department.
 - Healthcare workers assigned to care for smallpox patients.
 - Laboratory personnel processing specimens from patients with smallpox.
 - Other priorities will be determined in consultation with the CT Department of Public Health and the CDC.
- b) Anyone not able to receive vaccine (contraindications: pregnancy, immunosuppression, HIV infection, eczema, or anaphylaxis to polymyxin B, streptomycin, tetracycline, or neomycin; current household, sexual, or other close physical contact with person(s) possessing one of these conditions) shall be reassigned to low risk patient care activities or non-patient care activities.

I. Healthcare Worker, Patient, and Visitor Information

Fact sheets describing the disease epidemiology, clinical symptoms, diagnosis and treatment are available on the electronic Infection Control Manual (accessible on the clinical workstations). (Appendix 5; Smallpox - Quick Reference)

VI. VIRAL HEMORRHAGIC FEVER (VHF)

A. Etiology

The term viral hemorrhagic fever (VHF) is used to describe a spectrum of illnesses ranging from fever with some evidence of hemorrhagic disease to a syndrome of fever and severe shock, resulting in death. VHF is caused by a number of viral agents that include the following: Yellow Fever, Dengue, Marburg, Ebola, Crimean-Congo (CCHF), Lassa and Hantavirus.

B. Clinical Features and Modes of Transmission

Infections with viruses causing VHF are frequently asymptomatic. When symptomatic, these viruses cause fever, chills, headaches, myalgias and malaise, usually of abrupt onset and progress to include symptoms of conjunctival injection, periorbital edema and hypotension. The following table outlines the prominent clinical manifestations and mode of transmission of the agents that would most likely be involved in a bioterrorism event.

Virus	Incubation	Clinical signs/symptoms	Mode of transmission
Crimean-Congo (CCHF)	3-6 days	Nausea, vomiting, icteric hepatitis; followed by DIC, thrombocytopenia on day 4	Person-to-person
Hantavirus	?2 weeks	Pulmonary vascular permeability, ARDS, hypoxia, dyspnea, hemorrhage, and renal failure (rare)	Not person-to-person Standard precautions, no other special precautions/procedures required
Lassa	3-16 days	Retrosternal chest pain, back pain, sore throat, peripheral edema, proteinuria, relative bradycardia; hearing loss (VIII th nerve deafness) upon recovery	Contact with infected rodents, rodent excreta, often aerosolized material Person to person
Marburg and Ebola	3-9 days	Conjunctivitis, photophobia, watery diarrhea, lymphadenopathy, pancreatitis, delirium, coma, maculopapular rash on trunk and DIC (normal bilirubin)	Not known Person-to-person
Yellow Fever	3-6 days	Bradycardia with fever is characteristic, symptoms remit on day 3 then fever recurs with jaundice and bleeding; hypotension, delirium and coma may occur before death	Not person-to-person Standard Precautions, no other special precautions/procedures required

With the exception of dengue (virus present, but no secondary transmission) and hantavirus (virus not present in blood or body fluids at the time of clinical illness), VHF patients generally have significant quantities of virus in blood, excretions and secretions. Healthcare workers must handle all sharps with extreme safety to avoid percutaneous exposure.

Lassa, CCHF, Ebola, and Marburg viruses may be prone to aerosol nosocomial transmission.

C. Infection Control Practices for Patient Management

Symptomatic patients with suspected or confirmed infections with a viral hemorrhagic fever virus should be managed according to current guidelines specific to their disease state.

1. Isolation Precautions

- **Standard Precautions** and **Contact Precautions** are used for the care of most patients with infections associated with VHF.
- **Mask** and **eye protection** is required if within **3 feet of a patient** with suspected or proven Lassa fever, Crimean-Congo fever, Ebola or Marburg infection.
- **Airborne Precautions** are recommended if the patient has cough, vomiting, diarrhea or is hemorrhaging. A fit-tested N-95 (or equivalent) respirator should be worn upon entering the room. It is recommended to place the patient on Airborne Precautions upon presentation even if they do not meet the above criteria in order to avoid transport and re-location of the patient in the event of clinical deterioration. This recommendation is dependent on the availability of negative pressure rooms for Airborne Precautions.
- Limit entry into patient room to essential caregivers only. Visitors should be strictly limited to only those considered essential.

2. Patient Placement

- Private room placement with an anteroom is recommended for all patients with suspected or diagnosed VHF except for Hantavirus.
- The anteroom should be used for routine patient care supplies, personal protective equipment (PPE), containers with decontaminating solutions, etc.
- PPE should be removed in the anteroom, double bagged.
- Persons entering the room should be limited to essential caregivers only. Visitors should be limited to only those considered essential.

3. Patient Transport

- Standard and Contact Precautions should be used for transport and movement of patients with VHF.

- Limit the movement and transport of patients with suspected or confirmed VHF to essential medical purposes only. *All movement of patients must be reviewed and approved by Hospital Epidemiology and the receiving department or unit prior to transport.*
- When transport is necessary, minimize the dispersal of respiratory droplets by placing an N-95 respirator on the patient, covering the nose and mouth (tighter fit than a surgical mask). Do not place a respirator with an exhalation valve on the patient. Confine and contain blood and body fluids that soil the environment during transport.

4. Cleaning, Disinfection, and Sterilization of Equipment/Environment

Principles of Standard Precautions should be generally applied for the management of patient-care equipment and for environmental control.

- All environmental surfaces should be cleaned and disinfected with either an EPA-registered hospital approved disinfectant (quaternary or phenolic) or a 0.5% sodium hypochlorite solution (one part bleach to nine parts water).
- Disposable items used in patient care should be incinerated or decontaminated by autoclave or immersion in high level disinfectant.
- Linen should be placed in leak proof biohazard labeled bags, tightly closed and autoclaved prior to laundering. Alternatively, linens may be incinerated or washed in hot water with bleach if placed directly into the machine without sorting. Laundering instructions will be discussed by Hospital Epidemiology with the laundry contractor prior to sending laundry off site.
- Disposable material used for patient care (pajamas, gowns, gloves, etc.) should be double bagged in airtight bags. The bag should be incinerated or autoclaved.
- The patient's bed, other environmental surfaces, or stretchers used in transport should be decontaminated with an EPA-registered hospital approved disinfectant.
- Sewage and other fluids can be treated with household bleach (≥ 5 minutes) before flushing or can be autoclaved or processed in a chemical toilet prior to disposal.

