

Table 16.11 Treatment of Pneumonia as Recommended by Infectious Diseases Society of America

Medication	Indications	Dosing	Side effects affecting rehab	Other side effects or considerations
Beta-lactam antibiotics: Penicillins, cephalosporins, and carbapenems				
Penicillins				
Amoxicillin	Used to treat sensitive <i>Streptococcus pneumoniae</i> in ambulatory community-acquired pneumonia.	500 mg by mouth every 8 h.	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, serum sickness reactions, Stevens-Johnson skin reactions, tooth discoloration in pediatric patients. Increased rash when used with allopurinol.
Oxacillin	Agent of choice penicillin to treat methicillin-sensitive staphylococcal pneumonia.	1-2 g IV every 4-6 h. Adjust for renal insufficiency.	Cog: + S: + A: + Motor: ++ D: ++ Com: + F: ++	Nausea, vomiting, diarrhea, stomatitis, <i>Clostridium difficile</i> colitis, bone marrow suppression, jaundice, hepatotoxicity, renal failure, interstitial nephritis, thrombophlebitis at infusion site, seizures when dose is not adjusted for renal insufficiency, hypokalemia with high doses, rash. Increases levels and effects when combined with probenecid.
Ampicillin-sulbactam (Unasyn)	Extended-spectrum penicillin; used to treat methicillin-sensitive <i>Staphylococcus</i> and <i>Streptococcus</i> . Good anaerobic activity for treating suspected aspiration pneumonia.	1.5-3 g IV every 6 h. Adjust for renal insufficiency.	Cog: + S: + A: + Motor: ++ D: ++ Com: + F: ++	Gastrointestinal upset, diarrhea, drug fever, rash, increased liver enzymes, nausea, vomiting, 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 in pediatric patients. Increased rash when used with allopurinol.
Piperacillin-tazobactam (Zosyn)	Broad-spectrum antipseudomonal penicillin; active against gram-positive bacteria, gram-negative bacteria, and anaerobes, and <i>Pseudomonas</i> ; does not cover MRSA. Used empirically for treatment of critically ill patients or patients previously treated with antibiotics or with history of steroid use or bronchiectasis.	3.375 g IV every 6 h or 4.5 g every 8 h. Adjust for renal insufficiency.	Cog: + S: + A: + Motor: ++ D: ++ Com: + F: ++	Gastrointestinal upset, diarrhea, drug fever, rash, increased liver enzymes, nausea, vomiting, allergic reaction, <i>Clostridium difficile</i> colitis, bone marrow depression, dizziness, insomnia, confusion, agitation, convulsions, behavior changes, tooth discoloration in pediatric patients, serum sickness reactions, Stevens-Johnson skin reactions. Increased rash when used with allopurinol.
Cephalosporins				
Third-generation cephalosporins without activity against <i>Pseudomonas</i>				
Ceftriaxone (Rocephin)	Active against <i>Streptococcus pneumoniae</i> and	1-2 g IV or intramuscularly every 24 h. Safe	Cog: + S: + A: +	Thrombophlebitis at injection site, rash, allergic reaction, diarrhea, <i>Clostridium difficile</i> colitis, hypotension, bone marrow

From L. Carl, J. Gallo, and P. Johnson, 2014, *Practical Pharmacology in Rehabilitation: Effect of Medication on Therapy* (Champaign, IL: Human Kinetics).

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	gram-negative organisms (not <i>Pseudomonas</i>); empiric use combined with a second agent such as quinolone, doxycycline, or macrolide in treatment of community-acquired pneumonia in patients who are not critically ill.	to use in renal insufficiency; does not require dosage adjustment.	Motor: ++ D: ++ Com: + F: ++	suppression, nausea, vomiting, stomatitis, glossitis, hepatotoxicity. No identified drug interactions. Eliminated in the bile; no need to adjust dose for renal insufficiency. Can cause biliary sludging leading to obstruction, thrombophlebitis.
Cefpodoxime (Vantin)	Used in transition from IV antibiotics to oral therapy of pneumonia before discharge; active against gram-positive bacteria (not MRSA) and gram-negative bacteria (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)	Used in transition from IV antibiotics to oral therapy of pneumonia before discharge; active against gram-positive bacteria (not MRSA) and gram-negative bacteria (not <i>Pseudomonas</i>).	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)	Used in transition from IV antibiotics to oral therapy of pneumonia before discharge; active against gram-positive bacteria (not MRSA) and gram-negative bacteria (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 with activity against <i>Pseudomonas</i>				
Aztreonam (Azactam)	Used to treat pneumonia in critically ill patients and patients with history of antibiotic or steroid use or bronchiectasis who also have beta-lactam allergy;	1-2 g IV every 8 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.

