# San Francisco VA Medical Center
# Antimicrobial Guidebook – 2023 Edition

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**Approved by:**
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Pharmacy and Therapeutics Committee
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**Acknowledgments**:
Thanks to past and current staff of the Pharmacy Service and Infectious Diseases Section for preparing, compiling, and reviewing the materials contained in this pamphlet.

**Updated: June 2023**

# Table of Contents

# Phone/Pager Numbers

| | |
|---|---|
| Inpatient ID/ ASP Pharmacist | Pager (415) 223 – 8046 or EXT 25269 |
| ID Fellow | Pager (415) 443 – 5151 |
| COVID-19 Attending | Pager (415) 443-0427 |
| HIV Pharmacist | EXT 24793 |
| Outpatient Pharmacy | EXT 22708 |
| Inpatient Pharmacy | EXT 22934 or 22935 |
| Microbiology Lab | EXT 22267 or 23782 |
| Lab Send Out | 26583 |
| Infection Control (6AM – 4:30PM) | EXT 26269 |
| Occupational Health (8AM – 4:30PM) | Phone (415) 469 – 4411 |

# Resources

SFVA Specific Guidelines on SFVA Intranet

- Isolation Instructions (type of isolation by organism), interpreting C. Diff testing results, rule out TB algorithm:
  - Infection Control - Algorithms - All Documents (sharepoint.com)
- SFVAMC Antibiogram:
  - SFVAMC SharePoint: Antibiograms
- Infection Control Manual:
  - Infection Control - IC Manual - All Documents (sharepoint.com)

UCSF Infectious Diseases Management Program:

- Guidelines for Empiric Antimicrobial Therapy
  - https://idmp.ucsf.edu/guidelines-empiric-antimicrobial-therapy
- Antimicrobial Dosing Guidelines
  - https://idmp.ucsf.edu/antimicrobial-dosing-guidelines

SFVA Specific Guidelines under Hospital Specific Guidelines on IDMP:

- VASF Antimicrobial Guidebook
  - Guidelines At VASF | Infectious Diseases Management Program at UCSF

# Antibiograms (Urine and Non-Urine)

Please note the following comments:

- All data is reported as percent fully susceptible
- First isolate per patient per organism is counted in the antibiogram
- 30 organisms are required to report susceptibilities on an antibiogram per CLSI guidelines. Some organisms were included in despite less than 30 organisms isolated
- When treating UTIs, cefazolin can be used to predict results for the following oral agents: cephalexin (Keflex) and cefpodoxime (Vantin)
- Gentamicin susceptibilities for enterococcus are for gram-positive synergy
- Non-urine coagulase-negative *staphylococcus* includes: *S. capitis, S. cohnii, S. epidermidis, S. haemolyticus, S. hominis, S. lugdunensis, and S. saprophyticus, S. warneri*
- Urine coagulase-negative *staphylococcus* includes: *S. epidermidis, S. haemolyticus, S. lugdunensis, and S. saprophyticus*
- Key: ESBL: Extended-spectrum beta-lactamase; CR: Carbapenem resistant; MR: Methicillin resistant; NA: Not available; R: Intrinsic resistance

## Non-Urine Culture Antibiogram

| | # Isolates | Ampicillin | Cefazolin | Ceftriaxone | Ertapenem | Piperacillin/ tazobactam | Cefepime | Ciprofloxacin | Levofloxacin | Gentamicin | Oxacillin | Sulfamethoxazole/ trimethoprim | Clindamycin | Doxycycline | Vancomycin | Linezolid | Daptomycin |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Gram negative** | | | | | | | | | | | | | | | | | |
| *Enterobacter cloacae complex* | 29 | R | R | R | 93 | R | 100 | 97 | 97 | 100 | R | NA | R | R | R | R | R |
| *Escherichia coli* (ESBL 8%) | 49 | 53 | NA | 92 | 100 | 100 | 92 | 59 | 71 | 96 | R | NA | R | R | R | R | R |
| *Klebsiella pneumoniae* (ESBL 20%) | 30 | R | NA | 80 | 100 | 90 | 80 | 70 | 70 | 83 | R | NA | R | R | R | R | R |
| *Proteus mirabilis* | 37 | 69 | NA | 76 | 96 | 95 | 76 | 78 | 78 | 92 | R | NA | R | R | R | R | R |
| *Pseudomonas aeruginosa (*CR 5%) | 61 | R | R | R | R | 98 | 87 | 75 | 69 | 93 | R | R | R | R | R | R | R |
| **Gram positive** | | | | | | | | | | | | | | | | | |
| *Enterococcus faecalis* (VRE 0%) | 29 | 100 | R | R | R | 100 | R | NA | NA | 79 | NA | R | R | R | 100 | 100 | 100 |
| *Staphylococcus aureus* | 242 | R | 64 | NA | NA | NA | NA | NA | NA | R | 64 | 96 | 79 | 96 | 100 | 100 | 100 |
| MSSA (36%) | 87 | R | 100 | NA | NA | NA | NA | NA | NA | R | 100 | 96 | 79 | 99 | 100 | 100 | 100 |
| MRSA *(64%)* | 155 | R | R | NA | NA | NA | NA | NA | NA | R | R | 90 | 67 | 93 | 100 | 100 | 100 |
| Coagulase-negative *staphylococcus* | 88 | R | 48 | NA | NA | NA | NA | NA | NA | R | 48 | 72 | 84 | 82 | 99 | 98 | 70 |
| *Staphylococcus epidermitis (MR 52%)* | 49 | | 41 | NA | NA | NA | NA | NA | NA | R | 41 | 57 | 57 | 82 | 100 | 100 | 100 |

## Urine Culture Antibiogram

| | # Isolates | Ampicillin | Amoxicillin/ clavulanate | Cefazolin | Ceftriaxone | Ciprofloxacin | Gentamicin | Levofloxacin | Nitrofurantoin | Sulfamethoxazole / trimethoprim | Oxacillin | Vancomycin |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Gram negative** | | | | | | | | | | | | |
| *Enterobacter cloacae complex* | 44 | R | R | R | R | 93 | 100 | 91 | 50 | 84 | R | R |
| *Escherichia coli* (ESBL 11%) | 388 | 51 | 87 | 85 | 88 | 75 | 91 | | 98 | 77 | R | R |
| *Klebsiella oxytoca (CR 2%)* | 43 | R | 91 | 86 | 88 | 93 | 93 | 91 | 84 | 86 | R | R |
| *Klebsiella pneumoniae* (ESBL 9%) | 102 | R | 83 | 88 | 90 | 88 | 94 | 83 | 48 | 87 | R | R |
| *Proteus mirabilis (CR 5%)* | 104 | 76 | 83 | 71 | 72 | 78 | 90 | 79 | R | 81 | R | R |
| *Pseudomonas aeruginosa (CR 3%)* | 86 | R | R | R | R | 90 | 97 | 86 | R | R | R | R |
| **Gram positive** | | | | | | | | | | | | |
| *Enterococcus faecalis (VRE 1%)* | 149 | 99 | 99 | R | R | R | R | NA | 100 | R | NA | 99 |
| *Staphylococcus aureus* (MRSA 52%) | 61 | R | NA | 48 | NA | R | R | NA | 100 | 98 | 48 | 100 |
| Coagulase-negative *staphylococcus* | 26 | R | NA | 80 | R | R | R | NA | 92 | 81 | 80 | 100 |

# Spontaneous Bacterial Peritonitis (SBP)

Approximately 1/3 of cirrhotic patients have bacterial infections. Spontaneous bacterial peritonitis (SBP) is a common infection in this setting which occurs in the absence of an obvious source of infection. Presence of fever or hypothermia, chills, and localizing symptoms should raise suspicion for bacterial infection. Signs/symptoms specific to SBP are abdominal pain, tenderness on palpation +/- rebound tenderness, and ileus. However, typical symptoms may be absent in cirrhotic patients. Common pathogens include gut bacteria (*E. coli*, *Klebsiella spp.*) and *Streptococci spp*.

**Diagnosis**

- Diagnostic abdominal paracentesis for cell count and bacterial culture, even in absence of signs/symptoms of infection.
  - Culture ascitic fluid before initiating antibiotics.
- Polymorphonuclear (PMN) leukocyte count >250/mm$^3$ indicates SBP → Start empiric antibiotics.

## I. SBP Empiric Treatment: Expected duration 5-7 days

| SBP Infection | Empiric Therapy |
|---|---|
| Community Acquired[+] | Ceftriaxone 1 gm IV q24h |
| Nosocomial[++] | Piperacillin/tazobactam^* 4.5 gm IV q6h |
| Septic shock;<br>History of ampicillin-resistant *enterococcus* infection;<br>IV antibiotic use and hospitalization within prior 90 days; Positive MRSA nasal swab or prior MRSA infection | Piperacillin/tazobactam^* 4.5 gm IV q6h<br>**PLUS**<br>Vancomycin IV (see pages 36-37 for dosing) |
| History of Vancomycin-Resistant *Enterococcus* spp. (VRE) | Piperacillin/tazobactam^* 4.5 gm IV q6h<br>**PLUS**<br>Daptomycin* 10 mg/kg IV q24h |

[+] Present at or acquired within the first 48 hours of admission [++] Acquisition of infection >48 hours after admission

^ If patient received > 48 hours of piperacillin/tazobactam within the prior 60 days, consider empiric meropenem*

* Contact ID for approval (EXCEPTION: piperacillin/tazobactam may be used in ICU without ID prior approval)

## II. SBP Prophylaxis

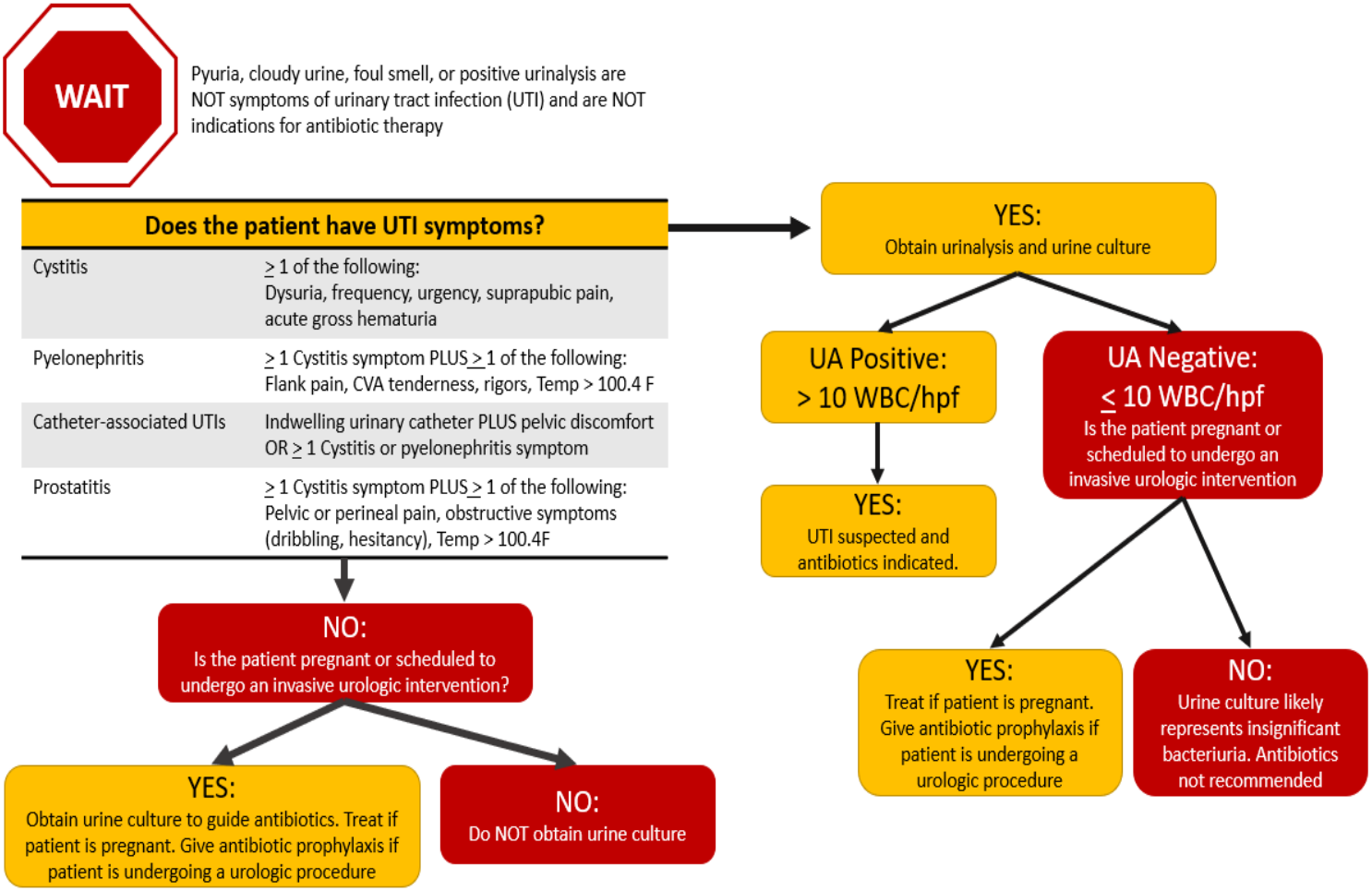
| Prophylaxis Criteria | Antibiotic Therapy | Duration |
|---|---|---|
| **Primary Prophylaxis**<br><br>Advanced cirrhosis without prior episode of SBP and Acute upper gastrointestinal hemorrhage | **Preferred**: Ceftriaxone 1 gm IV Q24H<br><br>**Alterative initial agent/ PO step down**:<br>Ciprofloxacin* 500 mg PO q12h<br>Sulfamethoxazole-trimethoprim 1 DS PO tab q12h | 7 days |
| **Primary Prophylaxis**<br>Low ascitic protein (<1.5 g/dL) AND<br>• Renal dysfunction (Cr ≥ 1.2 mg/dL, BUN ≥ 25 mg/dL, or Serum Na ≤ 130 mEq/L<br>OR<br>• Liver failure (CTP ≥ 9, total bilirubin ≥ 3 mg/DL) | **Preferred**: Ciprofloxacin* 500 mg PO Q24H<br><br>**Alternative:**<br>Sulfamethoxazole-trimethoprim 1 DS PO tab daily | Long term |
| **Secondary Prophylaxis**<br><br>Prior episode of SBP | **Preferred**: Ciprofloxacin* 500 mg PO Q24H<br><br>**Alternatives:**<br>Sulfamethoxazole-trimethoprim 1 DS PO tab daily<br>Rifaximin[#] 400 mg PO TID | Long term |

[#] Place pharmacy NFDR consult *Contact ID for inpatient use

References: 1. Biggins, Scott W., et al. "Diagnosis, evaluation, and management of ascites, spontaneous bacterial peritonitis and hepatorenal syndrome: 2021 practice guidance by the American Association for the Study of Liver Diseases." Hepatology 74.2 (2021): 1014-1048.

# Urinary Tract Infections (UTI)

Diagnosis




**Common Causative Organisms**

*E. coli, Proteus spp., Klebsiella spp. Pseudomonas spp.* (if at least 1 risk factor^ present)

^Pseudomonal risk factors include: hospitalization within the last 30 days AND received IV antibiotics, history of prior pseudomonal infection, immunocompromised (uncontrolled HIV, transplant, etc.)

**Uncomplicated vs complicated UTI**

- Uncomplicated: UTI in a patient with a normal GU tract and no recent instrumentation
- Complicated: UTI in the presence of an anatomic abnormality, functional abnormality, recent GU instrumentation, or foreign material (e.g., ureteral stent)

**Clinical Pearls**

- When results are available, treatment should be tailored based on culture data
- Asymptomatic bacteriuria does not require antibiotic therapy for most patients. Antibiotics are only indicated for:
- Pregnancy: cystitis treatment
- Urological procedure: 1 dose prior to procedure and 1 to 2 doses after
- Catheter associated UTIs (CAUTI) require change in catheter and then may be treated based on site of infection
- Lower cefepime doses are used to treat Pseudomonal UTIs compared to systemic pseudomonal infections due to high urinary concentration (85% of unchanged drug excreted via urine)

**Empiric Outpatient UTI Treatment**

| Diagnosis | Preferred Treatment | Duration |
|---|---|---|
| Uncomplicated cystitis | Cephalexin 500 mg PO q12h | 7 days |
| | Nitrofurantoin 100 mg PO q12h | Male: 7 days Female: 5 days |
| | Ciprofloxacin 500 mg PO q12h (*pseudomonas* risk^) | 7 days |
| CAUTI | Cephalexin 500 mg PO q6h | Prompt symptom resolution: 7 days<br>Delayed response: 10 - 14 days |
| | Sulfamethoxazole-trimethoprim 1 DS PO q12h | |
| | Ciprofloxacin 500 mg PO q12h (*pseudomonas* risk^) | |
| Pyelonephritis or complicated UTI | Ceftriaxone 1 gm x1 IM, then Cephalexin 500 mg PO q12h | 10 – 14 days |
| | Sulfamethoxazole-trimethoprim 1 DS PO q12h | 10 - 14 days |
| | Ciprofloxacin 500 mg PO q12h (*pseudomonas* risk^) | 7 days |
| Epididymitis | Levofloxacin* 500 mg PO daily | 10 days |
| | If concerned about sexually transmitted chlamydia and gonorrhea ADD: Doxycycline 100 mg PO BID x7 days<br>AND one-time dose of IM ceftriaxone:<br>Total body weight < 150 kg: ceftriaxone 500 mg IM x1<br>Total body weight ≥ 150 kg: ceftriaxone 1000 mg IM x1 | |
| Acute bacterial prostatitis | Sulfamethoxazole-trimethoprim 1 DS PO q12h | 14 days |
| | Ciprofloxacin 500 mg PO q12h | |
| Chronic prostatitis | Consider consulting urology service | |

**Empiric Inpatient UTI Treatment**

| Diagnosis | Preferred Treatment | Duration |
|---|---|---|
| Community acquired uncomplicated cystitis | Cephalexin 500 mg PO q12h | 7 days |
| | Nitrofurantoin 100 mg PO q12h | Male: 7 days Female: 5 days |
| | Ciprofloxacin* 500 mg PO q12h (*pseudomonas* risk^) | 7 days |
| Community acquired pyelonephritis or complicated UTI | Ceftriaxone 1 gm IV q24h | All IV or step down to PO fluroquinolone: 7 days<br><br>PO Step down to beta-lactam or sulfa-trimethoprim: 10 - 14 days |
| | Cefepime* 2 gm IV q12h (*pseudomonas* risk^) | |
| Healthcare associated complicated or uncomplicated UTI | Ertapenem 1 gm IV q24h | Prompt symptom resolution: 7 days<br>Delayed response: 10 - 14 days |
| | Cefepime* 2 gm IV q12h (*pseudomonas* risk^) | |
| CAUTI | Ceftriaxone 1 gm IV q24h | Prompt symptom resolution: 7 days<br>Delayed response: 10 - 14 days |
| | Cefepime* 2 gm IV q12h (*pseudomonas* risk^) | |
| Acute bacterial Prostatitis | Sulfamethoxazole-trimethoprim 1 DS PO q12h | 14 days |
| | Ciprofloxacin* 500 mg PO q12h | |

*Contact ID for approval

^Pseudomonal risk factors include hospitalization within the last 30 days AND received IV antibiotics, history of prior pseudomonal infection, immunocompromised (uncontrolled HIV, transplant, etc.)

References:

1. Gupta, Kalpana, et al. "International clinical practice guidelines for the treatment of acute uncomplicated cystitis and pyelonephritis in women: a 2010 update by the Infectious Diseases Society of America and the European Society for Microbiology and Infectious Diseases." Clinical infectious diseases 52.5 (2011): e103-e120.
2. Hooton, Thomas M., et al. "Diagnosis, prevention, and treatment of catheter-associated urinary tract infection in adults: 2009 International Clinical Practice Guidelines from the Infectious Diseases Society of America." Clinical infectious diseases 50.5 (2010): 625-663.

