



## Fact Sheet: Anthrax Information for Health Care Providers

<b>Cause</b>	<i>Bacillus anthracis</i> <ul style="list-style-type: none"><li>• Encapsulated, aerobic, gram-positive, spore-forming, rod-shaped (bacillus) bacterium</li></ul>
<b>Systems Affected</b>	<ul style="list-style-type: none"><li>• <a href="#">Skin or cutaneous</a> (most common)</li><li>• <a href="#">Respiratory tract or inhalation</a> (rare)</li><li>• <a href="#">Gastrointestinal (GI) tract</a> (rare)</li><li>• <a href="#">Oropharyngeal form</a> (least common)</li></ul>
<b>Transmission</b>	<ul style="list-style-type: none"><li>• Skin: direct skin contact with spores; in nature, contact with infected animals or animal products (usually related to occupational exposure)</li><li>• Respiratory tract: inhalation of aerosolized spores</li><li>• GI: consumption of undercooked or raw meat products or dairy products from infected animals</li><li>• NO person-to-person transmission of inhalation or GI anthrax</li></ul>
<b>Reporting</b>	<ul style="list-style-type: none"><li>• Report suspected or confirmed anthrax cases immediately to your local or state department of health.</li></ul>

### Cutaneous Anthrax

<b>Incubation Period</b>	<ul style="list-style-type: none"><li>• Usually an immediate response up to 1 day</li></ul>
<b>Typical Signs/Symptoms</b>	<ul style="list-style-type: none"><li>• Local skin involvement after direct contact with spores or bacilli</li><li>• Localized itching followed by 1) papular lesion that turns vesicular and 2) subsequent development of black eschar within 7–10 days of initial lesion</li></ul>
<b>Treatment</b> (See "Cutaneous Anthrax Treatment Protocol" for specific therapy*)	<ul style="list-style-type: none"><li>• Obtain specimens for culture BEFORE initiating antimicrobial therapy.</li><li>• Do NOT use extended-spectrum cephalosporins or trimethoprim/sulfamethoxazole because anthrax may be resistant to these drugs.</li></ul>
<b>Precautions</b>	<ul style="list-style-type: none"><li>• Standard contact precautions. Avoid direct contact with wound or wound drainage.</li></ul>

\* <http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5042a1.htm>

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**Inhalation Anthrax**

<b>Incubation Period</b>	<ul style="list-style-type: none"> <li>• Usually &lt;1 week; may be prolonged for weeks (up to 2 months)</li> </ul>	
<b>Typical Signs/Symptoms</b> (often biphasic, but symptoms may progress rapidly)	<b>Initial phase</b> <ul style="list-style-type: none"> <li>• Non-specific symptoms such as low-grade fever, nonproductive cough, malaise, fatigue, myalgias, profound sweats, chest discomfort (upper respiratory tract symptoms are rare)</li> <li>• Maybe rhonchi on exam, otherwise normal</li> <li>• Chest X-ray:               <ul style="list-style-type: none"> <li>○ mediastinal widening</li> <li>○ pleural effusion (often)</li> <li>○ infiltrates (rare)</li> </ul> </li> </ul>	<b>Subsequent phase</b> <ul style="list-style-type: none"> <li>• 1–5 days after onset of initial symptoms</li> <li>• May be preceded by 1–3 days of improvement</li> <li>• Abrupt onset of high fever and severe respiratory distress (dyspnea, stridor, cyanosis)</li> <li>• Shock, death within 24–36 hours</li> </ul>
<b>Laboratory</b>	<ul style="list-style-type: none"> <li>• Coordinate all aspects of testing, packaging, and transporting with public health laboratory/Laboratory Response Network (LRN).</li> <li>• Obtain specimens appropriate to system affected:               <ul style="list-style-type: none"> <li>○ blood (essential)</li> <li>○ pleural fluid</li> <li>○ cerebral spinal fluid (CSF)</li> <li>○ skin lesion</li> </ul> </li> </ul>	<b>Clues to diagnosis</b> <ul style="list-style-type: none"> <li>• Gram-positive bacilli on unspun peripheral blood smear or CSF</li> <li>• Aerobic blood culture growth of large, gram-positive bacilli provides preliminary identification of <i>Bacillus</i> species.</li> </ul>
<b>Treatment</b> (See "Inhalational Anthrax Treatment Protocol" for specific therapy)	<ul style="list-style-type: none"> <li>• Obtain specimens for culture BEFORE initiating antimicrobial therapy.</li> <li>• Initiate antimicrobial therapy immediately upon suspicion.</li> <li>• Do NOT use extended-spectrum cephalosporins or trimethoprim/sulfamethoxazole because anthrax may be resistant to these drugs.</li> <li>• Supportive care including controlling pleural effusions</li> </ul>	
<b>Precautions</b>	<ul style="list-style-type: none"> <li>• Standard contact precautions</li> </ul>	

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**Gastrointestinal Anthrax**