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	effective in treating gram-negative bacteria, including <i>Pseudomonas</i> .			
Ceftazidime (Fortaz)	Used to treat pneumonia in critically ill patients and patients with history of antibiotic or steroid use or bronchiectasis; effective in treating gram-negative bacteria, including <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.
Fourth-generation cephalosporin with activity against <i>Pseudomonas</i>				
Cefepime (Maxipime)	Intravenous cephalosporin; used to treat pneumonia in critically ill patients and patients with a history of antibiotic or steroid use or bronchiectasis. Active against all gram-negative bacteria such as <i>Escherichia coli</i> , <i>Proteus</i> , <i>Klebsiella</i> , <i>Haemophilus</i> , <i>Moraxella</i> ; excellent coverage of <i>Pseudomonas</i> ; also covers gram-positive bacteria.	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 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.
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> . Used with second agent such as an antipseudomonal	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). Carbapenem with the highest risk of seizures, especially in patients with renal impairment. Increases cyclosporine levels. Probenecid increases levels of carbapenem. Thrombophlebitis at injection site, rash, allergic reaction, diarrhea, <i>Clostridium difficile</i> colitis, hypotension, bone marrow

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	quinolone plus an aminoglycoside in treating pneumonia in critically ill patients and patients with a history of antibiotic or steroid use or bronchiectasis; agent of choice against <i>Acinetobacter</i> and resistant <i>Klebsiella</i> .			suppression, nausea, headache, hepatotoxicity, tremors, stiff muscles, seizures, sedation, confusion, dizziness, heartburn, pharyngeal pain.
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). Increases cyclosporine levels. Probenecid increases levels of carbapenem. Thrombophlebitis at injection site, rash, allergic reaction, diarrhea, <i>Clostridium difficile</i> colitis, hypotension, bone marrow suppression, nausea, headache, hepatotoxicity, tremors, stiff muscles, seizures, sedation, confusion, dizziness, heartburn, pharyngeal pain.
Doripenem (Doribax)	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 8 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.	Cog: + S: + A: + Motor: ++ D: + Com: + F: ++	Increased risk of seizures (especially if dose is not decreased with renal insufficiency). Increases cyclosporine levels. Probenecid increases levels of carbapenem.
Macrolides				
Azithromycin (Zithromax)	First-line therapy for outpatient community-acquired pneumonia and when combined with antipneumococcal agent in hospitalized patients with pneumonia.	500 mg IV/day; 500 mg by mouth/day for 3 days; or 500 mg on day 1, then 250 mg by mouth/day for 4 more days. Do not adjust for renal insufficiency.	Cog: + S: + A: + Motor: + D: + Com: + F: +	Nausea, gastrointestinal upset, diarrhea, rash which can rarely progress to an exfoliative rash such as Stevens-Johnson or TEN hepatotoxicity, headache, somnolence, vertigo, interstitial nephritis, renal insufficiency, rare psychiatric disturbances. May increase QT interval. Increases cyclosporine and digoxin levels. Pimozide may increase QT interval. Risk of torsades de pointes.
Clarithromycin (Biaxin)	First-line therapy for outpatient community-acquired pneumonia.	500 mg by mouth every 12 h.	Cog: + S: + A: + Motor: + D: + Com: +	Nausea, gastrointestinal upset, abdominal pain, diarrhea, rash which rarely can progress to an exfoliative rash such as Stevens-Johnson or TEN hepatotoxicity, headache, somnolence, vertigo, interstitial nephritis, renal insufficiency, rare psychiatric