# Community Acquired Pneumonia (CAP)

**Diagnosis**

Requires the presence of clinical features (cough, fever, sputum production, pleuritic chest pain) AND chest infiltrate demonstrated on imaging

**Common Causative Organisms**

*Streptococcus pneumoniae, Mycoplasma pneumoniae, Chlamydia pneumoniae, Haemophilus influenzae, Moraxella catarrhalis,* Respiratory viruses

**Outpatient Empiric CAP Treatment**

| | |
|---|---|
| Previously healthy<br>**AND**<br>no antibiotics in the past 3 months | Doxycycline 100 mg PO BID (preferred)<br>**OR**<br>Amoxicillin 1 gm PO TID (alternative) |
| Antibiotic use in prior 3 months<br>**OR**<br>Presence of co-morbidities<br>• Immunosuppression<br>• Chronic heart, lung, liver, or renal disease<br>• Diabetes mellitus<br>• Alcoholism<br>• Malignancy<br>• Asplenia | **Combination Therapy (preferred):**<br>Doxycycline 100 mg PO BID<br>**PLUS**<br>Amoxicillin 1 gm PO TID<br>**OR**<br>Amoxicillin/clavulanate 875/125 mg PO BID if pill burden or compliance concerns<br><br>**Monotherapy (alternative)**<br>Levofloxacin* 750 mg PO daily |

*Contact ID for approval

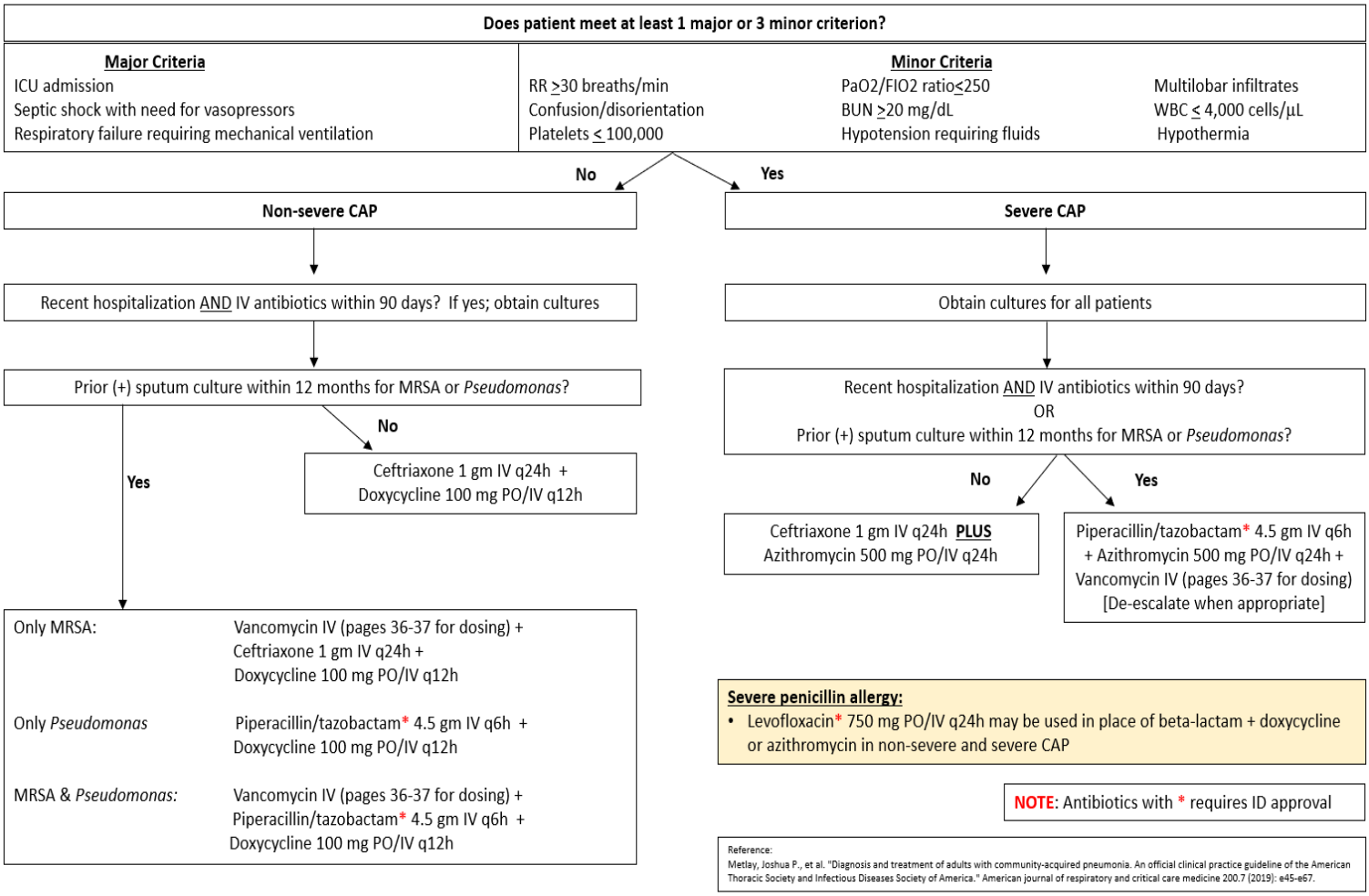
**Suggested Duration of Therapy**

- Patients should be treated for a minimum of 5 days
- Most patients are treated for 5-7 days

**Clinical Pearls**

- Routine sputum cultures and urine antigen tests are not recommended
- Consider testing for influenza and COVID-19 if patient exhibits flu-like symptoms during periods of high flu and SARS-CoV-2 activity
- Signs and symptoms of CAP may be lacking or altered in elderly patients
- Cough and chest X-ray abnormalities may take up to 6 weeks to improve and are NOT a valid reason to extend antibiotic courses

## Inpatient Empiric CAP Treatment




### Suggested Duration of Therapy

- Patients should be treated for a minimum of 5 days unless the patient has confirmed MRSA or *Pseudomonas aeruginosa* infection in which case the minimum duration is 7 days
- Patient should be afebrile for 48-72h, and should have no more than 1 of the following before stopping antibiotics:
  - Heart rate > 100 beats/min
  - Respiratory rate > 24 breaths/min
  - Systolic blood pressure < 90 mmHg
  - Arterial O2 saturation < 90%
  - Altered mental status

### Clinical Pearls

- Sputum cultures should be obtained for hospitalized patients with severe CAP or when strong risk factors for MRSA or *Pseudomonas* are identified
- MRSA nares should be obtained if empiric vancomycin therapy is initiated for pneumonia to assist with de-escalation (strong negative predictive value)
- For suspected influenza, obtain nasopharyngeal swabs for influenza antigen testing and respiratory virus DFA; if patient is hospitalized, place on droplet precautions until tests are negative, and treat with oseltamivir 75 mg PO bid for 5 days (reduce dose in renal insufficiency). ICU patients, immunocompromised patients, and obese patients may require higher doses and/or prolonged therapy.

References: Metlay, Joshua P., et al. "Diagnosis and treatment of adults with community-acquired pneumonia. An official clinical practice guideline of the American Thoracic Society and Infectious Diseases Society of America." American journal of respiratory and critical care medicine 200.7 (2019): e45-e67.

# Hospital Acquired Pneumonia and Ventilator Associated Pneumonia

| Risk Factors for MRSA | Risk Factors for Pseudomonas |
|---|---|
| • Prior intravenous antibiotic use within 90 days<br>• Hospitalization in a unit<br>• End stage renal disease<br>• IVDU<br>• Prior respiratory MRSA colonizer | • Prior intravenous antibiotic use within 90 days<br>• Bronchiectasis<br>• HIV<br>• Nursing homes |

**Hospital Acquired Pneumonia (HAP):**
Pneumonia not incubating at the time of hospital admission occurring ≥ 48 hours after admission

| Likely Pathogens | Therapy |
|---|---|
| **Patients not at high risk of mortality (not requiring ventilation because of pneumonia, not in septic shock) and without IV antibiotic use in the past 90 days, and low - no MRSA risk** | |
| *P. aeruginosa, S. pneumoniae*, *H. influenzae*, β-hemolytic *streptococcus* spp.<br>MSSA<br>Enteric gram-negative bacilli (*E. coli*; *Klebsiella; Proteus)* | Piperacillin/tazobactam* 4.5 gm IV q6h (preferred)<br>(if severe penicillin allergy: Aztreonam* 2 gm IV q8h + Metronidazole 500 mg IV q8h) |
| **Patients at high risk of mortality (requiring ventilation or in septic shock), receipt of IV antibiotic in the past 90 days, structural lung disease, and has risk factors for MRSA** | |
| *P. aeruginosa*<br>*S. pneumoniae*, *H. influenzae*, β-hemolytic *streptococcus* spp.<br>*Methicillin-resistant S. aureus* (MRSA)<br>MSSA<br>Enteric gram-negative bacilli (i.e., *E. coli*; *Klebsiella* spp.; *Enterobacter* spp.; *Proteus* spp.; *Serratia* spp.) | Piperacillin/tazobactam* 4.5 gm IV q6h (preferred)<br>(If severe penicillin allergy: Aztreonam* 2 gm IV q8h + Metronidazole 500 mg IV q8h<br><br>**PLUS**<br><br>Vancomycin IV one-time loading dose + maintenance dose (see pages 36-37 for dosing) |

* Contact ID for approval (exception: pip/tazo may be used in ICU without ID prior approval)

**Duration of Therapy:** Patients with HAP should be treated for 7 days. Shorter or longer duration of antibiotics may be indicated, depending upon the rate of improvement of clinical, radiologic, and laboratory parameters.

**Ventilator Associated Pneumonia (VAP)**
Pneumonia occurring ≥ 48 hours after endotracheal intubation

| Likely Pathogens | Therapy |
|---|---|
| *P. aeruginosa*<br>*Methicillin-resistant S. aureus* (MRSA)<br>*S. pneumoniae*, *H. influenzae*, β-hemolytic *streptococcus* spp.<br>MSSA<br>Enteric gram-negative bacilli (i.e., *E. coli*; *Klebsiella* spp.; *Enterobacter* spp.; *Proteus* spp.; *Serratia* spp.) | Piperacillin/tazobactam* 4.5 gm IV q6h<br>(If severe penicillin Allergy: Aztreonam* 2 gm IV q8h + Metronidazole 500 mg IV q8h)<br><br>AND<br><br>Vancomycin IV one-time loading dose + maintenance dose (see pages 36-37 for dosing) |

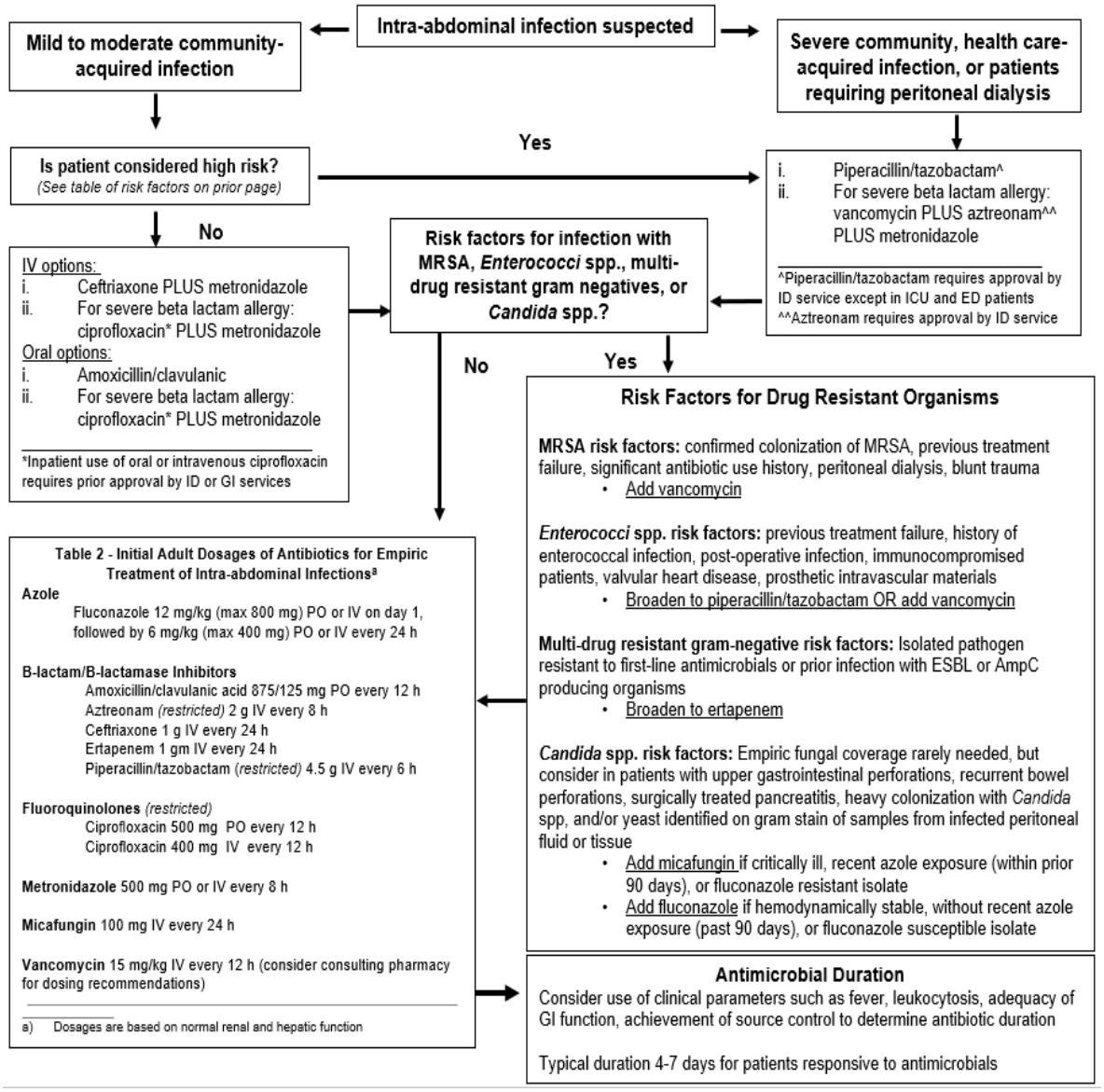
* Contact ID for approval (exception: pip/tazo may be used in ICU without ID prior approval)

**Duration of Therapy:** Patients with VAP should be treated for 7 days. Shorter or longer duration of antibiotics may be indicated, depending upon the rate of improvement of clinical, radiologic, and laboratory parameters.

# Intra-abdominal Infections (IAI)

- Intra-abdominal infections are those contained within the peritoneal cavity or retroperitoneal space.
- May be generalized or localized, complicated or uncomplicated, and community or healthcare-associated

| Possible Intra-abdominal Infection Etiologies[1] | Clinical Risk Factors Identifying Patients at High Risk[2,3,6] |
|---|---|
| • Peptic ulcer perforation<br>• Perforation of a gastrointestinal organ<br>• Appendicitis<br>• Endometritis secondary to intrauterine device<br>• Bile peritonitis<br>• Pancreatitis<br>• Operative contamination<br>• Diverticulitis<br>• Cholecystitis<br>• Intestinal neoplasms<br>• Secondary to peritoneal dialysis | Patients with ≥ 1 of the following:<br>• High severity of illness (APACHE II score ≥ 15)<br>• Severe sepsis or septic shock<br>• Diffuse, generalized peritonitis<br>• Delayed initial source control > 24 hours<br>• Inability to achieve adequate source control<br>Patients with ≥ 2 of the following:<br>• Advanced age ( ≥ 70 years of age)<br>• Malignancy<br>• Significant cardiovascular compromise<br>• Significant liver disease or cirrhosis<br>• Significant renal disease<br>• Hypoalbuminemia |



# *Clostridioides Difficile* Infection (CDI)

**Diagnosis**

- Presence of diarrhea defined as 3+ unformed stools within 24 hours AND either a positive stool test for *C. difficle* or presence of pseudomembranous colitis on colonoscopic or histopathologic exam

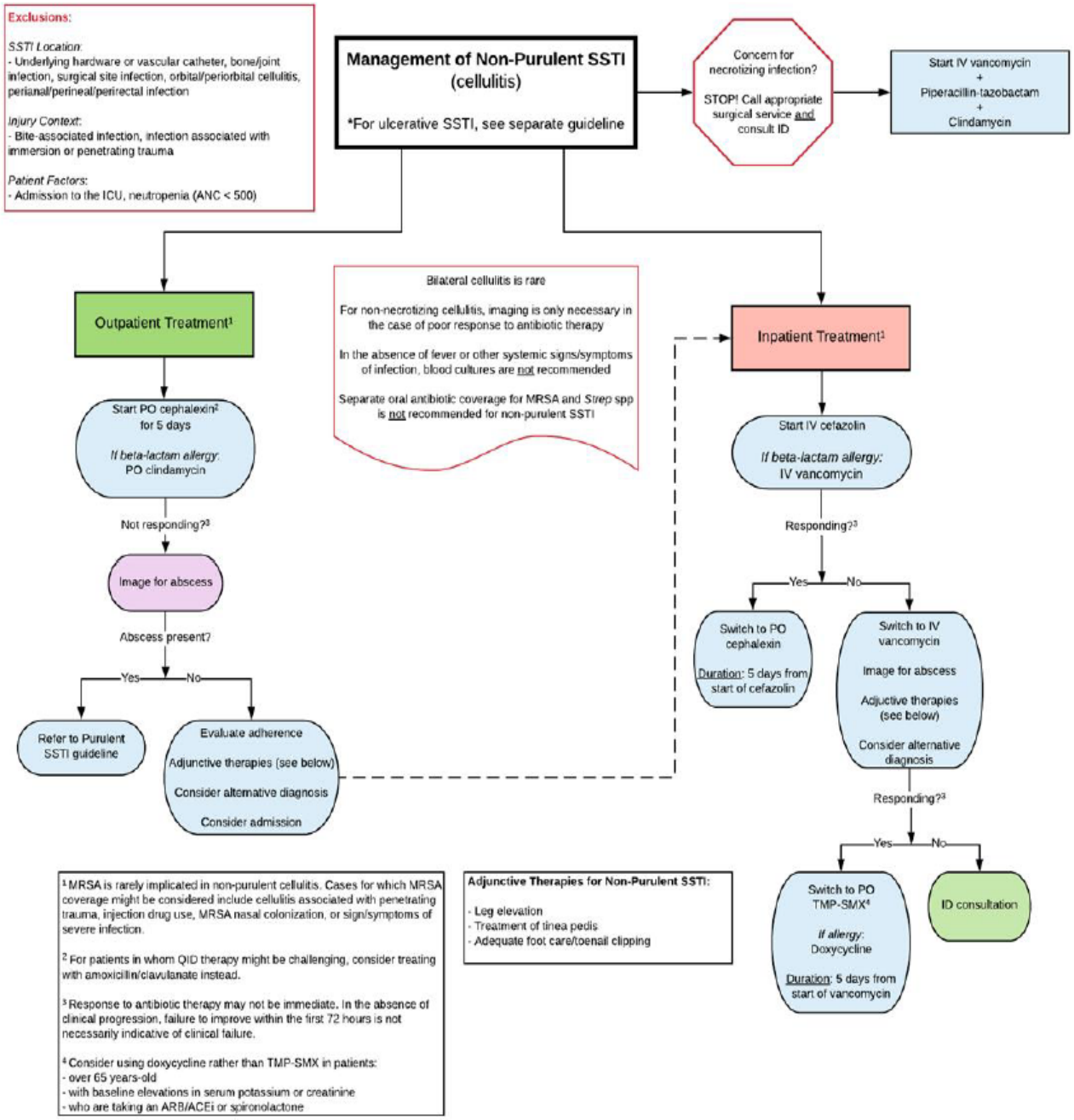
| Clinical Definition | Supportive Clinical Data |
|---|---|
| Asymptomatic colonization | Positive *C. difficle* PCR (only) **WITHOUT** diarrhea, ileus, or colitis |
| Active infection | Positive *C. difficle* PCR **AND** positive toxin A/B or GDH antigen |
| Fulminant | Active infection **PLUS** hypotension, shock, ileus, megacolon, or perforation |

| **CDI Treatment Regimens** | |
|---|---|
| Initial episode<br>Mild /Moderate/<br>Severe | Vancomycin 125 mg PO q6h for 10 days<br>OR<br>Fidaxomicin 200 mg PO q12h for 10 days <u>for patients at increased risk of CDI recurrence</u>:<br>• Age > 65 years old, immunosuppression, history of inflammatory bowel disease<br>• Concomitant antibiotic use during CDI treatment |
| 1st Recurrence | Fidaxomicin 200 mg PO q12h for 10 days |
| ≥ 2nd Recurrence | Vancomycin oral solution in a tapered regimen:<br>Vancomycin PO 125mg PO q6h x14 days, then 125mg PO q12h x7 days, then 125mg PO daily x7 days, then 125mg PO every other day x7 days, then 125mg every 3rd day x14 days<br>PLUS<br>Evaluate for fecal microbiota transplant (FMT) |
| Fulminant | Vancomycin oral solution 500mg PO q6h<br>If ileus is present, add metronidazole 500mg IV q8h and consider Vancomycin 500mg in 100ml normal saline given as a retention enema q6h. Therapy should be followed by a vancomycin taper (see below).<br>ID or GI and surgical consultation should be obtained for severely ill patients. |
| **CDI Prophylaxis Agents** | |
| Bezlotoxumab<br>10 mg/kg IV single dose<br><br>Infectious Diseases Section approval is required | <u>Initial episode</u>: Toxin antigen protein positive AND meets one of the following:<br>• Hematologic cancer with neutropenia (ANC < 500) expected > 30 days<br>• Recent bone-marrow transplant or treatment for GVHD<br>• Solid-organ transplant < 3 months<br>• Patient does not have history of heart failure<br><br><u>1st recurrence</u>: If recurrence occurred within previous 6 months<br><u>≥ 2nd recurrence</u>: All patients<br><br>• Given as a single, life-time dose.<br>• Must be administered during CDI treatment course.<br>• May be administered as in outpatient in the infusion center<br>• Patients with underlying congestive heart failure are at higher risk of mortality due to cardiac failure, reserved for use when the benefit outweighs the risk |
| Vancomycin<br>125 mg PO q12h | Must meet ALL of the following criteria:<br>• Recurrent episode of CDI within the past 6 months<br>• Patient requires treatment with antibiotics (beta-lactams, quinolones, or clindamycin) not directed against CDI in the inpatient setting<br>• No history of vancomycin allergy<br>Initiate as soon as possible and continue until antibiotics not directed against CDI are discontinued |

