



Empiric Antibiotic Guidelines

Updated February 2019

Full antibiogram available electronically on the intranet.
For a printed copy of the antibiogram, please contact pharmacy or infection prevention.

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Clinical Pearls	
Asymptomatic bacteriuria	<ul style="list-style-type: none"> 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 Document as asymptomatic bacteriuria
Urinary tract infections	<ul style="list-style-type: none"> Since <i>E. coli</i> is the most common cause of UTI, consider using ceftriaxone for empiric therapy as opposed to levofloxacin or ciprofloxacin <i>E. coli</i> is 100% susceptible to ceftriaxone and only 60% susceptible to levofloxacin and ciprofloxacin*
Skin and soft tissue infections	<ul style="list-style-type: none"> Clindamycin combination therapy is only indicated in Group A <i>Streptococcus</i> infections Purulent infection, moderate to severe: consider MRSA coverage with vancomycin Non-purulent or diffuse infections, mild to moderate: β-lactam (cefazolin) is preferred. Consider clindamycin as an allergic alternative Avoid using trimethoprim/sulfamethoxazole empirically due to lack of <i>Streptococcus</i> coverage
Methicillin-susceptible <i>Staphylococcus aureus</i> (MSSA)	<ul style="list-style-type: none"> Cefazolin (IV) or cephalexin (PO) are the drugs of choice Nafcillin is an alternative
Methicillin-resistant <i>Staphylococcus aureus</i> (MRSA)	<ul style="list-style-type: none"> Of the 771 <i>Staphylococcus aureus</i> isolates, 68% (528) were MRSA.* Vancomycin IV is the drug of choice
Enterococcal infections	<ul style="list-style-type: none"> Ampicillin (IV) or amoxicillin (PO) are the drugs of choice, unless resistant <ul style="list-style-type: none"> <i>Enterococcus faecalis</i> is 100% susceptible to ampicillin* Adding a β-lactamase inhibitor (ampicillin/sulbactam or amoxicillin/clavulanate) does not add any benefit, as this is not the resistance mechanism of <i>Enterococcus</i> Cephalosporins do not cover <i>Enterococcus</i>
Extended-spectrum beta-lactamase producers (ESBLs)	<ul style="list-style-type: none"> Meropenem is the preferred drug for ESBLs Only 18% of <i>E. coli</i> were ESBLs in 2018*
<i>Haemophilus influenzae</i> and <i>Moraxella catarrhalis</i>	<ul style="list-style-type: none"> 25% of <i>H. influenzae</i> and 88% of <i>M. catarrhalis</i> are β-lactamase producing Preferred therapy includes: IV: ceftriaxone or ampicillin/sulbactam PO: cefuroxime or amoxicillin/clavulanate
Candida infections	<ul style="list-style-type: none"> Fluconazole is the drug of choice for <i>C. albicans</i> For fungemia, consider micafungin empirically and narrowing to fluconazole if <i>C. albicans</i> is isolated Micafungin is the echinocandin on formulary

*data based on 2019 antibiogram at Rapides Regional Medical Center

De-escalation Tips	
<ul style="list-style-type: none"> Evaluate 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
<i>S. aureus</i> is not isolated	DC vancomycin
Resistant gram-negative organisms are not isolated (e.g. <i>Pseudomonas</i> , <i>Enterobacter</i>)	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 1 st generation cephalosporin	Do not use a 3 rd 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
1 st and 2 nd generation cephalosporins	2.4
3 rd and 4 th 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 contact the pharmacy.