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			F: +	<p>disturbances.</p> <p>May increase QT interval.</p> <p>Amiodarone, procainamide, sotalol, astemizole, terfenadine, cisapride, and pimozide increase QT interval.</p> <p>Increases levels and toxicity of carbamazepine and theophylline.</p> <p>Increases levels and effects of cimetidine, digoxin, ergot alkaloids, midazolam, triazolam, phenytoin, ritonavir, tacrolimus, and valproic acid.</p> <p>Decreases levels of zidovudine.</p> <p>Efavirenz, rifabutin, and rifampin decrease clarithromycin levels and effects.</p> <p>Increases INR when used with warfarin (Coumadin).</p> <p>Increases risk of rhabdomyolysis when used with statins.</p>
Tetracycline				
Doxycycline (Vibramycin)	First-line therapy for outpatient community-acquired pneumonia or combined with a second agent active against <i>Streptococcus</i> such as a beta-lactam in more serious pneumonias. Preferred agent in pneumonia suspected to be associated with <i>Chlamydia</i> .	100-200 mg by mouth or IV every 12 h. Adjust for hepatic dysfunction.	Cog: 0 S: 0 A: 0 Motor: 0 D: ++ Com: + F: 0	<p>Nausea if not taken with food, anorexia, vomiting, glossitis, rash, increase in BUN, bone marrow suppression, phlebitis if given IV in inadequate volume.</p> <p>Avoid use in children or pregnant women; stains teeth of children.</p> <p>Decreased oral absorption occurs when used with iron, antacids containing calcium, magnesium, aluminum, sucralfate, or zinc. Bicarbonate decreases absorption, phenytoin, carbamazepine. Phenobarbital can increase rate of elimination and decreases doxycycline's levels and effects.</p> <p>Increases INR when used with warfarin (Coumadin).</p>
Quinolones				
Levofloxacin (Levaquin)	First-line treatment of pneumonia as single agent in outpatient or inpatient therapy in patients who are not critically ill. Intravenous use is combined with second antipseudomonal agent such as an antipseudomonal beta-lactam with or without aminoglycoside in patients who are critically ill or patients with history of	750 mg by mouth or IV/day. Adjust dose for renal insufficiency. Levels attained with oral administration equivalent to those of IV administration; useful in transition to outpatient therapy.	Cog: +++ S: 0 A: ++ Motor: +++ D: +++ Com: ++ F: +++	<p>Increases effects of warfarin (Coumadin).</p> <p>Absorption is decreased when taken with aluminum, magnesium, antacids containing calcium, or iron or zinc supplements.</p> <p>Increases effects on the central nervous system when taken with NSAIDs.</p> <p>Probenecid increases levofloxacin levels.</p> <p>Effective treatment for gram-negative bacteria, including <i>Pseudomonas aeruginosa</i>.</p> <p>Avoid use in pregnant women; can interfere with cartilage formation in children.</p>

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	antibiotic or steroid use or bronchiectasis.			
Moxifloxacin (Avelox)	First-line treatment of pneumonia as single agent in outpatient or inpatient therapy in patients who are not critically ill.	400 mg IV or by mouth/day. Adjust dose for hepatic insufficiency. Levels attained with oral administration equivalent to those of IV administration. Useful in transition to outpatient therapy.	Cog: +++ S: 0 A: ++ Motor: +++ D: +++ Com: ++ F: +++	Taste perversion, abnormal dreams, vision changes, confusion, behavior changes, hallucinations, speech disorders, arthralgias, myalgias, bone marrow suppression, dysphagia, glossitis, gastritis, nausea, vomiting, stomatitis, <i>Clostridium difficile</i> colitis, altered coordination and gait, worsened myasthenia gravis, allergic reactions, liver dysfunction, tendon rupture, renal dysfunction, Stevens-Johnson reaction. Increases risk for QT prolongation with increased risk for arrhythmia and cardiac arrest. Increases effects of warfarin (Coumadin). Absorption is decreased when taken with aluminum, magnesium, antacids containing calcium, or iron or zinc supplements. Increases effects on the central nervous system when taken with NSAIDs. Probenecid increases levofloxacin levels. Avoid use in children and pregnant women; causes tooth discoloration and cartilage abnormalities.
Agents active against MRSA				
Vancomycin	First-line therapy in treatment of pneumonia caused by MRSA.	19 mg/kg IV every 12 h. Adjust for renal insufficiency or dose by pharmacokinetic calculation using vancomycin trough levels and serum creatinine levels.	Cog: 0 S: 0 A: 0 Motor: + D: + Com: 0 F: +	Increases nephrotoxicity when used with amphotericin B and aminoglycosides, polymyxin B, cisplatin, or radiographic contrast dye. Central line needed for long-term therapy.
Linezolid (Zyvox)	First-line therapy in pneumonia caused by methicillin-resistant staphylococcal infections that cannot be treated with vancomycin; oral formulation is useful for continued treatment as outpatient but is expensive.	600 mg by mouth or IV every 12 h. Do not adjust for renal insufficiency.	Cog: ++ S: ++ A: + Motor: ++ D: ++ Com: + F: ++	Serotonin syndrome, seizures, drowsiness, confusion, lactic acidosis, thrombocytopenia, anemia, leukopenia, optic neuropathy, peripheral neuropathy, diarrhea, headache, nausea, optic neuropathy that can progress to blindness, myelosuppression, tooth and tongue discoloration. Monitor visual function and CBC if taken for more than 2 wk. Pseudoephedrine, foods containing tyramine, and serotonergic agents (selective serotonin reuptake inhibitors and tricyclic antidepressants) can increase risk of serotonin syndrome.
Aminoglycosides				

