GUIDELINES FOR INITIAL THERAPY FOR COMMON PEDIATRIC INFECTIONS

The use of the following guidelines for empiric therapy should include patient-specific information, including drug allergies and renal/liver function; decisions should be based on the judgment of the clinician. Definitive therapy should be used when culture results/data are available.

Diagnosis		Usual Etiology	Suggested Empiric Therapy	Usual Duration of Treatment	Ref.
Central Nervous System					
Bacterial meningitis	Neonatal	*S. agalactiae* (GBS) *L. monocytogenes* *E. coli* *Klebsiella spp.*	Ampicillin + Ceftazidime if <4 weeks corrected age * Pediatric ID consult recommended (Consideration in the ddx of neonatal viral infections and/or TORCH infections)	*S. agalactiae* (GBS): 14-21 days *L. monocytogenes*: ≥ 21 days Aerobic gram-negative bacilli (e.g., *E. coli*, *Klebsiella* spp.)[‡]: 21 days [‡] Longer treatment courses recommended if clinical improvement is delayed or complicated meningitis (e.g. cerebritis, abscess, empyema, encephalomalacia, areas of infarcts)	(1), (2)
	Ages > 1 month	*S. pneumoniae* *N. meningitidis* *H. influenzae*	Ceftriaxone + Vancomycin	*S. pneumoniae*: 10-14 days *N. meningitidis*: 7 days *H. influenzae*: 7 days	(1)
Brain abscess		*Streptococcus spp.* (e.g., *S. anginosus* group, *S. pneumoniae, S. pyogenes*) *S. aureus* Enterobacterales spp. *H. influenzae* *Anaerobes* (e.g., *Bacteroides, Fusobacterium spp; Prevotella*) *Citrobacter spp.* (typically neonates)	Ceftriaxone + Metronidazole + Vancomycin * Pediatric ID, ENT, and Neurosurgical consults recommended	4 – 6 weeks	(3)
Healthcare- associated meningitis/ventriculitis		*S. aureus* Coagulase-negative staphylococci (CoNS) Aerobic gram-negative bacilli (including *P. aeruginosa,* multidrug resistant gram-negative organisms) *C. acnes* (formerly *Propionobacterium acnes*)	Cefepime + Vancomycin *Pediatric ID consult recommended	*S. aureus* or gram-negative bacilli: ≥ 10-14 days[‡] CoNS or *C. acnes* (minimal CSF pleocytosis, normal CSF glucose): ≥ 10 days[‡] CoNS or *C. acnes* (significant CSF pleocytosis, low CSF glucose): ≥ 10-14 days[‡] [‡]Days after last positive culture Note: Shunt removal is recommended	(4)

Diagnosis	Usual Etiology	Suggested Empiric Therapy	Usual Duration of Treatment	Ref.
Ears, Nose, Throat & Respiratory Tract				
Acute otitis media (AOM)	*S. pneumoniae* *H. influenzae* *M. catarrhalis*	Observation (no antibiotics): Use of symptomatic relief with observation and close follow-up is an option for unilateral AOM in children ≥ 6 months of age with non-severe signs or symptoms (i.e., mild otalgia for less than 48 hours and < 39°C [102.2°F], no otorrhea); initiate antibiotic therapy if the child worsens or fails to improve within 48 to 72 hours of symptoms onset. 1st line when antibiotic therapy indicated: Amoxicillin (high dose 80-90 mg/kg/day divided BID, max 4 gm/day) Receipt of Amoxicillin within last 30 days, concurrent conjunctivitis, or persistent symptoms following 48-72hr of 1st line therapy: Amoxicillin-clavulanate (see link) If penicillin allergy, Cefdinir 14 mg/kg/day divided BID	< 2 years or severe symptoms* — 10 days 2 - 5 years w/ mild-moderate symptoms — 7 days ≥ 6 years w/ mild-moderate symptoms — 5-7 days * Severe symptoms in all ages include moderate or severe otalgia or otalgia for at least 48 hours or temperature 39°C [102.2°F] or higher.	(5)
Cervical lymphadenitis	Group A -beta hemolytic streptococci *S. aureus* (MSSA) Oral anaerobes	Amoxicillin-clavulanate (see link) If Penicillin allergy, Clindamycin	Uncomplicated or adequate source control: 5-10 days (Tailor duration based on resolution of signs and symptoms.)	(6), (7)
	S. aureus (MRSA)	Trimethoprim-sulfamethoxazole (oral option) OR Vancomycin (IV only) OR Clindamycin, if susceptible		(8)
	Non-tuberculous mycobacteria (e.g., MAC)	Surgical excision typically curative. Start antimycobacterial therapy only if incomplete or no surgical excision or if recurrent disease. Medical treatment controversial, includes macrolide + (Ethambutol AND/OR Rifabutin OR Rifampin)	If antimycobacterial drugs indicated, duration may require >12 weeks	(6), (9)
	Mycobacterium tuberculosis	4 drugs: RIPE – Rifampin + Isoniazid + Pyrazinamide + Ethambutol *Pediatric ID consult recommended	≥ 6 months	(6), (10)
	Bartonella henselae (uncomplicated cat scratch disease)	Azithromycin *Pediatric ID consult recommended for complicated disease (e.g., osteitis, hepatosplenic disease)	5 days	(6)
Epiglottitis	*H. influenzae* Beta hemolytic streptococci *S. pneumoniae* *S. aureus*	Ceftriaxone If septic appearing, consider adding vancomycin	7 - 10 days	(11), (12)