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

Disease State	Common Pathogens	Adult Empiric Therapy*	Duration of Therapy
C difficile¹	Initial episode: Mild, Moderate, severe	Vancomycin 125 mg PO Q6 hours	10 days
	Initial episode: fulminant	Vancomycin 500 mg PO Q6 hours + Metronidazole 500 mg IV Q8 hours	10 – 14 days
	First recurrence	Vancomycin 125 mg PO Q6 hours x 10-14 days THEN prolonged taper and pulsed dosed regimen for 2-8 weeks	See empiric therapy column
	Second or subsequent recurrences	Vancomycin 125 mg PO Q6 hours x 10-14 days THEN prolonged taper and pulsed dosed regimen for 2-8 weeks	See empiric therapy column
Diabetic Foot Infections²	Polymicrobial: β-hemolytic Strep <i>S. aureus</i> <i>Pseudomonas</i> Gram-negative rods Anaerobes	Ampicillin/Sulbactam 3 gm IV Q6 hours or <i>If Pseudomonas concern:</i> Piperacillin/Tazobactam extended infusion 3.375gm IV Q8 hours +/- <i>if MRSA concern</i> Vancomycin (20-25 mg/kg load plus RX to dose)	Patient and pathogen dependent
Intra-abdominal Infections³	Abscess Cholecystitis Diverticulitis <i>Enterococcus</i> <i>Entero-</i> <i>bacteriaceae</i> <i>Anaerobes</i>	<i>Mild to moderate:</i> Ceftriaxone 1 gm IV Q24 hours + Metronidazole 500 mg PO Q12 hours OR <i>Severe:</i> Piperacillin/Tazobactam extended infusion 3.375gm IV Q8 hours	After source control: 4-7 days Abscess: Varies based on patient response
Meningitis⁴ (COMMUNITY ACQUIRED)	Age <50 yrs <i>S. pneumoniae</i> <i>N. meningitides</i>	Ceftriaxone 2 gm IV Q12 hours + Vancomycin (20-25 mg/kg load plus RX to dose) +/- Ampicillin 2gm IV Q4 hours <i>if Listeria concern</i>	Patient and pathogen dependent
Age >50 yrs <i>S. pneumoniae</i> <i>N. meningitides</i> <i>Listeria</i>	Ceftriaxone 2gm IV Q12 hours + Vancomycin (20-25mg/kg load plus Rx to Dose) + Ampicillin 2gm IV Q4 hours		
Neutropenic Fever⁵	<i>S. epidermidis</i> <i>K. pneumoniae</i> <i>P. aeruginosa</i> <i>S. aureus</i> <i>E. coli</i>	Zosyn 3.375 gm IV Q8 hours +/- Vancomycin (20-25mg/kg load plus Rx to Dose) +/- Levofloxacin 750 mg IV q24h	Continue until neutropenia subsides (ANC ≥ 500 cells/mm ³) and afebrile or longer if clinically necessary depending on symptoms and pathogens
Pneumonia⁶⁻¹⁰	Community-Acquired (CAP) <i>S. pneumoniae</i> <i>M. pneumoniae</i> <i>C. pneumoniae</i> <i>H. influenzae</i>	Ceftriaxone 1 gm IV Q24 hours + Azithromycin 500 mg IV/PO daily Cephalosporin allergy: <i>Non-ICU:</i> Levofloxacin 750 mg IV/PO Q24 hours <i>ICU:</i> Aztreonam 1gm IV Q8 hours + Levofloxacin 750 mg IV/PO Q24 hours	5 days Longer courses may be clinically necessary depending on symptoms and pathogens
	Aspiration Anaerobes	Ampicillin/Sulbactam 3gm IV Q6 hours OR Clindamycin 600mg IV Q8 hours OR Metronidazole 500mg IV Q6 hours + Ceftriaxone 1gm IV Q24 hours OR <i>if cephalosporin allergy</i> Levofloxacin 750 mg IV Q24 hours	5 days

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

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 contact the pharmacy.