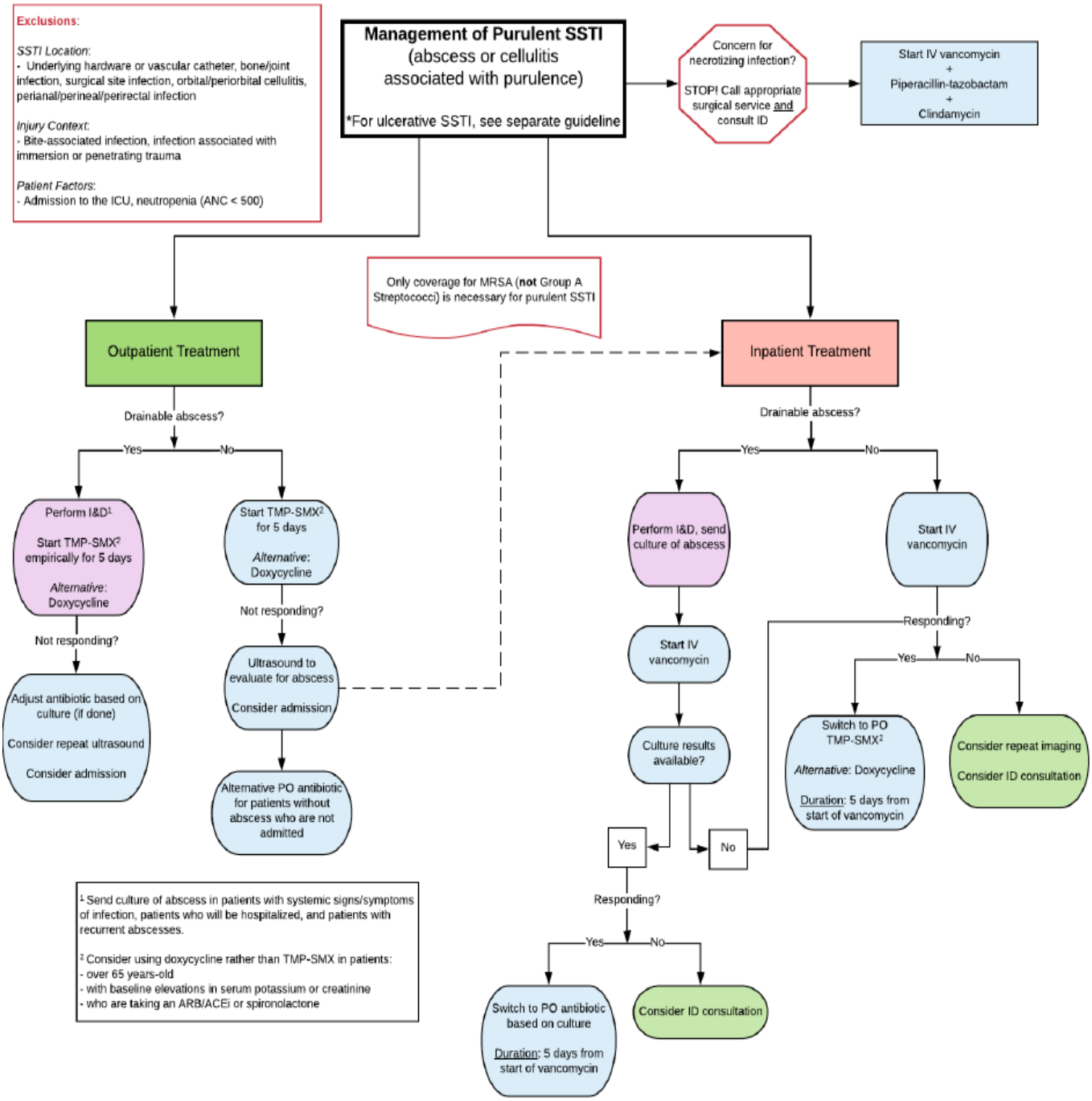
**<u>Clinical Pearls</u>**

- If an inciting antimicrobial is suspected (most commonly clindamycin, aminopenicillins, third generation cephalosporins, and fluoroquinolones), discontinue the agent as soon as possible.
- The use of antimotility agents (loperamide, etc.) should be avoided.
- If severe or fulminant disease is suspected, initiate empiric treatment while awaiting assay results. If the assay is negative, use clinical judgment when deciding if therapy should be discontinued.
- Use caution with high dose oral/rectal vancomycin (500mg Q6H) in patients with renal insufficiency, as significant absorption can occur in the setting of colitis and systemic accumulation could lead to ototoxicity, nephrotoxicity, or other adverse effects.
- Always wash hands with soap and water after examining a patient with suspected/confirmed *C. difficile*, as alcohol-based sanitizers do NOT kill spores.
- FMT is no longer available from ID Clinic. Consider contacting GI for guidance

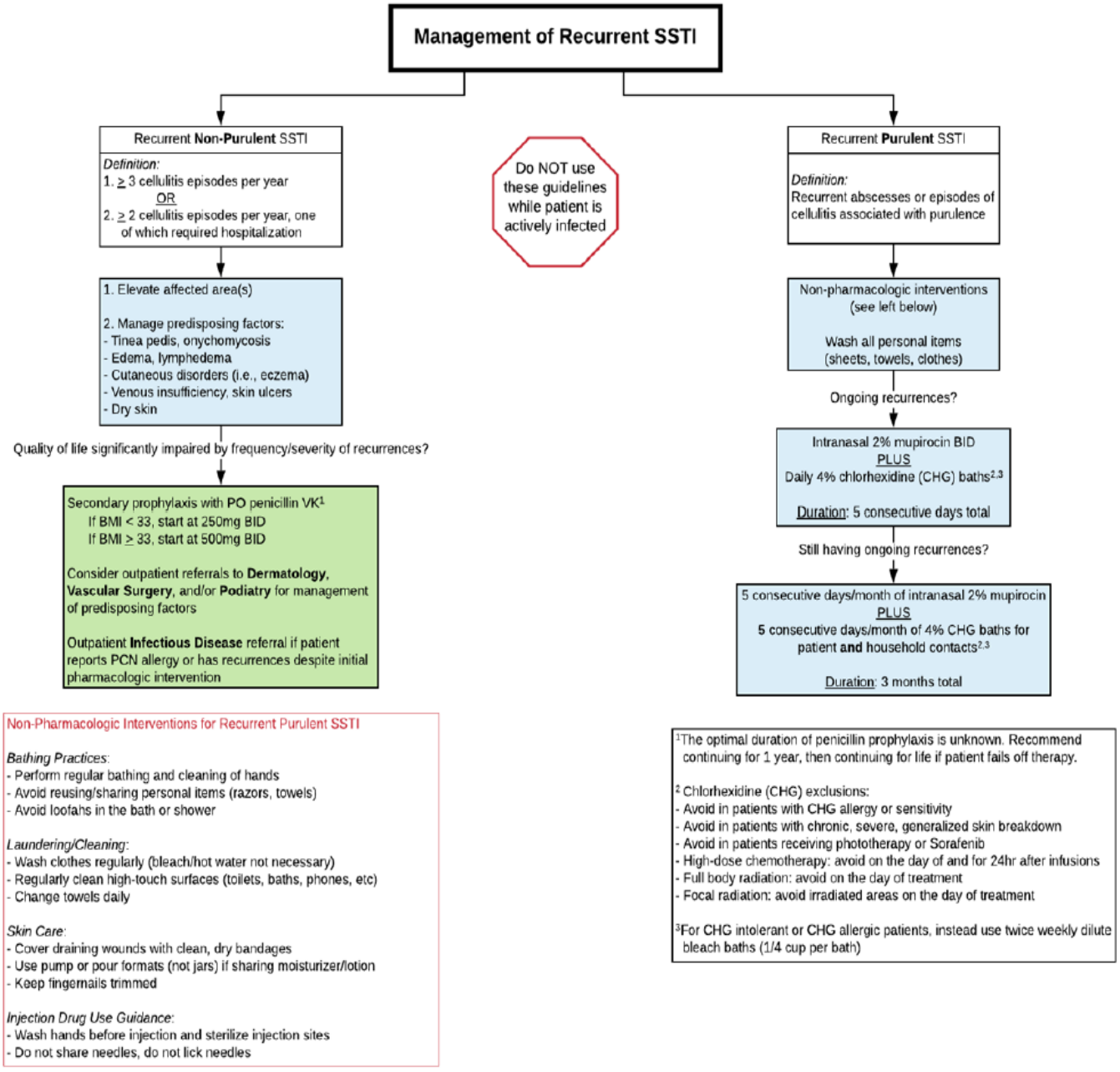
# Non-Purulent Skin and Soft Tissue Infections (SSTI)



# Purulent Skin and Soft Tissue Infections (SSTI)



# Recurrent Skin and Soft Tissue Infections (SSTI)




Non-Pharmacologic Interventions for Recurrent Purulent SSTI

*Bathing Practices*:
- Perform regular bathing and cleaning of hands
- Avoid reusing/sharing personal items (razors, towels)
- Avoid loofahs in the bath or shower

*Laundering/Cleaning*:
- Wash clothes regularly (bleach/hot water not necessary)
- Regularly clean high-touch surfaces (toilets, baths, phones, etc)
- Change towels daily

*Skin Care*:
- Cover draining wounds with clean, dry bandages
- Use pump or pour formats (not jars) if sharing moisturizer/lotion
- Keep fingernails trimmed

*Injection Drug Use Guidance*:
- Wash hands before injection and sterilize injection sites
- Do not share needles, do not lick needles

[1]The optimal duration of penicillin prophylaxis is unknown. Recommend continuing for 1 year, then continuing for life if patient fails off therapy.

[2] Chlorhexidine (CHG) exclusions:
- Avoid in patients with CHG allergy or sensitivity
- Avoid in patients with chronic, severe, generalized skin breakdown
- Avoid in patients receiving phototherapy or Sorafenib
- High-dose chemotherapy: avoid on the day of and for 24hr after infusions
- Full body radiation: avoid on the day of treatment
- Focal radiation: avoid irradiated areas on the day of treatment

[3]For CHG intolerant or CHG allergic patients, instead use twice weekly dilute bleach baths (1/4 cup per bath)

# Antibiotic Dosing for Skin and Soft Tissue Infections

| Drug | CrCl ≥ 30 mL/min | CrCl 15 – 29 mL/min | CrCl <15 mL/min | Dialysis (HD) |
|---|---|---|---|---|
| Cephalexin (Keflex) | 500 mg PO q6h or 1 gm PO TID | 500 mg PO q12h | 500 mg PO q24h | 500 mg PO q24h<br>(administer after HD on dialysis days) |
| Clindamycin | Weight-Based (using total body weight):<br>60 – 90kg: 300mg PO q8h<br>90 – 120kg: 450mg PO q8h<br>120 – 180kg: 450mg PO q6h<br>>180 kg: 600mg PO q6h | | | |
| TMP/SMX (Bactrim or Septra)<br>*Weight based dosing (using total body weight) * | (Ideally ≥5mg/kg/day)<br><br>60 – 90kg: 1 DS tablet PO q8h<br>90 – 120kg: 2 DS tablets PO q12h<br>120 – 180kg: 2 DS tablets PO q8h<br>>180kg: 2 DS tablets PO q6h | (Ideally ≥2.5mg/kg/day)<br><br>60 – 90kg: ½ DS tablet PO q8h<br>90 – 120kg: 1 DS tablets PO q12h<br>120 – 180kg: 1 DS tablets PO q8h<br>>180: 1 DS tablets PO q6h | Not Recommended | |
| Doxycycline | 100mg PO q12h | | | |
| Amoxicillin/Clavulanic Acid (Augmentin) | 875 mg PO q12h | 10-29 mL/min<br>500 mg PO q12h | <10 mL/min<br>500 mg PO q24h | 500 mg PO q24h<br>(administer after HD on dialysis days) |


References

1. Sanford Guide. Cephalexin.
2. Cox KK, Alexander B, Livorsi DJ, et. al. Clinical outcomes in patients hospitalized with cellulitis treated with oral clindamycin and trimethoprim/sulfamethoxazole: The role of weight-based dosing. *Journal of Infection.* 2017; 75(6):486 – 492
3. UpToDate. Doxycycline.
4. UpToDate. Amoxicillin and clavulanate.
5. MengL, MuiE, HolubarMK, et. al. Comprehensive Guidance for Antibiotic Dosing in Obese Adults. *Pharmacotherapy.*2017;37(11): 1415 - 1431

# Vaccines for Adults With Splenectomy

The following vaccines (in addition to any age-appropriate vaccines) are recommended for asplenia patients:

| Highly Recommended Vaccines | | May Consider for Specific Populations | |
|---|---|---|---|
| • Hib | • Tdap | • Hepatitis A | • MMR |
| • Meningococcal (conjugate and serogroup B) | • Zoster | • Hepatitis B | • Varicella |
| • Pneumococcal (conjugate and polysaccharide) | • Influenza | • HPV | |

**Timing of Vaccine Administration Relative to Splenectomy**

| Pre-operation | Post-operation |
|---|---|
| • Complete vaccination **> 2 weeks prior** to procedure.<br>• For vaccination series with **multiple doses**: **INITIATE ~10-12 weeks prior** to splenectomy, so recommended series can be COMPLETED > 2 weeks prior to procedure. | • If vaccination series cannot be initiated prior to splenectomy, **start at least 14 days after surgery** or prior to discharge, whichever comes first<br>• If vaccines were administered **prior to postoperative day 14** (sooner than 2 weeks post-operative): **Repeat the vaccines 8 weeks AFTER the initial doses** were given.<br>• Patients receiving other immunosuppressive treatment following splenectomy: The vaccination schedule is further modified. For example, **resumption of vaccines ~3 months after treatment** has been reported. |

**Vaccination Schedule**

| Highly Recommended Vaccines | | |
|---|---|---|
| **Dose #1** | **Dose #2** | **Boosters** |
| PNEUMOCOCCAL<br>1. Received PCV 20 → series completed<br>2. Vaccine naïve → administer PCV 20<br>3. Received PPSV 23 only → administer PCV 20 | N/A series completed after PCV 20 | N/A |
| HAEMOPHILUS B CONJUGATE (Hib) | N/A | N/A |
| MENINGOCOCCAL OLIGOSACCHARIDE CONJUGATE [MenACWY-CRM] (MENVEO)* | ≥ 8 weeks after dose 1 | Every 5 years<br>(off-label for ages >55) |
| MENINGOCOCCAL B<br>[MenB-4C] (BEXSERO) | ≥ 4 weeks after dose 1 | 1 year after completion of primary series, then every 2-3 years thereafter |
| DIPHTHERIA / PERTUSSIS / TETANUS (Tdap) | N/A | Every 10 years |
| ZOSTER RECOMBINANT (Shingrix) [**age > 50**] | 2-6 months after dose 1 | N/A |
| INFLUENZA | N/A | |
| **Additional Vaccines to Consider** | | |
| **Dose #1** | **Dose #2** | **Dose #3** |
| HEPATITIS A (HAVRIX) | 6-12 months after dose 1 | N/A |
| HEPATITIS B RECOMBINANT (ENGERIX-B) | 1 month after dose 1 | 6 months after dose 1 |
| PAPILLOMAVIRUS HUMAN 9-VALENT (GARDASIL 9)* | ≥ 4 weeks after dose 1 | ≥ 4 weeks after dose 2 |
| MEASLES, MUMPS, AND RUBELLA (MMR) | >1 month after dose 1 in select patients | N/A |
| VARICELLA VIRUS (VARIVAX)* | > 4-8 weeks after dose 1 | N/A |

*Service restricted

+Risk factors for Hepatitis A: International travelers, men who have sex with men, and individuals who use/inject illicit drugs, with occupational risk for exposure, who anticipate close contact with an international adoptee, and experiencing homelessness.

Risk factors for hepatitis B: Infants born to mothers with hepatitis B, individuals who inject drugs or share needles, sex partners of individuals with hepatitis B, men who have sex with men, individuals who live with someone who has hepatitis B, health care and public safety workers exposed to blood on the job, and people on dialysis.

## References


1. ACIP altered immunocompetence guidelines for immunizations. Centers for Disease Control and Prevention. https://www.cdc.gov/vaccines/hcp/acip-recs/general-recs/immunocompetence.html. Published April 14, 2022. Accessed May 24, 2022.
2. Anderson TC, Masters NB, Guo A, et al. Use of Recombinant Zoster Vaccine in Immunocompromised Adults Aged ≥19 Years: Recommendations of the Advisory Committee on Immunization Practices — United States, 2022. MMWR Morb Mortal Wkly Rep 2022;71:80–84. DOI: http://dx.doi.org/10.15585/mmwr.mm7103a2
3. Bonanni P, Grazzini M, Niccolai G, et al. Recommended vaccinations for asplenic and hyposplenic adult patients. Human Vaccines & Immunotherapeutics. 2016;13(2):359-368. doi:10.1080/21645515.2017.1264797
4. Mbaeyi SA, Bozio CH, Duffy J, et al. Meningococcal Vaccination: Recommendations of the Advisory Committee on Immunization Practices, United States, 2020. MMWR Recomm Rep 2020;69(No. RR-9):1–41. DOI: http://dx.doi.org/10.15585/mmwr.rr6909a1
5. Pasternack MS. Prevention of infection in patients with impaired splenic function. UpToDate. https://www.uptodate.com/contents/prevention-of-infection-in-patients-with-impaired-splenic-function. Published May 16, 2022. Accessed May 24, 2022.
6. Pneumococcal Vaccine Timing for Adults. Centers for Disease Control and Prevention. https://www.cdc.gov/vaccines/vpd/pneumo/downloads/pneumo-vaccine-timing.pdf. Published April 1, 2022. Accessed May 24, 2022.
7. Rubin LG, Levin MJ, Ljungman P, et al. 2013 IDSA Clinical Practice Guideline for vaccination of the immunocompromised host. Clinical Infectious Diseases. 2013;58(3). doi:10.1093/cid/cit684
8. Vaccination of adults with asplenia. Centers for Disease Control and Prevention. https://www.cdc.gov/vaccines/adults/rec-vac/health-conditions/asplenia.html. Published May 2, 2016. Accessed May 24, 2022.

# Beta-Lactam Test Dosing Protocol

## WHAT IS BETA-LACTAM TEST DOING?

A formalized process for evaluating patients with reported beta-lactam allergies. Those that are determined as low risk for an adverse reaction with a different beta-lactam antibiotic from their initial allergy, will receive a one-time test dose (10% of their full treatment dose) of an alternative beta-lactam under observation. If the patient tolerates this, they will receive a full dose (100% of treatment dose) 30 minutes later. If the patient tolerates both doses, they will continue on this antibiotic to treat their infection.

## WHY ARE WE DOING THIS?

- Cross-Reactivity rates between different beta-lactam antibiotics are low. Therefore, patients with true penicillin or cephalosporin allergies can still receive many other cephalosporins and carbapenems
- By evaluating patients through a thorough allergy assessment, we can identify patients at low risk of having an adverse reaction with alternative beta-lactams which will allow the patient to receive a more effective, less toxic, and/or less costly antibiotics to treat their infections.

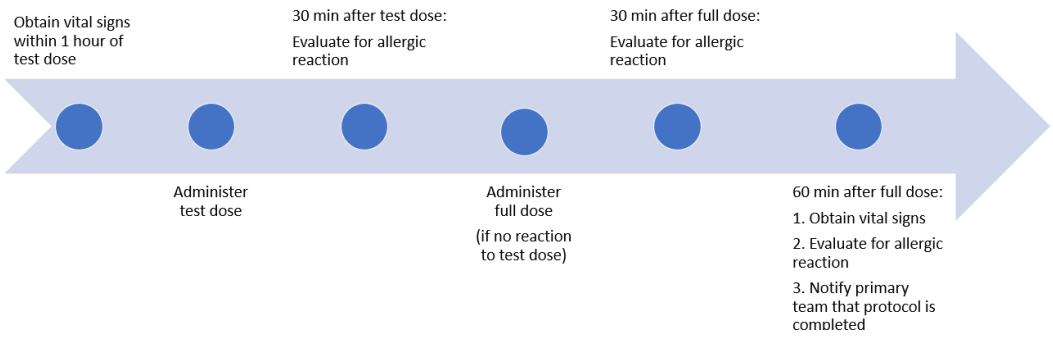
## HOW ARE WE DOING THIS?

