Tables of Antibacterial Drug Dosages

Recommended dosages for antibacterial agents commonly used for neonates (see Table 4.2, p 988) and for infants and children (see Table 4.3, p 993) are provided separately because of the pharmacokinetic and dosing differences between these 2 groups.

Table 4.2 is organized by variables such as gestational age (GA), postnatal age (PNA), and postmenstrual age (PMA) that best guide neonatal dosing for a given group of antimicrobial agents. Aminoglycosides and vancomycin are listed in separate tables to highlight their target serum concentration. For agents used to treat *Bacillus anthracis*, see Fluoroquinolones (p 973) and Anthrax (p 232).

Recommended dosages are not absolute and are intended only as a guide. When a dosage range is provided, the high dose generally is intended for severe infections. Clinical judgment about the disease, predicted drug concentration at the site of infection, alterations in renal or hepatic function, drug interactions, patient response, and laboratory test results may dictate modifications of these dosage recommendations in an individual patient. In some cases, monitoring of serum drug concentrations is recommended to avoid toxicity and to achieve concentrations associated with therapeutic efficacy. For vancomycin, this includes a recent consensus recommendation to utilize area under the curve (AUC)-guided therapeutic monitoring, preferably with Bayesian estimation, for all pediatric age groups based on developmental changes of vancomycin clearance documented from the newborn to the adolescent to reduce the risk of nephrotoxicity, as explained in the tables' footnotes. Trough-only monitoring is no longer recommended.

Product label information or a pediatric pharmacist should be consulted for guidance on the appropriate methods of preparation and administration, measures to be taken to avoid drug interactions, and other precautions. US Food and Drug Administration (FDA)-approved drug labels can be found online at the FDA website (**https://labels.fda.gov/**), Drugs@FDA (**www.accessdata.fda.gov/scripts/cder/daf/**), and DailyMed (**https://dailymed.nlm.nih.gov/dailymed/**).

For antimicrobial agents under investigation and not yet approved for use in children by the FDA, their indications under study and dosages can be found at **http://clinicaltrials.gov.**

Table 4.2. Antibacterial Drugs for Neonates (≤28 Postnatal Days of Age)[a]

Penicillins

Drug	Route	GA ≤34 wk 6 d		GA ≥35 wk 0 d	
		PNA ≤7 d	PNA >7 d	PNA ≤7 d	PNA >7 d
Bacteremia					
Ampicillin	IV, IM	50 mg/kg every 12 h	75 mg/kg every 12 h	50 mg/kg every 8 h	50 mg/kg every 8 h
Penicillin G aqueous	IV, IM	50 000 U/kg every 12 h	50 000 U/kg every 8 h	50 000 U/kg every 12 h	50 000 U/kg every 8 h
Meningitis					
Ampicillin	IV, IM	100 mg/kg every 8 h	75 mg/kg every 6 h	100 mg/kg every 8 h	75 mg/kg every 6 h
Penicillin G aqueous	IV, IM	150 000 U/kg every 8 h	125 000 U/kg every 6 h	150 000 U/kg every 8 h	125 000 U/kg every 6 h

Drug	Route	GA ≤34 wk 6 d		GA ≥35 wk 0 d	
		PNA ≤7 days	PNA >7 days	PNA ≤7 days	PNA >7 days
Nafcillin, oxacillin[b]	IV, IM	25 mg/kg every 12 h	25 mg/kg every 8 h	25 mg/kg every 8 h	25 mg/kg every 6 h

Drug	Route	PNA ≤7 days	PNA >7 days
Penicillin G procaine	IM only	50 000 U/kg every 24 h	50 000 U/kg every 24 h
Penicillin G benzathine	IM only	50 000 U/kg once	50 000 U/kg once

Drug	Route	PMA ≤30 wk	PMA >30 wk
Piperacillin-tazobactam	IV	100 mg/kg every 8 h	80 mg/kg every 6 h

Table 4.2. Antibacterial Drugs for Neonates (≤28 Postnatal Days of Age),[a] continued

Cephalosporins

Drug	Route	GA ≤31 wk 6 d		GA ≥32 wk 0 d	
		PNA <7 days	PNA ≥7 days	PNA ≤7 days	PNA >7 days
Cefazolin[c]	IV, IM	25 mg/kg every 12 h	25 mg/kg every 12 h	25 mg/kg every 8 h	25 mg/kg every 8 h
Cefotaxime[d]	IV, IM	50 mg/kg every 12 h	50 mg/kg every 8 h	50 mg/kg every 12 h	50 mg/kg every 8 h
Ceftazidime	IV, IM	50 mg/kg every 12 h	50 mg/kg every 8 h	50 mg/kg every 12 h	50 mg/kg every 8 h
Cefuroxime	IV, IM	50 mg/kg every 12 h	50 mg/kg every 8 h	50 mg/kg every 12 h	50 mg/kg every 8 h

Drug	Route	GA ≤31 wk 6 d		GA ≥32 wk 0 d
		PNA ≤7 days	PNA >7 days	
Cefoxitin	IV, IM	35 mg/kg every 12 h	35 mg/kg every 8 h	35 mg/kg every 8 h
Ceftolozane/tazobactam	IV	--	--	20 mg ceftolozane/kg every q8h

