

Guidelines for Empirical Antimicrobial Use in Adults

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This publication is designed to assist clinicians in the initial selection and monitoring of antimicrobial therapy for adult patients at UCSF Medical Center, San Francisco General Hospital, and the VA Medical Center. Recommendations represent the consensus of contributors and the Infectious Diseases Management Programs. **These recommendations may differ from product prescribing information.** Some of the policies contained in this document are hospital specific, and these are noted where applicable.

www.ucsf.edu/idmp.

Online version has updated information, full text references, infectious diseases library, comprehensive antibiograms, and additional guidelines.

I. Contact Information

San Francisco Department of Public Health: 554-2830

- reporting of communicable diseases (e.g. STDs, meningococcus)
- reporting and referrals to tuberculosis clinic (206-8524)

UCSF Infectious Diseases Program Contact Information

Infectious Diseases Consult Service (24hr consult pager): 719-9628

- formal ID service consultation
- recommendations for diagnosis and treatment
- approval of restricted laboratory tests

Infectious Diseases Pharmacy (24hr pager): 443-9421

- approval of restricted antimicrobials
- recommendations for antimicrobial selection and dosing

Microbiology Laboratory: 353-1268

- results of microbiology testing
- for susceptibility inquiries please have culture accession #

Inpatient Pharmacy: 353-1154

- information on dosing and availability of antimicrobials

Infection Control: 353-4343

- recommendations for infection control and patient isolation
- reporting of suspected outbreaks

Needlestick Hotline (24hr pager): 719-3898

- reporting and management of bloodborne pathogen exposures

SFGH Infectious Diseases Program Contact Information

Infectious Diseases Consult Service (24hr consult pager): 719-4737

- formal ID service consultation
- recommendations for diagnosis and treatment
- approval of restricted antibiotics (see section IV)

Microbiology Laboratory: 206-8576

- results of microbiology testing

Inpatient Pharmacy: 206-8460

- information on dosing and availability of antimicrobials

Infection Control: 206-5466 or 206-8451

- recommendations for infection control and patient isolation
- reporting of suspected outbreaks
- assistance with reportable diseases

Needlestick Hotline (24hrs): 469-4411

- reporting and management of bloodborne pathogen exposures

SF VA Medical Center Infectious Diseases Program Contact Information

Infectious Diseases Consult Service (24hr consult pager): 207-3614

- formal ID service consultation
- recommendations for diagnosis and treatment
- approval of restricted antibiotics (evenings, weekends)

Infectious Diseases Pharmacist (pager): 804-5982

- approval of restricted antimicrobials (weekdays)
- recommendations for antimicrobial selection and dosing

Microbiology Laboratory: 221-4810, ext. 2267

- results of microbiology testing

Inpatient Pharmacy: 221-4810, ext. 2935

- information on dosing and availability of antimicrobials

Infection Control: 221-4810, ext.2728 or ext. 3762

- recommendations for infection control and patient isolation
- reporting of suspected outbreaks
- assistance with reportable diseases

Needlestick Hotline (24hrs): 469-4411

- reporting and management of bloodborne pathogen exposures

II. Guidelines for Initial Therapy

a. Hospitalized Adults

Bone and Joint Infections

Diagnosis	Common Pathogens	Drug(s) of First Choice ¹	Alternative Drug(s) ¹	Comments
BONE AND JOINT INFECTIONS				
Septic Arthritis: Including prosthetic joint infection	<i>S. aureus</i> Streptococci <i>N. gonorrhoeae</i> <i>Coagulase negative staph (prosthetic joint)</i> <i>Enterobacteriaceae (rarely)</i>	Vancomycin² + Ceftriaxone⁵ 1 gm IV q24h Or Piperacillin/tazobactam (Zosyn[®]) 4.5g IV q8h	<i>For severe PCN allergy³:</i> Vancomycin² + Ciprofloxacin 400mg IV q12h Or Levofloxacin 500mg IV q24h^{4,5} (<i>If gram stain shows GNR's</i>)	Gram stain recommended to guide therapy Narrow coverage to microbiologically confirmed pathogens. ID consultation recommended
Osteomyelitis: Hematogenous	<i>S. aureus</i>	Vancomycin²	<i>For severe PCN allergy³:</i> Vancomycin²	If nafcillin susceptible <i>S. aureus</i> then cefazolin 2g IV q8h or nafcillin 2g IV q6h are the antibiotics of choice
With vascular insufficiency or Diabetes Mellitus (e.g. severe diabetic foot ulcer)	<i>S. aureus</i> Enterobacteriaceae Anaerobes	Vancomycin² <i>Plus</i> Piperacillin/tazobactam (Zosyn[®]) 4.5 g IV q8h	<i>For severe PCN allergy³:</i> Vancomycin² <i>Plus</i> Ciprofloxacin 400mg IV q12h Or Levofloxacin 500mg q24h^{4,5}	Other organisms are possible, esp. with hardware-microbiologic diagnosis and ID consultation recommended
¹ Doses provided in this table are for patients with normal renal and hepatic function. Consult Antimicrobial Dosing Guidelines (pg. 36-41) for dosing adjustment required in renal dysfunction. ² For dosing of vancomycin and aminoglycosides, refer to Antimicrobial Dosing Guidelines (pg. 36-41) and sections on vancomycin monitoring (pg. 33) and aminoglycoside dosing and monitoring (pg. 34-35) ³ Severe PCN allergy defined as anaphylaxis, bronchospasm, and hives. Mild PCN allergy defined as non- IgE mediated (i.e. maculopapular rash or drug fever). ⁴ Fluoroquinolone=Ciprofloxacin or Levofloxacin unless otherwise noted ⁵ ID approval needed at SFVAMC				

Skin and Soft Tissue Infections

Diagnosis	Common Pathogens	Drug(s) of First Choice ¹	Alternative Drug(s) ¹	Comments
SKIN AND SOFT TISSUE INFECTIONS				
Cellulitis	Group A streptococci Other beta-hemolytic streptococci <i>S. aureus</i> less common	Cefazolin 1 g IV q8h Or Nafcillin 1-2 g IV q6h	<i>For severe PCN allergy³:</i> Clindamycin⁵ 600-900 mg IV q8h Or Vancomycin²	The advantage of cefazolin is less frequent dosing The advantage of nafcillin is more focused and directed spectrum Increasing rates of MRSA in the community may be a cause for failure to respond to initial therapy. Nosocomial cellulitis may be due to MRSA or Enterobacteriaceae.
Abscess	<i>S. aureus</i>	Vancomycin²		
Necrotizing fasciitis or suspected deep tissue extension	Group A streptococci <i>S. aureus</i> Anaerobes Gram neg bacilli	Vancomycin² + Piperacillin/tazobactam (Zosyn [®]) 4.5g IV q8h + Clindamycin⁵ 600 – 900mg IV q8h Or Vancomycin² + Imipenem⁵ 500mg IV q 6-8h or Meropenem⁵ 0.5-1g IV q8h +Clindamycin⁵ 600-900mg IV q8h	Vancomycin² + Gentamicin²⁺ Clindamycin⁵ 600-900mg IV q8h	
¹ Doses provided in this table are for patients with normal renal and hepatic function. Consult Antimicrobial Dosing Guidelines (pg. 36-41) for dosing adjustment required in renal dysfunction. ² For dosing of vancomycin and aminoglycosides, refer to Antimicrobial Dosing Guidelines (pg. 36-41) and sections on vancomycin monitoring (pg. 33) and aminoglycoside dosing and monitoring (pg. 34-35) ³ Severe PCN allergy defined as anaphylaxis, bronchospasm, and hives. Mild PCN allergy defined as non- IgE mediated (i.e. maculopapular rash or drug fever). ⁴ Fluoroquinolone=Ciprofloxacin or Levofloxacin unless otherwise noted ⁵ ID approval needed at SFVAMC				