- A new order set is available to standardize the test dose, full dose, assessment, and monitoring
- Primary team can order Beta-Lactam Test Doses via the order set for eligible inpatients with a reported beta-lactam allergy AND an active infection in which a beta-lactam is indicated for treatment
- Case will be review by ID Pharmacist (pager: 415-223-8046) prior to proceeding
- Test doses will be conducted Monday through Friday from 10:00 to 14:00
- For patients with a history of severe, IgE mediated reactions, test doses should be administered in the TCU. All other patients may undergo this protocol outside of the TCU.
- If possible, systemic beta-blocker doses should be held for 24 hours prior to test dose
- Monitoring nurse will use new CPRS template to document vital signs obtained after doses

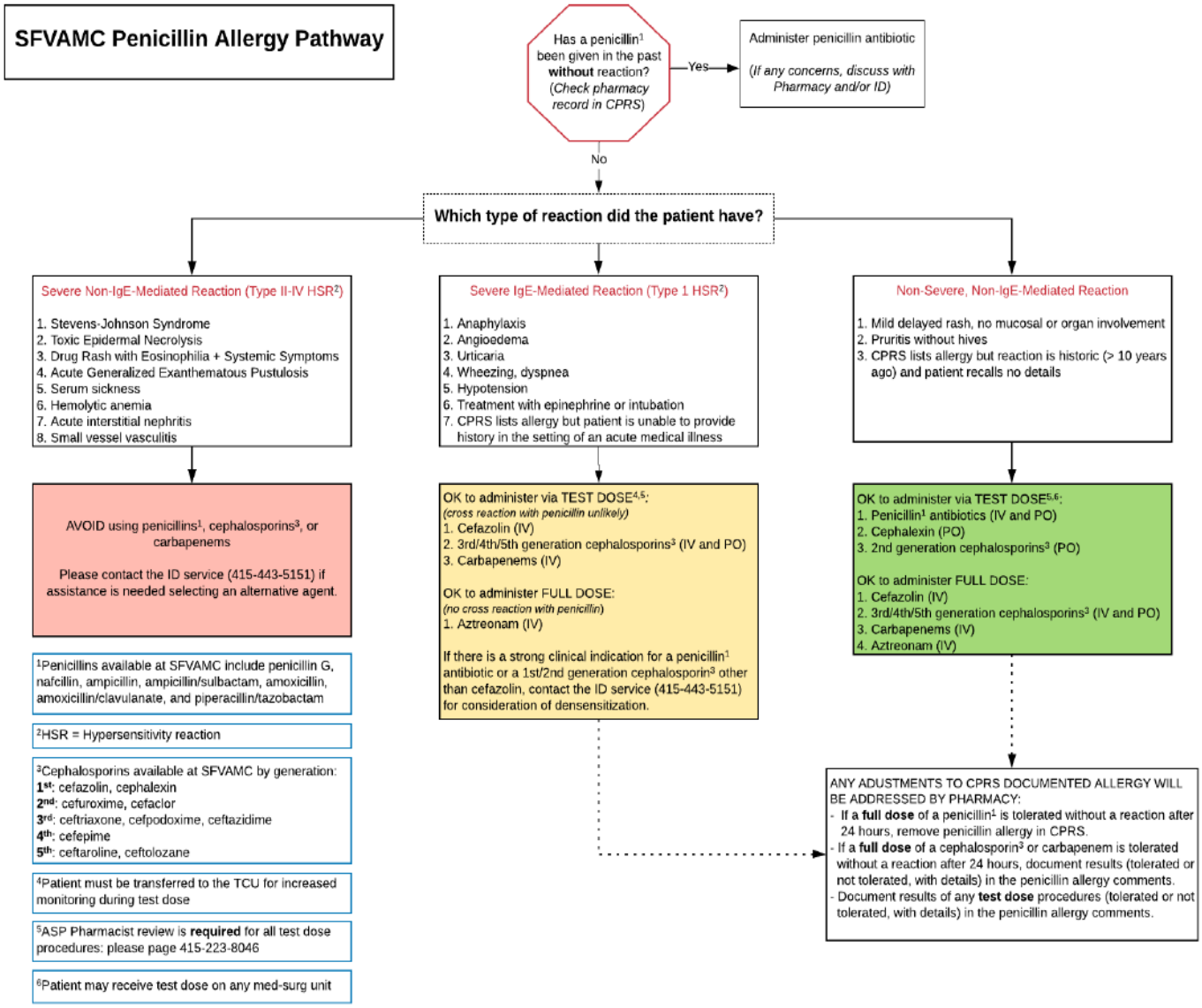
## WHAT MEDICATIONS ARE NEEDED FOR THIS PROCESS?

- Pharmacy will send the antibiotic test dose and the **Rescue Medication Kit** that will include:
  - Epinephrine 0.3 mg pen x1
  - 0.9% NS 1 L bag x1
  - Diphenhydramine 50 mg vial x1
  - Methylprednisolone 125 mg vial x1
  - Glucagon 1 mg vial x1
  - Albuterol 0.083% 3 mL vials x2
- The full dose may be located in the pyxis machine or will be delivered by pharmacy

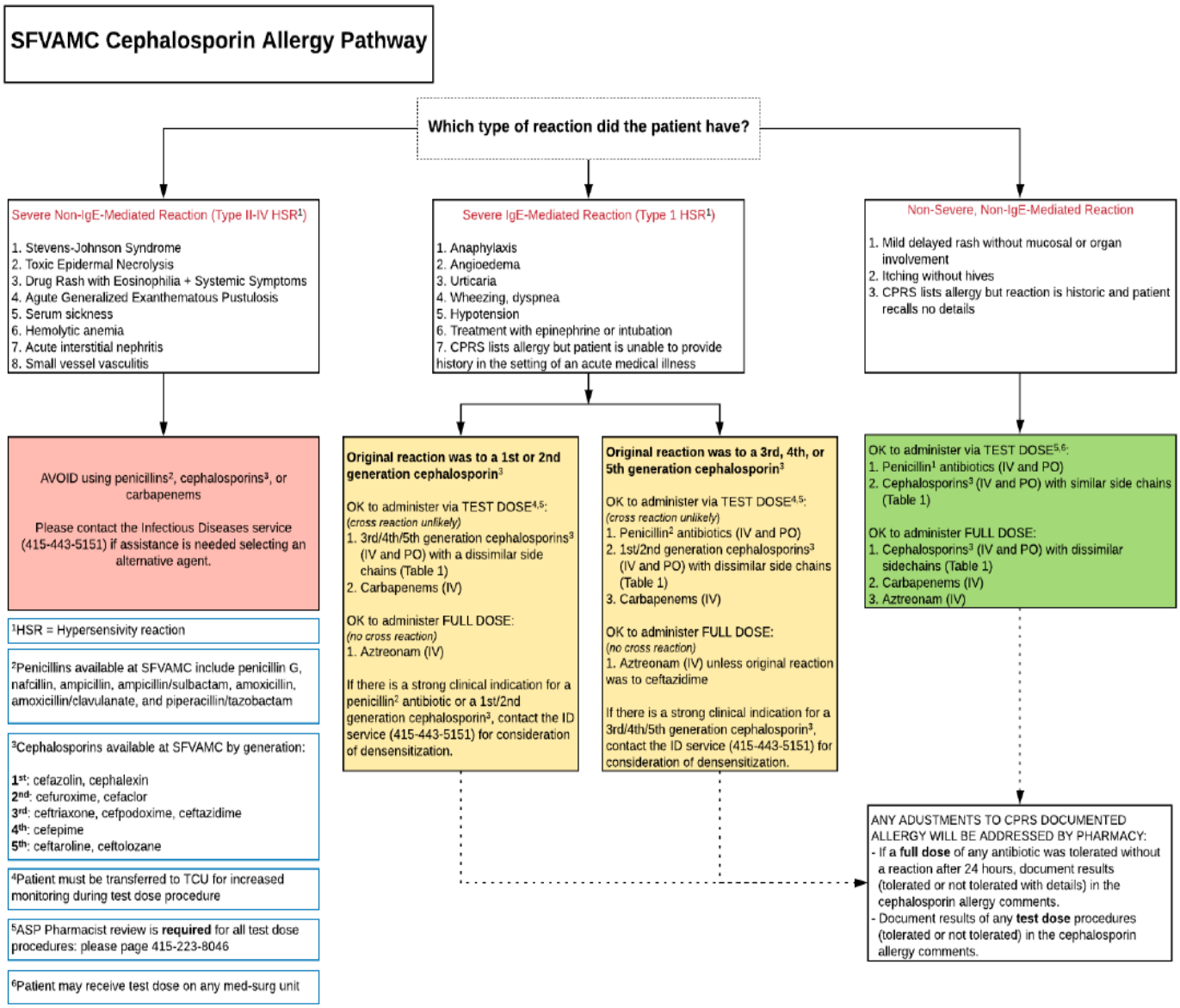
## Overview of Beta-Lactam Test Dose Protocol



# Penicillin Allergy Pathway for Beta-Lactam Test Dose



# Cephalosporin Allergy Pathway for Beta-Lactam Test Dose



# Beta-Lactam Cross Reactivity Table

| | | | Penicillins | | | | | | | Cephalosporins | | | | | | | | | | | | | | | Mono |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | 1st | | | 2nd | | | 3rd | | | | | 4th | 5th | | | |
| | | | Naficillin | Oxacillin | Dicloxacillin | Penicillin G/VK | Piperacillin | Ampicillin | Amoxicillin | Cefadroxil | Cephalexin | Cefazolin | Cefoxitin | Cefuroxime | Cefotetan | Cefdinir | Cefixime | Ceftriaxone | Cefpodoxime | Ceftazidime | Cefepime | Ceftaroline | Ceftolozane | Cefiderocol | Aztreonam |
| Penicillins | | Naficillin | | | | | | | | | | | | | | | | | | | | | | | |
| Penicillins | | Oxacillin | | | | | | | | | | | | | | | | | | | | | | | |
| Penicillins | | Dicloxacillin | | | | | | | | | | | | | | | | | | | | | | | |
| Penicillins | | Penicillin G/VK | | | | | | | | | | | | | | | | | | | | | | | |
| Penicillins | | Piperacillin | | | | | | | | | | | | | | | | | | | | | | | |
| Penicillins | | Ampicillin | | | | | | | | | | | | | | | | | | | | | | | |
| Penicillins | | Amoxicillin | | | | | | | | | | | | | | | | | | | | | | | |
| Cephalosporins | 1st | Cefadroxil | | | | | | | | | | | | | | | | | | | | | | | |
| Cephalosporins | 1st | Cephalexin | | | | | | | | | | | | | | | | | | | | | | | |
| Cephalosporins | 1st | Cefazolin | | | | | | | | | | | | | | | | | | | | | | | |
| Cephalosporins | 2nd | Cefoxitin | | | | | | | | | | | | | | | | | | | | | | | |
| Cephalosporins | 2nd | Cefuroxime | | | | | | | | | | | | | | | | | | | | | | | |
| Cephalosporins | 2nd | Cefotetan | | | | | | | | | | | | | | | | | | | | | | | |
| Cephalosporins | 3rd | Cefdinir | | | | | | | | | | | | | | | | | | | | | | | |
| Cephalosporins | 3rd | Cefixime | | | | | | | | | | | | | | | | | | | | | | | |
| Cephalosporins | 3rd | Ceftriaxone | | | | | | | | | | | | | | | | | | | | | | | |
| Cephalosporins | 3rd | Cefpodoxime | | | | | | | | | | | | | | | | | | | | | | | |
| Cephalosporins | 3rd | Ceftazidime | | | | | | | | | | | | | | | | | | | | | | | |
| Cephalosporins | 4th | Cefepime | | | | | | | | | | | | | | | | | | | | | | | |
| Cephalosporins | 5th | Ceftaroline | | | | | | | | | | | | | | | | | | | | | | | |
| Cephalosporins | 5th | Ceftolozane | | | | | | | | | | | | | | | | | | | | | | | |
| Cephalosporins | 5th | Cefiderocol | | | | | | | | | | | | | | | | | | | | | | | |
| Mono | | Aztreonam | | | | | | | | | | | | | | | | | | | | | | | |

| | |
|---|---|
| **Red Shaded** | **Avoid:** Identical R1 or R2 structures |
| **Blue Shaded** | **Use with Caution**: Similar R1 or R2 structures or compoenets (ring or branch chain moiety) |
| **Blank** | No R1 or R2 structural similarities |

Adapted from Zagursky RJ et al. Allergy Clin Immunol Pract (2017)6: 72-81

# Guidelines for Procalcitonin Use

## WHAT IS PROCALCITONIN

- Procalcitonin is a biomarker that has been used to aid in diagnosis of bacterial infection or sepsis
- May be used to guide antibiotic treatment decisions but **should be used in conjunction with laboratory findings** and **should not overrule clinical judgement**

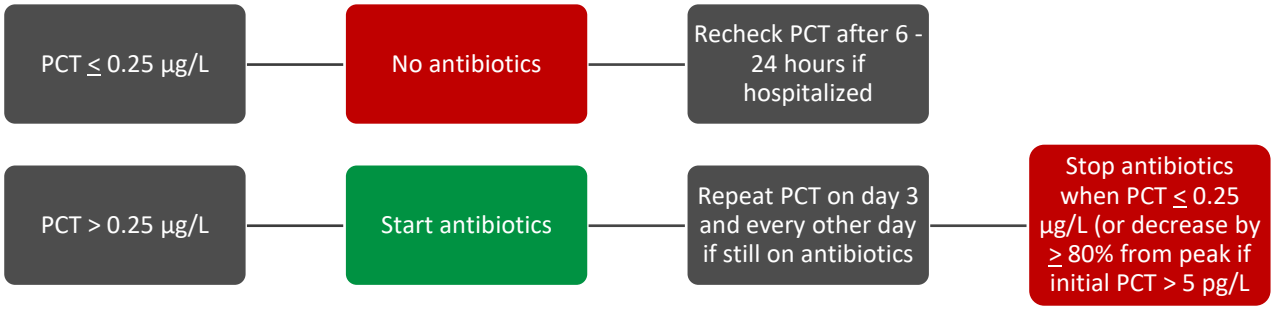
## INDICATIONS

| WHEN IS PROCALCITONIN RECOMMENDED | WHEN IS PROCALCITONIN NOT RECOMMENDED |
|---|---|
| Decision making about discontinuation of antimicrobials in:<br>• Non-critically ill ICU patients<br>• Hospitalized for lower respiratory tract infections | Severely immunocompromised (solid organ transplant patients, BMT patients, cancer patients receiving active treatment, HIV positive patients with CD4 <200, patients receiving immunosuppressive drugs other than prednisone) |

## HOW DO YOU USE PROCALCITONIN?

### SUSPECTED RESPIRATORY INFECTION IN STABLE PATIENTS

- Not critically ill or high-risk (e.g., CAP PSI ≥ IV / CURB 65 ≥ 2, COPD GOLD > 111)
- Not severely immunocompromised (other than corticosteroids)
- No other concomitant infection requiring antibiotics




### SUSPECTED SEPSIS IN CRITICALLY ILL PATIENTS

- Not severely immunocompromised (other than corticosteroids)
- Not on antibiotics for chronic bacterial infection (e.g., endocarditis, osteomyelitis)


## LIMITATIONS

- Serum procalcitonin may be elevated due to non-infectious causes based on various patient factors
- The time course of bacterial infection and type of infectious process may impact the serum procalcitonin level

References


1. Samsudin, Intan, and Samuel D Vasikaran. "Clinical Utility and Measurement of Procalcitonin." The Clinical biochemist. Reviews vol. 38,2 (2017): 59-68.
2. Huang, David T et al. "Procalcitonin-Guided Use of Antibiotics for Lower Respiratory Tract Infection." *The New England journal of medicine* vol. 379,3 (2018): 236-249. doi:10.1056/NEJMoa1802670
3. Kamat, Ishan S et al. "Procalcitonin to Distinguish Viral From Bacterial Pneumonia: A Systematic Review and Meta-analysis." *Clinical infectious diseases : an official publication of the Infectious Diseases Society of America* vol. 70,3 (2020): 538-542. doi:10.1093/cid/ciz545
4. Daubin, Cédric et al. "Procalcitonin algorithm to guide initial antibiotic therapy in acute exacerbations of COPD admitted to the ICU: a randomized multicenter study." *Intensive care medicine* vol. 44,4 (2018): 428-437. doi:10.1007/s00134-018-5141-9

# AmpC β-Lactamases Mediated-Resistance

**Background:**
Production of β-lactamase is one of the main mechanisms of how microbes can confer beta-lactam antibiotic resistance. AmpC β-Lactamase-Producing Enterobacteriaceae are gram-negative bacteria which produce β-lactamases through induction of the AmpC pathway. When the AmpC gene is induced (expressed), susceptibility of beta-lactam antibiotics is limited.

Resistance mechanism of AmpC includes:

- Plasmid-mediated resistance (ex: *Klebsiella pneumoniae*, *E. coli, Salmonella* spp.)
- Non-inducible chromosomal resistance due to mutations (ex: *E. coli*, *Shigella* spp., *Acinetobacter baumannii*)
- Inducible resistance (ex: *Enterobacter cloacae, Citrobacter freundii*)

**What makes inducible resistance different from other resistance mechanism?**
Inducible resistance is species and antibiotic dependent. Certain bacterial isolates such as *Hafnia alvei, Enterobacter cloacae, Citrobacter freundii, Citrobacter youngae, Klebsiella aerogenes* (*Enterobacter aerogenes*), *Yersinia enterocolitica* (collectively known by acronym HECK-Yes) are well known to have AmpC inducible resistance. HECK-Yes isolates may initially test as susceptible to certain beta-lactam antibiotics and 3rd generation cephalosporins, however non-susceptibility to these agents may occur after treatment is initiated.

- Strong Inducers of AmpC: Aminopenicillins, 1st generation cephalosporins, cefoxitin, cefotetan
- Weak Inducers of AmpC: Piperacillin/tazobactam, aztreonam, 3rd generation cephalosporins (Ceftazidime, ceftriaxone, cefotaxime)

**HECK-Yes and Empiric/Definitive Antibiotic Therapy:**
Due to exposure of beta-lactams which can induce resistance in HECK-Yes isolates, IDSA recommends avoiding antibiotics known to be strong and weak inducers of AmpC in HECK-Yes pathogens including piperacillin/tazobactam, aztreonam, and 3rd generation cephalosporins (ceftriaxone, cefotaxime, ceftazidime).

| **"HECK-Yes"**<br>***Hafnia alvei***<br>***Enterobacter cloacae***<br>***Citrobacter freundii or Citrobacter youngae***<br>***Klebsiella aerogenes (Enterobacter aerogenes)***<br>***Yersinia enterocolitica*** | |
|---|---|
| **Consider for Empiric/Definite Antimicrobial Therapy** | Ertapenem<br>Cefepime (MIC ≤ 2)<br>Fluroquinolones<br>Trimethoprim/Sulfamethoxazole |
| **Avoid** | Aminopenicillins, 1st generation cephalosporins, cefoxitin, cefotetan<br>Piperacillin/tazobactam<br>Aztreonam<br>3rd generation cephalosporins (ceftriaxone, cefotaxime, ceftazidime) |


References:

1. Enterobacterales Bloodstream Infection Adult IV to PO Step-Down Guideline. Infectious Diseases Management Program at UCSF. https://idmp.ucsf.edu/content/enterobacterales-bloodstream-infection-adult-iv-po-step-down-guideline. Published 2022. Accessed April 9, 2022.
2. https://www.idstewardship.com/heck-yes-get-amped-updates-ampc-harboring-bacteria/. Published 2022. Accessed April 9, 2022.
3. Pranita T, Aitken S, Bonomo R, Mathers A, van Duin D, Clancy C. IDSA Guidance on the Treatment of Antimicrobial-Resistant Gram-Negative Infections: Version 2.0. Idsociety.org. https://www.idsociety.org/practice-guideline/amr-guidance-2.0/#. Published 2022. Accessed April 9, 2022.

