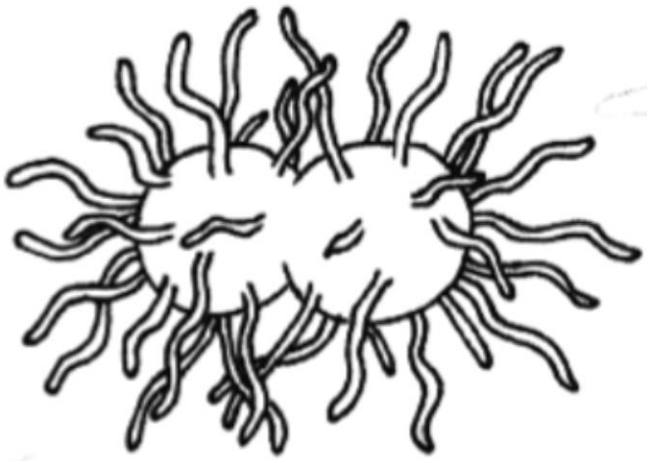

# Antibiotic Essentials

Created January 2017
Information contained was compiled using
Wesley Healthcare 2016 susceptibility data.
Full antibiogram available electronically on the Wesley Intranet.
For a printed copy of the antibiogram, please contact the pharmacy.

## Contacts

| | |
|---|---|
| **Main Pharmacy** | **962-2305** |
| Infectious Diseases Pharmacist<br>*Stephanie Kuhn, PharmD, BCPS- AQ ID* | **962-7474** |
| **Infection Prevention** | **962-7570** |
| **Microbiology Lab** | **962-2880** |
| **Microbiology Lab Director**<br>*Kathy Beadle, MT (ASCP)* | **962-2984** |
| **Infectious Diseases Physician**<br>*Shelley Jones, MD* | **962-3030** |

WESLEY Healthcare

Wesley Medical Center
Wesley Woodlawn Hospital & ER
Wesley Children's Hospital
Wesley West ER & Diagnostic Center
Wesley Derby ER
WesleyCare Clinics

| Clinical Pearls | |
|---|---|
| Asymptomatic bacteriuria | • Positive urine cultures (even if >100,000 cfu) without presence of symptoms do not require antibiotic treatment unless the patient is pregnant or undergoing urinary surgery<br>• Document as asymptomatic bacteriuria |
| Urinary tract infections | • 41% of *Proteus mirabilis* and 28% of *E. coli* strains are resistant to ciprofloxacin<br>• Consider using an alternative agent (such as ceftriaxone) for empiric therapy |
| Skin and soft tissue infections | • Clindamycin combination therapy is only indicated in Group A *Streptococcus* infections<br>• Purulent infection, moderate to severe: consider MRSA coverage with vancomycin<br>• Non-purulent or diffuse infections, mild to moderate: β-lactam (cefazolin) is preferred. Consider clindamycin as an allergic alternative<br>• Avoid using trimethoprim/sulfamethoxazole empirically due to lack of *Streptococcus* coverage |
| Methicillin-susceptible *Staphylococcus aureus* (MSSA) | • Cefazolin (IV) or cephalexin (PO) are the drugs of choice<br>• Nafcillin continuous infusion is an alternative<br>• 51% of staphylococcus aureus isolates are oxacillin sensitive (MSSA) |
| Enteroccocal infections | • Ampicillin (IV) or amoxicillin (PO) are the drugs of choice, unless resistant<br>• Adding a β-lactamase inhibitor (ampicillin/sulbactam or amoxicillin/clavulanate) does not add any benefit, as this is not the resistance mechanism of *Enterococcus*<br>• Cephalosporins do not cover *Enterococcus* |
| Extended-spectrum beta-lactamase producers (ESBLs) | • Meropenem is the preferred drug for ESBLs<br>• 6% of *E. coli* and 5% of *Klebsiella pneumoniae* are ESBLs |
| *Haemophilus influenza* and *Moraxella catarrhalis* | • 25% of *H. influenzae* and 88% of *M. catarrhalis* are β-lactamase producing<br>• Preferred therapy includes:<br>IV: ampicillin/sulbactam or ceftriaxone<br>PO: amoxicillin/clavulanate or cefuroxime |
| Candida infections | • 74% of Candida isolated from all sites is *C. albicans*<br>• 26% of Candida isolated in the blood is *C. albicans*<br>• Fluconazole is the drug of choice for *C. albicans*<br>• For fungemia, consider micafungin empirically and narrowing to fluconazole if C. albicans is isolated<br>• Micafungin is the echinocandin on formulary |