Diagnosis		Usual Etiology	Suggested Empiric Therapy	Usual Duration of Treatment	Ref.
Malignant otitis externa		*Pseudomonas spp.* *S. aureus* (less frequent)	Cefepime If penicillin allergy or step-down oral therapy, ciprofloxacin *Pediatric ID consult recommended	≥ 6 weeks (surgical intervention often indicated)	(13)
		Aspergillus spp.	Voriconazole *Pediatric ID consult recommended	>12 weeks	(14)
Mastoiditis	Acute	*S. pneumoniae* Beta hemolytic streptococci *S. aureus* *H. influenzae* *Fusobacterium spp.*	Ampicillin-sulbactam Consider Vancomycin if MRSA risk factors Consider transition to oral regimen (e.g., Amoxicillin-clavulanate, see link) when clinically appropriate Consider surgical drainage *Pediatric ID consult recommended	Uncomplicated: 10 days Complicated (including extra- and intracranial complications including subperiosteal abscess or osteomyelitis): 4 weeks	(15), (16),
	Chronic or recurrent AOM	*P. aeruginosa* Enteric gram-negative bacteria *S. aureus* *S. pneumoniae* Anaerobes	Cefepime + Metronidazole + Vancomycin *Pediatric ID consult recommended	4 weeks	(16), (17)
Odontogenic infection	Mild, no abscess	Polymicrobial; Viridans group streptococci *Peptostreptococcus* *Actinomyces* *Lactobacillus* spp.	Amoxicillin 45 mg/kg/day divided TID, max 1500 mg/day If NPO, Ampicillin If severe beta-lactam allergy, Clindamycin	7 days or until 3 days after symptom resolution (whichever is longer) with surgical intervention	(18 - 20)
	Moderate/severe, abscess	As above and follows: *Prevotella* spp. *Neisseria* spp. *Fusobacterium* spp. *Clostridium* spp. *Staphylococcus* spp. *Eikenella* spp. **Caution**: Culture results may have poor recovery of all pathogens involved	Ampicillin-sulbactam If Penicillin allergy (non-severe), Cefazolin + Metronidazole If severe beta-lactam allergy, Ciprofloxacin + Metronidazole	7 - 10 days or until 3 days after symptom resolution (whichever is longer) with surgical intervention *Consider transition IV to oral in patients without bacteremia if surgically controlled and clinical improving	(47 - 51)
	Severe, abscess, with no clinical improvement after trialing therapy listed above		Cefepime + Metronidazole + Vancomycin If severe beta-lactam allergy, Aztreonam + Metronidazole + Vancomycin *Pediatric ID consult recommended	≥ 10 days or until 3 days after symptom resolution (whichever is longer) with surgical intervention	
Peritonsillar, parapharyngeal, or retropharyngeal abscess		Beta hemolytic streptococci *S. aureus* (MSSA or MRSA) Respiratory anaerobes Kawasaki disease	Ampicillin-sulbactam If penicillin allergy, Ceftriaxone + Clindamycin Add Vancomycin for toxic appearing patients pending culture results	Parapharyngeal or retropharyngeal abscess: 14 days Submandibular space infections: 2-3 weeks	(21)