Endocarditis

Diagnosis	Common Pathogens	Drug(s) of First Choice ¹	Alternative Drug(s) ¹	Comments
ENDOCARDITIS				
Native Valve	<i>S. aureus</i> Streptococci Enterococcus Occasional gram negative rods HACEK < 5%	Vancomycin ² +/- Ceftriaxone 2 g IV q24h	<i>For severe PCN allergy</i> ³ : Vancomycin ² ± Ciprofloxacin 400mg IV q12h	ID consultation is strongly recommended regarding choice and duration of therapy Narrow coverage to microbiologically confirmed pathogens
Prosthetic Valve	<i>S. aureus</i> <i>Coag. negative staphylococci</i>	Vancomycin ² <i>Plus</i> Rifampin 300 mg PO q8h <i>Plus</i> Gentamicin ² 1mg/kg/dose IV q8h for initial two weeks only Single daily dose of gentamicin is not recommended		ID consultation is strongly recommended regarding choice and duration of therapy
¹ Doses provided in this table are for patients with normal renal and hepatic function. Consult Antimicrobial Dosing Guidelines (pg. 36-41) for dosing adjustment required in renal dysfunction. ² For dosing of vancomycin and aminoglycosides, refer to Antimicrobial Dosing Guidelines (pg. 36-41) and sections on vancomycin monitoring (pg. 33) and aminoglycoside dosing and monitoring (pg. 34-35) ³ Severe PCN allergy defined as anaphylaxis, bronchospasm, and hives. Mild PCN allergy defined as non- IgE mediated (i.e. maculopapular rash or drug fever). ⁴ Fluoroquinolone=Ciprofloxacin or Levofloxacin unless otherwise noted ⁵ ID approval needed at SFVAMC				

Gynecologic Infections

Diagnosis	Common Pathogens	Drug(s) of First Choice ¹	Alternative Drug(s)	Comments
GYNECOLOGIC INFECTIONS				
Endometritis	<i>Bacteroides</i> <i>Prevotella bivia</i> Group B & A streptococci Enterobacteriaceae <i>M. hominis</i>	Piperacillin/tazobactam (Zosyn [®]) 4.5 g IV q8h or Ampicillin/sulbactam ⁵ (Unasyn [®]) 3g IV q6h	<i>For severe PCN allergy</i> ³ : Clindamycin ⁵ 600 - 900 mg IV q8h <i>Plus</i> Levofloxacin ⁵ 500mg IV q24h or Gentamicin 5 mg/kg ² as a single daily dose	If test for chlamydia is positive and not using levofloxaicon, add azithromycin ⁶ or doxycycline.
Group B streptococcal infection	Group B streptococci	Ampicillin 2 g IV q6h	Clindamycin ⁵ 600 - 900 mg IV q8h	
Pelvic inflammatory disease	<i>Chlamydia trachomatis</i> <i>M. hominis</i> <i>Neisseria gonorrhoeae</i> Enterobacteriaceae <i>Anaerobes</i>	Ampicillin/sulbactam ⁵ 3g IV q6h (Unasyn [®]) or Piperacillin/tazobactam (Zosyn [®]) 4.5gm IV q6h <i>Plus</i> Doxycycline 100 mg IV/PO q12h Or Ceftriaxone ⁵ 1g IV q24h + Doxycycline 100mg PO/IV q12h +/- Metronidazole 500 mg IV/PO q8h	<i>For severe PCN allergy</i> ³ : Levofloxacin ⁵ 500 mg IV/PO daily + Metronidazole 500 mg IV/PO Q8h or Clindamycin ⁵ 600 - 900 mg IV q8h <i>Plus</i> Gentamicin ² 5 mg/kg as a single daily dose <i>Plus</i> Doxycycline 100 mg IV/PO q12h	
¹ Doses provided in this table are for patients with normal renal and hepatic function. Consult Antimicrobial Dosing Guidelines (pg. 36-41) for dosing adjustment required in renal dysfunction. ² For dosing of vancomycin and aminoglycosides, refer to Antimicrobial Dosing Guidelines (pg. 36-41) and sections on vancomycin monitoring (pg. 33) and aminoglycoside dosing and monitoring (pg. 34-35) ³ Severe PCN allergy defined as anaphylaxis, bronchospasm, and hives. Mild PCN allergy defined as non- IgE mediated (i.e. maculopapular rash or drug fever). ⁴ Fluoroquinolone=Ciprofloxacin or Levofloxacin unless otherwise noted ⁵ ID approval needed at SFVAMC				

Head and Neck Infections

Diagnosis	Common Pathogens	Drug(s) of First Choice ¹	Alternative Drug(s) ¹	Comments
HEAD AND NECK INFECTIONS				
Peritonsillar abscess, deep neck infections	Group A streptococci Anaerobes	Ampicillin/sulbactam ⁵ (Unasyn [®]) 3g IV q6h or Metronidazole 500 mg IV/PO q8h <i>Plus</i> Ceftriaxone ⁵ 1g IV q24h or Cefuroxime 750 mg IV q8h	<i>For severe PCN allergy</i> ³ : Clindamycin ⁵ 600 – 900 mg IV q8h <i>Plus</i> Ciprofloxacin 400mg IV q12h Or Levofloxacin 500mg IV q24h ⁵	Often polymicrobial
¹ Doses provided in this table are for patients with normal renal and hepatic function. Consult Antimicrobial Dosing Guidelines (pg. 36-41) for dosing adjustment required in renal dysfunction. ² For dosing of vancomycin and aminoglycosides, refer to Antimicrobial Dosing Guidelines (pg. 36-41) and sections on vancomycin monitoring (pg. 33) and aminoglycoside dosing and monitoring (pg. 34-35) ³ Severe PCN allergy defined as anaphylaxis, bronchospasm, and hives. Mild PCN allergy defined as non- IgE mediated (i.e. maculopapular rash or drug fever). ⁴ Fluoroquinolone=Ciprofloxacin or Levofloxacin unless otherwise noted ⁵ ID approval needed at SFVAMC				

Intra-abdominal Infections

Diagnosis	Common Pathogens	Drug(s) of First Choice ¹	Alternative Drug(s) ¹	Comments
INTRA-ABDOMINAL INFECTIONS				
SBP (Spontaneous Bacterial Peritonitis)	<i>E. coli</i> <i>Klebsiella</i> <i>Strep. spp.</i>	Ceftriaxone ⁵ 1g IV q24h	<i>For severe PCN allergy</i> ³ : Vancomycin ² or Clindamycin 600-900mg IV q8h Plus Gentamicin ² or Aztreonam ⁵ 2g IV q8h	Gram stain recommended
Secondary Peritonitis Moderate to severe, intra-abdominal abscess	<i>E. coli</i> <i>Klebsiella</i> <i>B. fragilis</i> <i>Enterococcus</i>	Piperacillin/tazobactam (Zosyn [®]) 4.5g q 8h	<i>For severe PCN allergy</i> ³ : Metronidazole 500 mg IV/PO q8h Plus Aztreonam ⁵ 2g IV q8h or Gentamicin ²	
Severe, major peritoneal soilage, large or multiple abscesses, patient hemodynamically unstable	<i>E. coli</i> <i>Klebsiella</i> <i>B. fragilis</i> <i>Enterococcus</i>	Piperacillin/tazobactam (Zosyn [®]) 4.5 g IV q8h Plus Gentamicin ²	Imipenem ² 0.5 g IV q6h or Meropenem ⁵ 1 g IV q8h <i>For severe PCN allergy</i> ³ : Vancomycin ² Plus Metronidazole 500 mg IV q8h Plus Gentamicin ² or Aztreonam ⁵ 2g IV q8h	ID consultation is recommended
Necrotizing pancreatitis	<i>E. coli</i> <i>Klebsiella</i> , <i>Enterobacter</i> <i>B. fragilis</i> <i>Enterococcus</i> <i>S.aureus</i>	Piperacillin/tazobactam (Zosyn [®]) 4.5 g IV q8h	<i>For severe PCN allergy</i> ³ : Metronidazole 500 mg IV q8h Plus Ciprofloxacin 400mg IV q12h Or Levofloxacin 500mg IV q24h ⁴	ID consultation is recommended. Antibiotics in this setting are for prevention, not treatment, of infection and should be used for the shortest possible duration.
¹ Doses provided in this table are for patients with normal renal and hepatic function. Consult Antimicrobial Dosing Guidelines (pg. 36-41) for dosing adjustment required in renal dysfunction. ² For dosing of vancomycin and aminoglycosides, refer to Antimicrobial Dosing Guidelines (pg. 36-41) and sections on vancomycin monitoring (pg. 33) and aminoglycoside dosing and monitoring (pg. 34-35) ³ Severe PCN allergy defined as anaphylaxis, bronchospasm, and hives. Mild PCN allergy defined as non- IgE mediated (i.e. maculopapular rash or drug fever). ⁴ Fluoroquinolone=Ciprofloxacin or Levofloxacin unless otherwise noted ⁵ ID approval needed at SFVAMC				