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

Disease State	Common Pathogens	Adult Empiric Therapy*	Duration of Therapy	
Pneumonia ⁶⁻¹⁰	Hospital-Acquired (HAP/ Ventilator-Associated (VAP))	<i>P. aeruginosa</i> <i>K. pneumoniae</i> <i>Acinetobacter</i> <i>S. aureus</i> (MRSA)	Piperacillin/Tazobactam 3.375gm IV Q8 hours OR Ceftazidime 2 gm IV Q8 hours +/- (if MRSA likely): Vancomycin (20-25 mg/kg load plus RX to dose) +/- (Consider adding if patient has high risk of mortality or has received IV antibiotics during the previous 90 days): Amikacin RX to dose OR Tobramycin RX to dose OR Levofloxacin 750mg IV daily	7 days
Septic Joint ¹¹	STD risk: <i>N. gonorrhoeae</i> , <i>S. aureus</i> , <i>Streptococcus</i>	Ceftriaxone 1g IV Q24 hours + Vancomycin (20-25 mg/kg load plus Rx to dose) +/- Azithromycin 1gm PO once <i>if STD risk to cover Chlamydia trachomatis</i>	Patient and pathogen dependent	
	Low STD risk: <i>S. aureus</i>			
SSTI: Cellulitis and Erysipelas ¹²	Non-Purulent/ Erysipelas	<i>Mild to Moderate:</i> Cefazolin 1gm IV Q8 hours OR Nafcillin 1gm IV Q4 hours <i>Severe:</i> Vancomycin (20-25 mg/kg load plus pharmacy protocol)+ Piperacillin/Tazobactam extended infusion 3.375gm IV Q8 hours	Uncomplicated: 5 days Abscess/Complicated: 7-10 days Longer courses may be clinically necessary depending on symptoms and pathogens	
	Purulent/ Abscess or Risk of MRSA	<i>S. aureus</i> Vancomycin (20-25 mg/kg load plus pharmacy protocol)		
Surgical Prophylaxis ¹³	Pre-operative	See: Guidelines for Antimicrobial Prophylaxis for Adult Surgery		
	Post-Operative	No antibiotic prophylaxis is necessary to be continued post-op. If it is clinically necessary to continue antibiotics for prophylaxis do not exceed 24 hours post-op and 48 hours for cardiac surgeries.		
Urinary Tract Infections ¹⁴	Cystitis	<i>E. coli</i> <i>Proteus</i> <i>Klebsiella</i> <i>Enterococcus</i>	<i>Uncomplicated:</i> Nitrofurantoin 100 mg PO BID OR Cephalexin 500 mg PO Q6 hours <i>if resistance or allergy</i> <i>Complicated:</i> Ampicillin 2gm IV Q6 hours + Gentamicin 5mg/kg IV Q24 hour (or per pharmacy protocol) OR Piperacillin/Tazobactam extended infusion 3.375gm IV Q8 hours	Uncomplicated: 3-5 days Complicated: 7-10 days Complicated with structural abnormalities or pyelonephritis: 14 days
	Pyelonephritis		Ceftriaxone 1 gm IV Q24 hours	

References: ¹IDSA/SHEA C difficile Guidelines. *CID* 2018; 66:987-994. ²Diagnosis and treatment of diabetic foot infections. *CID* 2012; 54: e132-73. ³Intra-abdominal infection guidelines. *CID* 2010; 50: 133-164. ⁴Guidelines for bacterial meningitis. *CID* 2004; 39: 1267-84. ⁵IDSA guidelines on Antimicrobial agent in Neutropenic Patients. *CID* 2011; 52:62-111. ⁶IDSA/ATS guidelines on CAP in adults. *CID* 2007; 44: S27-72. ⁷ATS, IDSA. Guidelines for adults with HAP, VAP, HCAP pneumonia. *Am J Respir Crit Care Med* 2005; 171: 388-416. ⁸Management 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. ⁹Gross AE et al. Epidemiology and Predictors of Multidrug-Resistant Community-Acquired and Health Care-Associated Pneumonia. *Antimicrob Agents Chemother*. 2014; 58(9):5262. ¹⁰Attridge 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]. ¹¹Guidelines for the diagnosis and management of prosthetic joint infection. *CID* 2013; 56: 1-25. ¹²Guidelines SSTI infections. *CID* 2014; 59: 10-52. ¹³Antimicrobial prophylaxis in surgery. *AJHP*. 2013; 70:195-283. ¹⁴Guidelines for uncomplicated acute bacterial cystitis and acute pyelonephritis in women. *CID* 2011; 52:e103-2.

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 contact the pharmacy.

