



Anthrax

This is an immediately reportable disease

Disease Plan

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Last updated: May 28, 2015, by Wei Hou

Questions about this disease plan?

Contact the Utah Department of Health Bureau of Epidemiology: 801-538-6191.

✓ WHY IS ANTHRAX IMPORTANT TO PUBLIC HEALTH?

Anthrax, *Bacillus anthracis*, is a gram-positive, spore-forming bacillus which can cause serious acute infections in both animals and humans. Anthrax can be found naturally in soil and affects domestic and wild animals worldwide. Although it is rare, people can get sick with anthrax if they come in contact with infected animals or contaminated animal products. The incidence of anthrax has decreased in developed countries, but it remains a considerable health problem in developing countries. Anthrax occurs primarily in three forms: cutaneous, inhalational/respiratory, and gastrointestinal. Due to the nature of the disease, anthrax could be used as a weapon of bioterrorism.

✓ DISEASE AND EPIDEMIOLOGY

Clinical Description

There are three clinical presentations of anthrax:

Cutaneous:

This is the most common clinical presentation. The disease creates a lesion (papular, becoming vesicular, and finally appearing as an eschar or a black depressed lesion) at the site of entry. This lesion evolves over a period of 2-6 days. Significant edema (swelling) surrounds the eschar. The ulcer is usually painless and typically is misdiagnosed as an insect bite or Orf virus (Orf is a virus that causes ulcers) until the eschar presentation.



Inhalational:

This is a rare presentation. Initial symptoms are flu-like, including fever, malaise, nausea, vomiting, and mild cough or chest pain. The disease worsens rapidly (within 3-5 days), with respiratory distress and shock. Diagnosis is typically through chest x-ray that shows a characteristic mediastinal widening, which is then confirmed by culture. Death is common.



Gastrointestinal:

This is also a rare presentation. It presents as abdominal distress, followed by fever, septicemia and death.

Oropharyngeal:

This is also a rare presentation consisting of mucosal lesions in the oral cavity or oropharynx, along with cervical adenopathy, fever, and edema.

Causative Agent

Bacillus anthracis is a gram-positive, nonmotile, spore-forming bacillus. The anthrax spores of *B. anthracis* are the infectious agent. *B. anthracis* has three virulence factors: an antiphagocytic capsule and two toxins (lethal and edema). These factors are responsible for hemorrhage, edema, and necrosis that accompany this disease.

Differential Diagnosis

The differential diagnosis for inhalational anthrax includes pneumonia, influenza, and bronchitis. The differential diagnosis for cutaneous anthrax includes spider bites and Orf virus.

Laboratory Identification

Anthrax is generally identified via culture or PCR. The organisms are easy to grow, but can be difficult to differentiate from other *Bacillus* species that are benign. Typically, clinical laboratories should attempt to rule out the presence of anthrax in blood cultures and lesions within 24 hours. If anthrax cannot be ruled out, then the isolate should be forwarded immediately to the Utah Public Health Laboratory (UPHL) for final identification.

Samples:

Cutaneous – Collect all samples listed below on all suspect patients:

- **Swab** – Collect two separate swabs (dacron or rayon only) of the lesion (one is for Gram stain and culture, the other for PCR). DO NOT use calcium alginate or cotton swabs, as they will interfere with the PCR test. Collect vesicular fluid aseptically on dry sterile swabs from previously unopened vesicles. If lesion is an eschar, carefully lift the eschar's outer edge and insert a sterile dry swab and rotate for 2-3 seconds, beneath the edge of the eschar.
- **Biopsy** – Collect biopsy specimens from both vesicle and eschar, if present.
 - **If patient has been on antibiotics for at least 24 hours:** collect one full-thickness punch biopsy from papule or vesicle which includes adjacent skin – place into 10% buffered formalin for histopathology and immunohistochemistry (IHC).
 - **If patient is NOT on antibiotics or has only received antibiotics within the preceding 24 hours:** collect two full-thickness punch biopsies from papule or vesicle which includes adjacent skin – place ONE of the biopsies into 10% buffered formalin and the SECOND one should be fresh frozen (for culture, Gram stain, PCR, and frozen tissue IHC).
- **Serum** – Always collect an acute serum sample as soon as the diagnosis is suspected. Always collect a convalescent serum sample 14-35 days after symptom onset.