# Antibiotic Spectrum of Activity

- Good activity = reliable coverage; often a good empiric drug option (depends on infectious etiology)
- Moderate activity = inconsistent coverage; may be treatment option in certain cases; confirm susceptibility
- Poor activity = Unreliable coverage; not a treatment option for this pathogen
- Enteric gram-negative rods = *Escherichia Coli, Proteus spp., Klebsiella ssp.*
- Anaerobes = GI: *Bacteroides Fragilis;* Oral: Peptostreptococci
- Atypicals = *Legionella spp., Mycoplasma pneumoniae, Chlamydia pneumoniae*

| Antibiotic | Good Activity | Moderate Activity | Poor Activity |
|---|---|---|---|
| Penicillin | Most streptococci<br>Anaerobes oral<br>Treponema palladium | Enterococci | Everything else |
| Nafcillin | MSSA<br>Streptococci | | Everything else |
| Amoxicillin<br>Ampicillin | Enterococci<br>Streptococci<br>Anaerobes oral | Enteric gram-negative rods<br>Haemophilus | Everything else |
| Amoxicillin-clavulanate (Augmentin)<br><br>Ampicillin-sulbactam (Unasyn) | Enterococci<br>Streptococci<br>Haemophilus<br>Anaerobes GI and oral<br>Enteric gram negative rods<br>Acinetobacter (Unasyn) | MSSA | MRSA<br>Pseudomonas<br>ESBL and AmpC producers |
| Piperacillin-Tazobactam (Zosyn) | Pseudomonas<br>Enterococci<br>Streptococci<br>Anaerobes GI and oral<br>Enteric gram negative rods | MSSA | MRSA<br>ESBL and AmpC producers |
| Cefazolin<br>Cephalexin | MSSA<br>Streptococci<br>Anaerobes oral<br>Enteric gram-negative rods (URINE ONLY) | Enteric gram-negative rods (outside of URINE) | MRSA<br>Enterococci<br>Pseudomonas<br>ESBL and AmpC producers<br>Anaerobes GI |
| Ceftriaxone<br>Cefpodoxime | Streptococci<br>Anaerobes oral<br>Enteric gram-negative rods | MSSA | MRSA<br>Enterococci<br>Pseudomonas<br>ESBL and AmpC producers<br>Anaerobes GI |
| Cefepime | Pseudomonas<br>Enteric gram-negatives<br>Anaerobes oral | MSSA<br>AmpC producers<br>Acinetobacter | MRSA<br>Enterococci<br>ESBL producers<br>Anaerobes GI |
| Ceftazidime | Pseudomonas<br>Enteric gram-negative rods | | Everything else |
| Ceftaroline | MSSA, MRSA<br>Streptococci<br>Anaerobes oral<br>Enteric gram-negative rods | Enterococci | Pseudomonas<br>Anaerobes GI<br>ESBL and AmpC producers |
| Ertapenem | Enteric gram-negative rods<br>ESBL producers<br>MSSA<br>Streptococci<br>Anaerobes GI and oral | AmpC producers | MRSA<br>Enterococci<br>Pseudomonas |

| Antibiotic | Good Activity | Moderate Activity | Poor Activity |
|---|---|---|---|
| Meropenem | Pseudomonas<br>Enteric gram-negative rods<br>ESBL producers<br>MSSA<br>Streptococci<br>Anaerobes GI and oral | AmpC producers<br>Acinetobacter<br>Enterococci | MRSA |
| Aztreonam | Pseudomonas<br>Enteric gram negative rods | Acinetobacter | Gram positive organisms<br>Anaerobes GI and oral<br>ESBL and AmpC producers |
| Vancomycin<br>Dalbavancin<br>Daptomycin<br>Linezolid | MRSA<br>MSSA<br>Streptococci<br>C. Difficle (Vancomycin PO)<br>Enterococci<br>Anaerobes oral | M. tuberculosis (Linezolid) | Gram negative organisms<br>Anaerobes GI |
| Ciprofloxacin | Pseudomonas<br>Enteric gram negative rods<br>ESBL and AmpC producers | MSSA | Anaerobes GI and oral<br>Streptococci<br>Enterococci |
| Levofloxacin<br>Moxifloxacin | Streptococci<br>Enteric gram negative rods<br>ESBL and AmpC producers<br>Pseudomonas (Levofloxacin)<br>Haemophilus<br>Anaerobes oral<br>Anaerobes GI (Moxifloxacin) | MSSA | Enterococci<br>Anaerobes GI (Levo)<br>Pseudomonas (Moxi) |
| Gentamicin<br>Tobramycin<br>Amikacin | Enteric gram negative rods<br>ESBL and AmpC producers | Pseudomonas<br>Enterococci (Gentamicin) | Gram-positive organisms<br>Anaerobes GI and oral |
| Doxycycline<br>Minocycline | MRSA, MSSA<br>Atyipicals | Streptococci<br>Anaerobes oral<br>Enteric gram negative rods (Minocycline) | Enterococci<br>Anaerobes GI<br>Enteric gram negative rods (Doxycycline) |
| Azithromycin | Atypicals<br>H. Pylori | Enteric gram-negative rods<br>Streptococci<br>Anaerobes oral | Everything else |
| Metronidazole | Anaerobes GI | C. Difficle<br>H. Pylori | Everything else |
| Nitrofurantoin | Enteric gram-negative rods<br>ESBL producer | Staphylococci spp.<br>Enterococci | Everything else |
| Fosfomycin | E. Coli<br>ESBL E. Coli | Pseudomonas<br>Proteus and Klebsiella<br>Enterococci | Everything else |
| Sulfamethoxazole-trimethoprim (Bactrim) | MSSA, MRSA<br>Streptococci<br>Enteric gram negative rods<br>ESBL and AmpC producers<br>Stenotrophomonas<br>Pneumocystis jirovecii | Strep Pnemoniae | Pseudomonas<br>Enterococci<br>Anaerobes GI and oral |
| Clindamycin | Streptococci | MSSA, MRSA<br>Anaerobes oral | Enterococci<br>Gram negatives<br>Anaerobes GI |

Reference: Adapted from Sanford Guide Web Edition: Sanford Guide: Antibacterial Agents: Spectra of Activity

# IV Antimicrobial Dosing

- Renal adjustments based on creatine clearance (mL/min) unless stated otherwise
- For weight-based doses, use ideal body weight (IBW) unless…
  - Total body weight (TBW) is less than IBW, use TBW
  - TBW is > 120% of IBW, use adjusted body weight (adjBW)

| **Acyclovir** | > 50 | 25-50 | 10-25 | < 10 | iHD | CRRT |
|---|---|---|---|---|---|---|
| Non-CNS infections | 5 mg/kg q8h | 5 mg/kg q12h | 5 mg/kg q24h | 2.5 mg/kg q24h | 2.5 mg/kg x1 now, then qPM | 5 mg/kg q24h |
| CNS and varicella zoster infections | 10 mg/kg q8h | 10 mg/kg q12h | 10 mg/kg q24h | 5 mg/kg q24h | 5 mg/kg x1 now, then qPM | 10 mg/kg q12h |

| **Amikacin** | Refer to "Aminoglycoside dosing and therapeutic monitoring" on pages 34-35 |
|---|---|

| **Ampicillin** | > 50 | 10-50 | < 10 | iHD | CRRT |
|---|---|---|---|---|---|
| - Meningitis<br>- Endovascular infection<br>- Bone & joint infection | 2 gm q4h | 2 gm q6h | 1 gm q8h | 2 gm q12h | 2 gm q6h |
| Uncomplicated infection | 2 gm q6h | 1 gm q6h | 1 gm q12h | 2 gm qPM | 2 gm q8h |

| **Ampicillin-Sulbactam (Unasyn®)** | ≥ 30 | 15-30 | < 15 | iHD | CRRT |
|---|---|---|---|---|---|
| All indications | 3 gm q6h | 3 gm q12h | 3 gm q24h | 3 gm q12h | 3 gm q6h |

| **Azithromycin** | No renal dose adjustments |
|---|---|
| Severe community-acquired pneumonia | 500 mg q24h |
| Non-severe community-acquired pneumonia | 500 mg x1, then 250 mg q24h |

| **Aztreonam** | > 50 | 10-50 | < 10 | iHD | CRRT |
|---|---|---|---|---|---|
| Meningitis | 2 gm q6h | 2 gm q12h | 1 gm q12h | 2 gm x1 now, then qPM | 2 gm q12h |
| UTI | 1 gm q8h | 1 gm q12h | 1 gm q24h | | |
| All other indications | 2 gm q8h | 2 gm q12h | 1 gm q12h | | |

| **Cefazolin** | > 35 | 10-35 | < 10 | iHD | CRRT |
|---|---|---|---|---|---|
| - Uncomplicated SSTI<br>- UTI | 1 gm q8h | 1 gm q12h | 1 gm q24h | 2 gm x1 then 2 gm post HD or 2 gm/ 2 gm/ 3 gm post HD | 2 gm q12h |
| All other indications | 2 gm q8h | 2 gm q12h | | | |
| Surgical prophylaxis | Weight < 120 kg = 2 gm per dose<br>Weight ≥ 120 Kg = 3 gm per dose | | | | |

| **Cefepime** | > 60 | 30-60 | 11-29 | ≤ 10 | iHD | CRRT |
|---|---|---|---|---|---|---|
| - Severe infections<br>- CNS<br>- Febrile Neutropenia<br>- Pseudomonas | 2 gm q8h | 2 gm q12h | 2 gm q24h | 1 gm q24h | 2 gm post HD 3x week | 1 gm q8h |
| Non-severe infections | 2gm q12h | 2 gm q24h | 1 gm q24h | 500 mg q24h | 1 gm on day 1, then 500 mg IV qPM OR 500 mg post HD 3x week | 1 gm q8h |
| Cystitis | 1 gm q12h | 1 gm q24h | 500 mg q24h | 500 mg q24h | | |

| **Ceftazidime** | > 50 | 31-50 | 15-30 | < 15 | iHD | CRRT |
|---|---|---|---|---|---|---|
| Standard dose | 2 gm q8h | 2 gm q12h | 2 gm q24h | 1 gm q24h | 1 gm IV x1 now and post-HD | 2 gm IV q12h |

| **Ceftazidime-Avibactam (Avycaz®)** | > 50 | 31-50 | 16-30 | 6-15 | ≤ 5 | iHD | CRRT |
|---|---|---|---|---|---|---|---|
| Standard dose | 2.5 gm q8h | 1.25 gm q8h | 0.94 gm q12h | 0.94 gm q24h | 0.94 gm q48h | | 2.5 gm q8h |

| **Ceftolozane-Tazobactam (Zerbaxa®)** | >50 | 30-50 | 15-29 | < 15 | iHD | CRRT |
|---|---|---|---|---|---|---|
| Standard dose | 1.5 gm q8h | 750 mg q8h | 375 mg q8h | No data | 750 mg x1, then 150 mg q8h | No data |
| Severe infection | 3 gm q8h | 1.5 gm q8h | 750 mg q8h | | 2.25 gm x1, then 450 mg q8h | |

| **Ceftriaxone** | No renal dose adjustment |
|---|---|
| Non-severe infections (UTI, intra-abdominal, etc.) | 1 gm q24h |
| Severe infections (osteomyelitis, bacteremia, etc.) | 2 gm q24h |
| Meningitis and Enterococcal endocarditis (synergy) | 2 gm q12h |

| **Ciprofloxacin** | > 50 | 30-50 | < 30 | iHD | CRRT |
|---|---|---|---|---|---|
| Standard dose | 400 mg q12h | | 400 mg q24h | 400 mg qPM | 400 mg q12h |
| - Pseudomonas<br>- Severe infection | 400 mg q8h | 400 mg q12h | 400 mg q24h | | |

| **Clindamycin** | No renal dose adjustment |
|---|---|
| Standard dose | 600 mg q8h |
| Necrotizing SSTI, Group A streptococcus, or TBW > 120 kg | 900 mg q8h |

| **Daptomycin** | ≥ 30 | <3 0 | iHD | CRRT |
|---|---|---|---|---|
| Mild to moderate infection | 4-6 mg/kg q24h | 4-6 mg/kg q48h | 4-6 mg/kg IV q48h (evening) | 8-10 mg/kg q48h |
| Severe infection | 8-10 mg/kg q24h | 8-10 mg/kg q48h | 8-10 mg/kg IV q48h (evening) | 6 mg/kg q24h |
| Enterococcal infection | 10 - 12 mg/kg q24h | 10-12 mg/kg q48h | 10-12 mg/kg IV q48h (evening) | 6 mg/kg q24h |

| **Doxycycline** | No renal dose adjustment) |
|---|---|
| Standard dose | 100 mg q12h |

| **Ertapenem** | ≥ 30 | <30 | iHD | CRRT |
|---|---|---|---|---|
| Standard dose | 1 gm IV q24h | 500 mg IV q24h | 500 mg IV x1 then qPM or 1 gm post HD 3x week | 1 gm IV q24h |

| **Fluconazole** | > 50 | 10-50 | < 10 | iHD | CRRT |
|---|---|---|---|---|---|
| Oropharyngeal infection | 100 mg q24h | 50% of target dose q24h | 25% of target dose q24h | 100 mg x1 now, then post-HD | 200 mg q24h |
| Esophageal infection | 200 mg q24h | | | 200 mg x1 now, then post-HD | 400 mg q24h |
| Systemic/ Severe infections | ≤ 80 kg: 400mg q24h<br>81-100 kg: 600 mg q24h<br>> 100 kg: 800 mg q24h | | | 400 mg x1 now, then post-HD | 800-1200 mg per day, divided q12-24h |

| **Ganciclovir** | > 70 | 50-69 | 25-49 | 10-24 | < 10 and iHD | CRRT |
|---|---|---|---|---|---|---|
| CMV treatment | 5 mg/kg q12h | 2.5 mg/kg q12h | 2.5 mg/kg q24h | 1.25 mg/kg q24h | 1.25 mg/kg 3x weekly (post HD if HD) | 2.5-5 mg/kg q12-24h |
| CMV prophylaxis | 2.5 mg/kg q12h | 2.5 mg/kg q24h | 1.25 mg/kg q24h | 0.625 mg/kg q24h | 0.625 mg/kg 3x weekly (post HD if HD) | No data |

| **Gentamicin** | Refer to "Aminoglycoside dosing and therapeutic monitoring" on pages 34-35 |
|---|---|

| **Isavuconazole** | No renal dose adjustment |
|---|---|
| All indications | 372 mg q8h x 6 doses, then 372 mg q24h |

| **Levofloxacin** | > 50 | 20-49 | < 20 | iHD | CRRT |
|---|---|---|---|---|---|
| - UTI<br>- Epididymitis | 500 mg q24h | 500 mg x1, then 250 mg q24h | 500 mg x1, then 250 mg q48h | 500 mg x1, then 250 mg q48h | 750 mg IV x1, then 250 mg q24h |
| - Pseudomonas<br>- Other indications | 750 mg q24h | 750 mg q48h | 750 mg x1, then 500 mg q48h | 750 mg x1, then 500 mg q48h | 750 mg IV x1, then 500 mg q24h |

| **Linezolid** | No renal dose adjustment |
|---|---|
| All indications | 600 mg IV q12h |

| **Meropenem** | > 50 | 26-50 | 10-25 | < 10 | iHD | CRRT |
|---|---|---|---|---|---|---|
| - Standard dose<br>- Pseudomonas | 1 gm q8h | 1 gm q12h | 500 mg q12h | 500 mg q24h | 500 mg x1, then QPM | 1 gm q8h |
| - Meningitis<br>- Cystic fibrosis | 2 gm q8h | 2 gm q12h | 1 gm q12h | 1 gm q24h | 1 gm x1, then QPM | 1 gm q8h |

| **Metronidazole** | ≥ 10 | < 10 | iHD and CRRT |
|---|---|---|---|
| Standard dose | 500 mg q8h | 500 mg q12h | 500 mg q8h |
| *C. Difficile* | 500 mg q8h | | 500 mg q8h |

| **Micafungin** | No renal dose adjustment |
|---|---|
| Standard dose | 100 mg q24h |
| Esophageal candidiasis | 150 mg q24h |
| Neutropenia Antifungal Prophylaxis | 50 mg or 100 mg q24h |

| **Moxifloxacin** | No renal dose adjustment |
|---|---|
| All indications | 400 mg q24h |

| **Nafcillin** | No renal dose adjustment |
|---|---|
| Meningitis and severe infections (ex: endocarditis) | 2 gm q4h |
| Uncomplicated infection | 1 gm q6h |

| **Penicillin G** | > 50 | 10-50 | < 10 | iHD | CRRT |
|---|---|---|---|---|---|
| - Neurosyphilis<br>- Meningitis | 4 million units q4h | 3 million units q4h | 3 million units q6h | 2 million units q6h | 3 million units q4h |
| - Endovascular<br>- Bacteremia | 3 million units q4h | 3 million units q6h | 2 million units q6h | 2 million units q8h | 3 million units q6h |
| Other indications | 3 million units q6h | 2 million units q6h | 1 million units q6h | 2 million units q12h | 2 million units q6h |

| **Piperacillin-Tazobactam (Zosyn®)** | > 40 | 20-40 | < 20 | iHD | CRRT |
|---|---|---|---|---|---|
| - Pseudomonas<br>- Severe infections | 4.5 gm q6h | 4.5 gm q8h | 2.25 gm q6h | 2.25 gm q8h | 4.5 gm q8h or 2.25 gm q6h |
| Standard dose | 4.5 gm q8h | 2.25 gm q6h | 2.25 gm q8h | 2.25 gm q12h | |
| Sepsis loading dose | 4.5 gm once | | | | |

| **Posaconazole** | ≥ 50 | < 50 |
|---|---|---|
| All indications | 300 mg q12h x 2 doses, then 300 mg q24h | Avoid IV if possible due to accumulation |

| **Remdesivir** | No renal dose adjustment |
|---|---|
| COVID-19 infection | 200 mg x1, then 100 mg q24h |

| **Rifampin** | No renal dose adjustment |
|---|---|
| Mycobacterial infections | 600 mg q24h |
| Prosthetic device infections | 300 mg q12h |

| Endocarditis | | 300 mg q8h | | | |
|---|---|---|---|---|---|
| **Sulfamethoxazole-Trimethoprim (Bactrim®)** | > 30 | 15-30 | < 15 | iHD | CRRT |
| - Systemic GNR infections<br>- *Nocardia* | 10 mg TMP/kg/day divided q6-12h | 5 mg TMP/kg/day divided q6-12h | 2.5 mg TMP/kg/ q24h | 2.5-5 mg TMP/kg x1 now and qPM | 5-7.5 mg TMP/kg/day divided q12h |
| - *Pneumocystis* pneumonia<br>- CNS infections | 15-20 mg TMP/kg/day divided q6-12h | 7.5-10 mg TMP/kg/day divided q12-24h | 4-5 mg TMP/kg/ q24h | 5-10 mg TMP/kg IV x1 now and qPM | 10-15 mg TMP/kg/day IV divided q6-12h |
| IBW is preferred dosing weight. Use total TBW if less than IBW and adjBW if TBW > 120% of IBW | | | | | |
| **Tobramycin** | Refer to "Aminoglycoside dosing and therapeutic monitoring" on pages 34-35 | | | | |
| **Vancomycin** | Refer to "Empiric vancomycin dosing and monitoring" on pages 36-37 | | | | |

| **Voriconazole** | ≥ 50 | < 50 |
|---|---|---|
| All infections | 6 mg/kg q12h x 2 doses, then 4 mg/kg q12h | Avoid: IV vehicle accumulates; consider PO |

# PO Antimicrobial Dosing

| **Acyclovir** | ≥ 25 | 10-24 | < 10 | iHD |
|---|---|---|---|---|
| Herpes simplex (HSV), initial episode | 400 mg TID | 200 mg TID | 200 mg BID | 200 mg BID |
| HSV treatment, recurrent immunosuppressed | 400 mg TID | 200 mg TID | 200 mg BID | 200 mg BID |
| HSV treatment, recurrent immunocompetent | 800 mg BID x 5 days or 800 mg TID x 2 days | 200 mg TID | 200 mg BID | 200 mg BID |
| HSV suppression or prophylaxis | 400 mg PO BID | 200 mg BID | 200 mg BID | 200 mg BID |
| Herpes zoster treatment | 800 mg PO 5 x daily | 800 mg TID | 400 mg BID | 400 mg BID |
| Varicella zoster (VZV) uncomplicated infection | 800 mg PO 5 x daily | 800 mg TID | 400 mg BID | 400 mg BID |
| VZV prophylaxis, immunocompromised | 800 mg BID or 200 mg 3 to 5 x daily | 200 mg TID | 200 mg BID | 200 mg BID |

| **Amoxicillin** | ≥ 30 | 10-29 | < 10 | iHD |
|---|---|---|---|---|
| Cystitis | 500 mg TID | 500 mg BID | 500 mg daily | 500 mg daily |
| Prosthetic joint chronic suppression | 1 gm TID or BID | 500 mg BID | 500 mg daily | 500 mg daily |
| All other infections | 1 gm TID | 1 gm BID | 500 mg BID | 500 mg BID |

| **Amoxicillin-Clavulanate (Augmentin®)** | ≥ 30 | 10-29 | < 10 | iHD |
|---|---|---|---|---|
| All indications | 875/125 mg BID | 500/125 mg BID | 500/125 mg daily | 500/125 mg qPM |

| **Atovaquone** | No renal dose adjustment |
|---|---|
| *Pneumocystis jirovecii* pneumonia treatment | 750 mg BID |
| *Pneumocystis jirovecii* pneumonia prophylaxis | 1500 mg daily |
| **Azithromycin** | Dose (no renal dose adjustment) |
| Non-severe pneumonia | 500 mg on day 1, then 250 mg daily |
| Severe pneumonia | 500 mg daily |

| **Cephalexin** | ≥ 30 | 15-29 | < 15 | iHD |
|---|---|---|---|---|
| - Uncomplicated cystitis<br>- Streptococcal pharyngitis | 500 mg BID | 250 mg BID | 250 mg daily | 250 mg qPM |
| Standard dose | 500 mg QID or 1,000 mg PO TID | 500 mg BID | 500 mg daily | 500 mg qPM |

| **Cefpodoxime** | ≥ 30 | < 30 | iHD |
|---|---|---|---|
| Standard dose | 200 mg BID | 200 mg daily | 200 mg qPM |
| Skin and soft tissue infection | 400 mg BID | 400 mg daily | 200 mg qPM |
| - Uncomplicated cystitis<br>- Streptococcal pharyngitis | 100 mg BID | 100 mg daily | 100 mg qPM |

| **Ciprofloxacin** | > 50 | 30-50 | < 30 | iHD |
|---|---|---|---|---|
| Standard dose | 500 mg PO BID | | 500 mg daily | 500 mg QPM |
| - Pseudomonas infection<br>- Blood stream infection | 750 mg BID | 500 mg BID | | |

| **Clindamycin** | No renal dose adjustment |
|---|---|
| Standard dose | 450 mg q8h |
| Skin and Soft Tissue infection (SSTI) | Weight based: refer to Antibiotic Dosing for SSTIs on page 20 |

| **Dapsone** | No renal dose adjustment |
|---|---|
| *Pneumocystis jirovecii* pneumonia prophylaxis or treatment | 100 mg daily |