Diagnosis		Usual Etiology	Suggested Empiric Therapy	Usual Duration of Treatment	Ref.
Pertussis		*B. pertussis* *B. parapertussis*	Azithromycin If Azithromycin contraindicated: Trimethoprim-sulfamethoxazole (TMP/SMX) in children ≥ 2 months	Azithromycin x 5 days TMP/SMX x 14 days (avoid in children <2 months)	(22)
Pharyngitis		Beta hemolytic streptococci (Group A streptococci)	Penicillin VK (patients ≤27 kg: 250 mg 2-3 times/day and patients >27 kg: 500 mg 2-3 times/day OR Amoxicillin 50 mg/kg/day once daily, max 1 gm/day Allergic: Cephalexin or Clindamycin or Azithromycin	10 days [For Azithromycin PO: 12 mg/kg/day (max: 500 mg/dose) X 5 days or 20 mg/kg/day (max: 1000 mg/dose) x 3 days]	(23), (54)
		Arcanobacterium	Azithromycin		
Pneumonia	Aspiration pneumonia	*Enteric Gram negative* *Oral flora* *Anaerobic bacteria*	Ampicillin If not fully immunized or failed Amoxicillin or Ampicillin, Ceftriaxone If empyema or lung abscess present, Ampicillin-sulbactam or Ceftriaxone + (Clindamycin or Metronidazole) If hospital-acquired aspiration pneumonia, Piperacillin-tazobactam Review previous microbiologic history to guide antibiotic selection	7 - 10 days	(24), (25)
	Community-acquired pneumonia (Ages >3 months)	*S. pneumoniae* Group A streptococci *S. aureus* Viruses (*M. pneumoniae, C. pneumoniae* if school-aged children and adolescents)	PO: Amoxicillin 90 – 100 mg/kg/day divided BID or TID, max 4 gm/day If not fully immunized, Amoxicillin-clavulanate (see link) If beta-lactam allergy, see "Clinical Pathways" for alternative enteral agents IV: Ampicillin Alternative: Ceftriaxone if not fully immunized, abscess or empyema present, or critically ill *For patients > 5 years of age, consider addition of Azithromycin [10 mg/kg (max, 500 mg) PO on day 1, then 5 mg/kg (max, 250 mg) daily on days 2-5] for suspected atypical pneumonia	Uncomplicated: 5 days Complicated (parapneumonic effusion or empyema): Prolonged, typically 2-4 weeks *Consider transition IV to oral in patients without bacteremia if clinically improved (as early as 2–3 days after the start of IV therapy)	(26), ()
	Hospital-acquired pneumonia	*S. aureus* (MRSA) *P. aeruginosa* Gram-negative bacilli (*E. coli, Klebsiella, Serratia, Enterobacter*)	[Cefepime OR Piperacillin-tazobactam OR Meropenem] + Vancomycin (guided by results of MRSA nasal swab) *Pediatric ID consult recommended	Duration should be guided by improvement in clinical and laboratory parameters, although evidence suggests that 7 days of therapy is sufficient in most cases	(27)

Diagnosis	Usual Etiology	Suggested Empiric Therapy	Usual Duration of Treatment	Ref.
Sinusitis	*S. pneumoniae* *H. influenzae* *M. catarrhalis* *S. aureus* (dental origin) Anaerobes (chronic)	Uncomplicated, mild infection (age 2 years or older): Amoxicillin (45 mg/kg/day divided BID) Complicated infection [severe onset and/or worsening course of infection OR age <2 years OR unimmunized OR daycare attendance OR receipt of antibiotics within last 30 days]: Amoxicillin-clavulanate (see link) If severe penicillin allergy, Cefdinir If severe cephalosporin allergy, Levofloxacin Severe infection requiring hospitalization: Ampicillin-sulbactam	Uncomplicated, mild infection: 7 days Complicated sinusitis or requiring hospitalization: 10 - 14 days or 7 days after patient's symptoms resolve (minimum 10 days)	(28), (29), (65), (66)
Eye				
Orbital cellulitis	*S. pneumoniae* Streptococci *S. aureus* *H. influenzae* (un-immunized) *M. catarrhalis* Anaerobes	Ampicillin/sulbactam If concern for extension into CNS: Ceftriaxone + Metronidazole + Vancomycin *Pediatric ID consult recommended, if complicated	Uncomplicated: 2-3 weeks Complicated: ID consult Transition IV to oral amoxicillin-clavulanate when clinically improved	(30)
Preseptal (periorbital) cellulitis	*S. pneumoniae* *S. aureus* Beta hemolytic streptococci *H. influenzae*	PO: Amoxicillin-clavulanate (see link) IV: Ampicillin-sulbactam *If extensive cellulitis or ill appearing patient, consider adding Vancomycin pending culture results	7 - 10 days Transition IV to oral Amoxicillin-clavulanate when clinically improving	(31)
Heart				
Endocarditis **(bacterial)**	***Pediatric ID consult recommended**			(32)
Blood				
Sepsis	Refer to LPCH "Severe Sepsis/Septic Shock Pathway" per the Clinical Pathways and Target Based Care Website			
Staphylococcal bacteremia *Pediatric ID consult recommended for *S. aureus* bacteremia	*S. aureus* (MSSA or MRSA) *S. lugdunensis*	Methicillin-sensitive: Cefazolin OR Nafcillin (central line administration preferred) Methicillin-resistant: Vancomycin *S. aureus* has a propensity to form biofilms; line removal is strongly recommended. For patients unable to undergo line removal, lock therapy may be considered on a case-by-case basis in conjunction with ID consult.	Uncomplicated[‡]: 14 days from first negative culture Complicated: 4-6 weeks from first negative culture [‡] Uncomplicated bacteremia defined by: 1) Exclusion of endocarditis 2) No implanted prostheses 3) Negative blood cultures within 72 hours of antibiotic initiation 4) Defervesce within 72 hours of therapy 5) No evidence of metastatic sites of infection	(8), (33) (34)
	Coagulase Negative Staphylococcus (*S. epidermidis*, *S. hominis*)	Methicillin-sensitive: Cefazolin OR Nafcillin (central line administration preferred) Methicillin-resistant: Vancomycin *Longer durations of antibiotic therapy may be required for indwelling hardware or surgical material present. ID consult recommended	*Single set with only one positive bottle may be representative of contamination and not require treatment* No catheter present: 7 days Catheter removal: 7 days post-removal Catheter retained: 10 days from 1st negative culture	(33)