Inhalational – Collect all samples listed below on all suspect patients:

- **Blood** – Collect typical volume and number of sets for blood culture as described by your institution. Also, collect an additional 10 ml of blood (for pediatric cases, collect the volume allowable) in an EDTA tube for PCR.
- **Pleural Fluid** – Collect pleural fluid and place into a sterile container. Test for culture, Gram stain, and PCR.

- **CSF** – Collect CSF if meningeal signs are present or if meningitis is suspected. Test for culture, Gram stain, and PCR.
- **Serum** – Always collect an acute serum sample as soon as the diagnosis is suspected. Always collect a convalescent serum sample 14-35 days after symptom onset.
- **Biopsy** – If available, submit a bronchial or pleural biopsy. These should be stored and shipped BOTH as fresh frozen tissue AND as formalin fixed samples.

Gastrointestinal –

- Collect blood and stool samples.

Information on sample size and transport are posted in the following table.

Test Types	Samples	Size (minimum)	Transport <2 hours	Transport > 2 hours	Do Not Send
Culture and PCR	Isolate	Plate/slant	RT*	RT	Broth
	Swabs ¹		RT	RT	On transport media
	Blood, whole	1.0 ml in EDTA or Na citrate tubes	RT	2-8°C	Blood culture bottle or heparin tube
	Fluids (pleural, bronchial, CSF)	0.5 ml	RT	2-8°C	
	Blood clot	1.0 ml clot	RT	2-8°C	
	Tissue, fresh	5 mm ³ in container	2-8°C	Frozen at -79°C	Preserved tissue
	Serum, separated and removed from clot	1.0 ml	RT	2-8°C	Frozen serum
	Citrated plasma, separated and removed from clot	1.0 ml	RT	2-8°C	Frozen plasma
	Stool	≥ 5 g	2-8°C	2-8°C	
Serology	Serum, separated and removed from clot	1.0 ml	2-8°C	Frozen at ≤ - 20°C	Whole blood, blood culture bottle, plasma
	Citrated plasma, separated and removed from clot	1.0 ml	2-8°C	Frozen at ≤ - 20°C	Plasma from EDTA or heparin

Histopathology	Tissue preserved in 10% buffered formalin	1.0 cm ³	RT	RT	Fresh or frozen tissue
	Biopsies of lesions, preserved in 10% buffered formalin	0.3 mm diameter	RT	RT	Fresh or frozen tissue

* Room Temperature ¹ from lesions

Treatment

Naturally occurring cutaneous disease can be treated with many antimicrobial agents, including penicillins and tetracyclines, for 7-10 days. For bioterrorism-associated cutaneous disease in adults or children, ciprofloxacin or doxycycline is recommended for initial treatment.

Case Fatality

It is estimated that approximately 20% of untreated cutaneous anthrax cases will result in death; however, mortality is rare with antimicrobial treatment. Fatality rates with inhalational and gastrointestinal forms of the disease, even with appropriate treatment, are much higher.

Reservoir

The ultimate reservoir for *B. anthracis* is the soil. Animals (normally herbivores) shed the bacilli in terminal hemorrhages at death. From a bioterrorism perspective, the main concern is specially processed spores which have a higher potential for causing infections. Presence of this disease should be investigated thoroughly to determine whether it could be due to bioterrorism.

Transmission

Anthrax is rarely transmitted from person-to-person. The infection can be transmitted through contact with infected animal carcasses (e.g., tissues or other parts of the animals). The disease may be transmitted through contact with infected animal hair, wool, hides, or bone, or products made from these. All cases of anthrax should be investigated to determine whether they are possibly due to bioterrorism.

Susceptibility

All humans are susceptible to anthrax.

Incubation Period

The incubation period varies for different forms of anthrax:

- Cutaneous Anthrax: 1-7 days, with a range of 1-12 days
- Inhalation Anthrax: ranges from 1-43 days, although incubation periods of up to at least 60 days may be possible
- Gastrointestinal Anthrax: estimated to range from 1-7 days

Period of Communicability

Anthrax is not communicable from person to person.