Line-Related Infections

Diagnosis	Common Pathogens	Drug(s) of First Choice ¹	Alternative Drug(s) ¹	Comments
LINE-RELATED INFECTIONS				
Line-related bacteremia (+ peripheral blood culture)	<i>Staph. epidermidis</i> <i>Staph. aureus</i> Yeast Enterococci Occasional gram negative rods	Vancomycin ² ± Piperacillin/tazobactam (Zosyn [®]) 4.5g IV q8h	Vancomycin ² ± Ciprofloxacin 400mg IV q12h Or Levofloxacin 500mg q24h ⁵	Remove the offending intravascular device immediately, if possible.
¹ Doses provided in this table are for patients with normal renal and hepatic function. Consult Antimicrobial Dosing Guidelines (pg. 36-41) for dosing adjustment required in renal dysfunction. ² For dosing of vancomycin and aminoglycosides, refer to Antimicrobial Dosing Guidelines (pg. 36-41) and sections on vancomycin monitoring (pg. 33) and aminoglycoside dosing and monitoring (pg. 34-35) ³ Severe PCN allergy defined as anaphylaxis, bronchospasm, and hives. Mild PCN allergy defined as non- IgE mediated (i.e. maculopapular rash or drug fever). ⁴ Fluoroquinolone=Ciprofloxacin or Levofloxacin unless otherwise noted ⁵ ID approval needed at SFVAMC				

Meningitis

Diagnosis	Common Pathogens	Drug(s) of First Choice ¹	Alternative Drug(s) ¹	Comments
MENINGITIS				
Meningitis	<i>Strep. pneumoniae</i> <i>Neisseria meningitidis</i> <i>Listeria</i> (especially in immuno-compromised, elderly patients, and alcoholics)	Ceftriaxone ⁵ 2 g IV q12h <i>Plus</i> Vancomycin ² If <i>Listeria</i> suspected add: Trimethoprim/Sulfamethoxazole (TMP/SMX) 15 mg/kg/day (in divided doses) <i>Or</i> Ampicillin 2g IV q4h	<i>For severe PCN allergy</i> ³ : Vancomycin ² + Aztreonam ⁵ 2g IV q8h ± Trimethoprim/Sulfamethoxazole (if <i>Listeria</i>) 15 mg/kg/day (in divided doses)	ID consultation recommended Therapy should be guided by Gram stain If bacterial meningitis suspected, dexamethasone 10 mg PO/IV q6h x 4 days given before or with initial dose of antibiotics
Open head trauma or surgery	<i>Staph. aureus</i> Gram negative rods	Cefepime 2g IV q8h ⁵ <i>Plus</i> Vancomycin ²	Aztreonam ⁵ 2 g IV q8h <i>Plus</i> Vancomycin ²	ID consultation recommended
¹ Doses provided in this table are for patients with normal renal and hepatic function. Consult Antimicrobial Dosing Guidelines (pg. 36-41) for dosing adjustment required in renal dysfunction. ² For dosing of vancomycin and aminoglycosides, refer to Antimicrobial Dosing Guidelines (pg. 36-41) and sections on vancomycin monitoring (pg. 33) and aminoglycoside dosing and monitoring (pg. 34-35) ³ Severe PCN allergy defined as anaphylaxis, bronchospasm, and hives. Mild PCN allergy defined as non- IgE mediated (i.e. maculopapular rash or drug fever). ⁴ Fluoroquinolone=Ciprofloxacin or Levofloxacin unless otherwise noted ⁵ ID approval needed at SFVAMC				

Pneumonia, Community-Acquired

Diagnosis	Common Pathogens	Drug(s) of First Choice ¹	Alternative Drug(s) ¹	Comments
PNEUMONIA, COMMUNITY ACQUIRED BACTERIAL				
Immunocompetent patient – Medical Ward	<i>Strep. pneumoniae</i> <i>Mycoplasma pneumoniae</i> <i>Chlamydia pneumoniae</i> <i>H. influenzae</i> <i>Legionella pneumophila</i> <i>Klebsiella pneumoniae</i> (alcoholics)	No Recent antibiotic therapy: ² Ceftriaxone ⁵ 1g IV q24h or Cefuroxime 1.5 g IV q8h (SFVAMC) Plus Doxycycline 100 mg PO/IV q12h	For severe PCN allergy: ³ Antipneumococcal fluoroquinolone ⁴ : Levofloxacin 500mg IV q24h or Moxifloxacin 400mg IV q24h or Gatifloxacin 400mg IV q24h	Fluoroquinolones are not routinely recommended as first-line therapy because of concerns about resistance ID consultation is recommended if ICU admission or high level PCN-resistant pneumococci documented *If patient has had recent antibiotic therapy, antibiotics from a different class should be selected i.e. recent use of a FQ should dictate selection of a non-FQ regimen, and vice versa.
Anaerobic lung abscess	Anaerobes Gram-positive oral flora	Clindamycin ⁵ 600 – 900 mg IV q8h		ID consultation is recommended
Immunocompetent patient – ICU no <i>Pseudomonas</i> coverage	<i>Strep. pneumoniae</i> <i>Mycoplasma pneumoniae</i> <i>Chlamydia pneumoniae</i> <i>H. influenzae</i> <i>Legionella pneumophila</i> <i>Klebsiella pneumoniae</i> (alcoholics)	Ceftriaxone ⁵ 1g IV q24h Plus Azithromycin 500 mg IV q24h	For severe PCN allergy: ³ Antipneumococcal fluoroquinolone ⁴ : Levofloxacin 500mg IV q24h or Moxifloxacin 400mg IV q24h or Gatifloxacin 400mg IV q24h ± Clindamycin ⁵ 600-900mg IV q8h	
Immunocompetent patient – ICU <i>Pseudomonas</i> coverage desired	As above and <i>Pseudomonas</i>	Piperacillin/Tazobactam (Zosyn [®]) 4.5g IV q6h Plus Ciprofloxacin ⁵ 400 mg IV q8h	Aztreonam ⁵ 2g IV q8h Plus Levofloxacin ⁵ 750 mg IV q24h	ID consultation is recommended. Note antipseudomonal dosing
¹ Doses provided in this table are for patients with normal renal and hepatic function. Consult Antimicrobial Dosing Guidelines (pg. 36-41) for dosing adjustment required in renal dysfunction. ² For dosing of vancomycin and aminoglycosides, refer to Antimicrobial Dosing Guidelines (pg. 36-41) and sections on vancomycin monitoring (pg. 33) and aminoglycoside dosing and monitoring (pg. 34-35) ³ Severe PCN allergy defined as anaphylaxis, bronchospasm, and hives. Mild PCN allergy defined as non- IgE mediated (i.e. maculopapular rash or drug fever). ⁴ Fluoroquinolone=Ciprofloxacin or Levofloxacin unless otherwise noted ⁵ ID approval needed at SFVAMC				

Pneumonia, Nosocomial

Diagnosis	Common Pathogens	Drug(s) of First Choice ¹	Alternative Drug(s) ¹	Comments
PNEUMONIA, NOSOCOMIAL BACTERIAL				
Ventilator-associated pneumonia [VAP]	<i>E. coli</i> <i>Enterobacter</i> <i>P. aeruginosa</i> <i>Klebsiella</i> <i>Staph. aureus</i>	If NO previous antibiotic therapy: Vancomycin ² Plus either Piperacillin/tazobactam (Zosyn [®]) 4.5 g IV q8h or Cefepime ⁵ 2g IV Q8h If previous antibiotic therapy: Vancomycin ² Plus Imipenem ⁵ 500mg IV q6-8h or Meropenem ⁵ 0.5-1g IV q8h	If NO previous antibiotic therapy: For severe PCN allergy ³ : Vancomycin ² Plus Ciprofloxacin 400mg IV q8h or Levofloxacin 750mg IV q24h ⁵ If previous antibiotic therapy: Vancomycin ² Plus Ciprofloxacin 400mg IV q8h Plus Aztreonam ⁵ 2g IV q8h	Mini-BAL recommended <i>Legionella</i> empirically covered by fluoroquinolone ⁴ , doxycycline, or macrolide; ID consultation recommended for confirmed disease
¹ Doses provided in this table are for patients with normal renal and hepatic function. Consult Antimicrobial Dosing Guidelines (pg. 36-41) for dosing adjustment required in renal dysfunction. ² For dosing of vancomycin and aminoglycosides, refer to Antimicrobial Dosing Guidelines (pg. 36-41) and sections on vancomycin monitoring (pg. 33) and aminoglycoside dosing and monitoring (pg. 34-35) ³ Severe PCN allergy defined as anaphylaxis, bronchospasm, and hives. Mild PCN allergy defined as non- IgE mediated (i.e. maculopapular rash or drug fever). ⁴ Fluoroquinolone=Ciprofloxacin or Levofloxacin unless otherwise noted ⁵ ID approval needed at SFVAMC				

