

Table 16.4 Antibiotic Treatment of Skin and Soft-Tissue Infections as Recommended by Infectious Disease Society of America

Medication	Indications	Dosing	Side effects affecting rehab	Other side effects or considerations
<b>Penicillins</b>				
Penicillin	Drug of choice for <i>Streptococcus pyogenes</i> infection.	2-4 million units IV every 4-6 h. Adjust for renal insufficiency.	Cog: + S: + A: + Motor: ++ D: ++ Com: + F: ++	Drug fever, rash, increased liver enzymes, nausea, vomiting, diarrhea, allergic reaction, <i>Clostridium difficile</i> colitis, bone marrow depression, dizziness, insomnia, confusion, agitation, convulsions, behavioral changes, serum sickness reactions, Stevens-Johnson skin reactions, tooth discoloration. Probenecid increases levels. Increased rash when used with allopurinol.
Amoxicillin-clavulanate (Augmentin)	Extended-spectrum aminopenicillin; covers <i>Staphylococcus</i> (not MRSA), <i>Streptococcus</i> , and anaerobes.	500 mg by mouth every 8 h or 875 mg by mouth every 12 h. Adjust dose for renal insufficiency.	Cog: + S: + A: + Motor: ++ D: ++ Com: + F: +	Drug fever, rash, increased liver enzymes, nausea, vomiting, diarrhea, allergic reaction, <i>Clostridium difficile</i> colitis, bone marrow depression, dizziness, insomnia, confusion, agitation, convulsions, behavior changes, tooth discoloration, serum sickness reactions, Stevens-Johnson skin reactions.
Ampicillin-sulbactam (Unasyn)	Broad-spectrum aminopenicillin; activity against gram-positive, gram-negative, and anaerobic bacteria except MRSA and <i>Pseudomonas</i> .	1.5-3 g IV every 6 h. Adjust for renal insufficiency.	Cog: + S: + A: + Motor: ++ D: ++ Com: + F: +	More gastrointestinal upset and diarrhea than with use of amoxicillin. Increased rash when used with allopurinol. Probenecid increases levels.
<b>First-generation cephalosporins</b>				
Cefazolin (Ancef)	Covers <i>Staphylococcus</i> , <i>Streptococcus</i> , and some <i>Escherichia coli</i> .	1 g IV every 8 h. Adjust for renal insufficiency.	Cog: + S: + A: + Motor: ++ D: ++ Com: + F: +	Drug fever, rash, dyspepsia, gastritis, abdominal pain, allergic reactions, skin reactions, dizziness, hallucinations, fatigue, confusion, agitation, diarrhea, interstitial nephritis, bone marrow suppression. No identified drug interactions.
Cephalexin (Keflex)	Covers <i>Staphylococcus</i> , <i>Streptococcus</i> , and sensitive <i>Escherichia coli</i> .	500 mg every 6 h. Adjust for renal insufficiency.	Cog: + S: + A: + Motor: ++ D: ++ Com: + F: +	Drug fever, rash, dyspepsia, gastritis, abdominal pain, allergic reactions, skin reactions, dizziness, hallucinations, fatigue, confusion, agitation, diarrhea, interstitial nephritis, bone marrow suppression, seizures when dose is not adjusted for renal insufficiency. No identified drug interactions.
<b>Second-generation cephalosporin</b>				
Cefoxitin (Mefoxin)	Covers anaerobic bacteria, including <i>Bacteroides fragilis</i> and many enteric gram-negative bacteria (not	500 mg IV every 6 h. Adjust for renal insufficiency.	Cog: + S: + A: + Motor: ++ D: ++	Thrombophlebitis at injection site, rash, allergic reaction, diarrhea, <i>Clostridium difficile</i> colitis, hypotension, exacerbation of myasthenia gravis, bone marrow suppression,

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	<i>Pseudomonas</i> .		Com: + F: +	hepatotoxicity, seizures when dose is not adjusted for renal insufficiency. No identified drug interactions.