## De-escalation Tips

- Consider evaluating the patient at 48 hours (at a minimum) to determine if antibiotics can be de-escalated
- De-escalation can occur both when specific organisms have been isolated or when no specific organism has been isolated
- When narrowing based on reported sensitivities, do not compare MIC values. MIC values are organism and drug specific. A lower MIC does not necessarily mean a better agent.
- Consider the following additional tips:

| If | Then |
|---|---|
| Viral panel is positive | **STOP** antibiotics |
| *S. aureus* is not isolated | **DC** vancomycin |
| Resistant gram-negative organisms are not isolated (e.g. *Pseudomonas, Enterobacter*) | De-escalate from piperacillin/tazobactam or cefepime to ampicillin/sulbactam or ceftriaxone |
| No isolate is identified or normal flora is identified | De-escalate to an oral antibiotic if patient is clinically stable to do so |
| Isolate is susceptible to a 1st generation cephalosporin | Do not use a 3rd generation cephalosporin (e.g. ceftriaxone), de-escalate to the narrowest spectrum (e.g. cefazolin) |

| IV antibiotic | Oral equivalent |
|---|---|
| Ampicillin | Amoxicillin |
| Ampicillin/sulbactam | Amoxicillin/clavulanate |
| Ceftriaxone | Cefdinir |
| Cefazolin | Cephalexin |

| ***C. difficile* colitis risk and antibiotic selection** | |
|---|---|
| **Antibiotic** | **Risk Ratio** |
| Penicillin | 1.9 |
| Beta-lactamase combinations | 2.3 |
| 1st and 2nd generation cephalosporins | 2.4 |
| 3rd and 4th generation cephalosporins | 3.1 |
| Clindamycin | 1.9 - 16.8 |
| Fluoroquinolones | 4 - 5.5 |

| **C. difficile risk increases with antibiotic days*** | | |
|---|---|---|
| 4-7 days=40% | 8-18 days=300% | >18 days=780% |

*1 day=1 day per drug (1 day of triple-drug therapy= 3 antibiotic days)

Stevens V, et al. Clin Infect Dis. 2011; 53:42-48

Brown KA, et al. Antimicrob Agents Chemother. 2013; 57:2326-32

# Preferred Antimicrobial List for Selected Disease States in Adults

**Please Note:** This table is only a guide, designed to assist healthcare providers in selecting an appropriate, empiric antimicrobial regimen and may or may not be appropriate for all patients. Ultimately, the antibiotic course depends upon culture results and the patient's clinical course.

For additional information, please see order sets or contact the pharmacy at 962-2305

***All dosing assumes IBW and normal renal and hepatic function**

| Disease State | Common Pathogens | | Adult Empiric Therapy* | Duration of Therapy |
|---|---|---|---|---|
| **Pneumonia[1-5]** | Community Acquired (CAP) | *H. influenzae*<br>*S. pneumoniae*<br><br>Plus atypicals including<br><br>*M. pneumoniae*<br>*C. pneumoniae* | Ceftriaxone 1 gm IV Q24 hours<br>**+**<br>Azithromycin PO 500 mg daily x 3 days or<br>Doxycycline 100 mg PO Q12 hours x7 days<br><br>**Cephalosporin allergy:**<br>*Non-ICU:*<br>Levofloxacin 750 mg PO Q24 hours x 5 days<br>*ICU:*<br>Aztreonam 1 gm Q8 hours<br>+<br>levofloxacin 750 mg PO Q24 hours | **Non-ICU:**<br>5 days<br><br>**ICU:**<br>7 days |
| | Aspiration | Anaerobes | Ampicillin/Sulbactam 3 gm IV Q6 hours<br>**OR**<br>Clindamycin 600 mg IV Q8 hours<br>**+**<br>Ceftriaxone 1 gm IV Q24 hours or<br>Levofloxacin 750 mg PO Q24 hours (if cephalosporin allergy) | 5 days |
| | Health-care Associated (HCAP) | *H. influenzae*<br>*S. pneumoniae*<br>*P. aeruginosa*<br>*S. aureus*<br>(MRSA) | **Mild/moderate with 0-1 risk factors*or Severe with 0 risk factors*:**<br>Ceftriaxone 1 gm IV Q24 hours<br>**+**<br>Azithromycin PO 500 mg daily x 3 days or<br>Doxycycline 100 mg PO Q12 hours x7 days<br><br>**Mild/moderate with ≥ 2 risk factors*or Severe with ≥ 1 risk factors*:**<br>Cefepime 1 gm IV Q6 hours<br>**+**<br>Vancomycin (20-25 mg/kg load plus RX to dose)<br><br>**Risk Factors= Antimicrobial therapy in the preceding 90 days, recent hospitalization >2 days in the preceding 90 days or immunosuppressive disease and/or therapy* | 7 days |
| | Hospital Acquired (HAP)/ Ventilator Acquired (VAP) | *P. aeruginosa*<br>*K. pneumoniae*<br>*Acinetobacter*<br>*S. aureus*<br>(MRSA) | Cefepime 1 gm IV Q6 hours<br>**+**<br>Vancomycin (20-25 mg/kg load plus RX to dose)<br>**+/-**<br>Tobramycin 7 mg/kg IVQ24 hours*<br>**Consider adding if the patient has received IV antibiotic therapy in the preceding 90 days:* | 7 days |