Septic Shock

Diagnosis	Common Pathogens	Drug(s) of First Choice ¹	Alternative Drug(s) ¹	Comments
SEPTIC SHOCK				
Septic shock – community acquired	Enterobacteriaceae <i>S. aureus</i> Streptococci	Vancomycin ² <i>Plus</i> Piperacillin/tazobactam (Zosyn®) 4.5 g IV q8h	<i>For severe PCN allergy</i> ³ : Vancomycin ² + Metronidazole 500mg IV/PO q8h + Gentamicin ²	
Septic shock – healthcare-associated and/or previous antibiotic therapy		Vancomycin ² + Imipenem ³ 500mg IV q6-8h or Meropenem ⁵ 0.5-1g IV q8h	<i>For severe PCN allergy</i> ³ : Vancomycin ² + Metronidazole 500mg IV q8h + Gentamicin ² or Ciprofloxacin 400mg IV q8h ⁴	For hospital-acquired infections ID consultation is recommended
¹ Doses provided in this table are for patients with normal renal and hepatic function. Consult Antimicrobial Dosing Guidelines (pg. 36-41) for dosing adjustment required in renal dysfunction. ² For dosing of vancomycin and aminoglycosides, refer to Antimicrobial Dosing Guidelines (pg. 36-41) and sections on vancomycin monitoring (pg. 33) and aminoglycoside dosing and monitoring (pg. 34-35) ³ Severe PCN allergy defined as anaphylaxis, bronchospasm, and hives. Mild PCN allergy defined as non- IgE mediated (i.e. maculopapular rash or drug fever). ⁴ Fluoroquinolone=Ciprofloxacin or Levofloxacin unless otherwise noted ⁵ ID approval needed at SFVAMC				

Tuberculosis

Diagnosis	Common Pathogens	Drug(s) of First Choice ¹	Alternative Drug(s) ¹	Comments
TUBERCULOSIS				
Suspected tuberculosis	<i>Mycobacterium tuberculosis</i>	Isoniazid 300 mg PO daily <i>Plus</i> Rifampin 600 mg PO daily <i>Plus</i> Pyrazinamide 25 mg/kg/day PO daily <i>Plus</i> Ethambutol 20 mg/kg/day PO daily <i>Plus</i> Pyridoxine (Vitamin B-6) 50 mg PO daily		ID consultation is recommended Notify the SF Department of Public Health or call TB Clinic @ SFGH (206-8524)
¹ Doses provided in this table are for patients with normal renal and hepatic function. Consult Antimicrobial Dosing Guidelines (pg. 36-41) for dosing adjustment required in renal dysfunction. ² For dosing of vancomycin and aminoglycosides, refer to Antimicrobial Dosing Guidelines (pg. 36-41) and sections on vancomycin monitoring (pg. 33) and aminoglycoside dosing and monitoring (pg. 34-35) ³ Severe PCN allergy defined as anaphylaxis, bronchospasm, and hives. Mild PCN allergy defined as non- IgE mediated (i.e. maculopapular rash or drug fever). ⁴ Fluoroquinolone=Ciprofloxacin or Levofloxacin unless otherwise noted ⁵ ID approval needed at SFVAMC				

Urinary Tract Infections

Diagnosis	Common Pathogens	Drug(s) of First Choice ¹	Alternative Drug(s) ¹	Comments
URINARY TRACT INFECTIONS				
Uncomplicated cystitis or pyelonephritis	Enterobacteriaceae (e.g. <i>E. coli</i> , <i>Proteus</i>) <i>Staph. saprophyticus</i>	Ceftriaxone ³ 1g IV Q24H or Cefazolin 1g IV q8h	Ciprofloxacin 400mg IV q12h or Levofloxacin 500mg IV q24h ^{4,5} Or Gentamicin ²	
Pyelonephritis with urosepsis	Enterobacteriaceae (e.g. <i>E. coli</i> , <i>Proteus</i>) <i>Staph. saprophyticus</i>	Piperacillin/tazobactam (Zosyn [®]) 4.5 g IV q8h	For severe PCN allergy ³ : Vancomycin ² Plus Gentamicin ²	
Catheter-associated candiduria	<i>Candida</i> species	No treatment required		
¹ Doses provided in this table are for patients with normal renal and hepatic function. Consult Antimicrobial Dosing Guidelines (pg. 36-41) for dosing adjustment required in renal dysfunction. ² For dosing of vancomycin and aminoglycosides, refer to Antimicrobial Dosing Guidelines (pg. 36-41) and sections on vancomycin monitoring (pg. 33) and aminoglycoside dosing and monitoring (pg. 34-35) ³ Severe PCN allergy defined as anaphylaxis, bronchospasm, and hives. Mild PCN allergy defined as non- IgE mediated (i.e. maculopapular rash or drug fever). ⁴ Fluoroquinolone=Ciprofloxacin or Levofloxacin unless otherwise noted ⁵ ID approval needed at SFVAMC				

b. Outpatients
Bites

Diagnosis	Common Pathogens	Drug(s) of First Choice ¹	Alternative Drug(s) ¹	Comments
BITES				
Consider evaluation for tetanus prophylaxis for all bites.				
Dog and Cat	Streptococci <i>Pasteurella</i> spp.* Staphylococci Anaerobes	Amoxicillin/ clavulanate 875mg/125mg PO BID Prophylaxis – x 5 days Treatment – x 10 days	<i>For PCN allergic patients²:</i> Clindamycin 300mg PO TID + Ciprofloxacin 500mg PO q12h <i>or</i> Levofloxacin 500mg PO q24h ⁵ Prophylaxis – x 5 days Treatment – x 10 days	Only 5% of dog bites become infected, whereas 30-50% of cat bites become infected. Prophylaxis in high risk patients or in high risk bite only <i>High risk patient</i> = post splenectomy, immunocompromised (eg., cirrhosis) <i>High risk bite</i> = hand or foot <u>Treatment</u> – if infection present, treatment should be guided by cultures; careful follow-up every 2-3 days recommended.
			<i>*P.multocida</i> is resistant to cephalixin & clindamycin; many strains are resistant to erythromycin but sensitive to fluoroquinolones, doxycycline and penicillin. If culture positive for <i>P.multocida</i> as sole organism, can switch to PCN VK PO	
Human	Viridans streptococci <i>Eikenella</i> * Oral anaerobes	Amoxicillin/ clavulanate 875mg/125mg PO BID Prophylaxis – x 5 days Treatment – x 10 days	<i>For PCN allergic patients²:</i> Clindamycin 300 mg PO TID <i>Plus</i> Ciprofloxacin 500mg PO q12h <i>or</i> Levofloxacin 500mg PO q24h ^{4,5} <i>or</i> Trimethoprim/ sulfamethoxazole DS One Tab PO BID Prophylaxis – x 5 days Treatment – x 10 days	Cleaning, irrigation and debridement important. For clenched fist injuries, x-rays should be obtained; infected patients are usually admitted <i>*Eikenella</i> resistant to clindamycin, metronidazole, 1 st gen cephalosporins and erythromycin; susceptible to fluoroquinolones ⁵ , clarithromycin, doxycycline, and TMP/SMX. Careful follow-up every 2-3 days
¹ Doses provided in this table are for patients with normal renal and hepatic function. Consult Antimicrobial Dosing Guidelines (pg. 36-41) for dosing adjustment required in renal dysfunction. ² For dosing of vancomycin and aminoglycosides, refer to Antimicrobial Dosing Guidelines (pg. 36-41) and sections on vancomycin monitoring (pg. 33) and aminoglycoside dosing and monitoring (pg. 34-35) ³ Severe PCN allergy defined as anaphylaxis, bronchospasm, and hives. Mild PCN allergy defined as non- IgE mediated (i.e. maculopapular rash or drug fever). ⁴ Fluoroquinolone=Ciprofloxacin or Levofloxacin unless otherwise noted ⁵ ID approval needed at SFVAMC				

