

**UCSF Benioff Children's Hospital Oakland
2017-2018 Empiric Antimicrobial Therapy Guide (EATG)**

(The following are guidelines only and should not replace clinical judgment. Immunocompromised patients may require special considerations not addressed here.)

Condition/Syndrome	Major Pathogen(s)	Empiric Outpatient Therapy	Empiric Inpatient Therapy	Duration/Notes
Abdominal – complicated¹				Consider ID consult if severe
A. Community-associated (CA) (ruptured apy, abdominal abscess)	enteric GNR, anaerobes	N/A	ceftriaxone 50-75 mg/kg/day IV q24 AND metronidazole 30-40 mg/kg/day IV q 8	
B. Healthcare-associated (HA)	GNR, anaerobes	N/A	piperacillin/tazobactam 200-300 mg/kg/day IV q6	
C. Necrotizing enterocolitis ^{1,2,3}	GNR, anaerobes	N/A	<u>Suspected/mild:</u> ampicillin AND gentamicin <u>Moderate:</u> ampicillin AND gentamicin and metronidazole <u>Advanced/sepsis:</u> vancomycin AND cefepime AND metronidazole	See NICU abdominal/NEC algorithm Refer to dosing guidelines for premature infants and neonates
Arthritis (septic/bacterial)	S. aureus, GAS	N/A	clindamycin 40 mg/kg/day IV q8 OR vancomycin 60 mg/kg/day IV q6	Consider ID consult
C. difficile colitis/diarrhea (antibiotic-associated)^{4,5}	C. difficile	Discontinue inciting antibiotic ASAP; metronidazole 30 mg/kg/day PO qid	Discontinue inciting antibiotic ASAP; <u>Mild-mod:</u> metronidazole 30 mg/kg/day PO/IV q6 <u>Severe:</u> vancomycin 40 mg/kg/day PO q6	Defer therapy if diarrhea resolves after inciting antibiotic is stopped Duration (if tx needed): 10 days
Congenital/neonatal infections (For sepsis – see “Sepsis rule out”)				Consider ID consult
A. CMV (congenital) ⁶	CMV		<u>Asymptomatic/mild symptoms:</u> no treatment <u>Moderate to severe symptoms:</u> valganciclovir 16 mg/kg/dose PO twice daily for 6 months (if NPO: ganciclovir 6 mg/kg/dose IV q12)	Start treatment in 1 st month of life Monitor neutrophil count
B. Herpes simplex virus (neonatal) ⁴	HSV	N/A	acyclovir 60 mg/kg/day IV q8 After IV course: 300 mg/m ² /dose PO q8 for 6 months for chronic suppression	Duration (IV): SEM: 14 days CNS: 21 days Disseminated: 21 days
C. Syphilis (congenital) ⁴	T. pallidum		<u>Age<7 d:</u> penicillin G 50,000 units/kg/dose IV q12 <u>Age 8-28d:</u> penicillin G 50,000 units/kg/dose IV q8 <u>Age>28d:</u> penicillin G 50,000 units/kg/dose IV q4-6 (benzathine penicillin IM considered in select cases)	Duration: 10 days
Gastroenteritis (bacterial)^{4,7}	E. coli 0157, Salmonella, Shigella, Campylobacter, Yersenia	Supportive care (hydration/nutrition); High-risk patient (age <3mos, chronic GI disease, immunocompromised): consider ceftriaxone OR azithromycin	Supportive care (hydration/nutrition); High-risk patient (age <3mos, chronic GI disease, immunocompromised): ceftriaxone 50 mg/kg IV/IM q24	Consider azithromycin if stool+ for Shigella or Campylobacter
Influenza⁸	Influenza virus	oseltamivir if suspected/proven influenza AND high-risk patient (e.g. age <2y; chronic pulm, CV, renal, hepatic, heme, metabolic, or neuro/develop condition; chronic aspirin therapy; morbid obesity; immunosuppression; etc) Refer to dosing in next column	oseltamivir if suspected/proven influenza requiring hospitalization <u>Premature infant (based on postmenstrual age):</u> <38 wk: 1 mg/kg/dose PO bid 38-40 wk: 1.5 mg/kg/dose PO bid <u>Term infant (or postmenstrual age >40 wk):</u> 0 to 8 mos: 3 mg/kg/dose PO bid 9 to 11 mos: 3.5 mg/kg/dose PO bid ≥12 mos: ≤15 kg: 30 mg PO bid >15 to 23 kg: 45 mg PO bid >23 to 40 kg: 60 mg PO bid >40 kg: 75 mg PO bid	Treatment duration: 5 days For chemoprophylaxis: Age <3 mos: not recommended unless situation judged critical Age ≥3 mos: use treatment dose given once daily for 10 days
Lymphadenitis⁹	GAS, S. aureus	cephalexin 50 mg/kg/day PO tid OR clindamycin 30 mg/kg/day PO tid	oxacillin 150-200 mg/kg/day IV q6 OR clindamycin 40 mg/kg/day IV q 8	Duration: 10 days (OR 5-7 days after abscess drainage)
Mastoiditis⁹				Consider ID consult
A. Acute (<1 mo duration)	S. pneumoniae, GAS, S. aureus	N/A	ampicillin/sulbactam 200 mg/kg/day IV q8 Suspect MRSA: add vancomycin 60 mg/kg/day IV q6	
B. Chronic (≥1 mo duration)	P. aeruginosa, S. aureus, anaerobes	N/A	piperacillin/tazobactam 300 mg/kg/day IV q6 Suspect MRSA: add vancomycin 60 mg/kg/day IV q6	