| **Doxycycline** | No renal dose adjustment |
|---|---|
| Standard dose | 100 mg BID |
| Post-exposure sexually transmitted infection prophylaxis | 200 mg PRN within 24-72 hr after condomless sex |

| **Ethambutol** | >30 | < 30 | iHD |
|---|---|---|---|
| Tuberculosis | 15 mg/kg/ daily | 20-25 mg/kg 3 x weekly | 20-25 mg/kg post-HD |

| **Fluconazole** | > 50 | 10-50 | < 10 | iHD |
|---|---|---|---|---|
| Oropharyngeal infection | 100 mg daily | 50% of target dose daily | 25% of target dose daily | 100 mg post-HD |
| Esophageal infection | 200 mg daily | | | 200 mg post-HD |
| Systemic/<br>Severe infection | ≤ 80 kg: 400 mg daily<br>81 – 100 kg: 600 mg daily<br>> 100 kg: 800 mg daily | | | 400 mg post-HD |

| **Fosfomycin** | > 50 | < 50 |
|---|---|---|
| Uncomplicated cystitis, female | 3 gm x1 dose | |
| Complicated cystitis | 3 gm every 2 days x 3 doses | 3 gm every 3 days x 3 doses |

| **Isavuconazole** | No renal dose adjustment |
|---|---|
| All indications | 372 mg PO q8h x 6 doses, then 372 mg daily |

| **Isoniazid** | No renal dose adjustment |
|---|---|
| Prevention of tuberculosis | 300 mg daily |
| Treatment of tuberculosis | 300 mg daily or 15 mg/kg TBW (up to 900 mg) 2-3 times weekly |

| **Levofloxacin** | > 50 | 20-49 | < 20 | iHD |
|---|---|---|---|---|
| - UTI<br>- Epididymitis | 500 mg daily | 500 mg x1, then 250 mg daily | 500 mg x1, then 250 mg q48h | 500 mg x1, then 250 mg q48h |
| - Pseudomonas<br>- Other indications | 750 mg daily | 750 mg q48h | 750 mg x1, then 500 mg q48h | 750 mg x1, then 500 mg q48h |

| **Linezolid** | No renal dose adjustment |
|---|---|
| Tuberculosis | 600 mg or 300 mg daily |
| All other indications | 600 mg BID |

| **Metronidazole** | > 10 | < 10 | iHD |
|---|---|---|---|
| Standard dose | 500 mg TID | 500 mg BID | 500 mg TID |
| *C. Difficle* | 500 mg TID | | 500 mg TID |

| **Molnupiravir (Lagevrio®)** | No renal dose adjustment |
|---|---|
| COVID-19 infection treatment | 800 mg BID |

| **Moxifloxacin** | No renal dose adjustment |
|---|---|
| Standard dose | 400 mg daily |

| **Nirmatrelvir and Ritonavir (Paxlovid®)** | > 60 | 30-60 | < 30 and iHD |
|---|---|---|---|
| Mild to Moderate COVID-19 infection | 300/100 mg BID | 150/100 mg BID | Avoid use |

| **Nitrofurantoin** | > 40 | 40-30 | < 30 and iHD |
|---|---|---|---|
| Cystitis treatment | 100 mg BID | 100 mg BID Safe for short term use up to 7 days | Avoid use |

| **Oseltamivir** | > 60 | 31-60 | 11-30 | ≤ 10 | iHD | CRRT |
|---|---|---|---|---|---|---|
| Influenza treatment | 75 mg BID | 30 mg BID | 30 mg daily | Avoid use | 30 mg post-HD | 75 mg BID |
| Influenza prophylaxis | 75 mg daily | 30 mg daily | 30 mg every other day | Avoid use | 30 mg after every other HD session | 30 mg daily |

| **Penicillin VK** | No renal dose adjustment |
|---|---|
| Standard dose | 500 mg QID |
| Cellulitis, long term suppression | 250 to 500 mg BID |

| **Posaconazole** | No renal dose adjustment |
|---|---|
| Standard dose | 300 mg BID x 2 doses, then 300 mg daily |

| **Rifabutin** | ≥ 30 | < 30 |
|---|---|---|
| Standard dose | 300 mg daily | 150 mg daily if toxicity occurs |

| **Rifampin** | No renal dose adjustment |
|---|---|
| Mycobacterial infections | 600 mg daily |
| Prosthetic device infections | 300 mg BID |
| Endocarditis | 300 mg TID |

| **Sulfamethoxazole-Trimethoprim (Bactrim®)** | > 30 | 15-30 | < 15 | iHD |
|---|---|---|---|---|
| UTI or prostatitis | 1 DS tab BID | 1/2 DS tab BID | 1/2 DS tab daily | 1/2 DS tab qPM |
| SSTI* | 2 DS tab BID | 1 DS tab BID | 1 DS tab daily | 1 DS tab qPM |
| *Pneumocystis jirovecii* prophylaxis | 1 DS tab daily or 3 x week | 1/2 DS tab daily or 3 x week | | 1/2 DS tab qPM or 3 x week |
| DS = double strength (800 mg sulfamethoxazole and 160 mg trimethoprim)<br>Weight based: refer to "Antibiotic Dosing for SSTIs" on page 20 | | | | |

| **Valacyclovir** | ≥ 50 | 30-50 | 10-29 | < 10 | iHD |
|---|---|---|---|---|---|
| - HSV systemic infection<br>- VZV treatment | 1 gm TID | 1 gm BID | 1 gm daily | 500 mg daily | 500 mg qPM |
| HSV genital, initial | 1 gm BID | | 1 gm daily | | |
| HSV genital, recurrent | 500 mg BID or 1 gm daily | | 500 mg daily | | |
| VZV prophylaxis | 500 mg BID | | 500 mg daily | | |

| **Voriconazole** | No renal dose adjustment |
|---|---|
| Standard dose | 6 mg/kg BID x 2 doses, then 4 mg/kg BID |

# ID Restricted Antimicrobial Prior Authorization Process

Several formulary antimicrobial medications are locally restricted to specialty services such as infectious diseases (ID) as part of ongoing antimicrobial stewardship measures to reduce collateral effects such as the emergence of antimicrobial resistance, *C. difficle* infection, and drug associated toxicities.

Antimicrobials restricted to the ID service are available to order by house staff BUT require prior approval by ID provider/ ASP pharmacist before processing pharmacist will release the medication order. If an order for an ID restricted agent is received without prior approval, pharmacist will make a reasonable attempt to contact prescribing provider/ ordering service.

**ID/ASP Antimicrobial Approval Coverage:**

- Weekdays 8 am to 4:30 pm → Contact ASP Pharmacist (pager: 415-223-8046)
- Weekdays 4:30 pm to 10 pm, Weekends, Holidays → Contact ID Fellow (pager: 415-443-5151)

Restricted agents ordered during off hours will be processed as one-time doses by pharmacy and reviewed for continuation by ID/ASP during business hours. Restricted antimicrobials may be continued when patients transfer units including antimicrobials initiated in the ICU prior to transfer.

# Available Antimicrobials at SFVA

Shaded = Restricted to Infectious Diseases (ID) service
* = Restricted to indication and/or non-ID specialty service
NFDR=Pharmacy NFDR Consult required

| ANTIBIOTICS |
|---|
| AMIKACIN SULFATE 250MG/ML INJ |
| AMOXICILLIN 125MG SUSP 250MG CAP/SUSP, 500MG CAP |
| AMOXICILLIN/CLAV 500/125MG, 875/125MG TAB |
| AMOXICILLIN/CLAV 400/ 57MG / 5 ML PO SUSP |
| AMPICILLIN 500MG, 1GM, 2GM INJ |
| AMPICILLIN /SULBACTAM 1.5GM, 3GM INJ |
| AZITHROMYCIN 250MG TAB/SUSP, 600MG TAB; 500MG INJ |
| AZTREONAM 1GM, 2GM INJ*SEVERE PENICILLIN-ALLERGY, OTHER USES NEED ID APPROVAL |
| CEFACLOR 250MG, 500MG CAP |
| CEFAZOLIN 1GM, 2GM INJ*ID IF DOSE > Q 8H |
| CEFEPIME 1GM, 2GM INJ |
| CEFOXITIN 1GM INJ |
| CEFPODOXIME PROXETIL 100MG, 200MG TAB |
| CEFTAROLINE FOSAMIL 600MG INJ |
| CEFTAZIDIME 1GM; 2GM INJ |
| CEFTAZIDIME/AVIBACTAM 2.5GM INJ |
| CEFTOLOZANE/TAZOBACTAM 1.5GM INJ |
| CEFTRIAXONE 250MG, 2GM, 1GM INJ |
| CEFUROXIME AXETIL 250MG TAB |
| CEFUROXIME 0.75GM, 1.5GM INJ* OPHTHAMOLOGY |
| CEPHALEXIN 250MG, 500MG CAP |
| CHLORAMPHENICOL 1GM INJ |
| CIPROFLOXACIN HCL 250MG, 500MG, 750MG TAB; 200MG, 400MG INJ* GI (service restrictions for inpatient use ONLY) |
| CIPROFLOXACIN HCL 500MG/5ML SUSP[NFDR]* GI (service restrictions for inpatient use ONLY) |
| CLARITHROMYCIN 500MG TAB |
| CLARITHROMYCIN 125 MG/ 5ML, 250MG/5ML SUSP[NFDR] |
| CLINDAMYCIN HCL 150MG CAP* ORAL SURG & ENT (service restrictions for Inpatient use ONLY) |
| CLINDAMYCIN 75MG/5ML ORAL SOLN *ORAL SURG & ENT (service restrictions for Inpatient use ONLY) |
| CLINDAMYCIN PHOS 150MG INJ |
| DALBAVANCIN 500 MG INJ [NFDR] |
| DAPTOMYCIN 500MG INJ |
| DEMECLOCYCLINE 150MG, 300MG TAB |
| DICLOXACILLIN 250MG CAP |
| DOXYCYCLINE 100MG TAB & INJ |
| ERAVACYCLINE 50MG INJ |
| ERTAPENEM 500MG, 1GM INJ |
| ERYTHROMYCIN BASE 250MG TAB* COLORECTAL SX PPX |
| ERYTHROMYCIN ES 400MG/5ML PO SUSP; 500MG, 1GM INJ |
| FIDAXOMICIN 200MG TAB |
| FOSFOMYCIN TROMETHAMINE 3GM SACHET[NFDR] |
| GENTAMICIN 10MG, 40 MG INJ |
| IMIPENEM- CILASTATIN 500MG; 1GM INJ |
| LEVOFLOXACIN 250MG, 500MG, 750MG TAB & INJ* HEM/ONC EXCEPT FOR PCN-ALLERGIC PTS W/CAP |
| LINEZOLID 600MG TAB & INJ; 100MG/5ML SUSP,ORAL |
| MEROPENEM 500MG, 1GM, 2GM INJ |
| METRONIDAZOLE 250MG, 500MG TAB; 500MG INJ |
| MINOCYCLINE HCL 50MG, 100MG CAP* DERM |
| MINOCYCLINE HCL 100MG/VIL INJ[NFDR] |
| MOXIFLOXACIN HCL 400MG TAB & INJ |
| MUPIROCIN 2% OINT |
| NAFCILLIN 1GM, 2GM INJ |
| NEOMYCIN SULFATE 500MG TAB |
| NITROFURANTOIN MONO/MACRO 100MG CAP |
| NORFLOXACIN 400MG TAB[NFDR] |
| OFLOXACIN 200MG, 300MG, 400MG TAB[NFDR] |
| PENICILLIN G BENZATHINE 1.2MU/2ML INJ |
| PENICILLIN G POTASSIUM 20 MU INJ |
| PENICILLIN G PROCAINE 1.2 MU TUBEX |
| PENICILLIN G SODIUM 5 MU INJ[NFDR] |
| PENICILLIN VK 250MG, 500MG TAB |
| PENICILLIN VK 125MG/5ML, 250MG/5ML SOLN |
| PIPERACILLIN TAZOBACTAM 2.25GM, 3.375GM, 4.5GM INJ*ICU, ED OR SINGLE PERI-PROCEDURAL DOSES |
| POLYMYXIN-B 500,000U INJ |
| STREPTOMYCIN 1GM INJ |
| SULFAMETHOX/TMP 80/16MG/ML INJ |
| SULFAMETHOX/TMP 200/40MG/5ML SUSP |
| SULFAMETHOX/TMP 400/80MG; 800/160MG TAB |
| TETRACYCLINE HCL 250MG, 500MG CAP* H. Pylori Treatment |
| TIGECYCLINE 50MG INJ |
| TRIMETHOPRIM 100MG TAB |
| TOBRAMYCIN SULFATE 40MG INJ |
| VANCOMYCIN HCL 125MG CAP* Outpatient restriction: NEED ID OK if dose exceeds 125MG QID X 10 days |
| VANCOMYCIN HCL 1GM INJ |
| VANCOMYCIN HCL 25MG/ML ORAL SOLN |
| **ANTIFUNGALS** |
| AMPHOTERICIN B CONVENTIONAL 50MG INJ |
| AMPHOTERICIN B LIPOSOME 50MG INJ |
| FLUCONAZOLE 50MG, 100MG, 150MG, 200MG TAB |
| FLUCONAZOLE 10MG/ML 40MG/ML PO SUSP |
| FLUCONAZOLE 200MG; 400MG INJ |
| FLUCYTOSINE 250MG, 500MG CAP |
| ISAVUCONAZONIUM SULFATE 186MG ORAL CAP[NFDR] |
| ISAVUCONAZONIUM SULFATE 372MG INJ[NFDR] |
| ITRACONAZOLE 100MG CAP & 50MG/5ML ORAL SOLN |
| KETOCONAZOLE 200MG TAB* HEM/ONC, ENDO |
| MICAFUNGIN 50MG; 100MG INJ |
| POSACONAZOLE 100MG EC TAB* HEM/ONC |
| POSACONAZOLE 200MG/5ML ORAL SUSP |
| TERBINAFINE 250MG TAB |
| VORICONAZOLE, 50MG, 200MG TAB & 200MG INJ |
| VORICONAZOLE 200MG/5ML ORAL SUSP[NFDR] |
| **ANTIRETROVIRALS** |
| ABACAVIR/DOLUTEGRAVIR/LAMIVUDINE 600/50/300MG TAB |
| ABACAVIR /LAMIVUDINE 600MG/300MG TAB |
| ABACAVIR 100MG/5ML ORAL SOLN |
| ABACAVIR SULFATE 300MG TAB |
| ABACAVIR/LAMIVUDINE/ZIDOVUDINE 300/150/300MG TAB |
| ATAZANAVIR 150MG, 200MG, 300MG CAP |
| BICTEGRAVIR/EMTRICITABINE/TAF 50/200/25MG TAB |
| COBICISTAT /DARUNAVIR 150MG/800MG TAB |
| EMTRICITABINE/RILPIVIRINE/TDF 200/25/25/300 MGTAB |
| DARUNAVIR ETHANOLATE 600MG, 800MG TAB |

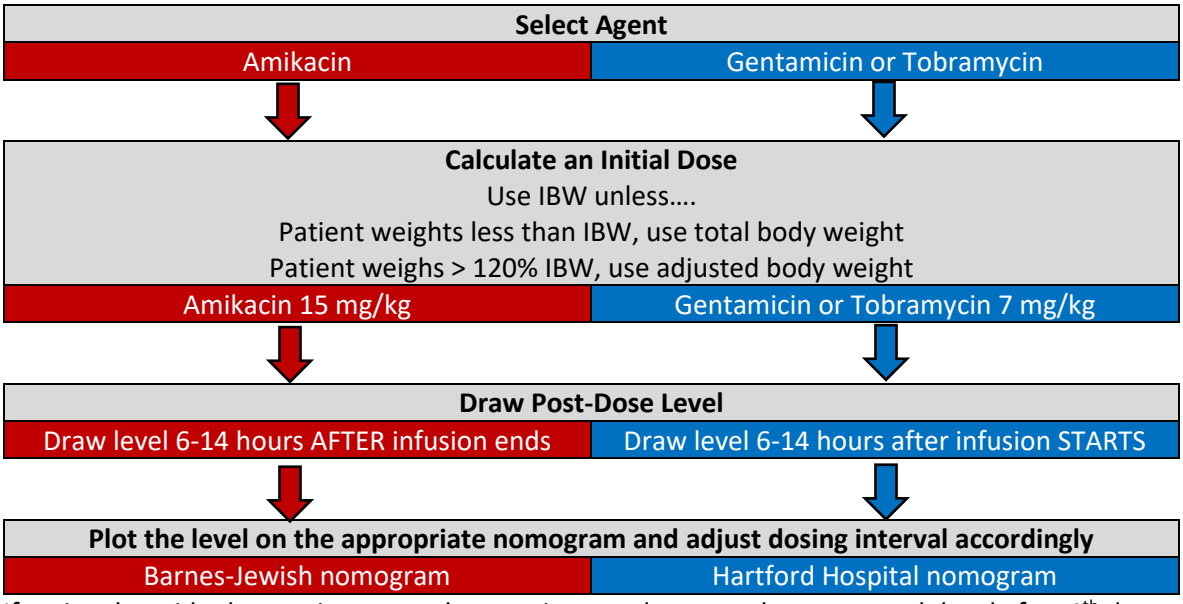
| |
|---|
| DIDANOSINE 250MG EC CAP |
| DOLUTEGRAVIR 50MG TAB |
| DOLUTEGRAVIR/LAMIVUDINE 50MG/300MG TAB |
| DOLUTEGRAVIR/RILPIVIRINE 50MG/25MG TAB |
| DORAVIRINE 100MG TAB |
| EFAVIRENZ/EMTRICITABINE/TDF 600/200/300MG TAB |
| EFAVIRENZ /LAMIVUDINE /TDF 600/300/ 300MG TAB |
| EFAVIRENZ 600MG TAB |
| EMTRICITABINE 200MG CAP |
| EMTRICITABINE 200MG/TAF 25MG TAB |
| EMTRICITABINE 200MG/TDF 300MG TAB |
| ENFUVIRTIDE 90MG INJ |
| ETRAVIRINE 100MG, 200MG TAB |
| FOSAMPRENAVIR 700MG TAB |
| FOSTEMSAVIR 600MG TAB |
| LAMIVUDINE 100MG, 150MG, 300MG TAB **Liver* |
| LAMIVUDINE 50MG/5ML ORAL SOLN* *Liver* |
| LAMIVUDINE 300MG/TDF 300MG TAB |
| LAMIVUDINE 150MG/ZIDOVUDINE 300MG TAB |
| LOPINAVIR 200MG/RITONAVIR 50MG TAB |
| MARAVIROC 150MG, 300MG TAB |
| NELFINAVIR MESYLATE 250MG, 625MG TAB |
| NEVIRAPINE 200MG TAB |
| EMTRICITABINE/RILPIVIRINE/TAF 200/25/25 TAB |
| RALTEGRAVIR 400MG, 600MG TAB |
| SAQUINAVIR MESYLATE 500MG TAB |
| STAVUDINE (d4T), 20MG, 30MG, 40MG CAP |
| COBICISTAT/ELVITEGR/ EMTRI/ TDF 50/150/200/300MG TAB |
| COBICISTAT/ DARUNAVIR/ EMT/ TAF 150/800/200/10MG TAB |
| TENOFOVIR ALAFENAMIDE (TAF) 25MG TAB* *Liver* |
| TENOFOVIR DISOPROXIL FUMARATE (TDF) 300MG TAB* *LIVER* |
| TIPRANAVIR 250MG CAP |
| ZIDOVUDINE 100MG CAP; 300MG TAB & 10MG/ML INJ |
| **ANTIVIRALS** |
| ACYCLOVIR 200MG CAP, 400MG, 800MG TAB |
| ACYCLOVIR 500MG, 1GM INJ |
| ADEFOVIR DIPIVOXIL 10MG TAB |
| CIDOFOVIR 75MG/ML INJ |
| ELBASVIR 50MG/GRAZOPREVIR 100MG TAB* *LIVER* |
| ENTECAVIR 0.5MG, 1MG TAB* *LIVER, RHEUM, HEM/ONC* |
| FAMCICLOVIR 125MG, 250MG, 500MG TAB* *DERM* |
| FOSCARNET 24MG/ML INJ 250ML, 24MG/ML INJ **DERM* |
| GANCICLOVIR 500MG CAP[NFDR] & 500MG INJ |
| GLECAPREVIR 100MG /PIBRENTASVIR 40MG TAB* *LIVER* |
| LEDIPASVIR 90MG/SOFOSBUVIR 400MG TAB* *LIVER* |
| OSELTAMIVIR 30MG, 75MG CAP |
| OSELTAMIVIR 6MG/ML ORAL SUSP[NFDR] |
| REMDESIVIR 100MG INJ* *Use > 5 days COVID ATTENDING OK* |
| RIBAVIRIN 200MG CAP* *LIVER* |
| RILPIVIRINE 25MG TAB |
| RIMANTADINE HCL 100MG TAB |
| RITONAVIR 100MG TAB & 80MG/ML ORAL SOLN |
| SOFOSBUVIR 400MG TAB[NFDR] **LIVER* |