Drug	Route	All neonates
Ceftriaxone[e]	IV, IM	50 mg/kg every 24 h

Drug	Route	GA ≤35 wk 6 d	GA ≥36 wk 0 d
Cefepime	IV	30 mg/kg every 12 h	50 mg/kg every 12 h[f]

Drug	Route	GA ≥34 wk 0 d and PNA ≥12 d
Ceftaroline	IV	6 mg/kg every 8 h

Table 4.2. Antibacterial Drugs for Neonates (≤28 Postnatal Days of Age),[a] continued

Carbapenems

Drug	Route	GA ≤31 wk 6 d		GA ≥32 wk 0 d	
		PNA <14 days	PNA ≥14 days	PNA <14 days	PNA ≥14 days
Meropenem (non-meningitic dosing)	IV	20 mg/kg every 12 h	20 mg/kg every 8 h	20 mg/kg every 8 h	30 mg/kg every 8 h
Meropenem (meningitic dosing)	IV	40 mg/kg every 12 h	40 mg/kg every 8 h	40 mg/kg every 8 h	40 mg/kg every 8 h

Drug	Route	PNA ≤7 days	PNA >7 days
Imipenem-cilastatin	IV	25 mg/kg every 12 h	25 mg/kg every 8 h

Other agents

Drug	Route	All neonates
Azithromycin[g,h]	IV, PO	10 mg/kg every 24 h
Erythromycin[g]	IV, PO	12.5 mg/kg every 6 h
Rifampin[i]	IV, PO	10–15 mg/kg every 24 h

Drug	Route	GA ≤33 wk 6 d		GA ≥34 wk 0 d	
		PNA ≤7 days	PNA >7 days	PNA ≤7 days	PNA >7 days
Aztreonam[b]	IV	30 mg/kg every 12 h	30 mg/kg every 8 h	30 mg/kg every 8 h	30 mg/kg every 6 h

Drug	Route	PMA ≤32 wk	PMA 33–40 wk	PMA >40 wk
Clindamycin	IV, PO	5 mg/kg every 8h	7 mg/kg every 8 h	9 mg/kg every 8 h

Table 4.2. Antibacterial Drugs for Neonates (≤28 Postnatal Days of Age),[a] continued

Drug	Route	GA ≤33 wk 6 d		GA ≥34 wk 0 d	
		PNA ≤7 days	PNA >7 days	PNA ≤7 days	PNA >7 days
Linezolid	IV, PO	10 mg/kg every 12 h	10 mg/kg every 8 h	10 mg/kg every 8 h	10 mg/kg every 8 h

Drug	Route	PMA ≤34 wk	PMA 35–40 wk	PMA >40 wk
Metronidazole[j]	IV	7.5 mg/kg every 12 h	7.5 mg/kg every 8 h	10 mg/kg every 8 h

Aminoglycosides

Drug	Route	GA ≤29 wk 6 d		GA 30 wk 0 d – 34 wk 6 d		GA ≥35 wk 0 d	
		PNA ≤14 days	>14 days	≤10 days	>10 days	≤7 days	>7 days
Amikacin[k]	IV, IM	15 mg/kg every 48 h	15 mg/kg every 36 h	15 mg/kg every 36 h	15 mg/kg every 24 h	15 mg/kg every 24 h	18 mg/kg every 24 h
Gentamicin[l]	IV, IM	5 mg/kg every 48 h	5 mg/kg every 36 h	5 mg/kg every 36 h	5 mg/kg every 24 h	4 mg/kg every 24 h	5 mg/kg every 24 h
Tobramycin[l]	IV, IM	5 mg/kg every 48 h	5 mg/kg every 36 h	5 mg/kg every 36 h	5 mg/kg every 24 h	4 mg/kg every 24 h	5 mg/kg every 24 h

Vancomycin[m]

Begin with a 20-mg/kg loading dose followed by a maintenance dose, according to the table

GA ≤28 wk 6 d		GA ≥29 wk 0 d	
Creatinine (mg/dL)	Dosage	Creatinine (mg/dL)	Dosage
<0.5	15 mg/kg every 12 h	<0.7	15 mg/kg every 12 h
0.5–0.7	20 mg/kg every 24 h	0.7–0.9	20 mg/kg every 24 h
0.8–1	15 mg/kg every 24 h	1–1.2	15 mg/kg every 24 h
1.1–1.4	10 mg/kg every 24 h	1.3–1.6	10 mg/kg every 24 h
>1.4	15 mg/kg every 48 h	>1.6	15 mg/kg every 48 h

Table 4.2. Antibacterial Drugs for Neonates (≤28 Postnatal Days of Age),[a] continued

Other glycopeptides

Drug	Route	All Neonates
Dalbavancin	IV	22.5 mg/kg, one time

GA, gestational age; IM, intramuscular; IV, intravenous; PNA, postnatal age; PO, oral.

[a] Dosages are given as per dose and the per dose frequency.