5. Laboratory Specimens

- Laboratory tests should be minimized to those absolutely necessary for patient care.
- Specimens should be placed in clearly labeled, durable, leakproof containers. Specimen containers are placed in sealed plastic bags, outside wiped with EPA-registered hospital disinfectant, and then transported directly (not by tube system) to the laboratory.
- The ordering physician must notify the laboratory **prior** to transporting specimens. (Department of Laboratory Medicine Policy and Procedure

Manual, Policy # 16.0, Handling of Specimens Suspected of Containing Hemorrhagic Fever Viruses)

6. Discharge Management

- Patient clothing should be autoclaved before allowing family or patient to take home. At home, clothing should be washed in HOT water using any commercial laundry product.
- Care givers should be instructed in the principles of Standard Precautions.
- Change the sick person's clothing and bed linens frequently especially if soiled with blood or body fluids.
- A mask should be worn when in contact with infected person (exception hantavirus and yellow fever).
- Disinfect the bathroom and kitchen with a disinfectant such as Lysol^R every day and when surface becomes soiled with blood or body fluids.

7. Post-Mortem Care

Standard Precautions should be used for post-mortem care. Standard Precautions include wearing appropriate personal protective equipment, including masks and eye protection, when generation of aerosols or splatter of body fluids is anticipated. There should be minimal handling of the body, with sealing of the corpse in leak-proof material for prompt burial or cremation.

G. Post Exposure Management

1. Decontamination of Exposed Persons/Environment

For percutaneous/mucocutaneous exposures:

- *Instruct exposed persons to clean exposed/injured area thoroughly with soap and water. Irrigate exposed mucous membranes with copious amounts of water or saline.*
- *Instruct treating healthcare workers regarding Standard Precautions and use of appropriate barriers (e.g. gloves, gown, and respiratory protection).*
- *Decontaminate environmental surfaces using an EPA-registered, facility-approved germicidal agent or a 0.5% hypochlorite solution (one part bleach to nine parts water).*
- *Notify supervisor and Occupational Health Services immediately.*
- *Occupational Health Services (or Emergency Department off hours) to evaluate exposed/injured person immediately for prophylaxis.*

2. Prophylaxis and Post-Exposure Immunization

A contact is defined as any person exposed to the infected person or his/her secretions, excretions, tissue in the 3 weeks before the patient's onset of

illness. Contacts can be stratified into the level of risk: casual contact, close contacts, high-risk contacts.

Recommendations for prophylaxis are subject to change. Up-to-date recommendations should be obtained in consultation with Occupational Health Services, the CT Department of Public Health and CDC.

The only licensed VHF vaccine is yellow fever vaccine. Prophylactic ribavirin may be effective for Lassa fever, Rift Valley fever, CCHF, and possibly HFRS.

- Healthcare workers involved in the care of a patient with VHF are to monitor their body temperature twice daily and maintain a temperature log during the period of contact and for three weeks following last contact.
- Contact investigation, if necessary, will be undertaken by Hospital Epidemiology
- Occupational Health Service will contact potentially exposed healthcare workers for further evaluation and instructions.
- Exposed healthcare workers will receive information regarding symptom monitoring and will be instructed to report such symptoms immediately.
- Healthcare workers with percutaneous or mucocutaneous exposure to blood, body fluids, secretions, or excretions from a patient with suspected or known VHF should immediately wash the affected skin surfaces with soap and water. Mucous membranes should be irrigated with copious amounts of water or saline. Immediate evaluation from Occupational Health Service, or the YNH Emergency Department off hours, should be sought.
- The exposed healthcare worker should notify their supervisor immediately.
- The supervisor should notify Occupational Health Service (or ED off hours) that a healthcare worker sustained an exposure and requires immediate evaluation.

H. Healthcare Worker, Patient, and Visitor, Information

Fact sheets describing disease epidemiology, clinical symptoms, diagnosis and treatment are available on the electronic Infection Control Manual (accessible on the clinical workstations). (Appendix 5; Viral Hemorrhagic Fever - Quick Reference)

VII. BOTULISM

A. Etiology

Clostridium botulinum is an anaerobic gram-positive bacillus that produces a potent neurotoxin, botulinum toxin. In humans, botulinum toxin inhibits the release of acetylcholine, resulting in characteristic flaccid paralysis. *C. botulinum* produces spores that are present in soil and marine sediment throughout the world. Foodborne botulism is the most common form of disease

in adults. An inhalational form of botulism is also possible. Botulinum toxin exposure may occur in both forms as agents of bioterrorism.

B. Clinical Features

Foodborne botulism is accompanied by gastrointestinal symptoms. Inhalational botulism and foodborne botulism are likely to share other symptoms including:

- *Responsive patient with absence of fever.*
- *Symmetric cranial neuropathies (drooping eyelids, weakened jaw clench, difficulty swallowing or speaking).*
- *Blurred vision and diplopia due to extra-ocular muscle palsies.*
- *Symmetric **descending** weakness in a proximal to distal pattern (paralysis of arms first, followed by respiratory muscles, then legs).*
- *Respiratory dysfunction from respiratory muscle paralysis or upper airway obstruction due to weakened glottis.*
- *No sensory deficits.*

C. Mode of Transmission

Botulinum toxin is generally transmitted by ingestion of toxin-contaminated food. Aerosolization of botulinum toxin has been described and may be a mechanism for bioterrorism exposure.

D. Incubation Period

- Neurologic symptoms of foodborne botulism begin 12 - 36 hours after ingestion.
- Neurologic symptoms of inhalational botulism begin 24 - 72 hours after aerosol exposure.

E. Period of Communicability

Botulism is **NOT** transmitted person to person.

F. Immunization Recommendations

Routine immunization of the public, including healthcare workers, is not recommended.

G. Infection Control Practices for Patient Management

Symptomatic patients with suspected or confirmed botulism should be managed according to current guidelines.

1. Isolation Precautions

Standard Precautions are used for the care of patients with botulism.

2. Patient Placement

Person-to-person transmission of botulism does NOT occur. Standard Precautions are indicated for patient care; a private room is not necessary.

3. Patient Transport

Standard Precautions should be used for transport and movement of patients with botulism.

4. Cleaning, Disinfection, and Sterilization of Equipment/Environment

Principles of Standard Precautions should be generally applied to the management of patient-care equipment and environmental control.

5. Laboratory Specimens

No special handling required.

6. Discharge Management

No special discharge instructions are indicated.