**UCSF Benioff Children's Hospital Oakland
2017-2018 Empiric Antimicrobial Therapy Guide (EATG)**

(The following are guidelines only and should not replace clinical judgment. Immunocompromised patients may require special considerations not addressed here.)

Condition/Syndrome	Major Pathogen(s)	Empiric Outpatient Therapy	Empiric Inpatient Therapy	Duration/Notes
Meningitis (bacterial/HSV)^{4,10}				Consider ID consult
A. Age 0-28 days	GBS, GNR, Listeria, HSV	N/A	<u>Age 0-7d</u> : ampicillin 150 mg/kg/day IV q8 AND cefotaxime 150 mg/kg/day IV q8 AND acyclovir 60 mg/kg/day IV q8 <u>Age 8-28d</u> : ampicillin 200 mg/kg/day IV q6 AND cefotaxime 200 mg/kg/day IV q6 AND acyclovir 60 mg/kg/day IV q8	Refer to meningitis dosing guidelines for premature infants
B. Age 29-60 days	GBS, GNR, S. pneumoniae, N. meningitidis, HSV	N/A	vancomycin 60 mg/kg/day IV q 6 AND ceftriaxone 100 mg/kg/day IV q 12 AND acyclovir 60 mg/kg/day IV q8	
C. Age >60 days	S. pneumoniae, N. meningitidis	N/A	vancomycin 60 mg/kg/day IV q 6 AND ceftriaxone 100 mg/kg/day IV q 12	
Orbital cellulitis¹¹	S. aureus, Streptococci, H. influenzae, anaerobes	N/A	ampicillin/sulbactam 200 mg/kg/day IV q6 AND vancomycin 60mg/kg/day IV q6	Consider ID consult
Osteomyelitis	S. aureus, GAS	N/A	clindamycin 40 mg/kg/day IV q8 OR vancomycin 60 mg/kg/day IV q6	Consider ID consult
Otitis media¹²	S. pneumoniae H. influenzae M. catarrhalis	<u>Consider observation if:</u> 6mo-2y: unilateral, no otorrhea, and nonsevere ≥2y: no otorrhea and nonsevere <u>Mild/mod</u> : amoxicillin 80-90 mg/kg/day PO bid <u>Severe (all ages)</u> : amoxicillin/clavulanate 80-90 mg/kg/day PO bid	Same as outpatient	Pain control for all children Duration: <2y or severe AOM: 10 days 2-5y: 7 days ≥6y: 5-7 days
Pertussis¹³	B. pertussis, B. parapertussis	<u>Age 0-5mo</u> : azithromycin 10 mg/kg PO qDay x5day <u>Age ≥6mo</u> : azithromycin 10 mg/kg (max: 500 mg) PO on day 1, then 5 mg/kg (max: 250 mg) qDay on days 2-5	Same as outpatient	Provide prophylaxis to close contacts using treatment regimens
Pharyngitis				
A. Strep throat ^{4,14}	GAS	amoxicillin 50 mg/kg PO qDay (max: 1 gram) OR <27kg: benzathine penicillin 600,000 unit IM x1 ≥27kg: benzathine penicillin 1.2 million unit IM x1	Same as outpatient	Duration: 10 days (PO therapy)
B. Peritonsillar or retropharyngeal abscess	GAS, S. aureus, anaerobes	amoxicillin/clavulanate 50 mg/kg/day PO bid OR clindamycin 30 mg/kg/day PO tid	ampicillin/sulbactam 150-200 mg/kg/day IV q6 OR clindamycin 40 mg/kg/day IV q8	Duration: 10 days (or 5-7 days after abscess drainage)
Pneumonia (bacterial)^{9,15}				
A. Community-associated (CA)	S. pneumoniae M. pneumoniae (esp. age≥5y) C. pneumoniae (esp. age≥5y) C. trachomatis (age<3 mo)	amoxicillin 90 mg/kg/day PO bid or tid Suspect atypical: azithromycin 10 mg/kg PO on day 1, then 5 mg/kg qDay on days 2-5	ampicillin 150-200 mg/kg/day IV q6 Suspect atypical: azithromycin (same as outpatient)	Duration for β-lactam therapy: Mild: 5-7 days Moderate: 10 days
B. CA – complicated (effusion/empyema/necrosis)	S. pneumoniae, S. aureus, GAS	N/A	<u>Mild-mod effusion/stable patient</u> : ampicillin (as dosed above) <u>Mod-large effusion, or necrotizing</u> : ceftriaxone 50-100 mg/kg/day IV q12-24 AND clindamycin 40 mg/kg/day IV q8 <u>Critical illness</u> : vancomycin 60 mg/kg/day IV q6 AND ceftriaxone 100 mg/kg/day IV q12	Consider ID consult
C. Aspiration pneumonia	Upper respiratory/oral flora	amoxicillin/clavulanate 80-90 mg/kg/day PO bid	ampicillin/sulbactam 150-200 mg/kg/day IV q6	
D. Healthcare-associated (HA)	S. aureus, GNR	N/A	Target therapy based on respiratory culture OR Use empiric therapy for HA NICU/PICU infections in “Sepsis rule out” section	Consider ID consult