Epidemiology

No cases of anthrax have been identified in Utah in recent history. However, any suspect cases should be thoroughly investigated.

Risk groups for anthrax include: veterinarians; people who work with hides, wool, or bone; and healthcare and laboratory workers who routinely work with *B. anthracis*.

✓ PUBLIC HEALTH CONTROL MEASURES

Public Health Responsibility

- Investigate all suspect anthrax cases of disease
- Fill out and submit appropriate disease investigation forms
- Provide education to the general public, clinicians, and first responders regarding disease transmission and prevention
- Initiate active surveillance immediately upon notification of suspect cases
- Identify clusters or outbreaks of anthrax
- Identify sources of exposure and stop further transmission

Prevention

Control of the disease in humans ultimately depends on control of the disease in animals. There are small endemic levels of anthrax spores in grazing areas, and occasionally ruminants become infected. Annual vaccination of grazing ruminants will prevent/reduce transmission to humans.

Chemoprophylaxis

Three oral antimicrobial agents (ciprofloxacin, doxycycline, and levofloxacin) have been approved by the United States Food and Drug Administration (FDA) and are recommended by CDC for anthrax post-exposure prophylaxis (PEP). The recommended duration of PEP antimicrobial therapy is 60 days.

Ciprofloxacin and **doxycycline** are approved for use in adults and children, and are considered equivalent first-line antimicrobial agents for inhalation anthrax PEP. The recommended dosing is as follows:

- Oral ciprofloxacin (500 mg twice daily in adults; 15 mg/kg twice daily [not to exceed 500 mg/dose] in children)
- OR
- Oral doxycycline (100 mg twice daily in adults; in children >8 yrs and >45 kg: 100 mg twice daily; in children >8 yrs and ≤45 kg: 2.2 mg/kg twice daily; in children ≤8 years: 2.2 mg/kg twice daily [not to exceed 100 mg/dose])

- Ciprofloxacin is considered the first-line drug for PEP in pregnant women and nursing mothers.

Levofloxacin is also FDA-approved for inhalation anthrax PEP in adults and children ≥ 6 months of age [30,31]. However, levofloxacin is considered a second-line antimicrobial agent for PEP when medical issues such as tolerance or resistance may call for its use, since safety data on the use of levofloxacin for more than 28 days are limited [8]. The recommended dosing is as follows:

- Oral levofloxacin (500 mg once daily in adults and children >50 kg; 8 mg/kg twice daily [not to exceed 500 mg/day] in children ≥ 6 months of age and <50 kg)

For patients unable to tolerate FDA-approved antimicrobial agents, clinicians may consider clindamycin, rifampin, fluoroquinolones (other than ciprofloxacin and levofloxacin), chloramphenicol, or vancomycin as alternatives for PEP, based on in vitro susceptibility results. However, data supporting the use of these antibiotics are lacking.

Vaccine for PEP

Anthrax vaccine adsorbed (AVA) is recommended by ACIP and CDC as part of the PEP regimen for inhalation anthrax (IA) exposure and is available from the CDC, through state and local health departments, as part of an Investigational New Drug (IND) protocol.

In the post-exposure setting, ACIP recommends that anthrax vaccine be administered in three subcutaneous doses (at zero, two, and four weeks) in conjunction with a 60 day course of antimicrobial therapy (see following table). In order to maximize the benefits of the vaccine, it should be offered within 10 days of exposure. ACIP recommends the use of AVA for both pregnant and lactating women exposed to aerosolized B. anthracis spores, and recommends consideration of the vaccine for children exposed to B. anthracis spores.

Recommended initial antimicrobial agent and anthrax vaccine adsorbed (AVA) dosages for postexposure prophylaxis (PEP) after exposure to aerosolized Bacillus anthracis spores		
Population	Antimicrobials for 60-day* PEP	AVA dosage and route •
Adults (18-65 years)	One of the following for 60 days: <ul style="list-style-type: none"> • Ciprofloxacin, Δ 500 mg orally twice daily • Doxycycline, 100 mg orally twice daily 	3-dose subcutaneous (SC) series: first dose administered as soon as possible, second and third doses administered 2 and 4 weeks after the first dose
Pregnant women \diamond	One of the following for 60 days: <ul style="list-style-type: none"> • Ciprofloxacin, 500 mg orally twice daily • Doxycycline, 100 mg orally twice daily • Amoxicillin, \S 500 mg every 8 hrs 	3-dose SC series; first dose administered as soon as possible, second and third doses administered 2 and 4 weeks after the first dose