Third-generation cephalosporins				
Ceftriaxone (Rocephin)	Parenteral cephalosporin; used to treat gram-negative bacteria other than the more resistant <i>Klebsiella</i> and <i>Pseudomonas acinetobacter</i> .	1-2 g IV or intramuscularly every 24 h. Do not adjust for renal insufficiency.	Cog: + S: + A: + Motor: ++ D: ++ Com: + F: +	Thrombophlebitis at injection site, rash, allergic reaction, diarrhea, <i>Clostridium difficile</i> colitis, hypotension, bone marrow suppression, nausea, vomiting, stomatitis, glossitis, hepatotoxicity. Eliminated in the bile and can cause biliary sludging leading to obstruction. Does not need dosage adjustment for renal insufficiency. No identified drug interactions.
Cefpodoxime (Vantin)	Oral cephalosporin; used to treat <i>Staphylococcus</i> , <i>Streptococcus</i> (not MRSA), and gram-negative bacteria such as <i>Escherichia coli</i> , <i>Proteus</i> , <i>Klebsiella</i> , <i>Haemophilus</i> , and <i>Moraxella</i> (not <i>Pseudomonas</i> ).	200 mg by mouth every 12 h. Adjust for renal insufficiency.	Cog: + S: + A: + Motor: ++ D: ++ Com: + F: +	Thrombophlebitis at injection site, rash, allergic reaction, diarrhea, <i>Clostridium difficile</i> colitis, hypotension, bone marrow suppression, nausea, vomiting, stomatitis, glossitis, hepatotoxicity, seizures when dose is not adjusted for renal insufficiency. No identified drug interactions.
Cefprozil (Cefzil)	Oral cephalosporin; used to treat <i>Staphylococcus</i> , <i>Streptococcus</i> (not MRSA), and gram-negative bacteria.	500 mg by mouth every 12 h. Adjust for renal insufficiency.	Cog: + S: + A: + Motor: ++ D: ++ Com: + F: +	Thrombophlebitis at injection site, rash, allergic reaction, diarrhea, <i>Clostridium difficile</i> colitis, hypotension, bone marrow suppression, nausea, vomiting, stomatitis, glossitis, hepatotoxicity, seizures when dose is not adjusted for renal insufficiency. No identified drug interactions.
Ceftibuten (Cedax)	Oral cephalosporin; used to treat <i>Staphylococcus</i> , <i>Streptococcus</i> (not MRSA), and gram-negative bacteria such as <i>Escherichia coli</i> , <i>Proteus</i> , <i>Klebsiella</i> , <i>Haemophilus</i> , and <i>Moraxella</i> (not <i>Pseudomonas</i> ).	400 mg by mouth every 24 h. Adjust for renal insufficiency.	Cog: + S: + A: + Motor: ++ D: ++ Com: + F: +	Thrombophlebitis at injection site, rash, allergic reaction, diarrhea, <i>Clostridium difficile</i> colitis, hypotension, bone marrow suppression, nausea, vomiting, stomatitis, glossitis, hepatotoxicity, seizures when dose is not adjusted for renal insufficiency. No identified drug interactions.
Third-generation cephalosporins effective against <i>Pseudomonas</i>				
Ceftazidime (Fortaz)	IV cephalosporin; used to treat all gram-negative bacteria such as <i>Escherichia coli</i> , <i>Proteus</i> , <i>Klebsiella</i> , <i>Haemophilus</i> , and <i>Moraxella</i> ; excellent coverage of <i>Pseudomonas</i> .	1-2 g IV every 8-12 h. Adjust for renal insufficiency.	Cog: + S: + A: + Motor: ++ D: ++ Com: + F: +	Thrombophlebitis at injection site, rash, allergic reaction, diarrhea, <i>Clostridium difficile</i> colitis, hypotension, bone marrow suppression, nausea, hepatotoxicity, seizures when dose is not adjusted for renal insufficiency. No identified drug interactions.