| |
|---|
| FOSBUVIR 400MG/VELPATASVIR 100MG TAB |
| SOFOSBUVIR/VELPATASVIR/VOXILAPREVIR TAB **LIVER* |
| VALACYCLOVIR HCL 500 MG, 1GM TAB |
| VALGANCICLOVIR HCL 450MG TAB |
| ZANAMIVIR 5MG INHL |
| **MISCELLANEOUS ANTI-INFECTIVES** |
| ALBENDAZOLE 200MG TAB |
| ATOVAQUONE 750MG/5ML ORAL SUSP |
| ATOVAQUONE 250MG/PROGUANIL HCL 100MG TAB |
| BEZLOTOXUMAB 25MG/ML SOLN INJ[NFDR] |
| DAPSONE 25MG, 100MG TAB |
| CYCLOSERINE 250MG CAP |
| ETHAMBUTOL HCL 100MG, 400MG TAB |
| ETHIONAMIDE 250MG TAB |
| ISONIAZID 100MG, 300MG TAB & 50MG/5ML SYRUP[NFDR] |
| IVERMECTIN 3MG TAB[NFDR] |
| LACTOBACILLUS ACIDOPHILUS TAB |
| NITAZOXANIDE 500MG TAB[NFDR] |
| PENTAMIDINE ISETHIONATE 300MG/VI INJ |
| PYRAZINAMIDE 500MG TAB |
| RIFABUTIN 150MG CAP |
| RIFAMPIN 150MG, 300MG CAP |
| RIFAMPIN 600MG INJ**ONE-TIME FOR O.R. GRAFT SOAKING* |
| RIFAPENTINE 150MG TAB **VA LTBI CLINIC ONLY* |
| SULFADIAZINE 500MG TAB |
| **VACCINES** |
| DIPHTH/PERTUSS/TET (Tdap) (ADACEL) INJ |
| HAVRIX 1440 EL.U./ML VACCINE INJ 1ML |
| HEP B VACC RECOM(ENGERIX-B) 20MCG/ML SYR |
| HEP B VACC RECOM(HEPLISAV-B) 20MCG/0.5ML-- *LIVER* |
| HEPATITIS A&B (720/20) VACC(TWINRIX) INJ*--*LIVER* |
| INFLUENZA VAC,QUAD RECOMBINANT(PF) 0.5ML* *PATIENTS WITH SEVERE EGG ALLERGY; CONSULT RX* |
| INFLUENZA VAC,TRI RECOMBINANT(PF) 0.5ML*--*FOR USE IN PATIENTS WITH SEVERE EGG ALLERGY; CONSULT RX* |
| INFLUENZA VACC AFLURIA,QUAD PF SYR 0.5ML*-- *CONSULT RX for outpatient use* |
| INFLUENZA VACC FLUAD,QUAD,ADJ PF 0.5ML*-- *PTS AT LEAST 65 YEARS OF AGE; CONSULT RX for outpatient use* |
| JAPANESE ENCEPHALITIS VIR VAC PF(IXIARO)[NFDR] |
| MEASLES/MUMPS/RUBELLA VACC(MMR II) 0.5ML |
| MENINGOCOCCAL B (BEXSERO) INJ SYR 0.5ML--*RESTRICTED TO ACIP RECOMMENDATION* |
| MENINGOCOCCAL OLIG CONJ (MENVEO) INJ |
| PAPILLOMA VIR 9-VAL VAC(GARDASIL 9)0.5ML |
| PNEUMOCOCCAL 15-VAL CONJ VAC (VAXNEUVANCE) |
| PNEUMOCOCCAL 20-VAL CONJ VAC(PREVNAR 20) |
| PNEUMOCOCCAL 23-VAL VACC (PNEUMOVAX 23) |
| POLIOVIRUS VACCINE INACTIVATED(IPOL)SYR |
| RABIES VACCINE 2.5UNT/VIL INJ,KIT |
| TYPHOID VACCINE LIVE (VIVOTIF) CAP |
| TYPHOID Vi POLYSAC TYPHIM VACC 0.5ML SYR |
| ZOSTER VACC RECOMBINANT (SHINGRIX) INJ |

# Aminoglycoside Dosing and Therapeutic Drug Monitoring

**<u>High Dose Extended Interval Dosing Strategy</u>** (Preferred dosing strategy if no exclusions)

**Exclusions:** gram-positive synergy (e.g., enterococcal endocarditis), unstable renal function, burn, pregnant, or trauma patient

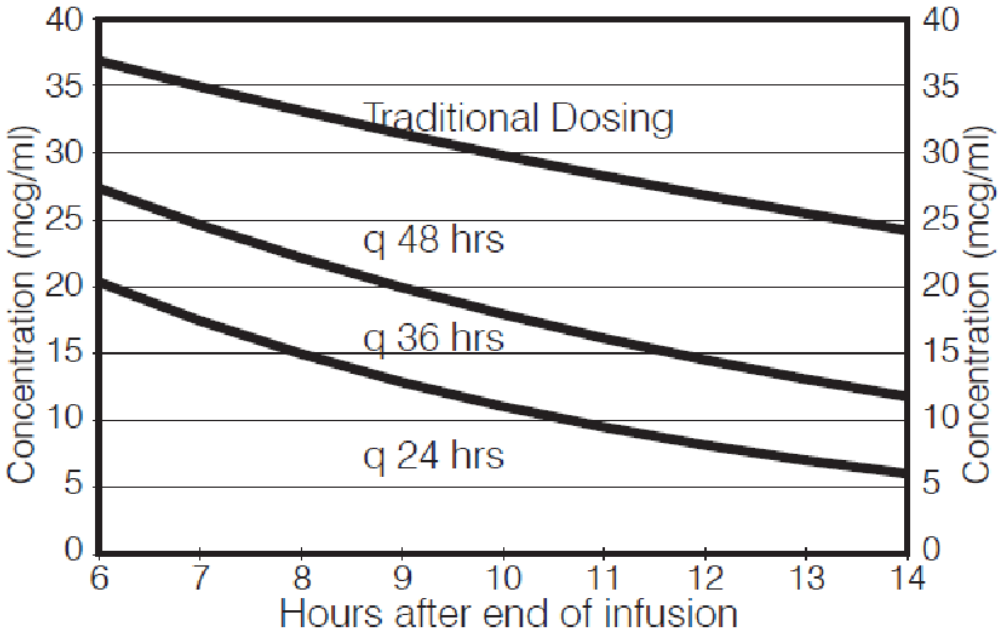



If aminoglycoside therapy is expected to continue, order a steady state trough level after 4th dose

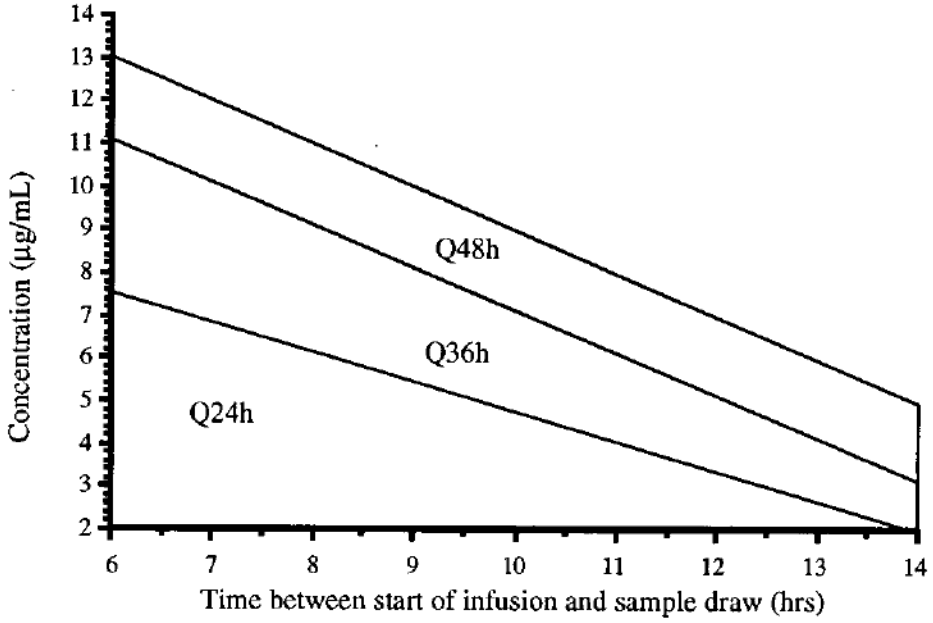
- Goal tobramycin/gentamicin trough of <1 mcg/mL
- Goal amikacin trough of <4-8 mcg/mL

Repeat post-dose level if there are significant changes in renal function or volume status

## Barnes Jewish Nomogram: Amikacin 15 mg/kg



## Hartford Hospital Nomogram: Gentamicin/ Tobramycin 7 mg/kg




**<u>Conventional Dosing Strategy</u>** (Utilize if there is an exclusion to High Dose-Extended Interval Dosing)

1. Use IBW unless….
   a. Patient weights less than IBW, use total body weight
   b. Patient weighs > 120% IBW, use adjusted body weight
2. Calculate the initial dose

| | | |
|---|---|---|
| Tobramycin and gentamicin | 1 - 2.5 mg/kg | (round to nearest 20 mg) |
| Amikacin | 5 - 7.5 mg/kg | (round to nearest 125 mg) |

3. Select a dosing interval based on the patient's creatinine clearance

| Creatinine Clearance (mL/min) | Suggested Dosing Interval |
|---|---|
| > 60 | Q8h |
| 40-59 | Q12h |
| 20-39 | Q24h |
| < 20 | Dose by level |

4. Once at steady state (~ 4th dose in patients with stable renal function), draw a trough level 30 min prior to the next infusion and a peak level 30 minutes after the infusion has ended.

| Indication | Desired Peak | | Desired Trough | |
|---|---|---|---|---|
| | Gent/Tobra | Amikacin | Gent/Tobra | Amikacin |
| Pneumonia | 8 – 10 | 25 – 35 | < 1 | < 4 – 8 |
| Cellulitis, intra-abdominal, neutropenia, osteomyelitis, pyelonephritis | 6 – 8 | 25 – 35 | < 1 | < 4 – 8 |
| Cystitis or gram-positive synergy | 3 – 5 | 20 – 25 | < 1 | < 4 – 8 |

5. Adjust the regimen as necessary and obtain repeat levels every 24 hours until at goal
   a. Peak in range and trough elevated: extend the dosing interval
   b. Peak above goal range and trough in range: decrease dose
   c. Peak below goal range and trough in range: increase dose, possibly extend interval
6. Once peak and trough goals are achieved, order follow up trough level after 4th dose

# Empiric Vancomycin Dosing

Step 1: Determine vancomycin indication

Step 2: Determine pharmacokinetic targets based on indication

| Infection Type | Mild or Moderate | Severe (non-CNS) | CNS infection |
|---|---|---|---|
| AUC (mg*h/L) | 400-500 | 500-600 | N/A |
| Trough (mcg/mL)* | 10-20 | 10-20 | 15-20 |
| Peak (mcg/mL)^ | 30-40 | 30-40 | N/A |

*Troughs < 10 may reduce antibiotic efficacy and > 20 may cause adverse reactions
^Target peak is an arbitrary number and does NOT represent therapeutic effectiveness

- Mild infections: cellulitis without systemic signs of infection, uncomplicated UTI
- Moderate infection: cellulitis with systemic signs of infection, complicated UTI
- Severe infection (Non-CNS): Pneumonia, bacteremia, endocarditis, sepsis, osteomyelitis
- CNS infections: Meningitis

Step 3: Calculate loading dose (consider in severe infections to attain therapeutic levels sooner)

- 20-35 mg/kg total body weight (TBW) if BMI 18.5 – 29 kg/m$^2$
- 20-25 mg/kg TBW if BMI $\geq$ 30 kg/m$^2$
- Max 2000 mg per dose; round to nearest 250 mg increment

Step 4: Calculate maintenance dose

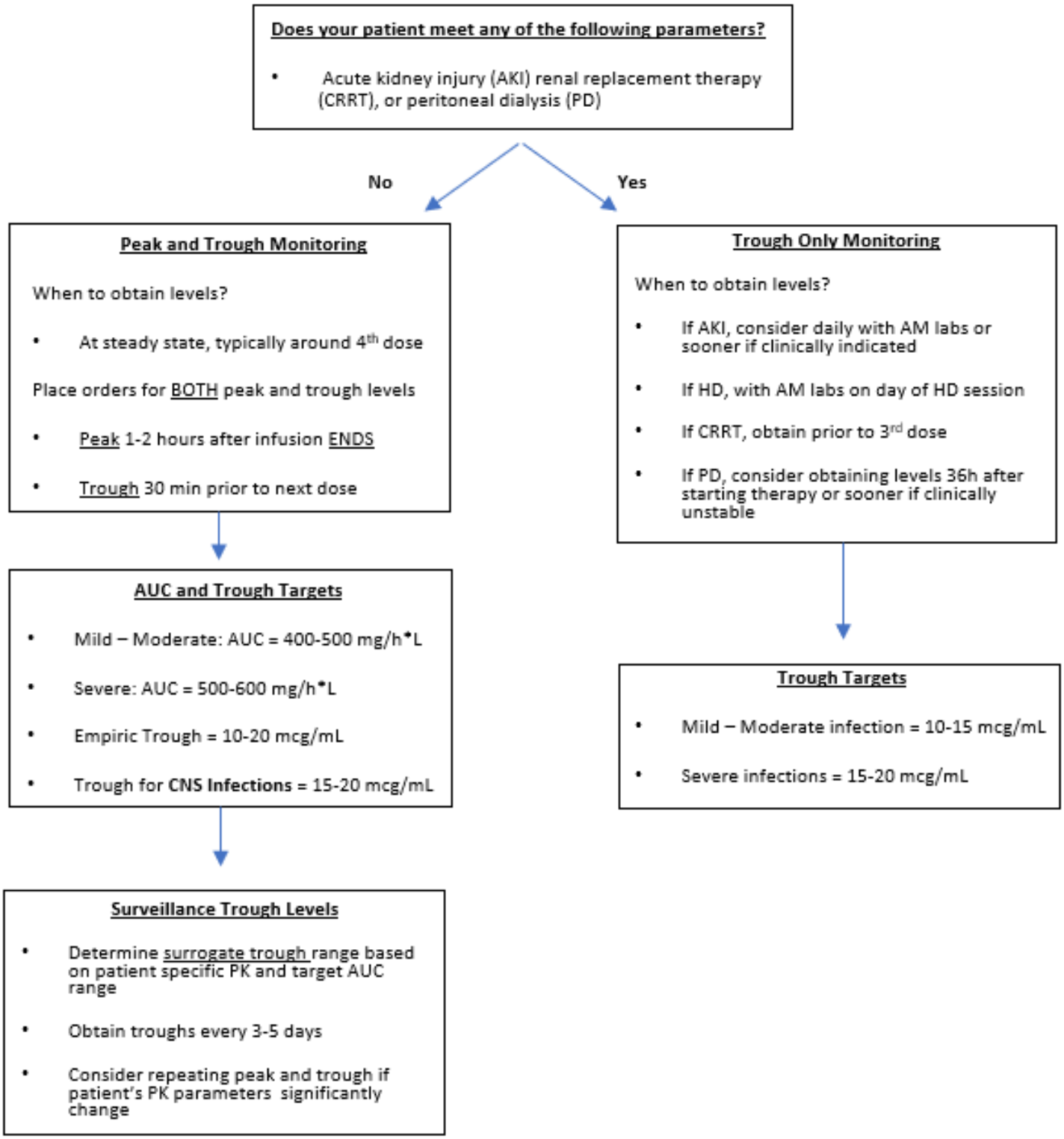
- 15 mg/kg TBW
- Max 2000 mg per dose; round to nearest 250 mg increment

Step 5: Determine maintenance dose administration frequency

- Contact team pharmacist and/or inpatient pharmacy for assistance with AUC target achievement

| Estimated Creatinine Clearance (mL/min) | Dosing Interval to Consider |
|---|---|
| $\geq$100 | q8h |
| 80 - 99 | q8h* or q12h |
| 50 – 79 | q12h |
| 25-49 | q24h |
| HD, PD, or CRRT | Contact pharmacist for assistance |

# Vancomycin Monitoring




Prioritize trough range of 15-20 mcg/L as efficacy parameter in patients with CNS infections such as meningitis or patients with enterococcal endocarditis. Consider consulting the infectious diseases service for assistance in managing these patients.

# HIV Antiretroviral Dosing

## Nucleoside/TIDE Reverse Transcriptase Inhibitors (N(t)RTIs)

| Drug | Dosage Forms | Dose | Excretory Route | Dosage Adjustment in Renal Insufficiency and Hemodialysis |
|---|---|---|---|---|
| **Abacavir (Ziagen®)**<br><br>**Note:** Generic tablet is available | Tablet: 300 mg<br><br>Oral solution: 20 mg/mL | 300 mg PO BID<br><br>or<br><br>600mg PO once daily | Hepatic and renal | No dosage adjustment in renal insufficiency<br><br>Child-Pugh Class — Dose<br>A — 200mg PO BID (use oral soln)<br>B or C — Contraindicated |
| **Emtricitabine (Emtriva™)** | Capsule: 200 mg<br><br>Oral solution: 10mg/mL | 200 mg PO once daily<br><br>or<br><br>240mg (24 mL) oral soln once daily | Renal | CrCl (mL/min) — Capsule — Soln<br>30-49 — 200 mg q48h — 120mg q24h<br>15-29 — 200 mg q72h — 80mg q24h<br><15 — 200 mg q96h — 60mg q24h<br>HD — 200 mg q24h# — 240mg q24h#<br>#Take dose after HD session on dialysis days |
| **Lamivudine (Epivir®)**<br><br>**Note:** Generic products are available | Tablets: 100 mg,150 mg, 300 mg<br><br>Oral solution: 5 mg/mL, 10 mg/mL | 150 mg PO BID<br><br>or<br><br>300 mg PO once daily | Renal | CrCl (mL/min) — Dose<br>15-29 — 150 mg x1, then 100mg q24h<br>5-14 — 150 mg x1, then 50mg q24h<br><5 — 50 mg x1, then 25mg q24h<br>HD — 50 mg x1, then 25mg q24h post HD on HD days |
| **Tenofovir Alafenamide (TAF) (Vemlidy®)** | Tablet: 25mg | 25 mg PO daily | Renal | CrCl (mL/min) — Dose<br><15 and not on HD — Not recommeded<br>HD — 25 mg q24h; post HD session on HD days<br><br>Child-Pugh Class — Dose<br>B or C — Not recommended |
| **Tenofovir disoproxil fumarate (TDF) (Viread®)**<br><br>**Note:** Generic product is available | Tablets:<br>150 mg, 200 mg, 250 mg, 300 mg<br><br>Oral powder: 40 mg/1 gm | 300 mg PO once daily<br><br>7.5 level scoops of oral powder PO once daily (dosing scoop dispensed with each bottle; one level scoop contains 1 gm of oral powder)<br><br>Mix oral powder with 2-4 ounces of soft food that does not require chewing. **Do not mix oral powder with liquid.** | Renal | CrCl (ml/min) — Dose<br>30-49 — 300 mg q48h<br>10-29 — 300 mg BIW (i.e., q 72-96 hours)<br><10 not on HD — No recommendation<br>HD — 300 mg every 7 days post HD |

## Nucleoside/TIDE reverse transcriptase inhibitors co-formulations

| Drug | Dosage Forms | Dose | Excretory Route | Dosage Adjustment in Renal Insufficiency and Hemodialysis |
|---|---|---|---|---|
| **Abacavir / Lamivudine (Epzicom®)** | Tablet:<br>600 mg abacavir/<br>300 mg lamivudine | 1 tablet once daily | Renal | Not recommended in patients with CrCl< 30 mL/min<br><br>Child-Pugh Class — Dose<br>A — Dose adjust Abacavir and use individual drugs<br>B or C — Contraindicated |

| | | | | |
|---|---|---|---|---|
| **Tenofovir alafenamide (TAF)/ Emtricitabine (Descovy®)** | Tablet:<br>25 mg tenofovir AF/<br>200mg emtricitabine | 1 tablet once daily | Renal | CrCl (mL/min) Dose<br>< 30 and not on HD Not recommended<br>< 30 and on HD 1 tablet once daily; take after HD on HD days<br><br>Concomitant administration with: Rifamycins |
| **Tenofovir disoproxil fumarate (TDF) / Emtricitabine (Truvada®)** | Tablet:<br>300 mg tenofovir DF/<br>200 mg emtricitabine | 1 tablet once daily | Renal | CrCl (mL/min) Dose<br>30-49 1 tablet q48h<br>< 30 or on HD Not recommended |