<p>Children (<18 yrs)¶</p>	<p>One of the following for 60 days:</p> <ul style="list-style-type: none"> • Ciprofloxacin,Δ‡ 15 mg/kg every 12 hrs • Doxycycline,¥† (maximum of 100 mg/dose) <ul style="list-style-type: none"> • >8 yrs and >45 kg: 100 mg every 12 hrs • >8 yrs and ≤45 kg: 2.2 mg/kg every 12 hrs • ≤8 yrs: 2.2 mg/kg every 12 hrs • Amoxicillin,§ ** 45 mg/kg/day orally divided into 3 daily doses given every 8 hrs; each dose should not exceed 500 mg 	<p>Recommendations for use of AVA in children are made on an event-by-event basis</p>
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*Antimicrobials should continue for 14 days after administration of the third dose of vaccine.

•AVA used for PEP must be administered subcutaneously.

ΔLevofloxacin is a second-line antimicrobial agent for PEP for persons aged ≥6 mos with medical issues (e.g., tolerance or resistance to ciprofloxacin) that indicate its use. Children: 16 mg/kg/day divided every 12 hrs; each dose should not exceed 250 mg. Adults: 500 mg every 24 hrs. Safety data on extended use of levofloxacin in any population for >28 days are limited; therefore, levofloxacin PEP should only be used when the benefit outweighs the risk.

◇The antimicrobial of choice for initial prophylactic therapy among pregnant women is ciprofloxacin. Doxycycline should be used with caution in asymptomatic pregnant women and only when other appropriate antimicrobial drugs are contraindicated. Although tetracyclines are not recommended during pregnancy, their use might be indicated for life-threatening illness.

§If susceptibility testing demonstrates an amoxicillin MIC ≤0.125 µg/mL, oral amoxicillin should be used to complete therapy.

¥Use of tetracyclines and fluoroquinolones in children can have adverse effects. These effects must be weighed carefully against the risk for developing life-threatening disease. If exposure to B. anthracis is confirmed, children may be treated initially with ciprofloxacin or doxycycline as prophylaxis. However, amoxicillin is preferred for antimicrobial PEP in children when susceptibility testing indicates that the B. anthracis isolate is susceptible to penicillins.

‡Each ciprofloxacin dose should not exceed 500 mg, or 1 g/day.

†In 1991, the American Academy of Pediatrics (AAP) amended the recommendation to allow treatment of young children with tetracyclines for serious infections such as Rocky Mountain spotted fever for which doxycycline might be indicated. Doxycycline is preferred for its twice daily dosage and low incidence of gastrointestinal side effects.

**Because of the lack of data on amoxicillin dosages for treating anthrax (and the associated high mortality rate), AAP recommends a higher dosage of 80 mg/kg/day, divided into 3 daily doses; each dose should not exceed 500 mg. If this higher dosage of amoxicillin is used, recipients should be carefully monitored for side effects from long-term treatment.

Vaccine

There is a vaccine available for anthrax, but the use is strictly limited to:

- Persons who work directly with the organism in the laboratory
- Persons who work with imported animal hides or furs in areas where standards are insufficient to prevent exposure to anthrax spores
- Persons who handle potentially infected animal products in high-incidence areas; while incidence is low in the United States, veterinarians who travel to work in other countries where incidence is higher should consider being vaccinated.
- Military personnel deployed to areas with high risk for exposure to the organism
- Post-exposure prophylaxis

Isolation and Quarantine Requirements

Isolation: None.

Hospital: Standard precautions.

Quarantine: None.

✓ CASE INVESTIGATION

Reporting

Anthrax is an immediately reportable disease.

Case Definition

CSTE Position Statement – 2010

Clinical Description

Cutaneous Anthrax:

An acute illness, or post-mortem examination revealing a painless skin lesion developing over 2-6 days from a papular through a vesicular stage into a depressed black eschar with surrounding edema. Fever, malaise and lymphadenopathy may accompany the lesion.

