VDH VIRGINIA DEPARTMENT OF HEALTH

Virginia Department of Health
Anthrax: Overview for Healthcare Providers

	Cutaneous	Inhalation	Gastrointestinal
Organism	• *Bacillus anthracis* is a large, gram-positive, encapsulated, spore-forming, nonmotile rod • Certain strains of *Bacillus cereus* that express anthrax toxin (e.g., *B. cereus* biovar *anthracis*) can also cause anthrax-like disease		
Reporting to Public Health	• *Suspected or confirmed cases require immediate notification to the local health department (LHD)* • *See https://www.vdh.virginia.gov/health-department-locator/*		
Infectious Dose	A few spores may cause infection	As few as 1 to 3 spores may cause infection	Unknown
Occurrence	Worldwide, especially in agricultural regions in Central and South America, sub-Saharan Africa, central and southwestern Asia, southern and eastern Europe, and the Caribbean. About 95% of naturally acquired infections are cutaneous anthrax. In the United States, 1–2 cases are reported annually.		
Reservoir	Primary reservoirs are herbivores (e.g., livestock and wildlife herbivores). Spores can remain dormant in soil for decades.		
Route of Infection	Contact via break in skin (especially, arms, hands, face, neck)	Inhalation of spores	Ingestion of contaminated meat from diseased animals
Communicability	Person-to-person transmission is very rare and has only rarely been reported for cutaneous anthrax via direct contact with lesions		
Case-Fatality Rate	<1% with treatment; 20% without treatment	~45% with treatment; 97% without treatment	≥40% with treatment; 25%–60% without treatment
Risk Factors	• Those at increased risk include persons who process animal products (e.g., hides, wool, hair, bone) from endemic areas, veterinarians, laboratorians, livestock producers, those who eat undercooked meat in endemic areas, heroin-injecting drug users • If bioterrorism: mail handlers, military personnel or other responders		
Incubation period	1–7 days (1–12 days or longer)	2–60 days or longer (2001 outbreak: 4–6 days)	2–5 days (range 1–7 days)
Clinical Manifestations	• Infection begins as a small papule or vesicle that ulcerates with central necrosis and drying. Painless, localized nonpitting edema surrounds the ulcerated area, which progresses to a dark, leathery eschar. Extensive nonpitting edema, regional lymphadenopathy, lymphangitis, fever, and malaise may be present. Lesions tend to occur on exposed areas of the body (e.g., face, hands, arms, neck).	• Phase 1: Nonspecific, including fever, nonproductive cough, fatigue, myalgias, sweats, chest discomfort • Phase 2: Occurs after 1–3 days of improvement after Phase 1, with abrupt onset of high fever and severe respiratory distress (dyspnea, stridor, cyanosis); shock and death can occur within 24–36 hours in Phase 2	• Intestinal form is manifested with nausea, vomiting, anorexia and fever, followed by severe abdominal pain, bloody diarrhea, vomiting of blood, and signs of septicemia • Oropharyngeal form is rare, manifested with dysphagia and posterior oropharyngeal necrotic ulcers, fever, sepsis, and bilateral neck swelling • GI tract ulcers may cause hemorrhage, obstruction, or perforation
Differential Diagnosis	Brown recluse spider bite, staphylococcal or streptococcal cellulitis, vasculitides, bubonic plague, necrotizing soft tissue infections, orf, necrotic herpes simplex	*Mycoplasma* pneumonia, Legionnaires' disease, psittacosis, tularemia, viral pneumonia, Q fever, histoplasmosis,	• Intestinal form: typhoid fever, intestinal tularemia, bacterial peritonitis • Oropharyngeal form: diphtheria, streptococcal pharyngitis, enteroviral

	Cutaneous	Inhalation	Gastrointestinal
	infection; ulceroglandular tularemia, scrub typhus, rickettsial spotted fevers, rat bite fever, ecthyma gangrenosum	coccidioidomycosis, acute bacterial mediastinitis, tuberculosis	vesicular pharyngitis, acute herpetic pharyngitis, *Yersinia enterocolitica*
Radiography	N/A	Chest X-ray may show mediastinal widening, pleural effusion (often), or infiltrates	N/A
Laboratory Testing and Sample Collection	• If systemic symptoms present, blood culture isolates (before the start of antimicrobial therapy) • Swab vesicle/eschar/ulcer (2 dry cotton swabs per site: 1 for culture, 1 for PCR) • Full thickness punch biopsy of papule or vesicle including adjacent skin • If on antibiotics <24 hours, 2nd biopsy for culture and PCR • Acute serum for anthrax lethal toxin testing and acute and convalescent serum samples for serologic testing	• Blood culture isolates (before the start of antimicrobial therapy) • Blood (10mL in EDTA or sodium citrate tubes) for PCR • Pleural fluid, if present, for culture, PCR and anthrax lethal toxin testing • Pleural and/or bronchial biopsies for immunohistochemistry (IHC) • CSF, if meningeal symptoms or signs, for culture and PCR • Acute serum for anthrax lethal toxin testing and acute and convalescent serum samples for serologic testing • If fatal case, autopsy tissues for histopathology, special stains, and IHC	• Blood culture isolates (before the start of antimicrobial therapy) • Blood (10mL in EDTA or sodium citrate tubes) for PCR • Ascites fluid for culture, PCR, and anthrax lethal toxin testing • Oropharyngeal form: 2 sterile moist swabs (1 for culture and 1 for PCR) of suspected lesions in the oropharynx or buccal cavity, or on the tongue, tonsils, or posterior pharyngeal wall • Intestinal form: stool (>5 grams) in a leak-proof sealed container • Acute and convalescent serum samples for serologic testing • If fatal case, autopsy tissues for histopathology, special stains, and IHC
	If anthrax is suspected, notify the LHD immediately to discuss the case and laboratory testing. Specimens may be sent to the Division of Consolidated Laboratory Services (DCLS) after VDH has approved testing. For questions about specimen collection and handling, the DCLS Emergency Officer can be reached 24/7 at 804-335-4617.		
Treatment	Recommended treatment depends on the clinical form of anthrax. Treatment includes antimicrobial therapy with antitoxin for systemic illness. Information on preferred drugs, dosing, and duration of treatment is available at https://www.cdc.gov/mmwr/volumes/72/rr/rr7206a1.htm . For additional information on dosing, please consult the package inserts.		
Postexposure Prophylaxis (PEP)	Exposed individuals should receive a PEP regimen regardless of anthrax vaccination status. Anthrax vaccine is also recommended for most unvaccinated people who have been exposed to anthrax. Information on drugs, dosing and duration of prophylaxis is available at https://www.cdc.gov/mmwr/volumes/72/rr/rr7206a1.htm. For additional information on dosing, please consult the package inserts.		
Infection Control	Use Standard Precautions; for patients with draining cutaneous wounds that cannot be contained, also use Contact Precautions		
Vaccine	There are two vaccines licensed to prevent anthrax (Anthrax Vaccine Adsorbed [BIOTHRAX] and Anthrax Vaccine Adsorbed, Adjuvanted [CYFENDUS]). BIOTHRAX is recommended for adults aged 18–65 years at high risk of exposure (e.g., certain lab workers, people who handle potentially infected animals, and some military personnel). BIOTHRAX or CYFENDUS is recommended for unvaccinated people who have been exposed to anthrax. If there was an emergency, exposed people would be given vaccine, in addition to antimicrobial drugs, to help prevent disease. Because neither vaccine has been approved for PEP in those <18 years, or >65 years, a special protocol to use vaccine in these groups would be needed in an emergency.		