## Non-Nucleoside Reverse Transcriptase Inhibitors (NNRTIs)

| Drug | Dosage Forms | Dose | Excretory Route | Dosage Adjustment in Renal Insufficiency and Hemodialysis |
|---|---|---|---|---|
| **Doravirine (Pifeltro®)** | Tablet: 100 mg | 100 mg PO once daily | Hepatic | No dosage adjustment with renal impairment. Has not been studied in ESRD or on HD<br><br>Child-Pugh Class Dose<br>A or B No dosage adjustment<br>C Not studied<br><br>Concomitant administration with:<br>Rifampin Contraindicated<br>Rifabutin Doravirine 100mg PO BID<br>Rifapentine Contraindicated |
| **Efavirenz (Sustiva®)**<br><br>**Note:** Generic product is available | Capsules: 50 mg, 200 mg<br><br>Tablet: 600 mg | 600 mg PO once daily, at or before bedtime | Hepatic and renal | No dosage adjustment necessary in renal impairment.<br>Caution with impaired hepatic function<br><br>Concomitant administration with:<br>Rifampin No dosage adjustment<br>Rifabutin ↑ Rifabutin dose 450-600 mg per day<br>Rifapentine No dosage adjustment |
| **Etravirine (Intelence®)** | Tablets:<br>25 mg, 100 mg, 200mg | 200 mg PO BID<br><br>Take following a meal | Hepatic | No dose adjustment necessary in renal impairment<br><br>Child-Pugh Class Dose<br>A or B No dosage adjustment<br>C No dose recommendation<br><br>Concomitant administration with:<br>Rifampin Do not co-administer<br>Rifabutin Do not coadminister if with PI/r<br>If without PI/r, use rifabutin 300mg once daily<br>Rifapentine Do not co-administer |
| **Nevirapine (Viramune®)**<br><br>**Note:** Generic products are available | Tablet: 200 mg<br><br>Extended-release tablet: 400 mg | 200 mg PO once daily for 2 weeks, then 200 mg PO BID thereafter*<br><br>or | Hepatic and renal | On hemodialysis, an additional 200mg dose following each dialysis treatment is recommended<br><br>Child-Pugh Class Dose<br>A No dosage adjustment |

| | | | | |
|---|---|---|---|---|
| | Oral suspension:<br>10 mg/mL | 400 mg XR once daily<br><br>*Repeat lead-in period if therapy is discontinued for >7 days | | B or C Contraindicated<br><br>Concomitant administration with:<br>Rifampin Do not co-administer<br>Rifabutin No dosage adjustment<br>Rifapentine Do not co-administer |
| **Rilpivirine (Edurant®)** | Tablet: 25 mg | 25 mg PO once daily | Hepatic | No dosage adjustment necessary in renal impairment<br><br>Child-Pugh Class Dose<br>A or B No dosage adjustment<br>C No dose recommendation<br><br>Concomitant administration with:<br>Rifampin Contraindicated<br>Rifabutin ↑ Rilpivirine 50mg once daily<br>Rifapentine Contraindicated |

## Fixed-dose combinations containing NON-NUCLEOSIDE REVERSE TRANSCRIPTASE INHIBITOR plus Two NRTIs

| Drug | Dosage Forms | Dose | Excretory Route | Dosage Adjustment in Renal Insufficiency and Hemodialysis |
|---|---|---|---|---|
| **Doravirine/ Lamivudine/ Tenofovir DF (Delstrigo®)** | Tablet:<br>100 mg doravirine/<br>300 mg lamivudine/<br>300 mg tenofovir DF | 1 tablet once daily | Hepatic and renal | Not recommended if CrCl <50 mL/min<br><br>Child-Pugh Class Dose<br>A or B No dosage adjustment<br>C Not studied |
| **Efavirenz/ Emtricitabine/ Tenofovir DF (Atripla®)** | Tablet:<br>600 mg efavirenz/<br>200 mg emtricitabine/<br>300 mg tenofovir DF | 1 tablet once daily | Hepatic and renal | Not recommended if CrCl <50 mL/min<br><br>Caution with impaired hepatic function |
| **Efavirenz/ Lamivudine/ Tenofovir DF (Symfi®)** | Tablet:<br>600 mg efavirenz/<br>300mg lamivudine/<br>300 mg tenofovir DF | 1 tablet once daily on an empty stomach, preferably at bedtime | Hepatic and renal | Not recommended if CrCl <50 mL/min<br><br>Not recommended with moderate to severe hepatic impairment. Caution with mild hepatic impairment |
| **Efavirenz/ Lamivudine/ Tenofovir DF (Symfi Lo®)** | Tablet:<br>400 mg efavirenz/<br>300mg lamivudine/<br>300 mg tenofovir DF | 1 tablet once daily on an empty stomach, preferably at bedtime | Hepatic and renal | Not recommended if CrCl <50 mL/min or if on HD<br><br>Not recommended with moderate to severe hepatic impairment. Caution with mild hepatic impairment |
| **Rilpivirine/ Emtricitabine/ Tenofovir DF (Complera®)** | Tablet:<br>25 mg rilpivirine/<br>200 mg emtricitabine/<br>300 mg tenofovir DF | 1 tablet once daily with a meal | Hepatic and renal | Not recommended CrCl <50 mL/min<br><br>Child-Pugh Class Dose<br>A or B No dosage adjustment<br>C No dose recommendation |
| **Rilpivirine/ Emtricitabine/ Tenofovir AF (Odefsey®)** | Tablet:<br>25 mg rilpivirine/<br>200 mg emtricitabine/<br>25 mg tenofovir AF | 1 tablet once daily with a meal | Hepatic and renal | Not recommended CrCL <30 mL/min who are not receiving chronic HD<br>On Chronic HD: 1 tablet once daily. On HD days, take after dialysis<br><br>Child-Pugh Class Dose |

| | | | | |
|---|---|---|---|---|
| | | | | A or B No dosage adjustment<br>C No dose recommendation |

## Protease Inhibitors

| Drug | Dosage Forms | Dose | Excretory Route | Dosage Adjustment in Renal Insufficiency and Hemodialysis |
|---|---|---|---|---|
| **Atazanavir (Reyataz®)** | Capsules:<br>100mg, 150 mg, 200 mg, 300 mg<br><br>Pediatric powder:<br>50 mg packet | ARV-naive:<br>Atazanavir 300mg plus ritonavir 100mg once daily<br><br>or<br><br>Atazanavir 400mg once daily<br><br>ARV-experienced: Atazanavir 300mg plus ritonavir 100mg once daily | Hepatic | ARV-naïve on HD: Atazanavir 300mg plus ritonavir 100mg once daily<br>ARV-experienced on HD: ATV and ATV/ritonavir not recommended<br><br>Child-Pugh Class Dose<br>A No dosage adjustment<br>B ATV 300mg unboosted for naive<br>C Not recommended<br><br>Concomitant administration with:<br>Efavirenz Atazanavir 400 mg plus ritonavir 100mg once daily<br>Tenofovir Atazanavir 300 mg plus ritonavir 100mg once daily |
| **Atazanavir/ Cobicistat (Evotaz®)** | Tablet:<br>300mg co-formulated with cobicistat 150 mg | One tablet once daily | Hepatic and renal | If used with Tenofovir DF:<br>Not recommended if CrCl < 70mL/min<br>Not recommended with hepatic impairment<br><br>Concomitant administration with:<br>Rifampin Contraindicated<br>Rifabutin Do not co-administer<br>Rifapentine Do not co-administer |
| **Darunavir (Prezista®)** | Tablets: 75 mg, 150 mg, 600 mg, 800 mg<br><br>Oral suspension:<br>100 mg/mL | ARV-naïve or no DRV mutations:<br>800 mg plus 100 mg RTV once daiy<br><br>ARV-experienced with one or more DRV mutations: 600 mg plus 100 mg RTV twice daily | Hepatic | Mild to moderate hepatic impairment: No dose adjustment<br><br>Severe hepatic impairment: Not recommended |
| **Darunavir/ Cobicistat (Prezcobix®)** | Tablet:<br>800 mg darunavir/<br>150 mg cobicistat | One tablet once daily<br><br>ARV-experienced with one or more DRV mutations: Not recommended | Hepatic and renal | If used with Tenofovir DF: Not recommended if CrCl < 70mL/min<br><br>Child-Pugh Class Dose<br>A or B No dosage adjustment<br>C Not recommended<br><br>Concomitant administration with:<br>Rifampin Contraindicated<br>Rifabutin Do not co-administer<br>Rifapentine Do not co-administer |
| **Ritonavir (Norvir®)** | Capsule: 100 mg (soft gelatin) | Primarily used for "boosting" and in combination with other PI's | Hepatic | Refer to recommendations for the primary PI for hepatic dose adjustment |

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| | Tablet: 100 mg<br><br>Oral solution: 80 mg/mL<br><br>Oral powder: 100mg single packet | 100 mg to 400 mg per day in 1 to 2 divided doses (refer to other PIs for specific dosing recommendations) | | |

## Fixed-dose combinations containing PROTEASE INHIBITOR plus Two NRTIs

| Drug | Dosage Forms | Dose | Excretory Route | Dosage Adjustment in Renal Insufficiency and Hemodialysis |
|---|---|---|---|---|
| **Darunavir/ Cobicistat/ Emtricitabine/ Tenofovir AF (Symtuza®)** | Tablet:<br>800 mg darunavir/<br>150 mg cobicistat/<br>200 mg emtricitabine/<br>10 mg tenofovir AF | 1 tablet once daily | Hepatic and renal | CrCl <30 mL/min – not recommended<br><br>On chronic HD: 1 tablet PO once daily. On HD days, administer after HD<br><br>Not recommended in severe hepatic impairment |

## CHEMOKINE CO-RECEPTOR ANTAGONIST

| Drug | Dosage Forms | Dose | Excretory Route | Dosage Adjustment in Renal Insufficiency and Hemodialysis |
|---|---|---|---|---|
| **Maraviroc (Selzentry®)** | Tablets: 150 mg, 300 mg | Depends on presence of concomitantly administered medications:<br>• 150 mg BID with strong CYP3A inhibitors (with or without CYP3A inducers)including PIs (except TPV/r)<br>• 300mg BID with NRTIs, T-20, TPV/r, NVP, and non-strong CYP3A inhibitors or inducers<br>• 600mg BID with CYP3A inducers, including EFV, ETR, etc. (without a CYP3A inhibitor) | Hepatic and renal | No dosage recommendation with hepatic impairment. Maraviroc concentrations will likely be increased<br><br>**CrCl <30 mL/min or on HD:**<br>Without potent CYP3A4 inhibitors or inducers: Maraviroc 300mg twice daily; if postural hypotension occurs, reduce to maraviroc 150 mg twice daily<br><br>With potent CYP3A4 inhibitors or inducers: Not recommended |

## CD4 Post-attachment Inhibitor

| Drug | Dosage Forms | Dose | Excretory Route | Dosage Adjustment in Renal Insufficiency and Hemodialysis |
|---|---|---|---|---|
| **Ibalizumab (Trogarzo®)** | Single-dose 2-mL vial containing 200 mg/1.33 mL (150 mg/mL) of ibalizumab | Loading: A single dose of 2,000 mg diluted IV infusion over 30 minutes<br><br>Maintenance: 800mg diluted IV infusion over 15 minutes OR IV push every 2 weeks<br><br>Missed dose: If maintenance dose is missed by 3 days or more beyond scheduled dosing day, administer a loading dose of 2000 mg as soon as possible. Resume maintenance dose every 2 weeks thereafter | Not well defined | No dosage recommendation in renal or hepatic impairment |

## gp-120-directed attachment inhibitor

| Drug | Dosage Forms | Dose | Excretory Route | Dosage Adjustment in Renal Insufficiency and Hemodialysis |
|---|---|---|---|---|
| **Fostemsavir (Rukobia®)** | Tablet: 600mg extended release | 600mg PO BID | Hepatic and renal | No dosage adjustment required with renal impairment or those on HD<br>No dosage adjustment required with mild to severe hepatic impairment<br><br>Concomitant administration with: |

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| | | | | Rifampin Contraindicated<br>Rifabutin Without PI/r, no dosage adjustment<br>With PI/s, use rifabutin 150mg PO once daily<br>Rifapentine Do not co-administer |

## Integrase Strand transfer INHIBITORs (INSTI)

| Drug | Dosage Forms | Dose | Excretory Route | Dosage Adjustment in Renal Insufficiency and Hemodialysis |
|---|---|---|---|---|
| **Bictegravir** | Only available as a component of fixed-dose combination **BIKTARVY®** | BIKTARVY:<br>One tablet PO once daily | Hepatic | Refer to BIKTARVY for details |
| **Cabotegravir** | Tablet: **(Vocabria®)** = 30 mg*<br><br>*Must be obtained from manufacturer for oral lead-in and oral bridging during administration of Cabenuva (CAB IM/RPV IM)<br><br>Long-acting injectable:<br>**Apretude®** = individual product for IM long-acting pre-exposure prophylaxis (CAB IM)<br>• 600-mg/3-mL vial<br><br>**Cabenuva®** (CAB IM and RPV IM) = co-packaged intra-muscular long-acting regimen<br>• 400-mg/2-ml vial or 600-mg/3-ml vial | Vocabria<br><br>30mg once daily<br><br>Apretude<br><br>Loading dose:<br>CAB 600mg/3mL IM monthly for 2 months<br><br>Continuation phase:<br>CAB 600mg/3mL IM q8 weeks<br><br>See CABENUVA for dosing information | Hepatic | No dosage adjustment necessary for mild to moderate renal impairment<br><br>For severe renal impairment or on HD, increase monitoring for adverse events<br><br><u>Child-Pugh Class</u> <u>Dose</u><br>A or B No dosage adjustment<br>C No recommendation<br><br><u>CAB PO and concomitant administration with</u>:<br>Rifampin Contraindicated<br>Rifabutin No dosage adjustment<br>Rifapentine Contraindicated<br><br><u>CAB IM and concomitant administration with</u>:<br>Rifampin Contraindicated<br>Rifabutin Contraindicated<br>Rifapentine Contraindicated |
| **Dolutegravir (Tivicay®)** | Tablet: 10 mg, 25 mg, 50 mg<br><br>Tablet for suspension: 5 mg | <u>ARV-naïve or treatment-experienced but integrase strand inhibitor-naïve (INSTI-naïve):</u><br>50 mg PO once daily<br><br><u>INSTI-experienced with certain known or clinically suspected INSTI-resistance:</u><br>50 mg PO BID | Hepatic and renal | No dosage adjustment necessary with renal impairment.<br><br><u>Child-Pugh Class</u> <u>Dose</u><br>A or B No dosage adjustment<br>C Not recommended<br><br><u>ARV- or INSTI- naïve and concomitant administration with</u>:<br>Rifampin ↑ Dolutegravir 50 mg BID (only if no INSTI mutation)<br>Rifabutin No dosage adjustment<br>Rifapentine Do not co-administer |
| **Elvitegravir** | Only available as a component of a fixed-dose combination known as either<br>**Genvoya®**<br>(elvitegravir/cobicistat/emtricitabine/TAF)<br>**Stribild®**<br>(elvitegravir/cobicistat/emtricitabine/TDF) | **Genvoya®**<br>One tablet PO once daily<br><br>**Stribild®**<br>One tablet PO once daily | Hepatic and renal | <u>Concomitant administration with</u>:<br>Rifampin Contraindicated<br>Rifabutin Do not co-administer<br>Rifapentine Do not co-administer |

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| **Raltegravir (Isentress®)** | Tablet: 400 mg<br><br>Chewable tablets: 25 mg, 100 mg<br><br>Powder for oral suspension:<br>100 mg single-use packet<br><br>High dose tablet: 600 mg | Regular tablet: 400 mg PO BID<br><br>High dose tablet: ARV-naïve or ARV-experienced with virologic suppression on a regimen containing RAL 400mg twice daily: 1200 mg PO once daily | Hepatic | No dosage adjustment necessary in renal insufficiency.<br>No dosage adjustment with mild to moderate hepatic insufficiency<br>No recommendation with severe hepatic insufficiency<br><br>Concomitant administration with:<br>Rifampin *Raltegravir 800mg BID (*standard tablet only)<br>Rifabutin No dosage adjustment<br>Rifapentine Do not co-administer with once daily Rifapentine |

## Fixed-dose combinations containing INTEGRASE STRAND TRANSFER INHIBITOR plus One NRTI

| Drug | Dosage Forms | Dose | Excretory Route | Dosage Adjustment in Renal Insufficiency and Hemodialysis |
|---|---|---|---|---|
| **Dolutegravir/ Rilpivirine (Juluca®)** | Tablet:<br>50 mg dolutegravir/ 25 mg rilpivirine | 1 tablet once daily with food | Hepatic | No dosage adjustment with renal insufficiency<br>Monitor for adverse effects when CrCl < 30 mL/min<br><br>Child-Pugh Class Dose<br>A or B No dosage adjustment<br>C No dose recommendation<br><br>Concomitant administration with:<br>Rifampin Contraindicated<br>Rifabutin ↑ Rilpivirine 50 mg once daily<br>Rifapentine Contraindicated |

## Fixed-dose combinations containing INTEGRASE STRAND TRANSFER INHIBITOR plus One NRTI

| Drug | Dosage Forms | Dose | Excretory Route | Dosage Adjustment in Renal Insufficiency and Hemodialysis |
|---|---|---|---|---|
| **Dolutegravir/ Lamivudine (Dovato®)** | Tablet:<br>50 mg dolutegravir/<br>300 mg lamivudine | 1 tablet once daily | Hepatic and renal | Not recommended if CrCl <30 mL/min<br><br>Child-Pugh Class Dose<br>A or B No dosage adjustment<br>C No dose recommendation<br><br>ARV- or INSTI- naïve and concomitant administration with:<br>Rifampin ↑ Dolutegravir 50 mg BID (only if no INSTI mutation)<br>Rifabutin No dosage adjustment<br>Rifapentine Do not co-administer |

## Fixed-dose combinations containing INTEGRASE STRAND TRANSFER INHIBITORS plus Two NRTIs

| Drug | Dosage Forms | Dose | Excretory Route | Dosage Adjustment in Renal Insufficiency and Hemodialysis |
|---|---|---|---|---|
| **Bictegravir/ Emtricitabine/ Tenofovir AF (Biktarvy®)** | Tablet:<br>50 mg bictegravir/<br>200 mg emtricitabine/<br>25 mg tenofovir AF | 1 tablet once daily | Hepatic and renal | CrCl <30 mL/min – not recommended<br><br>On chronic HD: 1 tablet PO once daily. On HD days, administer after HD<br><br>Child-Pugh Class Dose |

| | | | | |
|---|---|---|---|---|
| | | | | A or B No dosage adjustment<br>C Not recommended<br><br>Concomitant administration with:<br>Rifampin Contraindicated<br>Rifabutin Do not co-administer<br>Rifapentine Do not co-administer |
| **Elvitegravir/ cobicistat/ Emtricitabine/ Tenofovir AF (Genvoya®)** | Tablet:<br>150 mg elvitegravir/<br>150 mg cobicistat/<br>200 mg emtricitabine/<br>10 mg tenofovir AF | 1 tablet once daily | Hepatic and renal | CrCl <30 mL/min and not on chronic HD: Not recommended<br><br>On chronic HD: 1 tablet PO once daily. On HD days, administer after HD<br><br>No dosage adjustment necessary in mild-moderate hepatic impairment<br>Not recommended in severe hepatic impairment |
| **Elvitegravir/ cobicistat/ Emtricitabine/ Tenofovir DF (Stribild®)** | Tablet:<br>150 mg elvitegravir/<br>150 mg cobicistat/<br>200 mg emtricitabine/<br>300 mg tenofovir DF | 1 tablet once daily | Hepatic and renal | Initial use not recommended with CrCl < 70 ml/min<br>Continued use not recommended with CrCl < 50 ml/min<br><br>No dosage adjustment necessary in mild-moderate hepatic impairment<br>Not recommended in severe hepatic impairment |
| **Dolutegravir/ Abacavir/ Lamivudine (Triumeq®)** | Tablet:<br>50 mg dolutegravir/<br>600mg abacavir/<br>300 mg lamivudine | 1 tablet once daily | Hepatic and renal | Not recommended CrCl <30 mL/min<br>Child-Pugh class A: dose adjust abacavir and use individual drugs<br>Contraindicated for Child-Pugh class B and C |

## LONG-ACTING INJECTABLE containing INTEGRASE STRAND TRANSFER INHIBITOR and NNRTI

| Drug | Dosage Forms | Dose | Excretory Route | Dosage Adjustment in Renal Insufficiency and Hemodialysis |
|---|---|---|---|---|
| **Cabotegravir IM/ Rilpivirine IM (Cabenuva®)** | Available as part of the co-packaged intramuscular long-acting regimen (CAB IM and RPV IM)<br><br>**(CABENUVA®)**<br>600 mg/900 mg kit contains:<br>CAB 600 mg/3 mL vial and<br>RPV 900 mg/3 mL vial<br><br>**(CABENUVA®)**<br>400 mg/600 mg kit contains:<br>CAB 400 mg/2 mL vial and<br>RPV 600 mg/2 mL vial | Monthly Dosing<br>Loading dose: CAB 600mg/3mL IM x 1 dose and RPV 900mg/3 mL IM x 1 dose<br><br>Continuation phase: CAB 400mg/2mL IM and RPV 600mg/2mL every 4 weeks<br><br>Every 2-month Dosing<br>Loading dose: CAB 600mg/3mL IM monthly and RPV 900mg/3 mL IM monthly for 2 doses<br><br>Continuation phase: CAB 600mg/3mL IM and RPV 900mg/3mL every 8 weeks | Hepatic | No dosage adjustment necessary for mild to moderate renal impairment<br><br>For severe renal impairment or on HD, increase monitoring for adverse events<br><br>Child-Pugh Class Dose<br>A or B No dosage adjustment<br>C No dose recommendation<br><br>Concomitant administration with:<br>Rifampin Contraindicated<br>Rifabutin Contraindicated<br>Rifapentine Contraindicated |