<table>
<tr><th>Diagnosis</th><th>Usual Etiology</th><th>Suggested Empiric Therapy</th><th>Usual Duration of Treatment</th><th>Ref.</th></tr>
<tr><td colspan="5">GI/GU</td></tr>
<tr>
<td>C. difficile infection

- CDI episode: More than 3 watery bowel movements in 24 hours and a positive stool test for C. difficile toxin by PCR

- CDI recurrence: An episode of CDI occurring within 8 weeks of a previous episode

In general, only toxin-positive (EIA+) patients benefit from C. difficile treatment.</td>
<td colspan="2">
<table>
<tr><td>Initial CDI episode and subsequent episodes > 8 weeks apart</td><td>Vancomycin PO [a,b]

Alternative for NPO: Metronidazole IV</td></tr>
<tr><td>First CDI recurrence</td><td>Vancomycin PO [a,b]</td></tr>
<tr><td>Second or subsequent CDI recurrence</td><td>Vancomycin PO + taper [a,b]
OR
Fidaxomicin (NF) PO x 10 days[a-c]

If fidaxomicin PO 10-day course was used for previous episode:
Fidaxomicin (NF) PO tapered course [a-c]
--- Taper should start no later than day 5 of therapy.

For 2+ recurrences: Consider Gastroenterology consult for evaluation of Fecal microbiota transplant (FMT)</td></tr>
<tr><td>Severe/ fulminant CDI (hypotension/ shock, ileus, megacolon)

<u>Recommend ID consult</u></td><td>Vancomycin PO [a,b] + Metronidazole IV or PO

If ileus, consider adding rectal instillation of vancomycin four times daily to regimen. Not appropriate for neutropenic patients.
Vancomycin rectal enema:
1-3 years: 250mg (50 mL); 4-9 years: 375mg (75 mL);
>10 years: 500mg (100 mL)</td></tr>
</table>

[a] Dosing: General dosing recommendations are available in the HSM.
Vancomycin PO taper
• Vancomycin 10 mg/kg (max 125 mg/dose) QID x 10 days, then BID x 7 days, then once daily x 7 days, then daily every 2-3 days x 2-8 weeks.
Fidaxomicin (NF) PO:
• Standard course: 16 mg/kg BID (max 200 mg/dose) BID x 10 days
• Tapered course: 16 mg/kg BID (max 200 mg/dose) BID x 5 days, then 16 mg/kg (max 200 mg/dose) every other day for 20 days.

[b] Enteral administration of vancomycin or fidaxomicin includes PO and gastric tube administration with either the oral suspension or solid dosage formulations (opening vancomycin capsules or crushing fidaxomicin tablets).

[c] Fidaxomicin is non-formulary and requires Pediatric ID approval prior to inpatient use.
</td>
<td>10 days

If symptoms have improved but not resolved by 10 days, consider extending treatment duration to 14 days.