Inhalation Anthrax:

An acute illness, or post-mortem examination revealing a prodrome resembling a viral respiratory illness, followed by hypoxia, dyspnea or acute respiratory distress with resulting cyanosis and shock. Radiological evidence of mediastinal widening or pleural effusion is common.

Gastrointestinal Anthrax:

An acute illness, or post-mortem examination revealing severe abdominal pain and tenderness, nausea, vomiting, hematemesis, bloody diarrhea, anorexia, fever, abdominal swelling and septicemia.

Oropharyngeal Anthrax:

An acute illness, or post-mortem examination revealing a painless mucosal lesion in the oral cavity or oropharynx, with cervical adenopathy, edema, pharyngitis, fever, and possibly septicemia.

Meningeal Anthrax:

An acute illness, or post-mortem examination revealing fever, convulsions, coma, or meningeal signs. Signs of another form will likely be evident as this syndrome is usually secondary to the above syndromes.

Case Classification

Suspected

An illness suggestive of one of the known anthrax clinical forms. No definitive, presumptive, or suggestive laboratory evidence of *Bacillus anthracis*, or epidemiologic evidence relating it to anthrax.

Probable

A clinically compatible illness that does not meet the confirmed case definition, but with one of the following:

- Epidemiological link to a documented anthrax environmental exposure;
- Evidence of *B. anthracis* DNA (for example, by Laboratory Response Network [LRN]-validated polymerase chain reaction) in clinical specimens collected from a normally sterile site (such as blood or cerebrospinal fluid [CSF]) or lesion of other affected tissue (skin, pulmonary, reticuloendothelial, or gastrointestinal);
- Positive result on testing of clinical serum specimens using the QuickELISATM (enzyme-linked immunosorbent assay) Anthrax-PA (protective antigen) kit;
- Detection of Lethal Factor (LF) in clinical serum specimens by LF mass spectrometry;
- Positive result on testing of culture from clinical specimens with the RedLine Alert test.

Confirmed

A clinically compatible illness with one of the following:

- Culture and identification of *B. anthracis* from clinical specimens by the LRN;
- Demonstration of *B. anthracis* antigens in tissues by immunohistochemical staining using both *B. anthracis* cell wall and capsule monoclonal antibodies;
- Evidence of a four-fold rise in antibodies to protective antigen between acute and convalescent sera or a fourfold change in antibodies to protective antigen in paired convalescent sera using Centers for Disease Control and Prevention (CDC) quantitative anti-PA immunoglobulin G (IgG) ELISA testing;
- Documented anthrax environmental exposure AND evidence of *B. anthracis* DNA (for example, by LRN-validated polymerase chain reaction) in clinical specimens collected from a normally sterile site (such as blood or CSF) or lesion of other affected tissue (skin, pulmonary, reticuloendothelial, or gastrointestinal).

Classification Table:

Criterion	Case Definition			
	Confirmed	Probable		Suspect
<i>Clinical Evidence</i>				
Painless skin lesion developing over 2 to 6 days from a papular through a vesicular stage into a depressed black eschar with surrounding edema	O1	O1	O1	O1
Fever (any)	O1,2,3,4,5	O1,2,3,4,5	O1,2,3,4,5	O1,2,3,4,5
Malaise	O1,3,4	O1,3,4	O1,3,4	O1
Lymphadenopathy	O1	O1	O1	O1
Prodrome resembling a viral respiratory illness	O2	O2	O2	O2
Hypoxia	O2	O2	O2	O2
Dyspnea	O2	O2	O2	O2
Acute respiratory distress	O2	O2	O2	O2
Cyanosis	O2	O2	O2	O2
Shock	O2,3,4	O2,3,4	O2,3,4	O2,3,4
Radiological evidence of mediastinal widening	O2	O2	O2	O2
Radiological evidence of pleural effusion	O2	O2	O2	O2
Severe abdominal pain and tenderness	O3	O3	O3	O3
Nausea	O3	O3	O3	O3
Vomiting	O3	O3	O3	O3
Hematemesis	O3	O3	O3	O3
Bloody diarrhea	O3	O3	O3	O3
Anorexia	O3	O3	O3	O3
Abdominal swelling	O3	O3	O3	O3
Signs of septicemia	O1,2,3,4,5	O1,2,3,4,5	O1,2,3,4,5	O1,2,3,4,5
Painless mucosal lesion in the oral cavity	O4	O4	O4	O4