7. Post-Mortem Care

Standard Precautions should be used for post-mortem care.

H. Post Exposure Management

Suspicion of even single cases of botulism should immediately raise concerns of an outbreak potentially associated with shared contaminated food. In collaboration with the CT Department of Public Health/local health departments and the CDC, attempts should be made to locate the contaminated food source and identify other persons who may have been exposed. Any individuals suspected to have been exposed to botulinum toxin should be carefully monitored for evidence of respiratory compromise.

1. Decontamination of Exposed Persons/Environment

Contamination with botulinum toxin does not place persons at risk for dermal exposure or risk associated with re-aerosolization. Therefore, decontamination of exposed persons is not required.

2. Triage and Management of Large Scale Exposures/Potential Exposures

Patients affected by botulinum toxin are at risk for respiratory dysfunction that may necessitate mechanical ventilation. Ventilatory support is usually required for 2 to 3 months before neuromuscular recovery allows unassisted breathing. Respiratory Therapy must be notified immediately when it is anticipated that a large number of ventilators will be required. Sources of auxiliary support and means to transport patients to auxiliary sites will be coordinated through YNH Administration.

I. Healthcare Worker, Patient, and Visitor Information

Fact sheets describing the disease epidemiology, clinical symptoms, diagnosis and treatment are located on the electronic Infection Control Manual (accessible on the clinical workstations). (Appendix 5; Botulism - Quick Reference)

BIOTERRORISM RESOURCES

I. CDC

Agents of Bioterrorism: <http://www.bt.cdc.gov/Agent/Agentlist.asp>

Disease Information: <http://www.cdc.gov/ncidod/dbmd/diseaseinfo>

Health Advisory: How to Handle Anthrax and Other Biological Agent Threats:
<http://www.phppo.cdc.gov/han/documents/OfficialCDCHealthAdvisoryOct122001.pdf>

Vaccine Information; <http://www.immunofacts.com/general.html>

II. FBI

Advisory: How to Handle Suspicious Letters and Packages;

<http://www.cnn.com/2001/HEALTH/conditions/10/12/nyc.anthrax/fbi/jpg>

III. JAMA

Consensus Statements: Working Group on Civilian Biodefense.

(All include guidelines for postexposure prophylaxis and treatment)

Anthrax; <http://jama.ama-assn.org/issues/v281n18/ffull/jst80027.html>

Smallpox; <http://jama.ama-assn.org/issues/v281n22/ffull/jst90000.html>

Plague; <http://jama.ama-assn.org/issues/v283n17/ffull/jst90013.html>

Botulinum Toxin; <http://jama.ama-assn.org/issues/v285n8/ffull/jst00017.html>

Tularemia; <http://jama.ama-assn.org/issues/v285n21/ffull/jst10001.html>

IV. NY DOH

Medical Treatment and Response to Suspected Anthrax, Botulism, Plague, Q Fever, Smallpox, and Tularemia: Information for Health Care Providers During Biologic Emergencies; <http://nyc.gov/html/doh/html/cd/fsmd.html>

V. US Army

Handbook: Medical Management of Biological Casualties;

<http://ccc.apgea.army.mil/Documents/HandbookBioCas/Handbook.htm>

APPENDICES

BIOTERRORISM – Infection Control Practices for Patient Management

Hospital Epidemiology: 688-4634 or 688-4242 (after hours) CT Dept. of Public Health: 860-509-7994 or 860-509-8000 (after hours) Microbiology Laboratory: 688-2460 Virology Laboratory: 688-3524 Occupational Health Services: 688-2462 FBI: (203) 777-6311	BACTERIAL AGENTS	Anthrax	Brucellosis	Cholera	Glanders	Bubonic Plague	Pneumonic Plague	Tularemia	Q Fever	VIRUSES	Smallpox	Venez. Equine Encephalitis	Viral Encephalitis	Viral Hemorrhagic Fever	BIOLOGICAL TOXINS	Botulism	Ricin	T-2 Mycotoxins	Staph. Enterotoxin B
Isolation Precaution																			
Standard Precautions	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Contact Precautions	1	1		2							x			x					
Airborne Precautions											x			3					
N95 respirator for all persons entering room																			
Droplet Precautions						x													
Patient Placement																			
No restrictions	x							x	x			x	x			x	x	x	x
Private room		x	x	x	x	x	x				x			x					
Cohort "like" patients if no private room			x	x	x	x													
Negative Pressure											x			3					
Door closed at all times											x			3					
Patient Transport																			
No restrictions	x							x	x				x			x	x	x	x
Limit movement to essential medical purposes only		x	x	x	x	x	x				x	x		x					
Place mask on patient to minimize dispersal of droplets						x					x			3					
Cleaning, Disinfection of Equipment																			
Routine cleaning of room with EPA/hospital approved disinfectant	x	x	x	x	x	x	x	x	x		x	x	x	x		x	x	x	x
Disinfect surfaces with bleach/water sol. 1:9 (10%)	4				4	4		4											
Dedicated equipment – disinfect prior to removing from room											x			x					
Linen management as for all other patients	x	x	x	x	x	x	x	x	x		5	x	x	x		x	x	x	x
RMW handled per YNH policy	x	x	x	x	x	x	x	x	x		x	x	x	6		x	x	x	x
Discharge Management																			
No special discharge instructions	x		x	x				x	x			x	x			x	x	x	x
Standard Precautions for home care providers	x	x	x	x	x	x	x	x	x		x	x	x	x		x	x	x	x
Not discharged until no longer infectious						x					x			x					
Usually not discharged until 72 hours of antibiotics completed						x													
Post-mortem Care																			
Standard Precautions	x	x	x	x	x	x	x	x	x		x	x	x	x		x	x	x	x
Droplet Precautions						x													
Airborne Precautions											x								
N95 respirator for all persons entering room																			
Negative Pressure Ventilation											x								
Contact Precautions		x									x			x					
Routine cleaning of room with EPA/hospital approved disinfectant		x	x	x				x	x		x	x	x			x	x	x	x
Disinfect environmental surfaces w/ 10% bleach sol.	x					x	x		4					x					

¹ Contact Precautions may be considered if there is extensive skin involvement or lesions cannot be covered.

² Contact Precautions required when skin involved.

³ Airborne Precautions for patients with prominent cough, vomiting, diarrhea, or hemorrhage.