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

Disease State	Common Pathogens	Pediatric Empiric Therapy*	Duration of Therapy	
Intra-abdominal Infections ^{1,2}	Abscess Cholecystitis Diverticulitis	<i>Enterococcus</i> <i>E. coli</i> <i>Enterobacteriaceae</i> Anaerobes	Ceftriaxone 50 mg/kg (max dose 2000mg) IV Q12 hours + Metronidazole 10 mg/kg (max dose 500mg) IV Q8 hours	After source control: 4-7 days Abscess: Varies based on patient response
	Age < 1 month	<i>S. agalactiae</i> <i>E. coli</i> <i>Listeria</i>	Ampicillin 50-100 mg/kg IV Q6 hours + Cefotaxime 50 mg/kg IV Q6 hours OR Gentamicin 4 mg/kg Q24 hours	Patient and pathogen dependent
Age 1 month to 18 years	<i>S. pneumoniae</i> <i>N. meningitidis</i> <i>H. influenzae</i>	Ceftriaxone 50mg/kg (max dose 2000mg) IV Q12 hours + Vancomycin 1 month-12 years: 15 mg/kg Q6 hours Vancomycin >12 years: 20 mg/kg Q8 hours OR Vancomycin per pharmacy protocol		
Neutropenic Fever ⁴	<i>S. epidermidis</i> <i>K. pneumoniae</i> <i>P. aeruginosa</i> <i>S. aureus</i> <i>E. coli</i>	Ceftriaxone 50 mg/kg IV Q12 hours ± Vancomycin 1 month-12 years: 15 mg/kg Q6 hours Vancomycin >12 years: 20 mg/kg Q8 hours OR Vancomycin per pharmacy protocol	Continue until neutropenia subsides (ANC ≥ 500 cells/mm ³) and afebrile or longer if clinically necessary depending on symptoms and pathogens	
Pneumonia ^{5,6}	Community Acquired (CAP)	<i>S. pneumoniae</i> <i>M. pneumoniae</i> <i>C. pneumoniae</i> <i>H. influenzae</i> <i>C. trachomatis</i>	<p>Simple, Untreated, Immunized: Ampicillin 100 mg/kg (max dose 2000 mg) IV Q6-8 hours</p> <p>Non Fully Immunized, High-Level Penicillin Resistance to <i>Pneumococcal</i> Strains, Life-Threatening Infections OR failed outpatient treatment: Ceftriaxone 100 mg/kg (max dose 2000 mg) IV Q24 hours</p> <p>Optional Additional Coverage: Concern for Atypical Pathogens: Azithromycin 10 mg/kg (max dose 500 mg) IV Q24 hours x 2 doses, then 5 mg/kg (max dose 250 mg) IV daily x 3 doses</p> <p>Concern for <i>S. aureus</i>: Vancomycin 1 month-12 years: 15 mg/kg Q6 hours Vancomycin >12 years: 20 mg/kg Q8 hours OR Vancomycin per pharmacy protocol OR Clindamycin 10 mg/kg (max dose 600mg) IV Q6 hours</p>	10 days Shorter courses may be just as effective, specific pathogens may require longer therapy
	VAP, Risk of <i>Pseudomonas</i> or MRSA	<i>K. pneumoniae</i> <i>Acinetobacter</i> <i>P. aeruginosa</i> <i>S. aureus</i> (MRSA)	Ceftazidime 50 mg/kg Q8 hours OR Piperacillin/Tazobactam per pharmacy to dose Age <2 months: 80 mg of piperacillin/kg Q6 hours Age 2 - 9 months: 80 mg of piperacillin/kg IV Q8 hours Age >9 months: 100 mg/kg of piperacillin (max 4000 mg) IV Q8 hours + Vancomycin 1 month-12 years: 15 mg/kg Q6 hours Vancomycin >12 years: 20 mg/kg Q8 hours OR Vancomycin per pharmacy protocol ± Gentamicin Age < 1 month: per neonatal protocol Age > 1 month: per pharmacy protocol	7 days
SSTI: Cellulitis/ Erysipelas ⁷	Non-Purulent/ Erysipelas	β-hemolytic <i>streptococcus</i> <i>S. aureus</i>	<i>Mild to Moderate:</i> Cefazolin 30mg/kg (max dose 1000mg) IV Q8 hours OR Clindamycin 10 mg/kg IV Q6 hours <i>Severe:</i> Vancomycin 15 mg/kg (max dose 1000 mg) IV Q6 hours + Piperacillin/tazobactam 75mg of piperacillin/kg IV Q6 hours	Uncomplicated: 5 days Abscess/Complicated: 7-10 days
	Purulent/ Abscess or Risk of MRSA	<i>S. aureus</i>	Vancomycin 15 mg/kg(max dose 1000 mg) IV Q6 hours	
Urinary Tract Infections ⁸	<i>E. coli</i> <i>Proteus</i> <i>Klebsiella</i>	<i>Age less than 2 months:</i> Ampicillin 100 mg/kg IV Q6-8 hours + Cefotaxime 30-50 mg/kg IV Q8 hours + Gentamicin per pharmacy protocol <i>Age greater than 2 months:</i> Cephalexin 50 mg/kg/day (max dose 500mg/dose) PO divided Q6-8 hours OR Ceftriaxone 25-37.5 mg/kg (max dose 2000mg) IV Q12 hours	10 – 14 days	