Bronchitis

Diagnosis	Common Pathogens	Drug(s) of First Choice ¹	Alternative Drug(s) ¹	Comments
BRONCHITIS				
Acute Bronchitis	Viral	No drug therapy required	No drug therapy required	Antibiotics are <u>NOT</u> useful in acute bronchitis. Purulent sputum alone is not an indication for antibiotics.
Acute bacterial exacerbation of chronic bronchitis (COPD)	<i>S. pneumoniae</i> <i>H. influenzae</i> <i>Moraxella catarrhalis</i>	Doxycycline 100 mg PO BID x 10 days	Azithromycin ⁵ 500 mg PO daily x 1 day; then 250 mg PO daily x 4 days.	
¹ Doses provided in this table are for patients with normal renal and hepatic function. Consult Antimicrobial Dosing Guidelines (pg. 36-41) for dosing adjustment required in renal dysfunction. ² For dosing of vancomycin and aminoglycosides, refer to Antimicrobial Dosing Guidelines (pg. 36-41) and sections on vancomycin monitoring (pg. 33) and aminoglycoside dosing and monitoring (pg. 34-35) ³ Severe PCN allergy defined as anaphylaxis, bronchospasm, and hives. Mild PCN allergy defined as non- IgE mediated (i.e. maculopapular rash or drug fever). ⁴ Fluoroquinolone=Ciprofloxacin or Levofloxacin unless otherwise noted ⁵ ID approval needed at SFVAMC				

Skin and Soft Tissue Infections

Diagnosis	Common Pathogens	Drug(s) of First Choice ¹	Alternative Drug(s) ¹	Comments
SKIN AND SOFT TISSUE INFECTIONS				
Cellulitis	Group A streptococci (90-95%) <i>Staph. aureus</i> (5-10%)	Dicloxacillin 500 mg PO QID x 10 days, then reassess. <i>Or</i> Cephalexin 500 mg PO QID x 10 days, then reassess. <i>Or</i> Clindamycin or doxycycline if MRSA is a specific concern	<i>If mild PCN allergy²:</i> Cephalexin 500 mg PO QID x 10 days <i>If severe PCN allergic³:</i> Clindamycin 300 mg PO TID x 10 days.	
Abscess	<i>S. aureus</i>	I&D alone sufficient in most cases See pg 43 for more details		
¹ Doses provided in this table are for patients with normal renal and hepatic function. Consult Antimicrobial Dosing Guidelines (pg. 36-41) for dosing adjustment required in renal dysfunction. ² For dosing of vancomycin and aminoglycosides, refer to Antimicrobial Dosing Guidelines (pg. 36-41) and sections on vancomycin monitoring (pg. 33) and aminoglycoside dosing and monitoring (pg. 34-35) ³ Severe PCN allergy defined as anaphylaxis, bronchospasm, and hives. Mild PCN allergy defined as non- IgE mediated (i.e. maculopapular rash or drug fever). ⁴ Fluoroquinolone=Ciprofloxacin or Levofloxacin unless otherwise noted ⁵ ID approval needed at SFVAMC				

Foot Ulcer (Diabetic)

Diagnosis	Common Pathogens	Drug(s) of First Choice ¹	Alternative Drug(s) ¹	Comments
FOOT ULCER (DIABETIC)				
Localized cellulitis without systemic signs or symptoms, no osteomyelitis	<i>S. aureus</i> <i>Strep. spp.</i>	Cephalexin 500 mg PO QID for 10-14 days <i>Or</i> Dicloxacillin 500 mg PO QID x 10-14 days	<i>For PCN allergic patients²:</i> Clindamycin 300 mg PO TID for 10-14 days	Consider osteomyelitis especially if there is a failure to respond to therapy. While infections may be polymicrobial, they respond to treatment of staph and strep. Increasing rates of MRSA in the community may be a cause for failure to respond to initial therapy.
¹ Doses provided in this table are for patients with normal renal and hepatic function. Consult Antimicrobial Dosing Guidelines (pg. 36-41) for dosing adjustment required in renal dysfunction. ² For dosing of vancomycin and aminoglycosides, refer to Antimicrobial Dosing Guidelines (pg. 36-41) and sections on vancomycin monitoring (pg. 33) and aminoglycoside dosing and monitoring (pg. 34-35) ³ Severe PCN allergy defined as anaphylaxis, bronchospasm, and hives. Mild PCN allergy defined as non- IgE mediated (i.e. maculopapular rash or drug fever). ⁴ Fluoroquinolone=Ciprofloxacin or Levofloxacin unless otherwise noted ⁵ ID approval needed at SFVAMC				

Diverticulitis

Diagnosis	Common Pathogens	Drug(s) of First Choice ¹	Alternative Drug(s) ¹	Comments
DIVERTICULITIS				
No signs of bowel perforation. If bowel perforation, see Peritonitis on Inpatient Antibiotic Guidelines	Enterobacteriaceae <i>Bacteroides fragilis</i> <i>Enterococcus</i>	Amoxicillin/ clavulanate 875mg/125mg PO BID Or Fluoroquinolone⁴ Plus Metronidazole 500mg PO q8h Duration of treatment should be until patient is afebrile for 3-5 days	For PCN allergic patients ² : Ciprofloxacin 500mg PO q12h Or Levofloxacin 500mg PO q24h Plus Metronidazole 500mg PO q8h Duration of treatment should be until patient is afebrile for 3-5 days	Surgical evaluation and follow up is advised.
¹ Doses provided in this table are for patients with normal renal and hepatic function. Consult Antimicrobial Dosing Guidelines (pg. 36-41) for dosing adjustment required in renal dysfunction. ² For dosing of vancomycin and aminoglycosides, refer to Antimicrobial Dosing Guidelines (pg. 36-41) and sections on vancomycin monitoring (pg. 33) and aminoglycoside dosing and monitoring (pg. 34-35) ³ Severe PCN allergy defined as anaphylaxis, bronchospasm, and hives. Mild PCN allergy defined as non- IgE mediated (i.e. maculopapular rash or drug fever). ⁴ Fluoroquinolone=Ciprofloxacin or Levofloxacin unless otherwise noted ⁵ ID approval needed at SFVAMC				