Discontinue any potentially offending agents, including antibiotics, as soon as is clinically appropriate. In patients requiring systemic antibiotics during or shortly after CDI treatment, some experts recommend continuing oral vancomycin until completion of systemic antibiotics.</td>
<td>(35, 58-64)</td>
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<table>
<tr><th>Diagnosis</th><th>Usual Etiology</th><th>Suggested Empiric Therapy</th><th>Usual Duration of Treatment</th><th>Ref.</th></tr>
<tr>
<td>Intra-abdominal infection (including cholecystitis, necrotizing enterocolitis and perforated appendicitis)</td>
<td>E. coli
Klebsiella spp.
Pseudomonas
Proteus
Enterobacter spp.
Anaerobes (e.g., B. fragilis)
Streptococci
Enterococcus spp.</td>
<td>
<table>
<tr><td>Uncomplicated</td><td>Ceftriaxone + Metronidazole</td></tr>
<tr><td>Complicated/ healthcare-associated</td><td>([Cefepime or Ceftazidime or Ciprofloxacin] + Metronidazole ± Ampicillin*) OR Piperacillin-tazobactam OR Meropenem</td></tr>
<tr><td>Necrotizing enterocolitis (NEC)
- use vancomycin instead of ampicillin for suspected MRSA or ampicillin-resistant enterococcus</td><td>([Ampicillin or Vancomycin] + [Gentamicin or Ceftazidime] AND Metronidazole if perforation) OR Piperacillin-tazobactam OR Meropenem</td></tr>
<tr><td>Perforated appendicitis‡</td><td>Piperacillin-tazobactam</td></tr>
</table>
*Empiric anti-enterococcal therapy is recommended for patients with healthcare-associated intra-abdominal infections, those who have previously received cephalosporins, immunocompromised patients, and those with valvular heart disease or prosthetic intravascular materials.

‡LPCH Appendicitis Algorithm
</td>
<td>
<table>
<tr><td>Uncomplicated/ Complicated</td><td>4-7 days</td></tr>
<tr><td>Cholecystitis</td><td>4-7 days</td></tr>
<tr><td>Necrotizing enterocolitis</td><td>7-10 days</td></tr>
<tr><td>Perforated appendicitis</td><td>5 days (after appropriate source control)</td></tr>
</table>
</td>
<td>(36)</td>
</tr>
<tr>
<td>Traveler's diarrhea</td>
<td>E. coli
Campylobacter
Salmonella, Shigella
Vibrio cholera
Entamoeba histolytica
Giardia, Blastocystis
Cyclospora,
Cystoisospora
Cryptosporidium</td>
<td colspan="2">First-line: Azithromycin
Second-line: Ciprofloxacin (should not be used for traveler's returning from SE Asia due to high prevalence of quinolone-resistant organisms)

*Infants <3 months old, severe disease, or CNS involvement: Ceftriaxone
*Pediatric ID consult recommended

Azithromycin: 10 mg/kg (max, 500 mg) PO daily X 3 days

Ciprofloxacin: 15 mg/kg (max, 500 mg) PO BID X 3 days

Ceftriaxone: 50 mg/kg IV q12h (max, 2000 mg)
*Duration dependent on severity of disease</td>
<td>(37), (38)</td>
</tr>
<tr>
<td>Urinary tract infection (UTI)

Cystitis
• NO fever; pyuria; positive urine culture; symptoms (i.e., dysuria, frequency, urgency)
Pyelonephritis:
• Fever, flank pain, or ill appearing; pyuria; positive urine culture; symptoms (i.e., dysuria, frequency, urgency)</td>
<td>E. coli
Other gram-negative bacteria (Klebsiella, Enterobacter, Citrobacter)
Enterococcus spp.

NOTE: Ceftriaxone susceptibility is NOT a surrogate for cefazolin or cefdinir susceptibility</td>
<td>Cystitis: Nitrofurantoin OR Trimethoprim (TMP)-sulfamethoxazole (SMX)* OR Cephalexin*

Pyelonephritis: PO: Cephalexin*; if beta-lactam allergy, TMP-SMX*; IV: Ceftriaxone*

*Enterococcus spp. are NOT susceptible to cephalosporins or TMP-SMX; usual drug of choice for Enterococcus spp. is Ampicillin (IV) OR Amoxicillin (PO).

Ceftriaxone-resistant E. coli UTI may be treated with antibiotics other than meropenem, such as TMP-SMX PO, Ciprofloxacin or Levofloxacin, Gentamicin IV, Nitrofurantoin PO (if cystitis), and alternatively Amoxicillin-clavulanate PO (if cystitis) (see link).</td>
<td>Cystitis
Nitrofurantoin X 5 days
Trimethoprim-sulfamethoxazole X 3 days
Cephalexin X 5 - 7 days

Pyelonephritis: 7 days of therapy is sufficient for children >6 months of age with uncomplicated pyelonephritis who improve within 3 days of starting antibiotics. Complicated pyelonephritis should be treated for 10 days.</td>
<td>(39-41)</td>
</tr>
<tr>
<td>Sexually transmitted infections</td>
<td>Chancroid</td>
<td colspan="2">< 45 kg: Azithromycin 20 mg/kg (max 1g) PO once OR
≥ 45 kg: Azithromycin 1 g PO once OR Ceftriaxone 250 mg IM once OR Ciprofloxacin 500 mg PO BID X 3 days</td>
<td>(42), (43)</td>
</tr>
</table>