Aztreonam (Azactam)	IV cephalosporin; used to treat all gram-negative bacteria such as	1-2 g IV every 8 h. Adjust for renal insufficiency.	Cog: + S: + A: +	Thrombophlebitis at injection site, rash, allergic reaction, diarrhea, <i>Clostridium difficile</i> colitis, hypotension, bone

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	<i>Escherichia coli</i> , <i>Proteus</i> , <i>Klebsiella</i> , <i>Haemophilus</i> , and <i>Moraxella</i> ; excellent coverage of <i>Pseudomonas</i> .		Motor: ++ D: ++ Com: + F: +	marrow suppression, nausea, hepatotoxicity, seizures when dose is not adjusted for renal insufficiency. No identified drug interactions. Safe to use in most patients with penicillin allergy.
Fourth-generation cephalosporin effective against <i>Pseudomonas</i>				
Cefepime (Maxipime)	IV cephalosporin; used to treat all gram-negative bacteria such as <i>Escherichia coli</i> , <i>Proteus</i> , <i>Klebsiella</i> , <i>Haemophilus</i> , and <i>Moraxella</i> ; excellent coverage of <i>Pseudomonas</i> .	1-2 g IV every 8-12 h. Adjust for renal insufficiency.	Cog: + S: + A: + Motor: ++ D: ++ Com: + F: +	Thrombophlebitis at injection site, rash, allergic reaction, diarrhea, <i>Clostridium difficile</i> colitis, hypotension, bone marrow suppression, nausea, hepatotoxicity, seizures when dose is not adjusted for renal insufficiency. No identified drug interactions.
Carbapenem without activity against <i>Pseudomonas</i>				
Ertapenem (Invanz)	Active against gram-positive bacteria (not MRSA), anaerobes, and gram-negative bacteria (not <i>Pseudomonas</i> ).	1 g IV or intramuscularly every 24 h. Adjust for renal insufficiency.	Cog: + S: + A: + Motor: ++ D: + Com: + F: +	Thrombophlebitis at injection site, rash, allergic reaction, diarrhea, <i>Clostridium difficile</i> colitis, hypotension, bone marrow suppression, nausea, headache, hepatotoxicity, tremors, stiff muscles, seizures. Increases levels of antibiotic when combined with probenecid. Useful in outpatient treatment of diabetic foot and other polymicrobial infections with once/day dosing.
Carbapenems with activity against <i>Pseudomonas</i>				
Imipenem–cilastatin (Primaxin)	Active against gram-positive bacteria (not MRSA), anaerobes, and gram-negative bacteria, including <i>Pseudomonas</i> . Agent of choice against <i>Acinetobacter</i> and resistant <i>Klebsiella</i> .	500 mg IV every 6 h. Adjust for renal insufficiency.	Cog: + S: + A: + Motor: +++ D: ++ Com: + F: ++	Increased risk of seizures (especially if dose is not decreased with renal insufficiency), somnolence, confusion, dizziness, abdominal pain, glossitis, tremor, paresthesias, heartburn, pharyngeal pain, bone marrow suppression. Imipenem has the highest risk of seizures, especially in patients with renal impairment. Increases cyclosporine levels. Ganciclovir increases risk of seizures. Probenecid increases levels.
Meropenem (Merrem)	Active against gram-positive bacteria (not MRSA), anaerobes, and gram-negative bacteria, including <i>Pseudomonas</i> . Agent of choice against <i>Acinetobacter</i> and resistant <i>Klebsiella</i> .	500 mg-1 g IV every 8 h. Adjust for renal insufficiency.	Cog: + S: + A: + Motor: ++ D: + Com: + F: ++	Increased risk of seizures (especially if dose is not decreased with renal insufficiency), somnolence, confusion, dizziness, abdominal pain, glossitis, tremor, paresthesias, heartburn, pharyngeal pain, bone marrow suppression. Increases cyclosporine levels. Ganciclovir increases risk of seizures. Probenecid increases levels.