**UCSF Benioff Children's Hospital Oakland
2017-2018 Empiric Antimicrobial Therapy Guide (EATG)**

(The following are guidelines only and should not replace clinical judgment. Immunocompromised patients may require special considerations not addressed here.)

Condition/Syndrome	Major Pathogen(s)	Empiric Outpatient Therapy	Empiric Inpatient Therapy	Duration/Notes
Sepsis rule out (See "Meningitis" if CSF abnormal)				Consider ID consult if severe illness or positive culture
A. CA neonatal early/late onset ¹⁶ (Age 0-28 days)	GBS, GNR	N/A	ampicillin AND gentamicin OR cefotaxime alone Suspect MRSA: vancomycin AND gentamicin Severe sepsis: vancomycin AND cefotaxime	See NICU Sepsis Algorithm Refer to dosing guidelines for premature infants and neonates Consider neonatal HSV
B. CA neonatal late onset ¹⁶ (Age 29-60 days)	S. pneumoniae, GBS, GNR	Consider ceftriaxone 50 mg/kg/day IV/IM q24	ceftriaxone alone Severe sepsis or suspect MRSA: vancomycin AND ceftriaxone	Refer to dosing guidelines for premature infants and neonates Consider neonatal HSV
C. CA infant/child/teen (Age >60 days)	S. pneumoniae, N. meningitidis, S. aureus	Consider ceftriaxone 50 mg/kg/day IV/IM q24	ceftriaxone 50 mg/kg/day IV q24 Severe sepsis or suspect MRSA: vancomycin 60-80 mg/kg/day IV q6 AND ceftriaxone 100 mg/kg/day IV q12 Suspect toxic shock syndrome: add clindamycin 40 mg/kg/day IV q8	
D. HA NICU late onset (Age ≥3d)	Coag-neg Staph, S. aureus, GNR	N/A	oxacillin AND gentamicin Suspect MRSA: vancomycin AND gentamicin Severe sepsis: vancomycin AND cefepime	See NICU Sepsis Algorithm Refer to dosing guidelines for premature infants and neonates
E. HA PICU infant/child/teen	Coag-neg Staph, S. aureus, GNR	N/A	cefepime 150 mg/kg/day IV q8 Central line or suspect MRSA: vancomycin 60 mg/kg/day IV q6 AND cefepime Severe sepsis: vancomycin 60-80 mg/kg/day IV q6 AND meropenem 120 mg/kg/day IV q8	
Sexual assault^{4,17}	Multiple possibilities	For postpubertal adolescents: azithromycin 1 gram PO x1 PLUS either: cefixime 400 mg PO OR ceftriaxone 250 mg IM x1 Consider metronidazole 2 grams PO x1 Consider HIV prophylaxis	Same as outpatient	See HIV post-exposure prophylaxis guidelines Adjust dosages for young children Offer emergency contraception when appropriate Review hepatitis B and HPV vaccination status
Sexually transmitted diseases¹⁷				
A. Bacterial vaginosis	Anaerobic bacteria	metronidazole 500 mg PO bid x 7 days OR metronidazole gel 0.75% one applicator (5 gms) intravaginally qDay x 5 days	Same as outpatient	
B. Chlamydia	C. trachomatis	azithromycin 1 gram PO x1 OR doxycycline 100 mg PO bid x 7 days (age >7y)	Same as outpatient	
C. Gonorrhea (uncomplicated)	N. gonorrhoeae	ceftriaxone 250 mg IM x1 AND azithromycin 1 gram PO x1	Same as outpatient	Obtain culture with treatment failure or alternative regimens
D. Pelvic inflammatory disease	N. gonorrhoeae, C. trachomatis, anaerobes, other vaginal flora	ceftriaxone 250 mg IM x1 AND doxycycline 100 mg PO bid x14 days +/- metronidazole 500 mg PO bid x14 days	cefoxitin 2 grams IV q6 AND doxycycline 100 mg PO/IV q12 x 14 days (PO preferred if tolerated)	
E. Herpes (genital)	Herpes simplex virus	<u>First episode:</u> acyclovir 400 mg PO tid x 7-10 days OR valacyclovir 1 gram PO bid x 7-10 days <u>Recurrent episode:</u> acyclovir 400 mg PO tid x 5days OR valacyclovir 500 mg PO bid x 3 days OR valacyclovir 1 gram PO qDay x 5 days	Same as outpatient	
F. Syphilis	T. pallidum	<u>Primary/secondary/early latent:</u> benzathine penicillin 2.4 million units IM x1 <u>Late latent/unknown duration:</u> benzathine penicillin 2.4 million units IM weekly x3	Same as outpatient	
G. Trichomoniasis	T. vaginalis	metronidazole 2 grams PO x1	Same as outpatient	

**UCSF Benioff Children's Hospital Oakland
2017-2018 Empiric Antimicrobial Therapy Guide (EATG)**

(The following are guidelines only and should not replace clinical judgment. Immunocompromised patients may require special considerations not addressed here.)