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Painless mucosal lesion in the oropharynx	O4	O4	O4	O4
Cervical adenopathy	O4	O4	O4	O4
Cervical edema	O4	O4	O4	O4
Pharyngitis	O4	O4	O4	O4
Convulsions	O5	O5	O5	O5
Coma	O5	O5	O5	O5
Meningeal signs	O5	O5	O5	O5
<i>Laboratory Evidence</i>				
Culture and identification of <i>B. anthracis</i> from clinical specimens	O1,2,3,4,5			A1,2,3,4,5
Demonstration of <i>B. anthracis</i> antigens in tissues by immunohistochemical staining using both <i>B. anthracis</i> cell wall and capsule monoclonal antibodies	O1,2,3,4,5			A1,2,3,4,5
Evidence of a four-fold rise in antibodies to protective antigen between acute and convalescent sera or a fourfold change in antibodies to protective antigen in paired convalescent sera using quantitative anti-PA IgG ELISA testing	O1,2,3,4,5			A1,2,3,4,5
Evidence of <i>B. anthracis</i> DNA (for example, by polymerase chain reaction) in clinical specimens collected from a normally sterile site (such as blood or CSF) or lesion of other affected tissue (skin, pulmonary, reticuloendothelial, or gastrointestinal)			O1,2,3,4,5	A1,2,3,4,5
Positive result on testing of clinical serum specimens using the Quick ELISA Anthrax-PA kit			O1,2,3,4,5	A1,2,3,4,5
Detection of Lethal Factor (LF) in clinical serum specimens by LF mass spectrometry			O1,2,3,4,5	A1,2,3,4,5
Positive result on testing of culture from clinical specimens with the RedLine Alert test			O1,2,3,4,5	A1,2,3,4,5

<i>Epidemiologic Evidence</i>				
Epidemiologically linked to a documented anthrax environmental exposure		O1,2,3,4,5		A1,2,3,4,5

A = This criterion must be absent (i.e., NOT present) for the case to meet the classification criteria.
 O = At least one of these "O" (Optional) criteria in each category (i.e., clinical evidence and laboratory evidence) in the same column—in conjunction with all "N" criteria in the same column—is required to classify a case.

- 1 = Cutaneous anthrax
- 2 = Inhalation anthrax
- 3 = Gastrointestinal anthrax
- 4 = Oropharyngeal anthrax
- 5 = Meningeal anthrax

Case Investigation Process

I. "White Powder Incidents" – Exposure to unknown substance

Situation: Several times per year, first responders (and local health departments) are called upon to investigate exposure to an unknown substance. If the substance is a white powder, then there is concern that the substance contains anthrax. It is unlikely that these substances will turn out to contain an agent, but the substances need to be handled with care and with the assumption that they could contain an agent.

- When a call comes in that there is a "white powder incident" or exposure to any unknown substance, the first step is to ensure that first responders have been called, then to ensure notification of the local health department, UPHL, UDOH Epidemiology, and the FBI. UDOH Epidemiology should be contacted 24/7 using the 1-888-EPI-UTAH number. The on-call epidemiologist should notify the State Epidemiologist, CDEP Program Manager, Anthrax Epidemiologist, the Public Information Officer, State Laboratory Director, and the Microbiology Bureau Director, as well as assure that the local health departments (including Local Health Officer) have been notified. The incident should be posted to the Epidemiology Issue Tracker as soon as possible.
- Optimally, the unknown substance should not be touched or moved before it is analyzed for the presence of radiologic, chemical, or explosive agents. Work with CSTE, EMS, and the FBI to conduct this testing prior to transport.
- Do not take a sample to the UPHL lab until the sample has been documented that radiological, chemical, and explosives testing has occurred and the sample is negative for all three.
- When the sample arrives at UPHL, be prepared to list possible agents for testing. The listing of agents should come from the risk assessment. There is no reason to believe that a "white powder" is more likely to contain anthrax than any other biological agent. Ruling out all biological agents would be expensive and time-consuming, therefore, use results from the investigation, intelligence, and resources from the FBI to develop a list of probable agents.