Gastroenteritis

Diagnosis	Common Pathogens	Drug(s) of First Choice ¹	Comments
GASTROENTERITIS			
<p><u>Clinical Presentation</u></p> <p>Dysenteric Diarrhea</p> <p>Frequent, sometimes bloody, small-volume diarrhea associated with abdominal pain and cramping. Patient may be febrile and toxic.</p>	<p><i>Presumed bacterial pathogen</i></p> <p><i>Shigella</i> <i>Salmonella</i> <i>Campylobacter</i> <i>Yersinia</i> <i>E. coli</i> 0157:H7</p>	<p>Ciprofloxacin 500 mg PO BID x 3-5 days.</p>	<p><u>General Comments</u></p> <p>Empiric therapy is generally indicated if patient is toxic appearing, elderly or immunocompromised. If empiric therapy is given, obtain culture and give fluoroquinolone x 3 days while awaiting cultures.</p> <p>Antimotility drugs improve symptoms and can be used if patient is not toxic. Antimotility drugs should not be used in <i>C.difficile</i>.</p> <p>Strict handwashing is mandatory in all food preparation.</p> <p>Antimicrobial treatment may worsen outcomes in patients with <i>E. coli</i> 0157:H7</p> <p><i>C. difficile</i> - Metronidazole 500 mg PO TID x 10-14 days.</p> <p><i>E. histolytica</i> - Metronidazole 750 mg PO TID x 5-10 days then Iodoquinol 650 mg PO TID x 21 days or Paromomycin² 500 mg TID x 7 days</p>
<p>Nondysenteric Diarrhea</p> <p>Large volume, nonbloody, watery diarrhea. Patient may have nausea, vomiting, and abdominal cramping but fever often absent</p>	<p>Viruses <i>Giardia</i> <i>Enterotoxigenic E. coli</i> Enterotoxin-producing bacteria</p>	<p>General Care: Observation Oral rehydration Antimotility agents</p> <p><i>Giardia</i> – especially if patient describes recent history of travel and/or ingestion of unfiltered water (e.g., camping), consider – Metronidazole 250 mg PO TID x 5 days.</p>	<p>Generally, empiric therapy and stool cultures are not indicated. Most disease is self-limiting and can be treated with antimotility agents.</p> <p>If patient fails to improve, cultures (-), and symptoms persist, consider stool for O & P</p> <p>Check <i>C. difficile</i> toxin if recent history of antibiotic use or hospitalization.</p>
<p>Traveler's diarrhea</p> <p>Empiric treatment while abroad</p>	<p>Toxigenic <i>E. coli</i> <i>Salmonella</i> <i>Shigella</i> <i>Campylobacter</i> Amebiasis</p>	<p>Ciprofloxacin 500 mg PO BID x 3-5 days (Pregnancy: Azithromycin⁵ 1gm x 1 or 500 mg daily x 3days) <i>Plus</i> Loperamide 4 mg PO x1; then 2 mg after each loose stool, MAX 16 mg/day.</p>	<p>Mild, self-limited cases can be treated with fluid and electrolyte repletion and bismuth subsalicylate.</p> <p>Prophylaxis generally not recommended.</p>
<p>¹ Doses provided in this table are for patients with normal renal and hepatic function. Consult Antimicrobial Dosing Guidelines (pg. 36-41) for dosing adjustment required in renal dysfunction.</p> <p>² For dosing of vancomycin and aminoglycosides, refer to Antimicrobial Dosing Guidelines (pg. 36-41) and sections on vancomycin monitoring (pg. 33) and aminoglycoside dosing and monitoring (pg. 34-35)</p> <p>³ Severe PCN allergy defined as anaphylaxis, bronchospasm, and hives. Mild PCN allergy defined as non- IgE mediated (i.e. maculopapular rash or drug fever).</p> <p>⁴ Fluoroquinolone=Ciprofloxacin or Levofloxacin unless otherwise noted</p> <p>⁵ ID approval needed at SFVAMC</p>			

Herpes Simplex Virus Infections

Diagnosis	Common Pathogens	Drug(s) of First Choice ¹	Alternative Drug(s) ¹	Comments
HERPES SIMPLEX VIRUS (HSV) INFECTIONS				
GENITAL HERPES				
Acute	HSV 2 = 70-90% HSV 1 = 10-30%	Acyclovir 400 mg PO TID x 7-10 days	Valacyclovir ⁵ 1 g PO BID x 7-10 days	In HIV patients with documented acyclovir resistance, use foscarnet.
Recurrent Episodes		Acyclovir 400 mg PO TID x 5 days or Acyclovir 800 mg PO BID x 5 days	Valacyclovir ⁵ 500 mg - 1000 mg PO daily x 5 days	
Suppression for Frequent Recurrence	HSV 2 = 70-90% HSV 1 = 10-30%	Acyclovir 400 mg PO BID	Valacyclovir ⁵ 500 – 1000mg PO daily Valacyclovir ⁵ 500 mg daily may be less effective in patients who have > 10 episodes/year	Consider suppressive therapy for patients experiencing greater than 3-4 episodes in 12 months.
FACIAL/ORAL HERPES				
Recurrent episodes in immuno-competent patients	HSV 1 HSV 2	No therapy required (Valacyclovir ⁵ 2g PO Q12h x 1 day Acyclovir 400 mg PO TID x 5 days	Therapy of recurrent disease is of marginal benefit and most do not treat. Short-term prophylactic therapy with acyclovir may be desirable in some patients who anticipate intense exposure to UV light (e.g., skiers, or in those who work outdoors), although the clinical effect may vary.
¹ Doses provided in this table are for patients with normal renal and hepatic function. Consult Antimicrobial Dosing Guidelines (pg. 36-41) for dosing adjustment required in renal dysfunction. ² For dosing of vancomycin and aminoglycosides, refer to Antimicrobial Dosing Guidelines (pg. 36-41) and sections on vancomycin monitoring (pg. 33) and aminoglycoside dosing and monitoring (pg. 34-35) ³ Severe PCN allergy defined as anaphylaxis, bronchospasm, and hives. Mild PCN allergy defined as non- IgE mediated (i.e. maculopapular rash or drug fever). ⁴ Fluoroquinolone=Ciprofloxacin or Levofloxacin unless otherwise noted ⁵ ID approval needed at SFVAMC				

Herpes Zoster Infections

Diagnosis	Common Pathogens	Drug(s) of First Choice ¹	Alternative Drug(s) ¹	Comments
HERPES ZOSTER INFECTIONS				
Immuno-competent (Shingles/ Zoster) Immuno-compromised (Lymphoma, HIV infection, etc) and not severe (one dermatome)	Varicella-Zoster Virus	Acyclovir 800 mg PO 5x/day x 7-10 days Or Valacyclovir ⁵ 1 g PO TID x 7 days	Famciclovir 500 mg PO TID x 7 days (more expensive)	Treatment effective only if initiated within 48-72 hours of onset of lesions. May shorten duration of illness in immunocompetent patients. In patients > 65 years old administration of concomitant corticosteroids may improve quality of life.
Primary Infection in Adults (Chicken Pox)	Varicella-Zoster Virus	Acyclovir 800 mg PO 5x/day x 5 days Or Valacyclovir ⁵ 1 g PO TID x 5 days		Initiate therapy within 24 hours of onset of rash. Vaccination of non-immune close contacts recommended. Acyclovir treatment may also be effective for prophylaxis of at-risk individuals.
¹ Doses provided in this table are for patients with normal renal and hepatic function. Consult Antimicrobial Dosing Guidelines (pg. 36-41) for dosing adjustment required in renal dysfunction. ² For dosing of vancomycin and aminoglycosides, refer to Antimicrobial Dosing Guidelines (pg. 36-41) and sections on vancomycin monitoring (pg. 33) and aminoglycoside dosing and monitoring (pg. 34-35) ³ Severe PCN allergy defined as anaphylaxis, bronchospasm, and hives. Mild PCN allergy defined as non- IgE mediated (i.e. maculopapular rash or drug fever). ⁴ Fluoroquinolone=Ciprofloxacin or Levofloxacin unless otherwise noted ⁵ ID approval needed at SFVAMC				

Mastitis

Diagnosis	Common Pathogens	Drug(s) of First Choice ¹	Alternative Drug(s) ¹	Comments
MASTITIS				
Postpartum	<i>Staph. aureus</i>	Dicloxacillin 500 mg PO QID x 10 days <i>Or</i> Cephalexin 500 mg PO QID x 10 days	<i>For mild PCN allergy</i> ³ : Cephalexin 500 mg PO QID x 10 days <i>For severe PCN allergy</i> ³ : Clindamycin 300 mg PO TID x 10 days	If no abscess, increased frequency of nursing may hasten response. If abscess, I & D required; discontinue nursing. Increasing rates of MRSA in the community may be a cause for failure to respond to initial therapy. Doxycycline is active against 95% of MRSA but should not be used if breastfeeding. TMP-SMX and clindamycin generally are active.
¹ Doses provided in this table are for patients with normal renal and hepatic function. Consult Antimicrobial Dosing Guidelines (pg. 36-41) for dosing adjustment required in renal dysfunction. ² For dosing of vancomycin and aminoglycosides, refer to Antimicrobial Dosing Guidelines (pg. 36-41) and sections on vancomycin monitoring (pg. 33) and aminoglycoside dosing and monitoring (pg. 34-35) ³ Severe PCN allergy defined as anaphylaxis, bronchospasm, and hives. Mild PCN allergy defined as non- IgE mediated (i.e. maculopapular rash or drug fever). ⁴ Fluoroquinolone=Ciprofloxacin or Levofloxacin unless otherwise noted ⁵ ID approval needed at SFVAMC				