<b>Incubation Period</b>	<ul style="list-style-type: none"> <li>• Usually 1–7 days</li> </ul>	
<b>Typical Signs/Symptoms</b>	<p><b>Initial phase</b></p> <ul style="list-style-type: none"> <li>• Nausea, anorexia, vomiting, and fever progressing to severe abdominal pain, hematemesis, and diarrhea that is almost always bloody</li> <li>• Acute abdomen picture with rebound tenderness may develop.</li> <li>• Mesenteric adenopathy on computed tomography (CT) scan likely. Mediastinal widening on chest X-ray has been reported.</li> </ul>	<p><b>Subsequent phase</b></p> <ul style="list-style-type: none"> <li>• 2–4 days after onset of symptoms, ascites develops as abdominal pain decreases.</li> <li>• Shock, death within 2–5 days of onset</li> </ul>
<b>Laboratory</b>	<ul style="list-style-type: none"> <li>• Coordinate all aspects of testing, packaging, and transporting with public health laboratory/LRN.</li> <li>• Obtain specimens appropriate to system affected:               <ul style="list-style-type: none"> <li>○ blood (essential)</li> <li>○ ascitic fluid</li> </ul> </li> </ul>	<p><b>Clues to diagnosis</b></p> <ul style="list-style-type: none"> <li>• Gram-positive bacilli on unspun peripheral blood smear or ascitic fluid</li> <li>• Pharyngeal swab for pharyngeal form</li> <li>• Aerobic blood culture growth of large, gram-positive bacilli provides preliminary identification of <i>Bacillus</i> species.</li> </ul>
<b>Treatment</b> (See "Inhalational Anthrax Treatment Protocol" * for specific therapy)	<ul style="list-style-type: none"> <li>• Obtain specimens for culture BEFORE initiating antimicrobial therapy.</li> <li>• Early (during initial phase) antimicrobial therapy is critical.</li> <li>• Do <b>NOT</b> use extended-spectrum cephalosporins or trimethoprim/sulfamethoxazole because anthrax may be resistant to these drugs.</li> </ul>	
<b>Precautions</b>	<ul style="list-style-type: none"> <li>• Standard precautions</li> </ul>	

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**Oropharyngeal Anthrax**

<b>Incubation Period</b>	<ul style="list-style-type: none"> <li>Usually 1–7 days</li> </ul>	
<b>Typical Signs/Symptoms</b>	<p><b>Initial phase</b></p> <ul style="list-style-type: none"> <li>Fever and marked unilateral or bilateral neck swelling caused by regional lymphadenopathy</li> <li>Severe throat pain and dysphagia</li> <li>Ulcers at the base of the tongue, initially edematous and hyperemic</li> </ul>	<p><b>Subsequent phase</b></p> <ul style="list-style-type: none"> <li>Ulcers may progress to necrosis</li> <li>Swelling can be severe enough to compromise the airway</li> </ul>
<b>Laboratory</b>	<ul style="list-style-type: none"> <li>Coordinate all aspects of testing, packaging, and transporting with public health laboratory/LRN.</li> <li>Obtain specimens appropriate to system affected: <ul style="list-style-type: none"> <li>blood (essential)</li> <li>throat</li> </ul> </li> </ul>	<p><b>Clues to diagnosis</b></p> <ul style="list-style-type: none"> <li>Aerobic blood culture growth of large, gram-positive bacilli provides preliminary identification of <i>Bacillus</i> species.</li> </ul>
<b>Treatment</b> (See "Inhalational Anthrax Treatment Protocol"* for specific therapy)	<ul style="list-style-type: none"> <li>Obtain specimens for culture BEFORE initiating antimicrobial therapy.</li> <li>Do <b>NOT</b> use extended-spectrum cephalosporins or trimethoprim/sulfamethoxazole because anthrax may be resistant to these drugs.</li> <li>Supportive care including controlling ascites</li> </ul>	
<b>Precautions</b>	<ul style="list-style-type: none"> <li>Standard contact precautions</li> </ul>	

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For more information, visit [www.bt.cdc.gov/agent/anthrax](http://www.bt.cdc.gov/agent/anthrax),  
or call CDC at 800-CDC-INFO (English and Spanish) or 888-232-6348 (TTY).