**References:** [1]IDSA/ATS guidelines on CAP in adults. *CID* 2007; 44: S27-72. [2]ATS, IDSA. Guidelines for adults with HAP, VAP, HCAP pneumonia. *Am J Respir Crit Care Med* 2005; 171: 388-416. [3]Management of Adults With Hospital-acquired and Ventilator-associated Pneumonia: 2016 Clinical Practice Guidelines by the Infectious Diseases Society of America and the American Thoracic Society. Clin Infect Dis. 2016 Sep 1;63(5):e61-e111. [4]Gross AE et al. Epidemiology and Predictors of Multidrug-Resistant Community-Acquired and Health Care-Associated Pneumonia. Antimicrob Agents Chemother. 2014; 58(9):5262. [5]Attridge RT, et al. Health care-associated pneumonia in the intensive care unit: Guideline-concordant antibiotics and outcomes. J Crit Care. 2016 Aug 11. doi: 10.1016/j.jcrc.2016.08.004. [Epub ahead of print]

## Preferred Antimicrobial List for Selected Disease States in Adults (continued)

| Disease State | Common Pathogens | | Adult Empiric Therapy* | Duration of Therapy |
|---|---|---|---|---|
| **Meningitis**[1] | Age <50 yrs | *S. pneumoniae*<br>*N.meningitides* | Ceftriaxone 2 gm IV Q12 hours +<br>Vancomycin (20-25 mg/kg load plus RX to dose) | Patient and pathogen dependent |
| | Age >50 yrs | *S. pneumoniae*<br>*N.meningitides*<br>*Listeria* | Ceftriaxone 2gm IV Q12 hours +<br>Vancomycin (20-25 mg/kg load plus RX to dose)<br>+<br>Ampicillin 8 gm continuous infusion Q24 hours | |
| **Cellulitis/ Erysipelas**[2] | Erysipelas | β-hemolytic *streptococcus* | Cefazolin 1-2 gm IV Q8 hours **OR**<br>Nafcillin 8 gm continuous infusion Q24 hours **OR**<br>Penicillin G 18 million units continuous infusion Q24 hours | *Uncomplicated:* 5 days<br><br>*Abscess/Complicated:* 7-10 days |
| | Purulent/abscess or Risk of MRSA | *S. aureus* | Vancomycin (20-25 mg/kg load plus RX to dose) | |
| **Diabetic Foot Infections**[3] | Polymicrobial:<br>β-hemolytic *Strep*<br>*S. aureus*<br>*Pseudomonas*<br>Gram-negative rods<br>Anaerobes | | Ampicillin/Sulbactam 3 gm IV Q6 hours or<br>Piperacillin/Tazobactam IV 3.375 gm over 4 hours Q8 hours<br>*if Pseudomonas concern*<br>**+/-**<br>Vancomycin (20-25 mg/kg load plus RX to dose)<br>*if MRSA concern* | Patient and pathogen dependent |
| **Septic Joint**[4] | STD risk: *N. gonorrhoeae*<br>*S. aureus, Streptococcus*<br>Low STD risk: *S. aureus* | | Ceftriaxone 1 g IV Q24 hours<br>+<br>Vancomycin (20-25 mg/kg load plus RX to dose) | Patient and pathogen dependent |
| **Prosthetic Joint Infection**[4] | *S. aureus, S. epidermidis*<br>*Streptococcus* | | Vancomycin (20-25 mg/kg load plus RX to dose) | Patient and pathogen dependent |
| **Intra-abdominal Infections**[4,5] | Abscess<br>Cholecystitis<br>Diverticulitis | *Enterococcus*<br>*Entero-bactericeae*<br>*Anaerobes* | Ceftriaxone 1 gm IV Q24 hours +<br>Metronidazole 500 mg PO Q12 hours | After source control: 4 days<br>Abscess: Varies based on patient response |
| **C difficile**[6] | Mild to Moderate | | Metronidazole 500 mg PO Q8 hours | *Usual 14 days*<br>*For patients on antibiotics:*<br>*Treat 4+ days after antibiotic discontinuation* |
| | Severe | | Vancomycin PO 125 mg PO Q6 hours | |
| | Severe Complicated:<br>S/S of ileus, toxic megacolon, perforation, sepsis 2/2 CDI | | Metronidazole 500 mg IV Q8 hours +<br>Vancomycin 500 mg via retention enema Q6 hours | Treat at least 14 days |
| **Urinary Tract Infections**[7] | Cystitis | *E. coli*<br>*Proteus*<br>*Klebsiella*<br>*Enterococcus* | Cephalexin 500 mg PO Q6 hours **OR**<br>Amoxicillin 500 mg PO Q8 hours<br>*(if Enterococcus concern)* | *Uncomplicated*: 3 days<br>*Complicated*: 7-10 days<br>*Complicated with structural abnormalities or pyelonephritis:*<br>10-14 days |
| | Pyelonephritis | | Ceftriaxone 1 gm IV Q24 hours **OR**<br>Ampicillin 8 gm continuous infusion Q24 hours<br>*(if Enterococcus concern)* **OR**<br>Ciprofloxacin 500 mg PO Q12 hours | |
| **Surgical Prophylaxis**[9] | Pre-operative | | Please refer to order set #347 for recommendations based on specific surgical type | |
| | Post-operative | | No antibiotic prophylaxis is necessary to be continued post-op.<br>If it is clinically necessary to continue antibiotics for prophylaxis do not exceed 24 hours post-op and 48 hours for cardiac surgeries. | |