Otitis media

Diagnosis	Common Pathogens	Drug(s) of First Choice ¹	Alternative Drug(s) ¹	Comments
OTTITIS MEDIA				
Acute with effusion	<i>Strep. pneumoniae</i> (25-50%) <i>H. influenzae</i> (15-30%) <i>M. catarrhalis</i> (3-20%) Group A Strep. (2%)	Amoxicillin 500 mg PO TID x 5-7 days	For severe penicillin allergy ² : Azithromycin ³ 500 mg PO QD x 1 day; then 250 mg PO QD x 4 days. Or Or Doxycycline 100 mg PO BID for 5-7 days	Amoxicillin/clavulanic acid not indicated as initial therapy of acute otitis. High dose amoxicillin 1 g PO TID should be used over low dose (500 mg PO TID) in the treatment of patients at risk for drug resistant <i>S. pneumoniae</i> . For recurrent prolonged otitis consider ENT referral.
¹ Doses provided in this table are for patients with normal renal and hepatic function. Consult Antimicrobial Dosing Guidelines (pg. 36-41) for dosing adjustment required in renal dysfunction. ² For dosing of vancomycin and aminoglycosides, refer to Antimicrobial Dosing Guidelines (pg. 36-41) and sections on vancomycin monitoring (pg. 33) and aminoglycoside dosing and monitoring (pg. 34-35) ³ Severe PCN allergy defined as anaphylaxis, bronchospasm, and hives. Mild PCN allergy defined as non- IgE mediated (i.e. maculopapular rash or drug fever). ⁴ Fluoroquinolone=Ciprofloxacin or Levofloxacin unless otherwise noted ⁵ ID approval needed at SFVAMC				

Pharyngitis/Tonsilitis

Diagnosis	Common Pathogens	Drug(s) of First Choice ¹	Alternative Drug(s) ¹	Comments
PHARYNGITIS/TONSILLITIS				
Pharyngitis	Viral (EBV, rhinovirus, coronavirus, adenovirus etc) <i>Group A Streptococcus</i> (5-20%)	Penicillin VK 500 mg PO QID x 10 days	<i>For PCN allergic patients²:</i> Clindamycin 300 mg PO TID x 7-10 days	Most pharyngitis is viral thus antibiotics should not be used. Treatment with PCN prevents rheumatic fever. Treat documented Group A streptococcal infection confirmed by rapid strep. antigen test or culture or if 3 out of 4 clinical criteria present. <u>Clinical Criteria:</u> history of fever, tender anterior cervical adenopathy, absence of cough, tonsillar exudates. Penicillin resistance has not been observed.
¹ Doses provided in this table are for patients with normal renal and hepatic function. Consult Antimicrobial Dosing Guidelines (pg. 36-41) for dosing adjustment required in renal dysfunction. ² For dosing of vancomycin and aminoglycosides, refer to Antimicrobial Dosing Guidelines (pg. 36-41) and sections on vancomycin monitoring (pg. 33) and aminoglycoside dosing and monitoring (pg. 34-35) ³ Severe PCN allergy defined as anaphylaxis, bronchospasm, and hives. Mild PCN allergy defined as non- IgE mediated (i.e. maculopapular rash or drug fever). ⁴ Fluoroquinolone=Ciprofloxacin or Levofloxacin unless otherwise noted ⁵ ID approval needed at SFVAMC				

Pneumonia, Community-acquired

Diagnosis	Common Pathogens	Regimens	Comments
PNEUMONIA, COMMUNITY ACQUIRED (CAP)			
Adult	<i>S. pneumoniae</i> <i>M. pneumoniae</i> <i>C. pneumoniae</i> Respiratory viruses <i>Legionella</i> spp. <i>C. psittaci</i> <i>H. influenzae</i> (if patient has co-morbidity)	No recent antibiotic therapy: Doxycycline 100 mg PO BID x 7-10 days Or Azithromycin ⁵ 500 mg PO daily x 1 day; then 250 mg PO daily x 4 days <u>Recent antibiotic therapy or patients with co-morbidities:</u> Antipneumococcal fluoroquinolone ² : Levofloxacin 500mg PO q24h x 7-10days Or Gatifloxacin 400mg PO q24h x 7-10 days Or Moxifloxacin 400mg po q24h x 7-10 days Or Azithromycin ² 500mg PO daily x 1; then 250mg PO daily x 4 days or Doxycycline 100mg PO q12h x 7-10 days Plus Amoxicillin (High-dose) 1g PO TID Amoxicillin/clavulanate 875/125mg PO q12h Or Clindamycin 300mg po TID	Previous antibiotic therapy within last 3 month should be elicited from patient. A course of antibiotics is a risk factor for drug resistance. Recent use of a fluoroquinolone should dictate selection of a non-fluoroquinolone regimen, and vice versa. Careful follow-up highly recommended.
Anaerobic lung infection		Amoxicillin (High-dose) 1g PO TID Amoxicillin/clavulanate 875/125mg PO q12h Or Clindamycin 300mg po TID	
¹ Doses provided in this table are for patients with normal renal and hepatic function. Consult Antimicrobial Dosing Guidelines (pg. 36-41) for dosing adjustment required in renal dysfunction. ² For dosing of vancomycin and aminoglycosides, refer to Antimicrobial Dosing Guidelines (pg. 36-41) and sections on vancomycin monitoring (pg. 33) and aminoglycoside dosing and monitoring (pg. 34-35) ³ Severe PCN allergy defined as anaphylaxis, bronchospasm, and hives. Mild PCN allergy defined as non- IgE mediated (i.e. maculopapular rash or drug fever). ⁴ Fluoroquinolone=Ciprofloxacin or Levofloxacin unless otherwise noted ⁵ ID approval needed at SFVAMC			

Prostatitis

Diagnosis	Common Pathogens	Drug(s) of First Choice ¹	Alternative Drug(s) ¹	Comments
PROSTATITIS				
Acute	Enterobacteriaceae (<i>E. coli</i>) Enterococci	Ciprofloxacin 500 mg PO BID X 21 days* <i>Or</i> Levofloxacin ⁵ 500 mg PO daily x 21 days* <i>Or</i> Cephalexin 500 mg PO qid x 21 days	*Cultures should be obtained and definitive therapy for 21 days should be based on sensitivities.	Antibiotic penetration in the acute inflammatory state is adequate for the use of most antibiotics. Consider sexually transmitted disease treatment (Gonococcus or <i>C. trachomatis</i>) for appropriate patient populations.
Chronic	Enterobacteriaceae (<i>E. coli</i>) Enterococci	Ciprofloxacin x 2-3 months* <i>Or</i> Levofloxacin ⁵ x 2-3 months* <i>Or</i> Trimethoprim/ Sulfamethoxazole 1 DS tablet bid <i>Or</i> Doxycycline 100 mg PO bid	*Cultures should be obtained and definitive therapy should be based on sensitivities.	Few drugs penetrate non-inflamed prostate. Fluoroquinolone, trimethoprim/sulfamethoxazole and doxycycline adequately penetrate in non-inflamed state. Use TMP/SMX if organism is susceptible. Consider sexually transmitted disease treatment (Gonococcus or <i>C. trachomatis</i>) for appropriate patient populations. Consider urologic evaluation.
¹ Doses provided in this table are for patients with normal renal and hepatic function. Consult Antimicrobial Dosing Guidelines (pg. 36-41) for dosing adjustment required in renal dysfunction. ² For dosing of vancomycin and aminoglycosides, refer to Antimicrobial Dosing Guidelines (pg. 36-41) and sections on vancomycin monitoring (pg. 33) and aminoglycoside dosing and monitoring (pg. 34-35) ³ Severe PCN allergy defined as anaphylaxis, bronchospasm, and hives. Mild PCN allergy defined as non- IgE mediated (i.e. maculopapular rash or drug fever). ⁴ Fluoroquinolone=Ciprofloxacin or Levofloxacin unless otherwise noted ⁵ ID approval needed at SFVAMC				

Pyelonephritis

Diagnosis	Common Pathogens	Drug(s) of First Choice ¹	Alternative Drug(s) ¹	Comments
PYELONEPHRITIS				
	Enterobacteriaceae (<i>E. coli</i>) Enterococci	Fluoroquinolone ^{4,5} x 7-14 days <i>Or</i> Cephalexin 500 mg PO qid	Based on sensitivity. Trimethoprim-sulfamethoxazole is preferred if organism is susceptible.	For patients not tolerating oral therapy, may initiate therapy with single dose parenteral ceftriaxone or aminoglycoside while awaiting culture.
¹ Doses provided in this table are for patients with normal renal and hepatic function. Consult Antimicrobial Dosing Guidelines (pg. 36-41) for dosing adjustment required in renal dysfunction. ² For dosing of vancomycin and aminoglycosides, refer to Antimicrobial Dosing Guidelines (pg. 36-41) and sections on vancomycin monitoring (pg. 33) and aminoglycoside dosing and monitoring (pg. 34-35) ³ Severe PCN allergy defined as anaphylaxis, bronchospasm, and hives. Mild PCN allergy defined as non- IgE mediated (i.e. maculopapular rash or drug fever). ⁴ Fluoroquinolone=Ciprofloxacin or Levofloxacin unless otherwise noted ⁵ ID approval needed at SFVAMC				

