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Wolters Kluwer

Intravenous therapy for systemic anthrax when meningitis has been excluded*

Nonpregnant adults	Pregnant, postpartum, and lactating women	Children and adolescents (age ≥1 month through 17 years)
A bactericidal agent:		
Preferred for all strains, regardless of penicillin susceptibility or if susceptibility is unknown:		
Ciprofloxacin 400 mg every 8 hours	Ciprofloxacin 400 mg every 8 hours NOTE: The treatment of pregnant, postpartum, and lactating women is similar to that for nonpregnant adults, except that **ciprofloxacin is strongly preferred for the bactericidal agent** At least one agent with transplacental passage is recommended; agents with transplacental passage include ciprofloxacin, levofloxacin, meropenem, ampicillin, penicillin, clindamycin, and rifampin	Ciprofloxacin 30 mg/kg per day divided every 8 hours, not to exceed 400 mg per dose
Alternatives if ciprofloxacin is unavailable or contraindicated, in order of preference:		
Levofloxacin 750 mg every 24 hours **OR**	Levofloxacin 750 mg every 24 hours **OR**	Meropenem 60 mg/kg per day divided every 8 hours, not to exceed 2 g per dose **OR**
Moxifloxacin 400 mg every 24 hours **OR**	Moxifloxacin 400 mg every 24 hours **OR**	Levofloxacin ▪ <50 kg: 20 mg/kg per day divided every 12 hours, not to exceed 250 mg per dose ▪ ≥50 kg: 500 mg every 24 hours **OR**
Meropenem 2 g every 8 hours **OR**	Meropenem 2 g every 8 hours[Δ] **OR**	
Imipenem 1 g every 6 hours[◇] **OR**	Imipenem 1 g every 6 hours[Δ◇] **OR**	Imipenem 100 mg/kg per day divided every 6 hours, not to exceed 1 g per dose[◇] **OR**
Doripenem 500 mg every 8 hours **OR**	Doripenem 500 mg every 8 hours[Δ] **OR**	
Vancomycin 60 mg/kg per day divided every 8 hours, not to exceed 2 g per dose; maintain serum trough concentration of 15 to 20 mcg/mL	Vancomycin 60 mg/kg per day divided every 8 hours, not to exceed 2 g per dose; maintain serum trough concentration of 15 to 20 mcg/mL	Vancomycin 60 mg/kg per day divided every 8 hours, not to exceed 2 g per dose; maintain serum trough concentration of 15 to 20 mcg/mL

Alternatives for penicillin-susceptible strains:		
Preferred:		
Penicillin G 4 million units every 4 hours	Penicillin G 4 million units every 4 hours[Δ]	Penicillin G 400,000 units/kg per day divided every 4 hours, not to exceed 4 million units per dose
Alternative:		
Ampicillin 3 g every 6 hours	Ampicillin 3 g every 6 hours[Δ]	Ampicillin 200 mg/kg per day divided every 6 hours, not to exceed 3 g per dose
PLUS		
A protein synthesis inhibitor:		
Preferred:		
Clindamycin 900 mg every 8 hours **OR**	Clindamycin 900 mg every 8 hours **OR**	Clindamycin 40 mg/kg per day divided every 8 hours, not to exceed 900 mg/dose **OR**
Linezolid 600 mg every 12 hours[§]	Linezolid 600 mg every 12 hours[§]	
Alternatives if clindamycin and linezolid (for adults) or clindamycin (for children) are unavailable or contraindicated, in order of preference:		
		Linezolid (non-CNS infection dose)[§] ▪ <12 years old: 30 mg/kg per day divided every 8 hours, not to exceed 600 mg/dose ▪ ≥12 years old: 30 mg/kg per day divided every 12 hours, not to exceed 600 mg/dose **OR**
Doxycycline 200 mg loading dose, then 100 mg every 12 hours **OR**	Doxycycline 200 mg loading dose, then 100 mg every 12 hours[¥] **OR**	Doxycycline[¥] ▪ <45 kg: 4.4 mg/kg loading dose, not to exceed 200 mg; then 4.4 mg/kg per day divided every 12 hours, not to exceed 100 mg per dose ▪ ≥45 kg: 200 mg loading dose; then 100 mg every 12 hours **OR**
Rifampin 600 mg every 12 hours[‡]	Rifampin 600 mg every 12 hours[‡]	Rifampin 20 mg/kg per day divided every 12 hours, not to exceed 300 mg/dose[‡]

Systemic anthrax includes anthrax meningitis; inhalation, injection, and gastrointestinal anthrax; and cutaneous anthrax with systemic involvement, extensive edema, or lesions of the head or neck. In addition to antimicrobial therapy, antitoxin therapy (raxibacumab or anthrax immunoglobulin) should also be given. Patients should be treated with IV antimicrobial therapy for two weeks and until clinically stable, whichever is longer. These recommendations are based on the susceptibilities of *B. anthracis* isolated during the 2001 bioterrorism event in the United States. In the event of another

bioterrorism event, susceptibilities must be rechecked and antimicrobial therapy modified accordingly. Following completion of IV antimicrobial therapy, patients exposed to aerosolized spores will require PEP to complete 60 days of therapy from onset of illness. Refer to the related topic review and table on anthrax PEP.

CNS: central nervous system; IV: intravenous; PEP: postexposure prophylaxis.
* The doses recommended above are intended for patients with normal renal function; the doses of some of these agents must be adjusted in patients with renal insufficiency.
Δ Pharmacokinetic data indicate that penicillin, ampicillin, and carbapenems may require higher doses in pregnant and postpartum women than those recommended for nonpregnant adults.
◇ Imipenem is associated with an increased risk of seizures.
§ Linezolid should be used with caution in patients with thrombocytopenia because it might exacerbate it. Linezolid use for >14 days has additional bone marrow toxicity.
¥ A single 10 to 14 day course of doxycycline is not routinely associated with tooth staining.
‡ Rifampin is not a protein synthesis inhibitor. However, it may be used as an alternative agent based on its in vitro synergy for staphylococci in place of a protein synthesis inhibitor if linezolid and clindamycin cannot be given. Rifampin has not been evaluated for *B. anthracis*.

References:

1. *Hendricks KA, Wright ME, Shadomy SV, et al. Centers for Disease Control and Prevention expert panel meetings on prevention and treatment of anthrax in adults. Emerg Infect Dis 2014; 20.*
2. *Meaney-Delman D, Zotti ME, Creanga AA, et al. Special considerations for prophylaxis for and treatment of anthrax in pregnant and postpartum women. Emerg Infect Dis 2014; 20.*
3. *Bradley JS, Peacock G, Krug SE, et al. Pediatric anthrax clinical management. Pediatrics 2014; 133:e1411.*

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