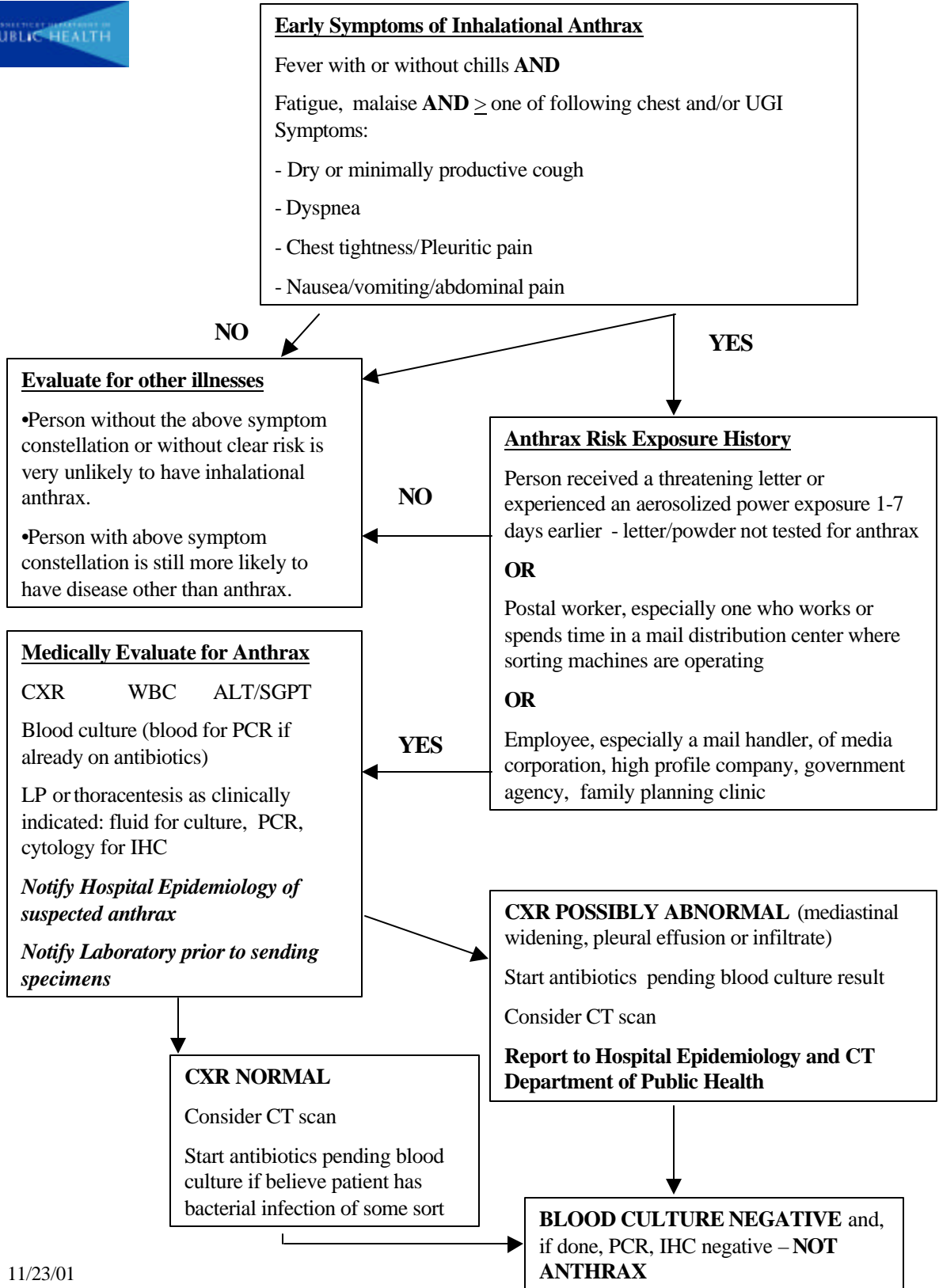
⁴ Decontamination considered only for instances of gross contamination (e.g. laboratory accident)

Change bed linen immediately if soiled with blood or other body fluid. All laundry should be placed in biohazard bags and autoclaved before laundering.

⁶ *All items contaminated with blood or body fluids should be handled as regulated medical waste.*

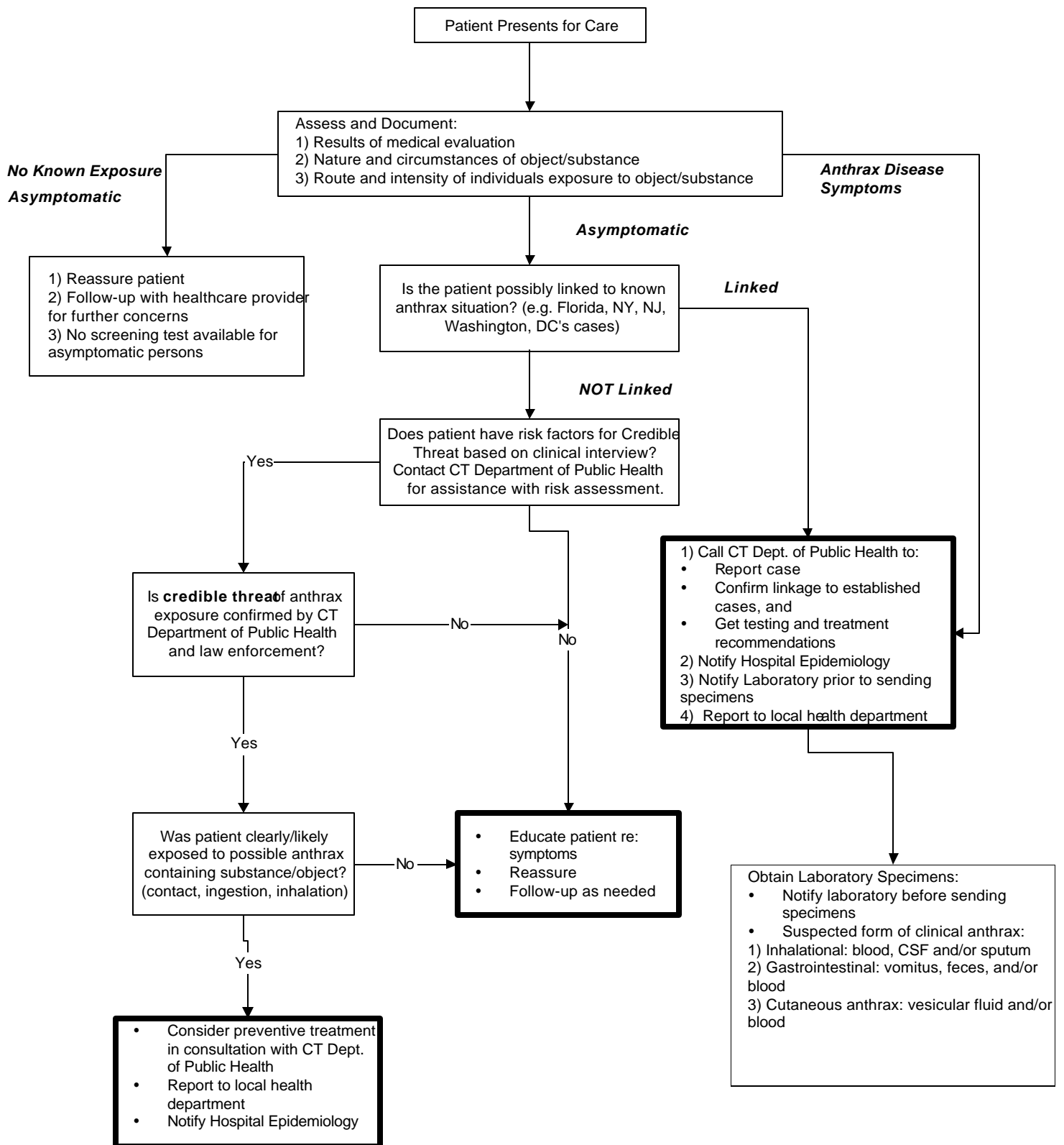
- Standard, contact, droplet, and airborne precautions are described in detail in the Infection Control Manual accessible on the Clinical Workstations.
- All cases related to bioterrorism **must** be reported **immediately** to YNHH Hospital Epidemiology and the CT Department of Public Health. The laboratory must be notified prior to sending any specimens from a suspected or known case related to bioterrorism.