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

Guidelines for Antimicrobial Prophylaxis for Adult Surgery

Prophylactic antibacterial agents should be initiated 1 hour prior to surgical incision and within 2 hours if vancomycin is used

Procedure	Recommended Prophylaxis	Alternative Prophylaxis
Cardiac: Pacemaker ICD	Cefazolin*	Clindamycin OR Vancomycin ¹
Cardiac Surgery [<i>Complete MRSA/MSSA culture and MRSA/MSSA PCR screening</i>]	Cefazolin*	Clindamycin ± Gentamicin ² Vancomycin ¹ ± Gentamicin ²
Vascular: Carotid Endarterectomy, Vascular Bypass, AAA Repair Endovascular, AAA Repair	Cefazolin	Clindamycin OR Vancomycin ¹
Thoracic: Thoracotomy	Cefazolin	Clindamycin ± Gentamicin ² Vancomycin ¹ ± Gentamicin ²
Gastroduodenal: Bariatric: <i>Use antimicrobial prophylaxis in high risk patients: increased gastric pH (receiving acid-suppression therapy), gastroduodenal perforation, decreased motility, gastric outlet obstruction, gastric bleeding, morbid obesity, ASA classification >3, and cancer</i>	Cefazolin	Clindamycin + Gentamicin Vancomycin ¹ + Gentamicin
Biliary Tract: Lap Chole, Cholecystectomy	Cefazolin	Clindamycin + Gentamicin
Appendectomy:	Cefoxitin or Cefotetan	Metronidazole + Gentamicin
Colorectal: Bowel Resection	Cefoxitin or Cefotetan	Clindamycin + Gentamicin Metronidazole + Gentamicin
Colorectal	Cefoxitin or Cefotetan	Clindamycin + Gentamicin Metronidazole + Gentamicin
Neurosurgery: Craniotomy	Cefazolin	Clindamycin OR Vancomycin ¹
Cesarean Delivery: OB C Section	Cefazolin	Clindamycin + Gentamicin
GYN General Surgery: Vaginal or Abdominal Hysterectomy	Cefazolin OR Cefotetan	Clindamycin + Gentamicin
Orthopedic: Ortho, Spine Surg, Laminectomy [<i>Complete MRSA/MSSA culture and MRSA/MSSA PCR screening</i>]	Cefazolin* ± Gentamicin ²	Clindamycin ± Gentamicin ² Vancomycin ¹ ± Gentamicin ²
Extremity FX, Upper Extremity FX, Total Shoulder, Hip, & Knee, Hip Pelvic Fx	Cefazolin*	Clindamycin OR Vancomycin ¹
Urologic: Cystoscopy TURP, Prostatectomy, TUR Bladder Tumor	Gentamicin OR Ceftriaxone	N/A
Breast Surgery:	Cefazolin	Clindamycin OR Vancomycin ¹

¹Vancomycin can be used in patients with beta-lactam allergy in settings where infections with MRSA are prevalent, or if patient has known MRSA colonization or recent history of MRSA infection (must document justification for use).

²Add gentamicin when gram-negative pathogens are a concern

*Add vancomycin to cefazolin if MRSA nasal carriage is confirmed or unknown