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Gentamicin	Used to treat pneumonia in critically ill patients or patients with history of antibiotic or steroid use, COPD, and bronchiectasis; highly effective when combined with other antipseudomonal agents (beta-lactam or quinolone) in treating serious gram-negative pneumonia associated with <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 are repeated at least 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. 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). Increased neuromuscular blockade when used with neuromuscular blockers used in anesthesia.
Tobramycin (Nebcin, Tobi)	Used to treat pneumonia in critically ill patients or patients with history of antibiotic or steroid use, COPD, and bronchiectasis. Highly effective when combined with other antipseudomonal agents (beta-lactam or quinolone) in treating serious gram-negative pneumonia associated with <i>Pseudomonas</i> .	5-7 mg/kg IV or intramuscularly/ day or per pharmacokinetic dosing using measurement of peak and trough levels. Inhaled tobramycin: 300 mg by inhalation every 12 h. High-dose therapy is monitored using levels obtained 12 h after the initial dose and then levels are repeated at least 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	Used to treat pneumonia in critically ill patients or patients with history of antibiotic or steroid use, COPD, and bronchiectasis. Highly effective when	600 mg IV or intramuscularly every 12 h or per pharmacokinetic parameters serum creatinine levels and amikacin peak	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

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	combined with other antipseudomonal agents (beta-lactam or quinolone) in treating serious gram-negative pneumonia associated with <i>Pseudomonas</i> .	and trough levels.		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.
Antibiotics with activity against anaerobes: Agents with anaerobic activity that include the carbapenems and broad-spectrum penicillins.				
Metronidazole (Flagyl)	Used in combination with other products to enhance anaerobic coverage in conditions such as lung abscess, empyema, or aspiration pneumonia. Most effective agent against anaerobic infection; works in anaerobic environment.	500 mg IV or by mouth every 6-12 h. Adjust for hepatic insufficiency.	Cog: 0 S: 0 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 decrease levels and effects.
Clindamycin (Cleocin)	Useful in combination with other agents in treating community-acquired and aspiration pneumonia in patients who have beta-lactam allergy. Active against gram-positive bacteria (not MRSA) and gram-negative bacteria (not <i>Pseudomonas</i>).	300-900 mg IV every 6-8 h or 150-450 mg by mouth every 6 h. Adjust for hepatic insufficiency.	Cog: + S: + 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.

Cog = cognition; S = sedation; A = agitation or mania; Motor = discoordination; D = dysphagia; Com = communication; F = falls; COPD = chronic obstructive pulmonary disease; IV = intravenously; MRSA = methicillin-resistant *Staphylococcus aureus*; NSAID = nonsteroidal anti-inflammatory drug; INR = international normalized ratio; CBC = complete blood count; BUN = blood urea nitrogen; TEN = toxic epidermal necrolysis.

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.