Condition/Syndrome	Major Pathogen(s)	Empiric Outpatient Therapy	Empiric Inpatient Therapy	Duration/Notes
Sinusitis (bacterial) ^{4,20}	S. pneumoniae, H. influenzae, M. catarrhalis	Consider observation if persistent symptoms only Nonsevere: amoxicillin 80-90 mg/kg/day PO bid Severe: amox/clavulanate 80-90 mg/kg/day PO bid	Same as outpatient OR ampicillin/sulbactam 150-200 mg/kg/day IV q6	Duration: 10-14 days
Skin/soft tissue infection ^{4,18,19}				
A. Uncomplicated cellulitis	GAS	cephalexin 50 mg/kg/day PO tid (max:500 mg/dose) OR dicloxacillin 500 mg PO qid if >40 kg	oxacillin 100-150 mg/kg/day IV q6 OR cefazolin 50 mg/kg/day IV q8	Duration: 5-10 days
B. Purulent cellulitis	S. aureus	TMP/SMX 8-12 mg/kg/day of TMP PO bid OR doxycycline 4 mg/kg/day PO bid if age >7y (max: 100 mg PO bid)	clindamycin 40 mg/kg/day IV q8	Duration: 5-10 days
C. Abscess (uncomplicated)	S. aureus	I&D alone often sufficient OR consider short course of TMP/SMX	I&D AND clindamycin 40 mg/kg/day IV q8	Duration: 5-10 days
D. Abscess (complicated)	S. aureus	N/A	I&D AND clindamycin 40 mg/kg/day IV q8 OR vancomycin 60 mg/kg/day IV q6	Duration: 7-14 days
E. Animal/human bite	P. multocida (cat/dog), Staph/Strep, anaerobes, Eikenella (human)	Consider rabies prophylaxis AND Update tetanus immunization status AND amoxicillin/clavulanate 50 mg/kg/day PO bid	Consider rabies prophylaxis AND Update tetanus immunization status AND ampicillin/sulbactam 150-200 mg/kg/day IV q6	Duration: Prophylaxis: 3-5 days Treatment: 7-10 days
Tuberculosis				
A. Latent TB infection	M. tuberculosis	<u>Preferred:</u> rifampin 10-20 mg/kg/day PO qDay x 4 months <u>Alternative:</u> isoniazid 10-15 mg/kg/day PO qDay x 9 months	Same as outpatient	See LTBI guidelines
B. Active TB	M. tuberculosis	Consult ID	Same as outpatient	
Urinary tract infection (See "Sepsis rule out" if age <2mo)				
A. Age 2mo-12y ²¹	E. coli, other enteric GNR	Same as inpatient if need initial parenteral therapy OR cephalexin 50-100 mg/kg/day PO tid	ceftriaxone 50-75 mg/kg/day IV/IM q24 (max: 1gm) OR gentamicin 5-7 mg/kg/day IV/IM q24	Duration: 7-10 days (14 days if severe)
B. Age >12y: Cystitis ²²	E. coli, other enteric GNR	nitrofurantoin (Macrobid) 100 mg PO bid OR cephalexin 50-100 mg/kg/day PO tid	nitrofurantoin (Macrobid) 100 mg PO bid OR cephalexin 50-100 mg/kg/day PO tid	Duration: 5 days