[b] Higher (double) doses than those listed may be required for meningitis, although safety and efficacy data for dosing of neonates with central nervous system (CNS) infection are lacking for these agents.

[c] Higher or more frequent dosing required for systemic, non-CNS, intermediately susceptible *Enterobacterales* infections.

[d] Cefotaxime is available by importation from Canada. See **www.fda.gov/media/152896/download** for details.

[e] Given dose also appropriate for meningitis. Neonates should not receive IV ceftriaxone if they also are receiving IV calcium in any form, including parenteral nutrition. Use in hyperbilirubinemic neonates should be undertaken thoughtfully, especially for those who were born preterm. In vitro studies have shown that ceftriaxone can displace bilirubin from its binding to serum albumin.

[f] May give 30 mg/kg, every 12 h, if target pathogen minimum inhibitory concentration (MIC) is ≤4 mg/L, such as *E coli*.

[g] An association between orally administered erythromycin and azithromycin and infantile hypertrophic pyloric stenosis (IHPS) has been reported in infants younger than 6 weeks. Infants treated with either of these antimicrobials should be followed for signs and symptoms of IHPS. Because of antibiotic resistance, these agents are not recommended to treat congenital *Mycoplasma hominis* infections.

[h] 20 mg/kg, every 24 hours for 3 days, for *Ureaplasma* or *Chlamydia trachomatis* infection.

[i] See *Haemophilus influenzae* Infections, p 400, and Meningococcal Infections, p 585, for alternate dosing in special situations.

[k] Begin with a 15-mg/kg loading dose.

[l] Desired serum or plasma concentrations: 20–40 mg/L or 10 x MIC (peak), <7 mg/L (trough).

[l] Desired serum or plasma concentrations: 6–12 mg/L or 10 x MIC (peak), <2 mg/L (trough).

[m] The maintenance dose should begin at the same number of hours after the loading dose as the maintenance interval. Creatinine concentrations normally fluctuate and are partly influenced by transplacental maternal creatinine in the first week of postnatal age. Cautious use of creatinine-based dosing strategy with frequent reassessment of renal function and vancomycin serum concentrations is recommended in neonates ≤7 days of age. The area-under-the-curve (AUC) to MIC has been identified as the most appropriate pharmacokinetic/pharmacodynamic (PK/PD) target vancomycin in adult patients with methicillin-resistant *Staphylococcus aureus* (MRSA) infections and is preferred over trough monitoring to prevent unnecessary overexposure to vancomycin. Although there are limitations in prospective outcomes data in pediatric patients with serious MRSA infections, the most recent consensus guideline from the American Society of Health-System Pharmacists, the Infectious Diseases Society of America, the Pediatric Infectious Diseases Society, and the Society of Infectious Diseases Pharmacists recommends AUC-guided therapeutic monitoring, preferably with Bayesian estimation, for all pediatric age groups receiving vancomycin.[n] This estimation accounts for developmental changes of vancomycin clearance from newborn to adolescent. Dosing in children should be designed to achieve an AUC of 400–600 mg-hour/L (assuming MIC of 1 mg/L) and/or trough levels <15 mg/L to minimize acute kidney injury risks. Bayesian estimation can be completed with 2 levels, with 1 level being recommended 1–2 hours after end of vancomycin infusion, and the second level being drawn 4–6 hours after end of infusion. Levels can be obtained as early as after the second dose. Software to assist with these calculations is available online and for purchase. It is recommended to avoid AUC >800 mg-hour/L and trough concentrations >15 mg/L. In situations in which AUC calculation is not feasible, a trough concentration ≥10 mg/L is very highly likely (>90%) to achieve the AUC target in neonates and children when the MIC is 1 mg/L. Trough concentrations as low as 7 mg/L can still achieve an AUC ≥400 mg-hour/L in some preterm neonates because of their slower clearance. For centers where invasive MRSA infection is relatively common or where MRSA with MIC of 1 mg/L is common, an online dosing tool is available that may improve the likelihood of empirically achieving AUC ≥400 mg-hour/L, compared with doses given in Table 4.2 **(https://connect.insight-rx.com/neovanco).**

[n] Rybak MJ, Le J, Lodise TP, et al. Executive summary: Therapeutic monitoring of vancomycin for serious methicillin-resistant *Staphylococcus aureus* infections: a revised consensus guideline and review by the American Society of Health-System Pharmacists, the Infectious Diseases Society of America, the Pediatric Infectious Diseases Society, and the Society of Infectious Diseases Pharmacists. *J Pediatric Infect Dis Soc.* 2020;9(3):281-284

Adapted from American Academy of Pediatrics. *2024 Nelson's Pediatric Antimicrobial Therapy*. 30th ed. Itasca, IL: American Academy of Pediatrics; 2024.