**References:** [1]Guidelines for bacterial meningitis. *CID* 2004; 39: 1267-84. [2]Guidelines SST infections. *CID* 2005; 41: 1373-406. [3]Diagnosis and treatment of diabetic foot infections. *CID* 2012; 54: e132-73. Guidelines for the diagnosis and management of prosthetic join infection. CID 2013; 56: 1-25. [5]Intra-abdominal infection guidelines. *CID* 2010; 50: 133-164. [6]Trial of Short-Course Antimicrobial Therapy for Intraabdominal Infection. *NEJM* 2015; 372:1996-2005. [7]IDSA/SHEA C difficile Guidelines. *ICHE 2010; 31:431-55.* [8]Guidelines for uncomplicated acute bacterial cystitis and acute pyelonephritis in women. *CID 2011;* 52:e103-2. [9]Antimicrobial prophylaxis in surgery. *AJHP. 2013; 70:195-283.*

# Preferred Antimicrobial List for Selected Disease States in Pediatrics

**Please Note:** This table is only a guide, designed to assist healthcare providers in selecting an appropriate, empiric antimicrobial regimen and may or may not be appropriate for all patients. Ultimately, the antibiotic course depends upon culture results and the patient's clinical course.
For additional information, please see order sets or contact the pharmacy at 962-2305 ***All dosing assumes normal renal and hepatic function**