Diagnosis	Usual Etiology	Suggested Empiric Therapy	Usual Duration of Treatment	Ref.
Sexually transmitted infections (cont.)	Chlamydia	Infants <3 month of age: Erythromycin base ethylsuccinate 12.5 mg/kg PO QID X 14 days Children <8 years old: Doxycycline 2 mg/kg (max 100 mg) PO BID X 7 days; Alternative: Azithromycin 20 mg/kg (max 1 g) PO as a single dose Children ≥8 years old, adolescents, and adults: Doxycycline* 2 mg/kg (max 100 mg) PO BID X 7 days Alternative: Azithromycin 20 mg/kg (max 1 g) PO once or Levofloxacin 500 mg PO daily X 7 days * Note that Doxycycline is contraindicated in the second and third trimester of pregnancy.		
	Genital herpes	1st episode: PO: Valacyclovir 20 mg/kg (max 1 g) PO BID X 7-10 days OR Acyclovir 14 – 27 mg/kg (max 400 mg/dose) PO TID X 7-10 days IV: Acyclovir 5 - 10 mg/kg Q8h, change to PO when appropriate to complete therapy Episodic therapy: Children and Adolescent: Acyclovir 20 mg/kg (max 400 mg) PO TID X 5 days OR Valacyclovir 20 mg/kg (max 500 mg) PO BID X 3 days OR Valacyclovir 20 mg/kg (max 1 g) PO daily X 5 days If adolescent or adult and HIV negative, can use high-dose acyclovir: Acyclovir 800 mg PO BID X 5 days OR Acyclovir 800 mg PO TID X 2 days Suppressive therapy: Valacyclovir 10 mg/kg (max 500 mg) PO BID* OR Valacyclovir 20 mg/kg (max 1 g) PO once daily OR Acyclovir 20-25 mg/kg (max 400 mg) PO BID; *May be less effective for patients with very frequent recurrences (≥10 episodes per year)		
	Gonorrhea	Infants & Children ≤45 kg with uncomplicated gonococcal vulvovaginitis, cervicitis, urethritis, pharyngitis, or proctitis: Ceftriaxone 50 mg/kg (max 500 mg) IM once Children >45 kg, Adolescents and Adults with uncomplicated gonococcal vulvovaginitis, cervicitis, urethritis, pharyngitis, or proctitis: Ceftriaxone 500 mg IM once (if ≥150 kg, 1g) and if concurrent chlamydial infection has not been excluded, add Doxycycline 100 mg BID x 7 days (Alternative: Azithromycin 1g PO once) If beta-lactam allergy, Gentamicin 240 mg IM once + Azithromycin 2 g PO once		
	Lymphogranuloma venereum	Doxycycline 100 mg PO BID X 21 days		
	Pelvic inflammatory disease (PID): *N. gonorrhoeae* *C. trachomatis* Vaginal flora (e.g., anaerobes, *G. vaginalis*, *H. influenzae*, enteric Gram-negative rods, *GBS*) *M. hominis* *U. urealyticum* *M. genitalium*	Parenteral regimens: Cefoxitin 40 mg/kg (max 2 g) IV q6hr **AND** Doxycycline 2 mg/kg (max 100 mg) PO/IV q12hr or Clindamycin 13 mg/kg (max 900 mg) IV q8hr **AND** Gentamicin 2 mg/kg IV X 1, followed by 1.5 mg/kg IV q8hr Oral/IM regimens: Mild-to-moderately severe acute PID Ceftriaxone 50 mg/kg (max 500 mg; if ≥150 kg, 1g) IM once **AND** Doxycycline 2mg/kg (max 100 mg) PO BID X 14 days **AND** Metronidazole 15 mg/kg (max 500 mg) PO BID X 14 days or Cefoxitin 40 mg/kg (max 2 g) IM once **AND** Probenecid 1 g PO once **AND** Doxycycline 2 mg/kg (max 100 mg) PO BID X for 14 days **AND** Metronidazole 15 mg/kg (max 500 mg) PO BID X 14 days		

<table>
<tr><th>Diagnosis</th><th>Usual Etiology</th><th>Suggested Empiric Therapy</th><th>Usual Duration of Treatment</th><th>Ref.</th></tr>
<tr><td rowspan="4">Sexually transmitted infections (cont.)</td><td>Pubic lice</td><td colspan="2">Permethrin 1% cream rinse or ivermectin 1% lotion; applied (up to 1 tube) to affected areas and washed off after 10 min OR Malathion 0.5% lotion applied to affected areas and washed off after 8–12h OR Ivermectin 250 mcg/kg PO once, then repeated 2 weeks later
Note that Malathion lotion and Ivermectin oral are not FDA approved for treatment of public lice</td><td></td></tr>
<tr><td>Syphilis</td><td colspan="2">Congenital syphilis
*Pediatric ID consult recommended