- All samples should follow appropriate chain of custody procedures.
- Emergency responders will ensure decontamination is done.

II. Clinical Lab “Rule Out Anthrax” – *Bacillus* species identified in a clinical sample

Situation: Since the Amerithrax incident, clinical laboratories have been called upon to rapidly determine whether a *Bacillus* species identified in clinical samples could be anthrax. *Bacillus* species are very common in the environment, so a “rule out anthrax” is not an urgent situation. Some larger laboratories are able to “rule out anthrax” in their laboratory, whereas, some smaller labs may wish to have UPHL perform the testing. Occasionally, this information may be made public or provided to the media, so health department knowledge of the situation is critical to providing rapid, accurate responses. Minimal investigation of these situations is warranted.

- Ensure that UPHL, UDOH epidemiology, and the local health department know that a “rule out anthrax” sample is being investigated. The FBI does not need to be notified at this point on a routine “rule out” sample. Use the 1-888-EPI-UTAH number for all UDOH notifications. The on-call epidemiologist should notify the CDEP Program Manager and post the occurrence to the Epidemiology Issue Tracker.
- The culture isolate may need to be transported to UPHL as soon as possible. It should be packaged according to IATA regulations (please see <http://health.utah.gov/els/microbiology/btsampletransport.pdf> for information on packaging and shipping; follow the guidelines for infectious substances). If a health care facility’s courier service will be transporting the isolates, UPHL should obtain relevant contact information and estimated arrival time information from the facility. (UPHL training for clinical labs should stress the importance of speed in ruling out anthrax in a timely manner.)
- The local health department (or UDOH Epidemiology, if requested) should contact the patient’s physician to brief them that a *Bacillus* species was found, and that it is routine for these samples to undergo “rule out” testing for anthrax. The physician could be asked if there were any reasons to believe that the sample might be anthrax.
- UPHL may perform several tests on the isolate to “rule out” anthrax. These tests include:
 - Colony morphology (if colony morphology is incorrect, the lab may elect to terminate further testing)
 - Gram stain
 - Gamma phage
 - DFA (Direct Fluorescent Antibody)
 - PCR (Polymerase Chain Reaction)
 - TRF (Time Resolved Fluorescence)

These tests will be run concurrently and can take up to 24 hours to complete initial testing. If the testing for all parameters is negative, UPHL will notify the health care facility, UDOH epidemiology, and the local health department. Whatever entity contacted the physician in the previous step should call them to let them know the results of the testing.

- If ANY of the tests are positive or inconclusive, the following events should occur:
 - Notify UDOH Epidemiology
 - Notify the local health department
 - Notify the FBI
 - Notify the CDC

Preparations for further investigation should occur at this time. The Local Health Department should initiate their investigation in conjunction with UDOH epidemiology.

- UPHL will perform testing as stipulated by the CDC (Laboratory Response Network) to determine whether a specimen is anthrax.

III. Lab researcher exposure – Known exposure to anthrax

Situation: A physician reports seeing a patient that had a laboratory exposure to anthrax. The patient is either asymptomatic or minimally symptomatic. The physician would like to know what to do.

- Fortunately, anthrax is not transmitted by person-to-person methods, so the first point is to educate that this does not present a health threat to the clinical staff.
- Ensure that UPHL, UDOH Epidemiology, and the local health department have been notified of this event. Use the 1-888-EPI-UTAH number to contact UDOH. The on-call epidemiologist should assure that the State Epidemiologist, the CDEP Program Manager, the Anthrax Epidemiologist, the State Laboratory Director, the Microbiology Bureau Director, the ELS Division Director, the local health department (including the Local Health Officer) and the FBI are notified. This incident will be posted to the Epidemiology Issue Tracker as well as to UNIS.
- The local health department should initiate an investigation with the University or laboratory and obtain the following information (UDOH Epidemiology will do this if requested):
 - Verify the patient's identity, and the laboratory where they work.
 - Is patient vaccinated against anthrax?
 - What were the circumstances of the exposure:
 - What quantities of organisms were used?
 - What substance was the organism in (i.e., powdered spores, liquid vegetative cells, etc.)?
 - What protective devices were being used at the time of exposure (i.e., respirators, bio safety cabinets, gloves, etc.)?
 - When was the exposure?
 - Was the exposure reported to safety officers?
- Using the Laboratory Testing portion of this document, public health should assure that appropriate samples are collected and sent to a sentinel or public health laboratory.
- Following the investigation, and working jointly, the UDOH and local health department will determine whether prophylactic antibiotics should be recommended.
- Current prophylactic treatment regimens include the use of ciprofloxacin or doxycycline for 60 days and a 3-dose regimen (0, 2 weeks, 4 weeks) of anthrax vaccine (BioThrax™).