Table 4.3. Antibacterial Drugs for Pediatric Patients Beyond the Newborn Period

Drug Generic (Trade Name)	Generic Available	Route	Dosage per kg per Day Absolute Maximum Dosage Provided, If Known	Comments[a]
Aminoglycosides				Not ideal for CNS infections. See Table 4.2 footnotes for serum concentration targets.
Amikacin[b]	Y	IV, IM	15–22.5 mg, divided in 2–3 doses or once daily	Higher doses than those given are appropriate for cystic fibrosis.
Gentamicin[b]	Y	IV, IM	6–7.5 mg, divided in 3 doses, or 5–7.5 mg once daily	
Neomycin	Y	PO	100 mg, divided in 4 doses, max 12 g per day	For some enteric infections.
Tobramycin[b]	Y	IV, IM	6–7.5 mg, divided in 3–4 doses, or 5–7.5 mg once daily	Higher doses than those given are appropriate for cystic fibrosis.
		Inhaled	300 mg, inhaled every 12 h	
Aztreonam (Azactam)	Y	IV, IM	90–120 mg, divided in 3 or 4 doses, max 8 g per day	A monobactam. Can be used for CNS infections.
Carbapenems[c]				
Imipenem/cilastatin (Primaxin)	Y	IV	60–100 mg, divided in 4 doses, max 4 g per day	Caution when treating CNS infections because of increased risk of seizures. High end of dose range for *Pseudomonas aeruginosa* infections.

Table 4.3. Antibacterial Drugs for Pediatric Patients Beyond the Newborn Period, continued

Drug Generic (Trade Name)	Generic Available	Route	Dosage per kg per Day Absolute Maximum Dosage Provided, If Known	Comments[a]
Meropenem (Merrem)	Y	IV	60 mg, divided in 3 doses, max 3 g per day 120 mg, divided in 3 doses for meningitis, max 6 g per day	Extended infusion over 3 to 4 hours may be needed for susceptible infections in critically ill children.
Ertapenem (Invanz)	N	IV/IM	30 mg, divided in 2 doses, max 1 g per day ≥13 y and adults, 1 g, once daily	Poor activity against *Pseudomonas* and *Acinetobacter*. Should not be used for CNS infections.
Cephalosporins[c]				The generation of each agent is listed as a guide to antimicrobial spectrum.
Cefaclor (Ceclor)	Y	PO	20–40 mg, divided in 2 or 3 doses, max 1 g per day	Second generation.
Cefadroxil (Duricef)	Y	PO	30 mg, divided in 2 doses, max 2 g per day	First generation.
Cefazolin (Ancef)	Y	IV, IM	25–75 mg, divided in 3 doses, max 6 g per day Up to 150 mg, divided in 3–4 doses for bone/joint infections, max 12 g per day	First generation. Limited data on dosages above 100 mg/kg/day. Should not be used for CNS infections.
Cefdinir (Omnicef)	Y	PO	14 mg, divided in 1 or 2 doses, max 600 mg/day	Third generation. Inadequate activity against penicillin-resistant *Streptococcus pneumoniae*.
Cefepime (Maxipime)	Y	IV, IM	100 mg, divided in 2 doses, max 4 g per day 150 mg, divided in 3 doses for *Pseudomonas* infections or febrile neutropenia, max 6 g per day	Fourth generation. Extended infusion over 3 to 4 hours may be needed for susceptible infections in critically ill children. Can be used for CNS infections.

Table 4.3. Antibacterial Drugs for Pediatric Patients Beyond the Newborn Period, continued

Drug Generic (Trade Name)	Generic Available	Route	Dosage per kg per Day Absolute Maximum Dosage Provided, If Known	Comments[a]
Cefixime (Suprax)	Y	PO	8 mg, divided in 1 or 2 doses, max 400 mg per day	Third generation. Inadequate activity against penicillin-resistant *Streptococcus pneumoniae*.
Cefotaxime (Claforan)[d]	Y	IV, IM	150–180 mg, divided in 3 doses, max 8 g per day 200–225 mg, divided in 4 doses for meningitis, max 12 g per day	Third generation. Up to 300 mg, divided in 4 or 6 doses. May be used for CNS infections.
Cefotetan (Cefotan)	Y	IV, IM	60–100 mg, divided in 2 doses, max 6 g per day	Second generation. A cephamycin, active against anaerobes. Should not be used for CNS infections.
Cefoxitin (Mefoxin)	Y	IV, IM	80–160 mg, divided in 3–4 doses, max 12 g per day	Second generation. A cephamycin, active against anaerobes. Should not be used for CNS infections.
Cefpodoxime (Vantin)	Y	PO	10 mg, divided in 2 doses, max 400 mg per day 800 mg (not per kg), divided in 2 doses for severe non-MRSA skin infections and ≥40 kg.	Third generation.
Cefprozil (Cefzil)	Y	PO	15–30 mg, divided in 2 doses, max 1 g per day	Second generation.