For Adolescents and Adults
Primary, Secondary, and early latent (latent <1 year) syphilis:
Benzathine penicillin G 2.4 million units/dose as a single dose intramuscularly

If treatment failure at 6-12 months, Benzathine penicillin G 50,000 units/kg IM weekly for three weeks (max 2.4 million units/dose)

For adolescents and adults (if infant or child, please contact Peds ID):
Late latent (latent > 1 year), latent of unknown duration, late cardiovascular, gumma: Benzathine penicillin G 2.4 million units IM X 3 weeks (consider EMLA before IM shot)

Neurosyphilis (children beyond neonatal period and adolescents)
Penicillin G 50,000 units/kg q4-6hr Intravenously only (max 24 million units/day) X 10-14 days
*If Penicillin allergic, consult ID</td><td>(42)</td></tr>
<tr><td>Trichomoniasis</td><td colspan="2">Children <45 kg: Metronidazole 15 mg/kg PO TID x 7 days (max: 2 g/day)
Children ≥45kg and Adolescents: Metronidazole 2 g PO once OR Metronidazole 500 mg PO BID X 7 days</td><td></td></tr>
<tr><td>Vaginosis, bacterial</td><td colspan="2">Metronidazole 15 mg/kg (max 500 mg) PO BID X 7 days OR Metronidazole gel 0.75%, one applicator (5 g) intravaginally once daily X 5 days OR Clindamycin cream 2%, one applicator (5 g) intravaginally at bedtime X 7days</td><td></td></tr>
<tr><td colspan="5">Skin, Soft Tissues, and Skeletal System</td></tr>
<tr><td colspan="2">Bites, animal or human</td><td>S. aureus
Beta hemolytic streptococci (Group A)
Capnocytophaga canimorsus
Pasteurella (animal)
Eikenella (human, animal)</td><td>1st line: Amoxicillin-clavulanate (see link)

2nd line: Trimethoprim-sulfamethoxazole + Clindamycin

IV: Ampicillin-sulbactam
If Penicillin allergy, Ceftriaxone + Clindamycin OR Trimethoprim-sulfamethoxazole + Clindamycin</td><td>Prophylaxis of high-risk bite wound: 3-5 days
Cellulitis present: 10-14 days
Tenosynovitis: 3 weeks
Septic arthritis: 4 weeks
Osteomyelitis: 6 weeks</td><td>(44), (45)</td></tr>
<tr><td>Bone and joint infections (osteomyelitis, septic arthritis)</td><td>Uncomplicated</td><td>S. aureus
S. pyogenes
S. pneumoniae
K. kingae

Sickle cell disease:
Salmonella spp.</td><td><table><tr><td>Uncomplicated</td><td>Cefazolin
If penicillin allergy, Clindamycin</td></tr><tr><td>Complicated/ill-appearing/unimmunized</td><td>Ceftriaxone + Vancomycin</td></tr></table></td><td>Osteomyelitis: 4-6 weeks*
Septic arthritis: 2-3 weeks*^
*Consider enteral transition once CRP down trending, afebrile ≥24hr, negative blood cultures ≥ 48hr, and improved use of affected bone or joint</td><td>(46-51)</td></tr>
</table>

<table>
<tr><th colspan="2">Diagnosis</th><th>Usual Etiology</th><th>Suggested Empiric Therapy</th><th>Usual Duration of Treatment</th><th>Ref.</th></tr>
<tr><td>Bone and joint infections (osteomyelitis, septic arthritis) (cont.)</td><td>Complicated bone and joint infections</td><td>S. aureus
S. pyogenes
S. pneumoniae
Kingella spp. (≤4 years)
Enterobacterales
Pseudomonas spp.
Anaerobes

Infants (<3mo): GBS, N. gonorrhea

Sickle cell disease: Salmonella spp.</td><td><table><tr><td>Sickle cell disease</td><td>Ceftriaxone
If beta-lactam allergy, Ciprofloxacin + Vancomycin</td></tr><tr><td>Atypical (immunocompromised, infants <3mo, duration of fever and/or pain >48-72hr, involves axial skeleton, presence of hardware)</td><td>Discuss with Pediatric ID consult service before start of empiric antibiotic</td></tr></table>*Pediatric ID consult recommended</td><td>Drainage/debridement recommended