IV. X-ray with “widened mediastinum” or “necrotic skin lesion” – Anthrax in clinical differential diagnosis

Situation: A patient without risk factors presents to a physician with results that are consistent with inhalational anthrax.

- Ensure notification of the UPHL, UDOH epidemiology, and/or the local health department. The local health department will lead the appropriate investigation in conjunction with the UDOH (unless they request that the UDOH lead the investigation). The information should come through the 1-888-EPI-UTAH phone number. The on-call epidemiologist should assure that the State Epidemiologist, the CDEP Program Manager, the Anthrax Epidemiologist, the State Laboratory Director, the Microbiology Bureau Director, the ELS Division Director, the local health department (including the Local Health Officer) and the FBI are notified.
- This event should be posted to Epidemiology Issue Tracker and UNIS.
- Information regarding exposure history and risk factors should be collected as soon as possible to determine if this could be related to a bioterrorism threat. Information should be shared with the FBI as quickly as possible.
- Questions should include:
 1. How many cases have there been? Is the number larger than expected?
 2. Did the person have an appropriate exposure?
 3. Is the age/sex appropriate for this disease?
 4. Is any geographic clustering apparent?
 5. Has Agriculture been called to see if there is any concurrent outbreak in animals?
 6. Is the antibiotic resistance profile “normal-appearing”?
 7. Are the symptoms (disease presentation) usual?
 8. Was the patient previously healthy?
 9. Have there been unexplained disease, syndromes, or deaths recently?
 10. Is the time of year appropriate?
 11. Did the patient die?
 12. Did the patient respond typically to therapy?
 13. Does the patient have any other coexisting diseases?
 14. Has surveillance been initiated to determine if similar syndromes (undiagnosed) have been seen?
 15. Is there likelihood that the disease was transmitted via aerosol, person-to-person contact, food, or water?
 16. If more than one person is ill, is there a common ventilation system?
 17. What are the symptoms?
 18. Is the patient a healthcare worker?
 19. Is the patient a laboratory worker?
- Obtain detailed signs/symptoms of the patient.
- Follow the Laboratory Testing area of this protocol to assure that the correct specimens are obtained and sent to a sentinel or public health laboratory.
- Treatment
 - Current treatment consists of ciprofloxacin, doxycycline, or penicillin.

Outbreaks

Due to the serious nature of the disease, a single case constitutes an outbreak and warrants immediate investigation. Public health will ensure appropriate management and provision of information and education to the public, clinicians, and first responders in the event of a real outbreak.

Identifying Case Contacts

None.

Case Contact Management

None.

✓ **ACKNOWLEDGEMENTS**

This document is a revision of the Utah Department of Health disease plan for anthrax. We would like to acknowledge the Kansas Department of Health and Environment, Oregon Public Health Division and Massachusetts Department of Public Health for select content of this document.

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✓ **VERSION CONTROL**

V.05.15: “Why is Anthrax important to public health?” section added. Case definition updated. Treatment section updated. “UT-NEDSS minimum/required fields” for morbidity event added. Content updated.

✓ UT-NEDSS Minimum/Required Fields by Tab

MORBIDITY EVENT

Demographic

- Last Name
- Street
- State
- County
- Date of Birth
- Birth Gender
- Ethnicity
- Race

Clinical

- Disease
- Onset Date
- Date Diagnosed
- Died
- Date of Death

Laboratory

- Test Type
- Organism
- Test Result

Epidemiological

- Imported From

Reporting

- Date first reported to public health

Administrative

- State Case Status (completed by UDOH)
- Outbreak Associated
- Outbreak Name