C. Age >12y: Pyelonephritis ^{22, 23,24}	E. coli, other enteric GNR	Same as inpatient if need initial parenteral therapy OR ciprofloxacin 20-30 mg/kg/day PO bid (max: 500 mg PO bid)	ceftriaxone 50-75 mg/kg/day IV/IM q24 (max: 1gm) OR gentamicin 5-7 mg/kg/day IV/IM q24	Duration: β-lactams: 10-14 days ciprofloxacin: 7 days

**UCSF Benioff Children's Hospital Oakland
2017-2018 Empiric Antimicrobial Therapy Guide (EATG)**

(The following are guidelines only and should not replace clinical judgment. Immunocompromised patients may require special considerations not addressed here.)

Strategies to Reduce Inappropriate Antimicrobial Use and Its Negative Consequences

1. Avoid using antibiotics when bacterial infection is unlikely. Do not treat colonization or contamination.
2. Obtain appropriate cultures and other diagnostic testing.
3. Select empiric antimicrobial therapy based on likely pathogens, using CHO EATG and CHO antibiogram for guidance.
4. Determine appropriate dose based on site and severity of infection, using CHO EATG and drug formulary for guidance.
5. Within 48-72 hours, de-escalate therapy based on the likely diagnosis, and when available, based on culture and susceptibility data.
 - a. Discontinue unnecessary antimicrobials, including redundant coverage
 - b. Use narrowest effective regimen
6. Switch from IV to PO therapy as soon as it is clinically appropriate.
7. Treat with the shortest duration of therapy that is effective for the presumed or proven infection.

Narrower First-Line Agents	Broader	Broadest Last-Line Agents
penicillin amoxicillin ampicillin dicloxacillin oxacillin cephalixin cefazolin cefuroxime cefoxitin gentamicin nitrofurantoin trimethoprim/sulfamethoxazole azithromycin tetracycline or doxycycline metronidazole	amoxicillin/clavulanate ampicillin/sulbactam cefotaxime ceftriaxone tobramycin clindamycin	piperacillin/tazobactam aztreonam ceftazidime cefepime ertapenem meropenem amikacin ciprofloxacin vancomycin linezolid

UCSF Benioff Children's Hospital Oakland
2017-2018 Empiric Antimicrobial Therapy Guide (EATG)

(The following are guidelines only and should not replace clinical judgment. Immunocompromised patients may require special considerations not addressed here.)