Clinical Evaluation of Ill Persons with Respect to Possible Inhalational Anthrax



11/23/01

ALGORITHM: MANAGEMENT OF POSSIBLE ANTHRAX EXPOSURE



Connecticut Department of Public Health: 860-509-7994; after hours: 860-509-8000

Hospital Epidemiology: 688-4634; after hours: 688-4242

FBI: 203-777-6311

Microbiology Laboratory: 688-2460

Adopted	Revised	Responsible person
3/10/02		M. Landry, M.D. Director, Virology Laboratory

**Clinical Virology Laboratory
Yale New Haven Hospital**

Specimen Handling and Laboratory Testing of Patients at Risk for Smallpox

Background

Although the last naturally occurring case of smallpox occurred in 1977, there is concern that variola virus (smallpox) may be used as a bioterrorism agent. Consequently, the Clinical Virology Laboratory has drafted a plan for dealing with samples for diagnostic testing. As new information becomes available, this plan will be revised and updated.

CDC Guidelines

The Centers for Disease Control has prepared a response plan and guidelines (*CDC Smallpox Outbreak Response Plan and Guidelines*). Parts of this plan have been included in the Appendix of this policy. The entire plan is available at the Hospital Epidemiology and Infection Control Office (8-4634, GB 325) and on the web at www.cdc.gov/nip/smallpox. The YNH smallpox protocol can be found in section 2 in the Appendix and in the Infection Control Manual at <http://info.med.yale.edu/ynhh/infection/>.

Smallpox is currently considered a **Biosafety level 4** agent and therefore samples from patients determined to be at high risk of smallpox cannot be handled in BSL 2 (virology) or BSL 3 (TB) facilities. These samples will be sent to the CDC. (Note: In the future, State Laboratory personnel may be vaccinated against smallpox. If lab personnel are immune, they may be allowed to handle samples in a BSL 3 facility, but this has not yet been determined.)

Notification of the Virology Laboratory of possible Smallpox Cases

If a patient is identified by clinical presentation to be at risk of having smallpox, Hospital Epidemiology will notify the CT Department of Public Health (DPH) who will in turn notify the CDC.

The Virology Laboratory should also be notified by clinicians and Hospital Epidemiology of suspected patients prior to sending specimens to be certain that patient samples are NOT: 1) inadvertently inoculated into cell culture, or 2) centrifuged onto slides in the open laboratory.

In emergencies, the Laboratory Director can be reached at 8-3475 or beeper 1-888-631-0112.

Possible Smallpox Scenarios

- 1) Virology may be notified of a possible smallpox case and be asked to provide **packaging for shipment** of specimens to CT DPH or the CDC for diagnostic testing.
- 2) A sample may be received, without a prior phone call, with the request **"R/O smallpox"**
- 3) After a smallpox case has been confirmed, all persons seen at the hospital with rash illness will need to be **triaged according to their risk of smallpox, prior to virology testing.**

Handling of these various scenarios is described below.

1) Packaging of possible smallpox samples for shipment

The Virology Laboratory will maintain proper packing materials in its storeroom, CB556. Instructions on triple packaging are in the CDC Interim Smallpox Response Plan, under Specimen collection guidelines, pages D8-12. A "Shipper's Declaration of Dangerous Goods" form must be filled out to accompany the package (forms kept in Virology). Communication between Hospital Epidemiology, the State DPH and the

CDC will be essential prior to the transport of any samples. Depending upon the circumstances, personal transport to the State Lab may be indicated, or direct shipment to the CDC.

2) Samples received as “R/O Smallpox”

If a sample labeled as “R/O smallpox” arrives in Virology, without prior notification, the sample should not be processed until the Laboratory Director or Manager calls the clinician to determine the circumstances. Before the laboratory handles the sample, an evaluation by Hospital Epidemiology/ Infectious Disease and/or Dermatology is indicated, followed by a discussion with the Laboratory Director.

3) Triage according to Risk of Smallpox

After an index case of smallpox is diagnosed, a triage system will be implemented, depending on the instructions of the State DPH and the CDC. Under the triage system, patients with a rash illness suspicious for smallpox will be categorized as low risk, moderate risk or high risk of smallpox (see Tables 1 and 2 and Flow chart attached; CDC guidelines in section 6). This determination will be made by Infectious Disease and/or Dermatology specialists, in consultation with Hospital Epidemiology.