Table 4.3. Antibacterial Drugs for Pediatric Patients Beyond the Newborn Period, continued

Drug Generic (Trade Name)	Generic Available	Route	Dosage per kg per Day Absolute Maximum Dosage Provided, If Known	Comments[a]
Ceftaroline (Teflaro)	N	IV	1 mo to <2 mo: 18 mg, divided in 3 doses 2 mo to <2 y: 24 mg, divided in 3 doses ≥2 y: ≤33 kg: 36 mg, divided in 3 doses >33 kg: 1200 mg (not per kg), divided in 2–3 doses	Fifth generation with anti-MRSA activity. No activity against *Pseudomonas* species. Adult dose: 400 mg/dose, every 8 h, or 600 mg/dose, every 12 h (max 1200 mg/day). Potentially useful for CNS infections, based on limited data.
Ceftazidime (Fortaz)	Y	IV, IM	90–150 mg, divided in 3 doses 200–300 mg, divided in 3 doses for serious *Pseudomonas* infections	Third generation. Max 6 g per day (12 g per day for serious *Pseudomonas* infections). Can be used for CNS infections.
Ceftazidime/avibactam (Avycaz)	N	IV	<6 mo: 120 mg, divided in 3 doses 6 mo–18 y: 150 mg, divided in 3 doses, max 6 g per day	Dose based on ceftazidime component. Used for certain multidrug-resistant gram-negative bacterial infections. Can be used for CNS infections.
Ceftolozane/tazobactam (Zerbaxa)	N	IV	90 mg, divided in 3 doses, max 4.5 g per day	Used for complicated intra-abdominal infections and complicated urinary tract infections

Table 4.3. Antibacterial Drugs for Pediatric Patients Beyond the Newborn Period, continued

Drug Generic (Trade Name)	Generic Available	Route	Dosage per kg per Day Absolute Maximum Dosage Provided, If Known	Comments[a]
Ceftriaxone (Rocephin)	Y	IV, IM	50–75 mg, once daily, max 1 g per day (for non-CNS, non-endocarditis infections) 100 mg, divided in 1 or 2 doses, max 4 g per day (for CNS or endocarditis infections) 50 mg/kg, IM, once daily for 1–3 days for AOM, max 1 g per day	Third generation.
Cefuroxime (Zinacef)	Y	IV, IM	100–150 mg, divided in 3 doses, max 6 g per day	Second-generation. Limited activity against penicillin-resistant *Streptococcus pneumoniae.* Other agents preferred for CNS infections.
Cefuroxime axetil (Ceftin)	Y	PO	20–30 mg, divided in 2 doses, max 1 g per day Up to 100 mg, divided in 3 doses for bone or joint infections, max 3 g per day	Second-generation. Limited activity against penicillin-resistant *Streptococcus pneumoniae.*
Cephalexin (Keflex)	Y	PO	25–50 mg divided in 2 doses 75–100 mg divided in 3–4 doses for bone or joint infections, max 4 g per day	First-generation.
Clindamycin (Cleocin)	Y	IM, IV	20–40 mg, divided in 3–4 doses, max 2.7 g per day	Often active against *Streptococcus pneumoniae*, *Streptococcus pyogenes*, and *Staphylococcus aureus* (including some MRSA) and many anaerobes of the respiratory tract. Penetrates into brain but not CSF.
	Y	PO	10–25 mg, divided in 3 doses 30–40 mg, divided in 3–4 doses for AOM or CA-MRSA, max 1.8 g per day	

Table 4.3. Antibacterial Drugs for Pediatric Patients Beyond the Newborn Period, continued

Drug Generic (Trade Name)	Generic Available	Route	Dosage per kg per Day Absolute Maximum Dosage Provided, If Known	Comments[a]
Daptomycin (Cubicin)	N	IV	For *Staphylococcus aureus* bacteremia: 1–6 y: 12 mg, once daily 7–11 y: 9 mg, once daily 12–17 y: 7 mg, once daily For skin and skin structure infections: 1–2 y: 10 mg, once daily 2–6 y: 9 mg, once daily 7–11 y: 7 mg, once daily 12–17 y: 5 mg, once daily	Neuromuscular toxicity in neonatal and juvenile canine model. FDA warns to avoid use in infants <12 mo. Not used for CNS infections.
Fluoroquinolones see also p 973, and Anthrax, p 232.				
Ciprofloxacin (Cipro)	Y	PO	30 mg, divided in 2 doses, max 1.0 g per day	Can be used to treat CNS infections.
		IV	20–30 mg, divided in 2 or 3 doses, max 1.2 g per day	For empiric therapy or therapy of penicillin-resistant strains of anthrax, the benefits of fluoroquinolones for pediatric anthrax are far greater than potential toxicities.
Levofloxacin (Levaquin)	Y	PO	<50 kg: 16 mg, divided in 2 doses, max 500 mg per day ≥50 kg: 500 mg per dose (not per kg), once daily	
		IV	<50 kg: 20 mg, divided in 2 doses, max 500 mg per day ≥50 kg: 500 mg per dose (not per kg), once daily	

Table 4.3. Antibacterial Drugs for Pediatric Patients Beyond the Newborn Period, continued