March 8, 2002

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**TABLE 1. Inhalational anthrax treatment protocol\*:**

Category	Initial therapy (intravenous) <sup>§1</sup>	Duration
Adults	Ciprofloxacin 400 mg every 12 hrs* or Doxycycline 100 mg every 12 hrs <sup>††</sup> and One or two additional antimicrobials <sup>‡</sup>	IV treatment initially <sup>**</sup> . Switch to oral antimicrobial therapy when clinically appropriate: Ciprofloxacin 500 mg po BID or Doxycycline 100 mg po BID  Continue for 60 days (IV and po combined) <sup>§§</sup>
Children	Ciprofloxacin 10–15 mg/kg every 12hrs <sup>††***</sup> or Doxycycline: <sup>††††</sup> >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 and One or two additional antimicrobials <sup>‡</sup>	IV treatment initially <sup>**</sup> . Switch to oral antimicrobial therapy when clinically appropriate: Ciprofloxacin 10–15 mg/kg po every 12 hrs <sup>***</sup> or Doxycycline: <sup>†††</sup> >8 yrs and >45 kg: 100 mg po BID >8 yrs and ≤45 kg: 2.2 mg/kg po BID ≤8 yrs: 2.2 mg/kg po BID  Continue for 60 days (IV and po combined) <sup>§§</sup>
Pregnant women <sup>§§§</sup>	Same for nonpregnant adults (the high death rate from the infection outweighs the risk posed by the antimicrobial agent)	IV treatment initially. Switch to oral antimicrobial therapy when clinically appropriate. <sup>†</sup> Oral therapy regimens same for nonpregnant adults
Immunocompromised persons	Same for nonimmunocompromised persons and children	Same for nonimmunocompromised persons and children

\* For gastrointestinal and oropharyngeal anthrax, use regimens recommended for inhalational anthrax.  
<sup>†</sup> Ciprofloxacin or doxycycline should be considered an essential part of first-line therapy for inhalational anthrax.  
<sup>‡</sup> Steroids may be considered as an adjunct therapy for patients with severe edema and for meningitis based on experience with bacterial meningitis of other etiologies.  
<sup>†</sup> Other agents with *in vitro* activity include rifampin, vancomycin, penicillin, ampicillin, chloramphenicol, imipenem, clindamycin, and clarithromycin. Because of concerns of constitutive and inducible beta-lactamases in *Bacillus anthracis*, penicillin and ampicillin should not be used alone. Consultation with an infectious disease specialist is advised.  
<sup>\*\*</sup> Initial therapy may be altered based on clinical course of the patient; one or two antimicrobial agents (e.g., ciprofloxacin or doxycycline) may be adequate as the patient improves.  
<sup>††</sup> If meningitis is suspected, doxycycline may be less optimal because of poor central nervous system penetration.  
<sup>§§</sup> Because of the potential persistence of spores after an aerosol exposure, antimicrobial therapy should be continued for 60 days.  
<sup>†††</sup> If intravenous ciprofloxacin is not available, oral ciprofloxacin may be acceptable because it is rapidly and well absorbed from the gastrointestinal tract with no substantial loss by first-pass metabolism. Maximum serum concentrations are attained 1–2 hours after oral dosing but may not be achieved if vomiting or ileus are present.  
<sup>\*\*\*</sup> In children, ciprofloxacin dosage should not exceed 1 g/day.  
<sup>††††</sup> The American Academy of Pediatrics recommends treatment of young children with tetracyclines for serious infections (e.g., Rocky Mountain spotted fever).  
<sup>§§§</sup> Although tetracyclines are not recommended during pregnancy, their use may be indicated for life-threatening illness. Adverse effects on developing teeth and bones are dose related; therefore, doxycycline might be used for a short time (7–14 days) before 6 months of gestation.

**TABLE 2. Cutaneous anthrax treatment protocol\***

Category	Initial therapy (oral) <sup>†</sup>	Duration
Adults*	Ciprofloxacin 500 mg BID or Doxycycline 100 mg BID	60 days <sup>‡</sup>
Children*	Ciprofloxacin 10–15 mg/kg every 12 hrs (not to exceed 1 g/day) <sup>†</sup> or Doxycycline: <sup>†</sup> >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	60 days <sup>‡</sup>
Pregnant women**	Ciprofloxacin 500 mg BID or Doxycycline 100 mg BID	60 days <sup>‡</sup>
Immunocompromised persons*	Same for nonimmunocompromised persons and children	60 days <sup>‡</sup>

\* Cutaneous anthrax with signs of systemic involvement, extensive edema, or lesions on the head or neck require intravenous therapy, and a multidrug approach is recommended. Table 1.

<sup>†</sup> Ciprofloxacin or doxycycline should be considered first-line therapy. Amoxicillin 500 mg po TID for adults or 80 mg/kg/day divided every 8 hours for children is an option for completion of therapy after clinical improvement. Oral amoxicillin dose is based on the need to achieve appropriate minimum inhibitory concentration levels.

<sup>‡</sup> Previous guidelines have suggested treating cutaneous anthrax for 7–10 days, but 60 days is recommended in the setting of this attack, given the likelihood of exposure to aerosolized *B. anthracis* (6).

<sup>†</sup> The American Academy of Pediatrics recommends treatment of young children with tetracyclines for serious infections (e.g., Rocky Mountain spotted fever).

\*\* Although tetracyclines or ciprofloxacin are not recommended during pregnancy, their use may be indicated for life-threatening illness. Adverse effects on developing teeth and bones are dose related; therefore, doxycycline might be used for a short time (7–14 days) before 6 months of gestation.