Laboratory Protocol according to Risk of Smallpox

The Virology Laboratory Protocol will vary depending upon the risk category as follows:

HIGH RISK for SMALLPOX:

Samples from High Risk patients will NOT be tested in Virology. Smallpox virus can only be handled in Biosafety Level 4 facilities. Samples will be collected according to the strict guidelines of the CDC, preferably by persons vaccinated for smallpox (see *CDC Guide D - Specimen Collection Guidelines*). A smallpox collection kit will be available from Hospital Epidemiology, in the ED and from Virology. Viral Transport Media will not be used. The Virology Laboratory however may be asked to assist in or to provide the packaging materials for samples to be shipped to the CDC.

MODERATE RISK for SMALLPOX:

Samples from Moderate Risk patients will be submitted to the Virology Laboratory for direct immunofluorescence testing (DFA) for VZV and HSV. A different protocol will be used to prevent aerosolization of virus and to ensure adequate fixation (i.e. virus inactivation).

- 1) A swab will be collected by the physician at the bedside using appropriate safety precautions and a smallpox collection kit available from Hospital Epidemiology, in the ED and from Virology. The swab will be collected in a tube without VTM*. In addition, a slide can be prepared directly from skin lesions.
- 2) The laboratory will be notified by phone that the sample is being submitted.
- 3) The sample will be hand-transported in a safety container (provided in the smallpox collection kit) to Virology, and NOT sent via the Tube System.
- 4) Instead of cytopsin preparation of slides, the slide will be prepared in the biological safety cabinet in the TB lab (BSL3). The swab will be rolled over the well on the slide and the cells allowed to air dry. The slide will then be fixed in formalin in a Coplin jar, which will be brought from Virology to the TB lab for this purpose.
- 5) The remainder of the staining process will be conducted in the fume hood in the Virology Laboratory.
- 6) The formalin fixation and permeabilization protocol (used for CMV antigenemia) will be used instead of the usual acetone fixation protocol used for VZV/HSV.
- 7) The slide will be examined by fluorescence microscopy for VZV and HSV antigens.
- 8) The sample will NOT be placed into cell culture if the test is negative.

Hospital Epidemiology and other involved clinicians will be notified of the test result as soon as it is available.

*If a sample is inappropriately collected in VTM, recollection will be required. Swabs placed in VTM require centrifugation to pellet cells; this presents a safety risk due to potential for aerosolization. Improperly collected samples will be autoclaved in the Virology Laboratory, prior to disposal in a Red Biohazard container.

LOW RISK for SMALLPOX:

Samples from Low Risk patients submitted for diagnosis of VZV/HSV will be handled as usual.

Appendix:

- **CDC Interim Smallpox Response Plan and Guidelines**
- **Evaluating Patients for Smallpox: Acute, generalized vesicular or pustular illness protocol.** *Department of Health and Human Services and CDC*
- **Guidelines for the Safe Transport of Infectious Substances and Diagnostic Specimens**
WHO, 1997
- **VA Connecticut Medical Center Bulletin: Laboratory Diagnosis of Bioterrorism Pathogens**
- **Strengthening National Preparedness for Smallpox: an Update,** from *Emerging Infectious Diseases*, vol 7, no. 1, Jan-Feb 2001.
- **Transmission potential of smallpox in contemporary populations,** *Nature*, vol. 414, December 2001 pp 748-751

For additional and/or updated information on the Web:

Yale New Haven Hospital Infection Control Manual

<http://info.med.yale.edu/ynhh/infection/>

Connecticut State Laboratory

www.state.ct.us/dph/Agency_news/FCT_bioterror.htm

Centers for Disease Control

www.cdc.gov/nip/smallpox

Abbreviated Summary for Specimen Collection, Packaging and Shipping

Note: For complete instructions see Sections 4 and 5 of this booklet

Specimen Collection Guidelines - Abbreviated

PRIOR to shipping, contact must be made with the Agency to whom samples are to be shipped (call CT DPH first, then CDC if the State so directs) and approval obtained. Specific directions regarding the transportation methods will be given at the time of consultation.

LABEL all samples (name, date, specimen [vesicle, pustule, scab])

AVOID GLASS VIALS

Wrap tubes and slide holders with PARAFILM

Place samples from a single patient into a biohazard bag with outside label that includes: name, date, SS# or birth date.

Package samples from a single patient (except biopsies) on gel packs; formalin-fixed biopsies at room temperature, and non-fixed biopsies on dry ice, and ship within 24 hours. If longer delays are necessary, see CDC instructions on page D-5.

Vesicles or pustules

- 1) Top (skin) of vesicle or pustule removed by scalpel and placed in a dry 1.5-2 ml screw capped vial
- 2) Vesicle fluid applied to microscope slide (touch prep), then air dried and placed in plastic slide holder (separate holders for separate patients)
- 3) If slide not available, swab base of lesion with polyester or cotton swab, place in dry screw-capped vial

- 4) Touch electron microscope grid to unroofed base of lesion; air-dry; repeat x 2; place in grid box
- 5) Biopsy vesicles (2) with 3.5-4 mm punch biopsy kit; place one biopsy in formalin and one in dry screw-capped vial
- 6) Draw 10 cc blood in plastic marble-top tube or plastic yellow-top serum separator tube
- 7) Swab posterior tonsillar tissue and place swab in dry screw-capped vial
- 8) Draw 5 cc blood into plastic purple-topped tube, then mix

Scab lesions

- 1) Pry off 4 scabs with 26 gauge needle and place 2 scabs per plastic screw-capped vial
- 2) Obtain samples as in no. 5-8 above.

Autopsy specimens

- 1) Specimens should be frozen and shipped with dry ice (skin lesions, liver, spleen, lung, lymph nodes, and/or kidney)
- 2) Formalin fixed tissue for histopathology, immunohistochemistry and PCR should be shipped separately at room temperature

Principles of Packaging Specimens for Shipment-Abbreviated

- 1) Triple packaging of specimens using insulated "Infectious Substance" containers is required for shipping samples on dry ice.
- 2) Noninsulated "Infectious Substance" containers can be used for shipping samples at room temperature, or samples with gel packs.
- 3) A "Shipper's Declaration for Dangerous Goods" form must be filled out. See examples attached. Either a form from the shipping company (e.g. Federal Express) or a generic form provided by the manufacturer of the container can be used.

ANTHRAX – QUICK REFERENCE

Bioterrorism Epidemiology:

- Inhalation anthrax: most likely disease presentation if bacilli aerosolized.
- Person to person transmission does NOT occur.