| Disease State | Common Pathogens | | Pediatric Empiric Therapy | Duration of Therapy |
|---|---|---|---|---|
| **Pneumonia[1-2]** | Community Acquired (CAP) | *H. influenzae*<br>*S. pneumoniae*<br>Plus atypicals including<br>*M. pneumonia*<br>*C. trachomatis*<br>*C. pneumoniae* | **Simple, Untreated, Immunized:**<br>Ampicillin 75 mg/kg (max dose of 2000 mg) IV Q6 hours<br><br>**Failed treatment or Complication:**<br>Ceftriaxone 50 mg/kg (max dose of 1000 mg) IV Q24 hours<br><br>***Optional Additional Coverage:***<br><br>**Concern for Atypical Pathogens:**<br>Azithromycin I0 mg/kg (max dose of 500 mg) PO ONCE, then 5 mg/kg (max dose of 250 mg) PO daily AC breakfast x 4 doses<br><br>**Concern for S. aureus:**<br>Vancomycin 20 mg/kg IV Q6 hours | 7-10 days<br><br>Shorter courses may be just as effective, specific pathogens may require longer therapy |
| | VAP, Risk of Pseudomonas or MRSA | *K. pneumoniae*<br>*Acinetobacter*<br>*P. aeruginosa*<br>*S. aureus* (MRSA) | Cefepime 50 mg/kg (max 1000 mg) IV Q8 hours<br>**OR**<br>Piperacillin/tazobactam<br>Dosed based off piperacillin component<br>Age <30 days: 75 mg/kg IVQ6 hours (over 30 min)<br>Age ≥30 days: 100 mg/kg (max 3000 mg) IV Q8 hours (over 4 hours)<br>**+**<br>Vancomycin 20 mg/kg (max 1000 mg) IV Q6 hours<br>**±**<br>Tobramycin<br>Age <1 month: 4 mg/kg IV Q24 hours<br>Age 1-6 months: 6 mg/kg IV Q24 hours<br>Age >6 months: 7.5 mg/kg IV Q24 hours | 7 days |
| **Meningitis[3]** | Age <1 month | *S. agalactiae*<br>*E. coli*<br>*Listeria* | Ampicillin 75 mg/kg IV Q6 hours **+**<br>Cefotaxime 50 mg/kg IV Q6 hours | Patient and pathogen dependent |
| | Age 1 month to <12 yrs | *S. pneumoniae*<br>*N. meningitides*<br>*H. Influenzae* | Ceftriaxone 50 mg/kg (max dose 2000 mg) IV Q12 hours **+**<br>Vancomycin 20 mg/kg (max dose 1000 mg) IV Q6 hours | |
| | Age ≥12 yrs | *N. meningitides*<br>*S. pneumoniae* | Ceftriaxone 50 mg/kg (max dose 2000 mg) IV Q12 hours **+**<br>Vancomycin 20 mg/kg (max dose 1500 mg) IV Q6 hours | |
| **Cellulitis/ Erysipelas[4]** | Erysipelas | β-hemolytic *streptococcus* | Cefazolin 30 mg/kg (max dose 1000 mg) IV Q8 hours **OR**<br>Nafcillin 200 mg/kg/day IV Q24 hours as a continuous infusion | *Uncomplicated:*<br>5 days<br><br>*Abscess/Complicated:*<br>7-10 days |
| | Purulent/ abscess or Risk of MRSA | *S. aureus* | Vancomycin 20 mg/kg IV Q6 hours | |
| **Intra-abdominal Infections[5,6]** | Abscess<br>Cholecystitis<br>Diverticulitis | *Enterococcus*<br>*E. coli*<br>*Enterobactericeae*<br>*Anaerobes* | Ceftriaxone 50 mg/kg (max dose 1000 mg) IV Q24 hours **+**<br>Metronidazole 10 mg/kg (max dose 500 mg) PO Q8 hours | After source control:<br>4 days<br><br>Abscess: Varies based on patient response |
| **Urinary Tract Infections[7]** | *E. coli*<br>*Proteus*<br>*Klebsiella* | | Cephalexin 50 mg/kg/day PO in 2-3 divided doses<br>**OR**<br>Ceftriaxone 50 mg/kg (max dose 1000 mg) IV Q24 hours | 7-14 days |
| **Neutropenic Fever[8]** | *S. epidermidis*<br>*K. pneumonia*<br>*P. aeruginosa*<br>*S. aureus*<br>*E. coli* | | Cefepime 50 mg/kg (max 2000 mg) IV Q8 hours<br>**±**<br>Vancomycin 20 mg/kg (max dose of 1000mg) IV Q6 hours | Continue until neutropenia subsides (ANC ≥ 500 cells/mm$^3$) and afebrile or longer if clinically necessary depending on symptoms and pathogen. |

**References:** [1]IDSA guidelines on CAP in infants and children. *CID* 2011; e1-52. [2]Sandora TJ, Harper MB. Pneumonia in hospitalized children. Pediatr Clin North Am 2005; 52:1059. [3]Guidelines for bacterial meningitis. *CID* 2004; 39: 1267-84. [4]Guidelines SST infections. *CID* 2005; 41: 1373-406. [5]Intra-abdominal infection guidelines. *CID* 2010; 50: 133-164. [6]Trial of Short-Course Antimicrobial Therapy for Intraabdominal Infection. *NEJM* 2015; 372:1996-2005 [7]Guidelines for uncomplicated acute bacterial cystitis and acute pyelonephritis in women. *CID 2011;* 52:e103-2. [10]Antimicrobial prophylaxis in surgery. *AJHP. 2013; 70:195-283* [8]IDSA guidelines on Anitmicrobial agent in Neutropenic Patients. *CID* 2011; e56-93.