Doripenem	Active against gram-	500 mg IV every 8	Cog: +	Increased risk of seizures (especially if

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(Doribax)	positive bacteria (not MRSA), anaerobes, and gram-negative bacteria, including <i>Pseudomonas</i> . Agent of choice against <i>Acinetobacter</i> and resistant <i>Klebsiella</i> .	h. Adjust for renal insufficiency. Creatinine clearance 30-50 ml/min: 250 mg IV every 8 h. Creatinine clearance <30 ml/min: 250 mg IV every 12 h.	S: + A: + Motor: ++ D: + Com: + F: ++	dose is not decreased with renal insufficiency), somnolence, confusion, dizziness, abdominal pain, glossitis, tremor, paresthesias, heartburn, pharyngeal pain, bone marrow suppression. Increases cyclosporine levels. Ganciclovir increases risk of seizures. Probenecid increases levels.
<b>Agents with anaerobic activity</b>				
Clindamycin (Cleocin)	Used to treat gram-positive organisms (not MRSA), anaerobes, and gram-negative bacteria such as <i>Escherichia coli</i> .	300-900 mg IV every 6-8 h or 150-450 mg by mouth every 6 h. Adjust for hepatic insufficiency.	Cog: 0 S: 0 A: 0 Motor: ++ D: +++ Com: + F: ++	Diarrhea (occurs in 20% of treated patients), nausea, vomiting, esophagitis, dry mouth, taste perversion, rash, heart block with rapid IV administration, hypotension, hepatotoxicity, neuromuscular blockade, rash that can be severe (Stevens-Johnson) in rare instances. Increases muscle paralysis and apnea when used with neuromuscular relaxant and neuromuscular blockers. Kaolin decreases oral absorption of clindamycin; clindamycin increases theophylline levels and risk of seizures. <i>Clostridium difficile</i> diarrhea more common with oral administration than with IV administration.
Metronidazole (Flagyl)	Most effective agent against anaerobic infection. Works in anaerobic environment. Oral and IV therapy provide similar blood levels and effects.	500 mg IV or by mouth every 6-12 h. Adjust for hepatic insufficiency.	Cog: + S: + A: 0 Motor: ++ D: +++ Com: + F: +	Nausea, vomiting, gastrointestinal upset, metallic taste, aseptic meningitis, encephalitis, seizures, brown discoloration of urine. Disulfiram (Antabuse) reaction occurs when used with alcohol. Increases INR when used with warfarin (Coumadin). Phenobarbital and phenytoin increase metabolism and decrease levels and effects.
<b>Aminoglycosides</b>				
Gentamicin (Garamycin)	Bactericidal antibiotic that is highly effective against serious gram-negative pathogens, including <i>Pseudomonas</i> .	4-7 mg/kg IV or intramuscularly/day or per pharmacokinetic dosing using measurement of peak and trough levels. High-dose therapy is monitored using levels obtained 12 h after the initial dose and then repeated	Cog: 0 S: 0 A: 0 Motor: ++ D: 0 Com: + F: ++	Neuromuscular blockade with rapid administration, nephrotoxicity, ototoxicity, vestibular toxicity, dizziness, vertigo, ataxia, peripheral neuropathy, encephalopathy, lethargy, confusion, worsened myasthenia gravis, hypomagnesemia, hypocalcemia, hypokalemia that can result in muscle weakness, tetany, respiratory depression, joint pain, hypotension, bone marrow suppression, rash, pyrogenic reaction to initial high-dose therapy with fever, shaking, chills,

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		levels taken once weekly.		rigors, tachycardia. Increases nephrotoxicity when used with amphotericin B, cyclosporine (Sandimmune), NSAIDs such as ibuprofen (Motrin), polymyxin B, radiographic contrast dye, vancomycin, or cisplatin (Platinol). Increased ototoxicity when used with loop diuretics such as furosemide (Lasix). Increases neuromuscular blockade when used with neuromuscular blockers used in anesthesia.