Drug Generic (Trade Name)	Generic Available	Route	Dosage per kg per Day Absolute Maximum Dosage Provided, If Known	Comments[a]
Macrolides				
Azithromycin (Zithromax, Zmax)	Y	PO	5–10 mg, once daily for the immediate-release products 60 mg as a single dose for the extended-release (ER) formulation Respiratory tract infection dosages (per kg, interval is once daily): AOM: 10 mg for 3 days; or 30 mg for 1 day; or 10 mg for 1 day then 5 mg for 4 days Pharyngitis: 12 mg for 1 day, then 6 mg for 4 days Sinusitis: 10 mg for 3 days CAP: 10 mg for 1 day, then 5 mg for 4 days	Per dose max 250 mg for 6 mg/kg, 500 mg for 10–12 mg/kg, 1.5 g for 30 mg/kg. Normal adult total course is 1.5–2 g. Total course max 2.5 g. Multiple additional indications. See relevant chapters in Section 3.
	Y	IV	10 mg, once daily, max 500 mg per day	See *Legionella* Infections, p 531. Can be used for some CNS infections.
Clarithromycin (Biaxin)	Y	PO	15 mg, divided in 2 doses, max 1 g per day	Similar activity to erythromycin; more activity against *Mycobacterium avium* and *Helicobacter pylori*.
Erythromycin (numerous)	Y	PO	40–50 mg, divided in 3–4 doses, max 4 g per day	
	N	IV	20 mg, divided in 4 doses, max 4 g per day	Administer over at least 60 minutes to potentially prevent cardiac arrhythmias. Not used for CNS infections.

Table 4.3. Antibacterial Drugs for Pediatric Patients Beyond the Newborn Period, continued

Drug Generic (Trade Name)	Generic Available	Route	Dosage per kg per Day Absolute Maximum Dosage Provided, If Known	Comments[a]
Fidaxomicin (Dificid)	N	PO	≥6 mo (per day, not per kg/day, divided twice a day): 4–<7 kg: 160 mg 7–<9 kg: 240 mg 9–<12.5 kg: 320 mg ≥12.5 kg: 400 mg	For treatment of *Clostridioides difficile* infection.
Metronidazole (Flagyl)	Y	PO	Range: 15–50 mg, divided in 3 doses, max 2.25 g per day 30 mg, divided in 3 doses for anaerobic bacterial infections including *Clostridioides difficile* (maximum 500 mg per dose) For bacterial vaginosis, see Table 4.4 (p 1007) and Table 4.5 (p 1014) For *Trichomonas vaginalis*, see Table 4.4 (p 1007) and Table 4.5 (p 1014) For Amebiasis, see Table 4.11 (p 1036)	Can be used for CNS infections.
	Y	IV	22.5–40 mg, divided in 3 or 4 doses, max 4 g per day	Can be used for CNS infections.
Nitrofurantoin (Furadantin, Macrodantin, Macrobid)	Y	PO	UTI prophylaxis: 1–2 mg, once daily Cystitis treatment: <12 y: 5–7 mg divided in 4 doses, max 200 mg per day ≥12 y: 200 mg total daily dosage (not per kg), divided in 2 doses	For treatment of cystitis; not appropriate for pyelonephritis. Macrobid form for twice daily dosing.

Table 4.3. Antibacterial Drugs for Pediatric Patients Beyond the Newborn Period, continued

Drug Generic (Trade Name)	Generic Available	Route	Dosage per kg per Day Absolute Maximum Dosage Provided, If Known	Comments[a]
Oxazolidinones				
Linezolid (Zyvox)	Y	PO, IV	≤11 y: 30 mg divided in 3 doses, max 1200 mg per day >11 y: 1200 mg total daily dose (not per kg) divided in 2 doses	Myelosuppression increases with duration of therapy over 10 days. Can be used for CNS infections (IV or PO).
Tedizolid (Sivextro)	N	PO, IV	≥ 12 y: 200 mg (not per kg) once daily	Not known if effective for CNS infections.
Penicillins[c]				
Amoxicillin (Amoxil)	Y	PO	Standard dose: 40–45 mg, divided in 3 doses High dose: 80–90 mg, divided in 2 doses, max 4 g per day Streptococcal pharyngitis: 50 mg once daily (see Group A Streptococcal Infections, p 785). *Bacillus anthracis* exposure: 75 mg, divided in 3 doses, max 3 g per day, for prophylaxis and empiric treatment (see Anthrax, p 232). See fluoroquinolones row above for empiric or therapy of penicillin-resistant strains of anthrax.	Higher doses may be needed for some penicillin-resistant *Streptococcus pneumoniae* infections (see p 810).

Table 4.3. Antibacterial Drugs for Pediatric Patients Beyond the Newborn Period, continued