References

1. Solomkin JS et al. Diagnosis and Management of Complicated Intra-abdominal Infection in Adults and Children: Guidelines by the Surgical Infection Society and the Infectious Diseases Society of America. *CID* 2010;50:133-64.
2. Remington JS, Klein JO, Wilson CB, Nizet V, Maldonado YA, editors. *Infectious diseases of the fetus and newborn infant*. 7th ed. Philadelphia: Elsevier Saunders; 2006.
3. Autmizguine J et al. Anaerobic Antimicrobial Therapy After Necrotizing Enterocolitis in VLBW Infants. *Pediatrics* 2015;135:e117-e125.
4. American Academy of Pediatrics. In: Kimberlin DW, Brady MT, Jackson MA, Long SS, eds. *Red Book: 2015 Report of the Committee on Infectious Diseases*. 30th ed. Elk Grove Village, IL: American Academy of Pediatrics; 2015.
5. Committee on Infectious Diseases. Policy Statement: *Clostridium difficile* Infection in Infants and Children. *Pediatrics* 2013;131:196-200.
6. Rawlinson WD et al. Congenital cytomegalovirus infection in pregnancy and the neonate: consensus recommendations for prevention, diagnosis, and therapy. *Lancet Infectious Diseases* 2017;17:e177-88.
7. Guerrant RL et al. Practice Guidelines for the Management of Infectious Diarrhea. *CID* 2001;32:331-51.
8. Committee on Infectious Diseases. Recommendations for Prevention and Control of Influenza in Children, 2016-2017. *Pediatrics* 2016;138:1-17.
9. Feigen RD, Cherry JD, Demmler GJ, Kaplan SL, eds. *Textbook of Pediatric Infectious Diseases*. Sixth Edition. Philadelphia: Saunders Elsevier; 2009.
10. Tunkel AR et al. Practice Guidelines for the Management of Bacterial Meningitis. *CID* 2004;39:1267-84.
11. Wald ER. Periorbital and Orbital Infections. *Infectious Disease Clinics of North America* 2007;21:393-408.
12. Lieberthal AS et al. Clinical Practice Guideline: The Diagnosis and Management of Acute Otitis Media. *Pediatrics* 2013;131:e964-e999.
13. Tiwari T et al. Recommended Antimicrobial Agents for the Treatment and Postexposure Prophylaxis of Pertussis. *MMWR* Dec 9, 2005;54:1-18.
14. Shulman ST et al. Clinical Practice Guideline for the Diagnosis and Management of Group A Streptococcal Pharyngitis: 2012 Update by the Infectious Diseases Society of America. *CID* 2012; Published online on September 9, 2012.
15. Bradley JS et al. The Management of Community-Acquired Pneumonia in Infants and Children Older Than 3 Months of Age: Clinical Practice Guidelines by the Pediatric Infectious Diseases Society and the Infectious Diseases Society of America. *CID* 2011; Published online on August 30, 2011.
16. Leazer R et al. A Meta-analysis of the Rates of *Listeria monocytogenes* and *Enterococcus* in Febrile Infants. *Hospital Pediatrics* 2016;6:187-195.
17. Workowski KA, Bolan GA. Sexually Transmitted Diseases Treatment Guidelines, 2015. *MMWR* Jun 5, 2015;64:1-137.
18. Stevens DL et al. Practice Guidelines for the Diagnosis and Management of Skin and Soft Tissue Infections: 2014 Update by the Infectious Diseases Society of America. *CID* 2014;Advanced access published June 18, 2014.
19. Liu C et al. Clinical Practice Guidelines by the Infectious Diseases Society of America for the Treatment of Methicillin-Resistant *Staphylococcus aureus* infections in Adults and Children. *CID* 2011;52:1-38.
20. Wald ER et al. Clinical Practice Guideline for the Diagnosis and Management of Acute Bacterial Sinusitis in Children Aged 1 to 18 Years. *Pediatrics* 2013;132:e262-e280.
21. American Academy of Pediatrics. Urinary Tract Infection: Clinical Practice Guideline for the Diagnosis and Management of the Initial UTI in Febrile Infants and Children 2 to 24 months. *Pediatrics* 2011;128:595-610.
22. Gupta K et al. International Clinical Practice Guidelines for the Treatment of Acute Uncomplicated Cystitis and Pyelonephritis in Women: A 2010 Update by the Infectious Disease Society of America and the European Society for Microbiology and Infectious Diseases. *CID* 2011;53:e103-e120.
23. Bocquet N et al. Randomized Trial of Oral Versus Sequential IV/Oral Antibiotic for Acute Pyelonephritis in Children. *Pediatrics* 2012;129:e269-e275.
24. Hodson EM et al. Antibiotics for acute pyelonephritis in children. *Cochrane Database of Systematic Reviews* 2007, Issue 4. Art. No.:CD003772. DOI: 10.1002/14651858.CD003772.pub3.