Tobramycin (Nebcin, Tobi)	Bactericidal antibiotic that is highly effective against serious gram-negative pathogens, including <i>Pseudomonas</i> .	5-7 mg/kg IV or intramuscularly/day or per pharmacokinetic dosing using measurement of peak and trough levels. High-dose therapy is monitored using levels obtained 12 h after the initial dose and then levels repeated once weekly.	Cog: 0 S: 0 A: 0 Motor: ++ D: 0 Com: + F: ++	Neuromuscular blockade with rapid administration, nephrotoxicity, ototoxicity, vestibular toxicity, dizziness, vertigo, ataxia, peripheral neuropathy, encephalopathy, lethargy, confusion, worsened myasthenia gravis, hypomagnesemia, hypocalcemia, hypokalemia that can result in muscle weakness, tetany, respiratory depression, joint pain, hypotension, bone marrow suppression, rash, pyrogenic reaction to initial high-dose therapy with fever, shaking, chills, rigors, tachycardia. Increased nephrotoxicity when used with amphotericin B, cyclosporine (Sandimmune), NSAIDs such as ibuprofen (Motrin), polymyxin B, radiographic contrast dye, vancomycin, or cisplatin (Platinol). Increased ototoxicity when used with loop diuretics such as furosemide (Lasix). Increased neuromuscular blockade when used with neuromuscular blockers used in anesthesia.
Amikacin	Bactericidal antibiotic that is highly effective against serious gram-negative pathogens, including <i>Pseudomonas</i> .	600 mg IV every 12 h or per pharmacokinetic dosing using measurement of peak and trough levels. High-dose therapy is monitored using levels obtained 12 h after the initial dose and then levels repeated once	Cog: 0 S: 0 A: 0 Motor: ++ D: 0 Com: + F: ++	Neuromuscular blockade with rapid administration, nephrotoxicity, ototoxicity, vestibular toxicity, dizziness, vertigo, ataxia, peripheral neuropathy, encephalopathy, lethargy, confusion, worsened myasthenia gravis, hypomagnesemia, hypocalcemia, hypokalemia that can result in muscle weakness, tetany, respiratory depression, joint pain, hypotension, bone marrow suppression, rash, pyrogenic reaction to initial high-dose therapy with fever, shaking, chills,

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		weekly.		rigors, tachycardia. Increased nephrotoxicity when used with amphotericin B, cyclosporine (Sandimmune), NSAIDs such as ibuprofen (Motrin), polymyxin B, radiographic contrast dye, vancomycin, or cisplatin (Platinol). Increased ototoxicity when used with loop diuretics such as furosemide (Lasix). Increased neuromuscular blockade when used with neuromuscular blockers used in anesthesia.
Agents active against MRSA				
Vancomycin	Used to treat infections caused by MRSA or MRSE.	15-19 mg/kg IV every 8-12 h. Adjust dose for renal insufficiency by pharmacokinetic calculations using vancomycin trough levels and serum creatinine levels. Central line needed for long-term therapy.	Cog: 0 S: 0 A: 0 Motor: + D: + Com: 0 F: +	Red man syndrome (wheezing, dyspnea, upper-body rash, hypotension) with rapid infusion, thrombophlebitis, leukopenia, thrombocytopenia, hypotension, nephrotoxicity (especially when dose is not adjusted in patients with renal impairment or when used with other nephrotoxins), ototoxicity (hearing loss, vertigo, tinnitus) associated with high doses or concurrent use of other ototoxic medications, phlebitis at the site of the infusion, rare instances of rash with exfoliative dermatitis (Stevens-Johnson reaction or TENS). Increased nephrotoxicity when used with amphotericin B, aminoglycosides (e.g., gentamicin, tobramycin or amikacin), polymyxin B, cisplatin (Platinol), or radiographic contrast dye.