Drug Generic (Trade Name)	Generic Available	Route	Dosage per kg per Day Absolute Maximum Dosage Provided, If Known	Comments[a]
Amoxicillin-clavulanic acid (Augmentin)	Y	PO	14:1 Formulation: 90 mg, divided in 2 doses 7:1 Formulation: 25–45 mg, divided in 2 doses, max 1750 mg per day 4:1 Formulation: 30 mg, divided in 2 doses for <3 months of age	Dosed on amoxicillin component. 14:1 Formulation – Augmentin ES-600 7:1 Formulation – Augmentin 400 4:1 Formulation – Augmentin 250
Ampicillin	Y	IV, IM	50–200 mg, divided in 4 doses, max 8 g per day 300–400 mg, divided in 6 doses for meningitis, endocarditis, max 12 g per day	Can be used for CNS infections.
	Y	PO	50–100 mg, divided in 4 doses, max 2 g per day	
Ampicillin-sulbactam (Unasyn)	Y	IV	100–200 mg, divided in 4 doses, max 8 g per day 400 mg, divided in 4 doses for meningitis	Dosed on ampicillin component. Can be used for CNS infections.
Dicloxacillin (Dynapen)	Y	PO	12–25 mg, divided in 4 doses, max 1 g per day 100 mg, divided in 4 doses for bone or joint infections, max 2 g per day	Oral suspension not commercially available.
Nafcillin (Nallpen)	Y	IV, IM	100–200 mg, divided in 4–6 doses, max 12 g per day	Can be used for CNS infection.
Oxacillin (Bactocill)	Y	IV, IM	100–200 mg, divided in 4–6 doses, max 12 g per day	Can be used for CNS infection.
Penicillin G, crystalline potassium or sodium	Y	IV, IM	100 000–300 000 U, divided in 4–6 doses, 300 000–400 000 U, divided in 6 doses for CNS infection	Max 24 million U per day.

Table 4.3. Antibacterial Drugs for Pediatric Patients Beyond the Newborn Period, continued

Drug Generic (Trade Name)	Generic Available	Route	Dosage per kg per Day Absolute Maximum Dosage Provided, If Known	Comments[a]
Penicillin G procaine	Y	IM	50 000 U, divided in 1–2 doses, max 1.2 million U	Not safe for IV administration. Should not be used for CNS infection. As of July 2023, no longer manufactured in the United States.
Penicillin G benzathine (Bicillin LA)	N	IM	<27 kg (60 lb): 600 000 U (not per kg), one time >27 kg (60 lb): 1.2 million U (not per kg), one time See Table 4.2 for congenital syphilis dosing	Not safe for IV administration. Main use is treatment of group A streptococcal infections (see p 785). Should not be used for acute CNS infection (see Syphilis, p 825).
Penicillin G benzathine/procaine (Bicillin CR)	N	IM	<14 kg (30 lb): 600 000 U (not per kg), one time 14–27 kg (30–60 lb): 1.2 million U (not per kg), one time ≥27 kg (60 lb): 2.4 million U (not per kg), one time	Not safe for IV administration. Main use is treatment of group A streptococcal infections (see p 785).
Penicillin V	Y	PO	25–50 mg, divided in 4 doses, max 2 g per day	50–75 mg, divided in 4 doses for group A streptococcal pneumonia.
Piperacillin-tazobactam (Zosyn)	Y	IV	240–300 mg, divided in 3–4 doses, max 16 g per day	Dosed on piperacillin component. Extended infusion may be needed for susceptible-dose dependent infections. 400–600 mg, divided in 6 doses, max 24 g per day, may be appropriate in some patients with cystic fibrosis. Other agents preferred for CNS infections.

Table 4.3. Antibacterial Drugs for Pediatric Patients Beyond the Newborn Period, continued

Drug Generic (Trade Name)	Generic Available	Route	Dosage per kg per Day Absolute Maximum Dosage Provided, If Known	Comments[a]
Polymyxins				Not ideal for CNS infections; local (intraventricular) administration required to achieve therapeutic concentrations.
Colistimethate (Colymycin M)	Y	IV, IM	2.5–5 mg base, divided in 3 doses	Up to 7 mg base/kg/day may be required. 1 mg base = 2.7 mg colistimethate.
Polymyxin B	Y	IV	2.5 mg, divided in 2 doses	>3 mg/kg/day not well studied. 1 mg = 10 000 U.
Rifamycins				
Rifampin (Rifadin)	Y	IV, PO	15–20 mg, divided in 1–2 doses, max 600 mg per day See p 902–905 for *Mycobacterium tuberculosis* dosing	Should not be used routinely as monotherapy because of rapid emergence of resistance. Many experts recommend using a daily rifampin dose of at least 20 mg/kg/day for infants and toddlers. Can be used for CNS infections (IV or PO).
Rifaximin (Xifaxan)	N	PO	20–30 mg, divided in 3 doses, max 600 mg per day	For travelers' diarrhea
Sulfonamides				
Sulfadiazine	Y	PO	120–150 mg, divided in 4 doses, max 6 g per day Rheumatic fever secondary prevention: 500 mg (not per kg), once daily in children <30 kg; 1 g, once daily in bigger children and adults	G6PD deficiency should be evaluated when using this drug.