^Durations as short as 10-14 days may be considered after 2-4 days of IV therapy in patients with <u>all</u> of the following:
Infection due to S. aureus, S. pyogenes, S. pneumoniae, or H. influenzae type b
No adjacent osteomyelitis
Rapid clinical improvement
Consistent, progressive decrease in CRP by the end of the first week of treatment</td><td></td></tr>
<tr><td colspan="2">Cellulitis</td><td>Group A streptococci (non-purulent)
S. aureus (purulent)</td><td><table><tr><th colspan="2">Non-purulent</th></tr><tr><td>Mild</td><td>Oral: Cephalexin
If beta-lactam allergic, Clindamycin</td></tr><tr><td>Moderate</td><td>IV: Cefazolin
If beta-lactam allergic, Clindamycin</td></tr><tr><td>Severe</td><td>Vancomycin + Piperacillin-tazobactam</td></tr><tr><th colspan="2">Purulent/abscess</th></tr><tr><td>Moderate*</td><td>Trimethoprim-sulfamethoxazole OR Doxycycline OR Clindamycin</td></tr><tr><td>Severe*</td><td>Vancomycin</td></tr><tr><th colspan="2">Neonate</th></tr><tr><td colspan="2">*Pediatric ID consult recommended</td></tr></table>*Incision and drainage recommended</td><td>Cellulitis: 5 days
Abscess: 5-10 days
(Tailor duration based on resolution of signs and symptoms)</td><td>(8), (44)</td></tr>
<tr><td colspan="2">Lymphadenitis</td><td>Group A streptococci
S. aureus</td><td><u>Acute unilateral cervical lymphadenitis and moderate symptoms</u>
(e.g., fever, ill-appearing, warm and/or tender adenitis)
Cephalexin or Amoxicillin-clavulanate (see link)

If concern for MRSA, Trimethoprim-sulfamethoxazole or Doxycycline can be considered</td><td>7 – 14 days depending on clinical response</td><td>(52)</td></tr>
<tr><td colspan="2">Necrotizing fasciitis</td><td>Beta hemolytic streptococci (Group A)
S. aureus
V. vulnificus
A. hydrophila
Peptostreptococci
Polymicrobial (mixed aerobic-anaerobic microbes)</td><td>Vancomycin + Piperacillin-tazobactam + Clindamycin
OR
Piperacillin-tazobactam + Linezolid

Prompt debridement required

*Pediatric ID consult recommended</td><td>Depends on clinical response; duration usually prolonged (4-6 weeks)</td><td>(44), (53)</td></tr>
</table>

Diagnosis	Usual Etiology	Suggested Empiric Therapy	Usual Duration of Treatment	Ref.
Miscellaneous systemic infections				
Febrile neutropenia	*Pseudomonas* Enteric gram-negative bacilli *Staphylococci spp.* *Streptococci spp.* Yeast	*Refer to the LPCH F&N Guidelines		(54), (55)
Lyme disease	*B. burgdorferi* *Pediatric ID consult recommended *Doxycycline is safe in children <8 years of age as long as duration does not exceed 21 days. Doxycycline has not been well studied in children < 8 years for durations >21 days	Early localized, erythema migrans,	Doxycycline 4.4 mg/kg per day divided BID (max 200 mg/day) for 10 days OR Amoxicillin 50 mg/kg per day divided TID (max 1.5 g/day) for 14 days OR Cefuroxime 30 mg/kg per day divided BID (max 1g/day) for 14 days	(56), (57)
		Isolated Bell's Palsy	Doxycycline 4.4 mg/kg per day divided BID (max 200 mg/day) for 14 days. *Amoxicillin and cefuroxime have not been studied for the treatment of Lyme Bell's Palsy	
		Arthritis	**Initial episode:** As for early localized disease with a duration of 28 days	
			Recurrent arthritis despite adequate prior oral therapy: Repeat second course of oral antibiotics as above x4 weeks OR Ceftriaxone 50-75 mg/kg (max 2 g) IV once daily for 14-28 days	
		Carditis	Ceftriaxone 50-75 mg/kg once daily for 14-21 days. Can consider transitioning to Doxycycline once patient improving	
		Meningitis, neuroborreliosis	Ceftriaxone 50-75 mg/kg (max 2 g) IV once daily for 14 days OR Doxycycline 4.4 mg/kg per day divided BID (max 200 mg/day) for 14 days	

❖ **Please visit the Antimicrobial Stewardship Program (ASP) website located in the Housestaff Manual for more useful resources, including:**

- LPCH antibiogram and antimicrobial dosing quick reference
- Antimicrobial monitoring
- Neonatal Intensive Care Unit (NICU) late onset sepsis algorithm
- Vancomycin Dosing Guidelines:
  - Vancomycin Guideline for Neonates and Children
  - Vancomycin Guideline in Hemodialysis
  - Initial Vancomycin Dosing Guideline for Surgical Patients up to 1 Week Post-Op
- Restricted antimicrobials and the appropriate approval process
- Palivizumab (Synagis®) guidelines
- Surgical prophylaxis guidelines
- Amoxicillin-clavulanate dosing and formulation selection guide
- Other clinical practice guidelines and clinician education

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