Incubation Period:

- Average 1-6 days
- Up to 6 weeks following a bio-aerosol release

Clinical Disease:

- Gastrointestinal: abdominal pain, bloody diarrhea, hematemesis
- Cutaneous: pruritic skin lesion with black eschar and tissue edema
- Inhalation: bi-phasic illness
 - Initial phase: flu-like symptoms, low grad fever, non-productive cough, malaise, fatigue, myalgias, mild chest discomfort followed by a short period (several hours to days) of improvement.
 - Acute phase: abrupt onset of respiratory distress with dyspnea, stridor, cyanosis, high fever, shock and death within 24-36 hours.

Diagnosis:

- Presumptive diagnosis based on characteristic skin lesion (cutaneous), intestinal bleeding (gastrointestinal) and respiratory failure with widening mediastinum (inhalation).

Treatment:

Early antibiotic treatment is critical to survival.

- Ciprofloxacin, doxycycline, penicillin (if susceptible)

Prophylaxis:

Early antibiotic prophylaxis is critical to preventing disease.

- Ciprofloxacin, doxycycline, amoxicillin (if strain penicillin susceptible)

Isolation:

- Gastrointestinal, Cutaneous, Inhalation: Standard precautions

Any suspected case of anthrax (*Bacillus anthracis*) must be reported **immediately** to YNHH Hospital Epidemiology (688-4634, after hours call page operator 688-4242), the CT Department of Public Health (860-509-7994, after hours 860-509-8000), and the local health department.

PLAGUE – QUICK REFERENCE

Bioterrorism Epidemiology:

- Pneumonic plague: most likely disease presentation if bacilli intentionally aerosolized.
- Bubonic plague: most likely disease presentation if infected fleas released.

Transmission:

- Person-to-person exposure to respiratory droplets (within 3 feet).
- Contact with infected animals.
- Contact with infected, draining buboes.

Incubation Period:

- Pneumonic: 1-3 days
- Bubonic: 2-10 days

Clinical Disease:

- Pneumonic: acute onset high fever, chills, headache, myalgias, malaise, cough (hemoptysis) progressing rapidly to dyspnea, stridor, cyanosis, and death; gastrointestinal symptoms may be present.
- Bubonic: high fever, malaise, painful groin lymph nodes common.
- Septicemic: 80% of persons with bubonic disease become septic; 5-15% develop pneumonia.

Diagnosis:

- Presumptive diagnosis: gram-negative coccobacilli with “safety pin” bipolar staining on Gram, Wright, Giemsa, or Wayson stain of blood, sputum, CSF, or lymph node aspirates (if present).

Treatment:

Early antibiotic treatment is critical to survival.

- Gentamicin, streptomycin, doxycycline, ciprofloxacin

Prophylaxis:

Early antibiotic prophylaxis is critical to preventing disease.

- Doxycycline, ciprofloxacin

Isolation:

- Pneumonic: Standard and Droplet Precautions
- Bubonic: Standard and Contact Precautions. Droplet Precautions if bubonic progresses to pneumonia.

Any suspected case of plague (*Yersinia pestis*) must be reported **immediately** to YNHH Hospital Epidemiology (688-4634, after hours call page operator 688-4242), the CT Department of Public Health (860-509-7994, after hours 860-509-8000), and the local health department.

TULAREMIA – QUICK REFERENCE

Bioterrorism Epidemiology:

- Exposure to 10-50 organisms can result in clinical disease.
- Person to person transmission does NOT occur even with the pneumonic form.
- Laboratory personnel are at high risk for infection.

Incubation Period:

- Average 3-5 days (range 1-21 days)

Clinical Disease: Six classic forms of tularemia that may overlap

- Pneumonic: most likely presentation; abrupt onset of fever, chills, headache, malaise, anorexia, cough (with little or no sputum production), myalgias, pleuritic chest pain, substernal tightness, and rarely hemoptysis. Pneumonia may be primary or secondary to bacteremic dissemination from other tularemia syndromes.
- Systemic: fever, chills, myalgias, sore throat, nausea, anorexia, vomiting, abdominal pain, and loose or watery diarrhea.
- Oropharyngeal: exposure via contaminated food or water; sore throat with exudative tonsillitis and pharyngitis with the formation of ulcer(s).
- Ulceroglandular: enlarged, local tender lymph nodes. Skin lesions may appear before, simultaneously, or after lymphadenopathy. Skin lesions start as red, painful papule(s) that progress to necrotic draining ulcer(s) with raised borders.
- Glandular: Same as ulceroglandular without the skin lesions.
- Oculoglandular: results from inoculation onto the eye; photophobia and excessive lacrimation, swollen eyes, painful injected conjunctivae and yellowish conjunctival ulcers.

Diagnosis:

- Laboratory: elevated WBC, LDH, transaminases, alkaline phosphatase, and evidence of rhabdomyolysis. Pleural fluid generally exudative with >1000 leukocytes/mm³. Organism may be recovered from culture of blood, ulcers, conjunctival exudates, sputum, gastric washings, and pharyngeal exudates. Serology useful.
- Radiology: Chest x-ray may show infiltrates without symptoms; subsegmental/lobar infiltrates, hilar adenopathy, pleural effusion, granulomas, or miliary infiltrates (may mimic tuberculosis).

Treatment:

- Gentamicin, ciprofloxacin, or doxycycline.

Prophylaxis:

- Doxycycline or ciprofloxacin

Isolation:

- Standard precautions

Any suspected case of tularemia (*Francisella tularensis*) must be reported **immediately** to YNH Hospital Epidemiology (688-4634, after hours call page operator 688-4242), the CT Department of Public Health (860-509-7994, after hours 860-509-8000), and the local health department.

Q-FEVER – QUICK REFERENCE

Bioterrorism Epidemiology:

- Exposure to a single inhaled organism can result in clinical disease.
- Person to person transmission does NOT occur.

Incubation Period:

- Average 2-14 days

Clinical Disease:

- Symptoms may include fever, non-productive cough, severe headache, fatigue, and myalgias.
- Less prominent symptoms include chills, sweats, nausea, vomiting, diarrhea and pleuritic chest pain and neurological manifestations.
- 33% of patients will develop acute hepatitis
- Pneumonia may be rapidly progressive especially in persons who are immunocompromised.

Diagnosis:

- Laboratory tests are generally unremarkable. The WBC and hepatic transaminase levels may be elevated. The bilirubin is generally normal.
- Serologic tests. Specific IgM antibodies may be detectable as early as the second week after onset of illness.