Daptomycin (Cubicin)	Used to treat serious gram-positive infections, including resistant <i>Staphylococcus</i> (MRSA, MRSE) and resistant <i>Streptococcus</i> (vancomycin-resistant <i>Enterococcus</i> ).	4-6 mg/kg/day. Creatinine clearance <30 ml/min: Adjust dosing interval to every 48 h.	Cog: ++ S: ++ A: + Motor: ++ D: ++ Com: + F: ++	Constipation, somnolence, nausea, headache, diarrhea, vomiting, abdominal pain, dry mouth, stomatitis, jitteriness, rigors, taste disturbances, fatigue, eosinophilic pneumonia, dyspnea, rash, pruritus, paresthesias, peripheral neuropathy, hallucinations, anxiety, insomnia, confusion, worsening of renal function, changes in electrolyte levels of potassium, phosphorus, and magnesium. Increased CPK; monitor for muscle pain and weakness; check CPK weekly. Suspend use of statins during use. False positive increase in INR when used with warfarin (Coumadin).
Linezolid (Zyvox)	Used to treat serious gram-positive infections,	600 mg by mouth or IV every 12 h. Do	Cog: ++ S: ++	Serotonin syndrome, seizures, drowsiness, confusion, lactic acidosis,

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	including resistant <i>Staphylococcus</i> (MRSA, MRSE) and resistant <i>Streptococcus</i> (vancomycin-resistant <i>Enterococcus</i> ).	not adjust for renal insufficiency. Oral and IV therapy provide similar blood levels.	A: + Motor: ++ D: ++ Com: + F: ++	thrombocytopenia, anemia, leukopenia, peripheral neuropathy, diarrhea, headache, nausea, optic neuropathy that can progress to blindness, myelosuppression, tooth and tongue discoloration. Pseudoephedrine, foods containing tyramine, and serotonergic agents (selective serotonin reuptake inhibitors and tricyclic antidepressants) can increase risk of serotonin syndrome. Monitor visual function and CBC if taken for more than 2 wk.
Telavancin (Vibativ)	Used to treat skin and soft-tissue infections caused by gram-positive bacteria, including MRSA.	10 mg/kg every 24 h. Adjust dose for renal impairment. Creatinine clearance 30-50 ml/min: 7.5 mg/kg every 24 h. Creatinine clearance 10-30 ml/min: 10 mg/kg every 48 h.	Cog: + S: 0 A: 0 Motor: ++ D: ++ Com: 0 F: ++	Nausea, vomiting, diarrhea, taste disturbances, dizziness, foamy urine, renal impairment, cardiac events, respiratory events, arrhythmias associated with QT prolongation. Avoid using with other medications known to prolong QT interval; causes cardiac arrhythmias. Chemically related to vancomycin but requires once/day dosing.
Tigecycline (Tygacil)	Bacteriostatic synthetic derivative of tetracycline; indicated for complicated infections of the skin and soft tissue.	50 mg IV every 12 h.	Cog: + S: + A: + Motor: + D: ++ Com: + F: +	Nausea (35%), vomiting (20%), dyspepsia, pancreatitis, anorexia, diarrhea, taste disturbance, headache, dizziness, insomnia, somnolence, rash, hepatotoxicity (rare). May decrease effectiveness of oral contraceptives.

Cog = cognition; S = sedation; A = agitation or mania; Motor = discoordination; D = dysphagia; Com = communication; F = falls; IV = intravenously; MRSA = methicillin-resistant *Staphylococcus aureus*; MRSE = methicillin-resistant *Staphylococcus epidermidis*; NSAID = nonsteroidal anti-inflammatory drug; INR = international normalized ratio; CBC = complete blood count; CPK = creatine phosphokinase; BUN = blood urea nitrogen.

The likelihood rating scale for encountering the side effects is as follows: 0 = Almost no probability of encountering side effects. + = Little likelihood of encountering side effects. +/+ = Low probability of encountering side effects; however, probability increases with increased dosage. ++ = Medium likelihood of encountering side effects. +++ = High likelihood of encountering side effects, particularly with high doses. ++++ = Highest likelihood of encountering side effects; best to avoid in at-risk patients.