Table 4.3. Antibacterial Drugs for Pediatric Patients Beyond the Newborn Period, continued

Drug Generic (Trade Name)	Generic Available	Route	Dosage per kg per Day Absolute Maximum Dosage Provided, If Known	Comments[a]
Trimethoprim-Sulfamethoxazole (TMP-SMX) (Bactrim, Septra)	Y	PO, IV	8–12 mg, divided in 2 doses, max 640 mg per day 2 mg, once daily for UTI prophylaxis 15–20 mg, divided in 3–4 doses for *Pneumocystis jirovecii* treatment, no max; 5 mg, divided in 2 doses 3 times/wk for prophylaxis	Dosed on TMP component. See also *Pneumocystis jirovecii* Infections (p 676). Can be used for CNS infections.
Tetracyclines see also p 975				
Doxycycline (Vibramycin)	Y	PO, IV	2.2–4.4 mg, divided in 2 doses, max 200 mg per day	Can be used for CNS infections (IV or PO). Higher doses reported (max 400 mg per day) in adults with Lyme neuroborreliosis.
Minocycline (Minocin)	Y	PO, IV	4 mg, divided in 2 doses, max 200 mg per day	Other agents preferred for CNS infections.
Tetracycline	Y	PO	25–50 mg, divided in 4 doses, max 2 g per day	Tetracycline limited to ≥8 y of age.
Vancomycin and other glycopeptides				
Vancomycin (Vancocin)	Y	IV	45–60 mg, divided in 3–4 doses 60–70 mg, divided in 4 doses, may be necessary in some patients to achieve target serum concentrations for invasive MRSA infections	Measured serum concentrations should guide ongoing therapy.[e] Can be used for CNS infections.
		PO	40 mg, divided in 4 doses, up to 500 mg per day	For treatment of *Clostridioides difficile* infection (see Table 3.3, p 317). Up to 2 g per day divided in 4 doses for severe, complicated cases.

Table 4.3. Antibacterial Drugs for Pediatric Patients Beyond the Newborn Period, continued

Drug Generic (Trade Name)	Generic Available	Route	Dosage per kg per Day Absolute Maximum Dosage Provided, If Known	Comments[a]
Dalbavancin (Dalvance)	N	IV	<6 y: 22.5 mg, one time ≥6 y: 18 mg, one time, max 1500 mg (not per kg)	Should not be used for CNS infections.

AOM indicates acute otitis media; CAP, community-acquired pneumonia; CA-MRSA, community associated methicillin-resistant *Staphylococcus aureus*; CDI, *Clostridioides difficile* infection; CNS, central nervous system; eGFR, estimated glomerular filtration rate; ER, extended-release; FDA, US Food and Drug Administration; G6PD, glucose-6-phosphate dehydrogenase; IBD, inflammatory bowel disease; IM, intramuscular; IV, intravenous; MRSA, methicillin-resistant *Staphylococcus aureus*; PO, oral; SBBO, small bowel bacterial overgrowth; SSTI, skin and soft tissue infection; UTI, urinary tract infection.

[a] Comments regarding CNS infections are based on FDA-approved indication or evidence from clinical studies in children or adults and apply to administration by the intravenous route unless otherwise specified.

[b] Extended interval ("once daily") dosing may provide equal efficacy with reduced toxicity.

[c] Children with a history of an IgE-mediated, immediate hypersensitivity reaction to penicillins (urticaria, angioedema, bronchospasm, anaphylaxis) who require treatment with an alternate beta-lactam should be considered for skin testing (if available) to confirm the allergy, and/or undergo supervised graded clinical challenge or desensitization with the alternate beta-lactam agent under the supervision of an expert in drug allergy and desensitization. See Beta-lactam and Monobactam Allergies (p 976) and Fig 4.1 (p 979).

[d] Cefotaxime is available by importation from Canada. See **www.fda.gov/media/152896/download** for details.

[e] The area-under-the-curve to minimum inhibitory concentration (AUC/MIC) has been identified as the most appropriate pharmacokinetic/pharmacodynamic (PK/PD) target vancomycin in adult patients with methicillin-resistant *Staphylococcus aureus* (MRSA). Although there are limitations in prospective outcomes data in pediatric patients with serious MRSA infections, the most recent consensus guideline from the American Society of Health-System Pharmacists, the Infectious Diseases Society of America, the Pediatric Infectious Diseases Society, and the Society of Infectious Diseases Pharmacists recommends AUC-guided therapeutic monitoring, preferably with Bayesian estimation, for all pediatric age groups receiving vancomycin.[f] This estimation accounts for developmental changes of vancomycin clearance from newborn to adolescent, and is preferred over trough monitoring to prevent unnecessary overexposure to vancomycin. Dosing in children should be designed to achieve an AUC of 400–600 mg-hour/L (assuming MIC of 1 mg/L) and/or trough levels <15 mg/L to minimize acute kidney injury risks. Bayesian estimation can be completed with 2 levels, with 1 level being recommended 1–2 hours after end of vancomycin infusion, and the second level being drawn 4–6 hours after end of infusion. Levels can be obtained as early as after the second dose. Software to assist with these calculations is available online and for purchase. It is recommended to avoid AUC >800 mg-hour/L and troughs >15 mg/L. Most children younger than 12 years will require higher doses to achieve optimal AUC/MIC compared with older children.

[f] Rybak MJ, Le J, Lodise TP, et al. Executive summary: Therapeutic monitoring of vancomycin for serious methicillin-resistant *Staphylococcus aureus* infections: a revised consensus guideline and review by the American Society of Health-System Pharmacists, the Infectious Diseases Society of America, the Pediatric Infectious Diseases Society, and the Society of Infectious Diseases Pharmacists. *J Pediatric Infect Dis Soc.* 2020;9(3):281-284

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