Treatment:

- Tetracycline, doxycycline

Prophylaxis:

Antibiotics if given too early following exposure, may delay but not prevent the onset of symptoms.

- Tetracycline, doxycycline

Isolation:

- Standard precautions

Any suspected case of Q-Fever (*Coxiella burnetii*) must be reported **immediately** to YNH Hospital Epidemiology (688-4634, after hours call page operator 688-4242), the CT Department of Public Health (860-509-7994, after hours 860-509-8000), and the local health department.

SMALLPOX – QUICK REFERENCE

Bioterrorism Epidemiology:

- Transmission: highly contagious; person-to-person contact with respiratory secretions; coughing patients most contagious; contact with lesions and fomites (clothes and bed linens).
- Persons vaccinated prior to 1972 DO NOT have immunity. Persons vaccinated multiple times (military prior to 1990 and foreign travelers prior to 1972) may have some residual immunity.

Incubation Period:

- Average 12-14 days; range 7-17 days.

Clinical Disease:

- Acute onset of malaise, rigors, vomiting, headache, backache, possible delirium; high fever (up to 40.5°C) at or just prior to onset of rash, maculopapular rash predominate on face and mucous membranes of mouth, pharynx migrating to forearms, legs, palms and soles then to trunk.

Diagnosis:

- Presumptive diagnosis based on signs and symptoms.
- Differential Diagnosis:
 - Chickenpox, allergic contact dermatitis, erythema multiforme with bullae, secondary syphilis, atypical measles.
 - Chickenpox eruptions are more numerous on trunk than on face and extremities.
 - Chickenpox lesions occur in crops in different stages of development and are superficial with rare scar formation.
 - Smallpox lesions are in the same stage of development and are most prominent on face and extremities (including palms and soles).

Treatment:

- Provide supportive care, pain and fever control, sedation for delirium; maintain hydration; antibiotics for secondary infection.
- Cidofovir?

Prophylaxis:

- Smallpox vaccine is not commercially available. The CDC has a small supply of vaccine and vaccinia immunoglobulin.

Isolation:

- Airborne Precautions (monitored negative pressure private room, N95 respirators for all individuals entering the room) and Contact Precautions in addition to Standard Precautions.

Any suspected case of smallpox must be reported **immediately** to YNHH Hospital Epidemiology (688-4634, after hours call page operator 688-4242), the CT Department of Public Health (860-509-7994, after hours 860-509-8000), and the local health department.

VIRAL HEMORRHAGIC FEVER – QUICK REFERENCE

Bioterrorism Epidemiology:

- Transmission: Except for Hantaviruses, all VHF viruses are highly contagious especially in the terminal stages of the disease; person-to-person contact with blood, all body fluids and tissue; coughing patients may aerosolize virus into the air and may result in transmission.

Incubation Period:

- Varies with each virus; range is 5-42 days.

Clinical Disease:

- Varies slightly with each virus.
- The target organ is the vascular bed and the dominant clinical features are the result of microvascular damage and changes in vascular permeability.
- Common symptoms include fever, myalgias, prostration, conjunctival injection, hypotension, flushing, petechial hemorrhages, shock and generalized hemorrhage.

Viral Hemorrhagic Fever (HF)	Prominent Clinical Variables
Argentine and Bolivian HF	Epigastric, retroorbital and low back pain, vesicles on palate, hyporeflexia with gait abnormalities, tremors of tongue and upper extremities, hematuria, proteinuria
Lassa Fever	Retrosternal chest pain, back pain, sore throat, peripheral edema, proteinuria, hemorrhage uncommon, hearing loss, elevated AST
Rift Valley Fever	Retinitis, loss of vision (delayed), jaundice, DIC
Crimean-Congo Fever	DIC, thrombocytopenia, jaundice
Hantavirus HF with Renal Syndrome	Renal failure, proteinuria, hematuria, oliguria, polyuric, blanching erythematous rash
Hantavirus Pulmonary Syndrome	Pulmonary vascular permeability, ARDS, hypoxia, dyspnea, hemorrhage and renal failure rare
Marburg Pulmonary Syndrome	Photophobia, lymphadenopathy, jaundice, pancreatitis, delirium, coma, maculopapular rash on trunk, DIC
Yellow Fever	Jaundice

Diagnosis:

- Presumptive, based on clinical signs and symptoms.

Treatment:

- Supportive care, pain and fever control, sedation, hydration.
- Ribavirin?

Prophylaxis:

- Ribavirin?
- Yellow fever vaccine

Isolation:

- Standard Precautions and Contact Precautions.
- Mask and eye protection within 3 feet of patients with proven Lassa fever, CCHF or filovirus infections.
- Airborne Precautions if patients have prominent cough, vomiting, diarrhea, or hemorrhage.

Any suspected case of viral hemorrhagic fever must be reported **immediately** to YNHH Hospital Epidemiology (688-4634, after hours call page operator 688-4242), the CT Department of Public Health (860-509-7994, after hours 860-509-8000), and the local health

BOTULISM – QUICK REFERENCE

Bioterrorism Epidemiology:

- Botulinum toxins are considered the most lethal substances known to man.
- Intentional exposure could occur through contaminated food or water or by bio-aerosol.
- Person to person transmission does NOT occur.

Incubation Period:

- 12-36 hours following exposure, may be as long as several days, depending on the size of the inoculum and route of exposure.

Clinical Disease:

Foodborne: Acute bilateral cranial nerve impairment, blurred or double vision, ptosis, dysphagia, dry mouth, slurred speech, afebrile, alert and oriented.

- Cranial nerve palsies, dilated pupils (50%), urinary retention
- Symptoms may progress to a symmetrical flaccid paralysis in which sensation is completely preserved and result in respiratory failure.

Inhalation: symptoms would be similar to foodborne illness.

Diagnosis:

- Presumptive - based on symptoms
- Tensilon test may be slightly positive.
- Brain imaging (CT or MRI), lumbar puncture and edrophonium chloride tests normal
- Electromyography may show decreased amplitude of action potentials in involved muscle group.

Treatment:

- Botulism antitoxin – obtained through the CT Department of Public Health.
- Most effective if administered early in disease.
- Mechanical ventilation

Isolation:

- Standard Precautions

Any suspected case of botulism (*Clostridium botulinum*) must be reported **immediately** to YNHH Hospital Epidemiology (688-4634, after hours call page operator 688-4242), the CT Department of Public Health (860-509-7994, after hours 860-509-8000), and the local health department.