Sexually Transmitted Diseases (STDs)

Diagnosis	Common Pathogens	Drug(s) of First Choice ¹	Alternative Drug(s) ¹	Comments
SEXUALLY TRANSMITTED DISEASES (STDs)				
Syphilis Early	<i>T. pallidum</i>	Benzathine penicillin G 2.4 MU IM X 1 dose (early)	Doxycycline 100 mg PO BID X 2 weeks	Sexual partners must be treated.
Latent		Benzathine penicillin G 2.4 MU IM Q week X 3 doses (latent)		
Gonorrhea	<i>N. gonorrhoeae</i>	Cefpodoxime 400 mg PO X 1 dose <i>Or</i> Ceftriaxone 125 mg IM X 1 dose <i>Each of the above courses should be followed by azithromycin 1 g PO X 1 or doxycycline 100 mg BID PO X 7 days or erythromycin 500 mg QID PO X 7 days</i>	Considering high frequency of <i>Neisseria</i> coinfection with <i>Chlamydia</i> , concomitant therapy with azithromycin, doxycycline, or erythromycin must be administered.	All cases of syphilis and Gonococcus must be reported to the San Francisco Public Health Department at 554-2830. Sexual partners must be treated. Pharyngeal Gonococcus must be treated with Ceftriaxone. Fluoroquinolones should not be used for infections acquired in CA, Asia, and the Pacific, including Hawaii, due to increasing resistance and treatment failures.
Chlamydia cervicitis	<i>Chlamydia trachomatis</i>	Azithromycin 1g PO once	Doxycycline 100 mg PO q12h x 7 days	
PID (Pelvic Inflammatory Disease)	<i>N.gonorrhoeae</i> <i>C.trachomatis</i> anaerobes Gram-negative facultative bacteria streptococci	Levofloxacin ³ 500 mg PO daily x 14 days ± Metronidazole 500 mg PO BID x 14 days	Ceftriaxone 250 mg IM in a single dose <i>Plus</i> Doxycycline 100 mg PO BID x 14 days ± Metronidazole 500 mg PO BID x 14 days	Follow-up examination should be performed within 72 hours when PID is treated with these regimens Fluoroquinolones should not be used for <i>N.gonorrhoeae</i> infections acquired in CA, Asia, and the Pacific, including Hawaii, due to increasing resistance and treatment failures.
¹ Doses provided in this table are for patients with normal renal and hepatic function. Consult Antimicrobial Dosing Guidelines (pg. 36-41) for dosing adjustment required in renal dysfunction. ² For dosing of vancomycin and aminoglycosides, refer to Antimicrobial Dosing Guidelines (pg. 36-41) and sections on vancomycin monitoring (pg. 33) and aminoglycoside dosing and monitoring (pg. 34-35) ³ Severe PCN allergy defined as anaphylaxis, bronchospasm, and hives. Mild PCN allergy defined as non- IgE mediated (i.e. maculopapular rash or drug fever). ⁴ Fluoroquinolone=Ciprofloxacin or Levofloxacin unless otherwise noted ⁵ ID approval needed at SFVAMC				

Sinusitis

Diagnosis	Common Pathogens	Drug(s) of First Choice ¹	Alternative Drug(s) ¹	Comments
SINUSITIS, ACUTE				
	Viruses <i>Strep. pneumoniae</i> <i>H. influenzae</i> <i>M. catarrhalis</i>	Amoxicillin 500 mg PO q8h x 5-7 days	<i>For severe PCN allergy³:</i> Doxycycline 100 mg PO BID x 5-7 days <i>Or</i> Azithromycin 500mg PO daily x 3 days	Majority of cases are viral. Consider treatment only in presence of fever, purulence or bloody discharge following an upper respiratory infection if symptoms persist for 7-10 days suggesting bacterial etiology.
SINUSITIS, CHRONIC				
	Viruses <i>Strep. pneumoniae</i> <i>H. influenzae</i> <i>M. catarrhalis</i> Anaerobes <i>Staph. aureus</i> Enterobacteriaceae	Amoxicillin/ clavulanate 875mg/125mg PO BID x 10-14 days or Amoxicillin/ clavulanate CR 2 g BID x 10-14 days if DRSP* suspected	<i>For PCN allergic patients²:</i> Ciprofloxacin 500mg PO q12h or Levofloxacin 500mg PO q24h⁵ x 10-14 days ± Clindamycin 300mg PO	Consider otolaryngology consult to rule out anatomic abnormality. If acute exacerbation, treat as acute sinusitis. HIV positive patients may need a 2-3 week course. *DRSP=drug-resistant <i>Streptococcus pneumoniae</i>
¹ Doses provided in this table are for patients with normal renal and hepatic function. Consult Antimicrobial Dosing Guidelines (pg. 36-41) for dosing adjustment required in renal dysfunction. ² For dosing of vancomycin and aminoglycosides, refer to Antimicrobial Dosing Guidelines (pg. 36-41) and sections on vancomycin monitoring (pg. 33) and aminoglycoside dosing and monitoring (pg. 34-35) ³ Severe PCN allergy defined as anaphylaxis, bronchospasm, and hives. Mild PCN allergy defined as non- IgE mediated (i.e. maculopapular rash or drug fever). ⁴ Fluoroquinolone=Ciprofloxacin or Levofloxacin unless otherwise noted ⁵ ID approval needed at SFVAMC				

Tuberculosis

Diagnosis	Common Pathogens	Drug(s) of First Choice ¹		Comments
TUBERCULOSIS				
Treatment	<i>Mycobacterium tuberculosis</i>	Isoniazid (INH) 300 mg PO daily x 6 months Plus Rifampin 600 mg PO daily x 6 months Plus Pyrazinamide (PZA) 25 mg/kg PO daily x 2 months Plus Ethambutol 15 mg/kg PO daily until Isoniazid or Rifampin sensitivity established Plus Pyridoxine (Vitamin B-6) 50 mg PO daily for 6 months		All cases of tuberculosis must be reported. Call the SF Department of Public Health at 206-8524. Smear positive cases should receive directly observed therapy. Other cases often receive directly observed therapy at the discretion of the Tuberculosis Control Unit. Obtain baseline LFT's on all patients. Additional LFT's advised if liver disease present. Perform a monthly symptom review if LFTs are normal
Latent TB		Isoniazid 300 mg po daily x 9 months	Rifampin 600 mg PO daily x 4 months	
¹ Doses provided in this table are for patients with normal renal and hepatic function. Consult Antimicrobial Dosing Guidelines (pg. 36-41) for dosing adjustment required in renal dysfunction. ² For dosing of vancomycin and aminoglycosides, refer to Antimicrobial Dosing Guidelines (pg. 36-41) and sections on vancomycin monitoring (pg. 33) and aminoglycoside dosing and monitoring (pg. 34-35) ³ Severe PCN allergy defined as anaphylaxis, bronchospasm, and hives. Mild PCN allergy defined as non- IgE mediated (i.e. maculopapular rash or drug fever). ⁴ Fluoroquinolone=Ciprofloxacin or Levofloxacin unless otherwise noted ⁵ ID approval needed at SFVAMC				

Urinary Tract Infection (UTI)

Diagnosis	Common Pathogens	Drug(s) of First Choice ¹	Alternative Drug(s) ¹	Comments
URINARY TRACT INFECTION (UTI)				
Uncomplicated Cystitis, Women	Enterobacteriaceae (<i>E. coli</i>) Enterococci <i>Staph. saprophyticus</i> (Coagulase negative staphylococcus) (4%)	Trimethoprim/Sulfamethoxazole 1 DS BID x 3 days (if no previous antibiotic therapy) <i>Or</i> Nitrofurantoin 50-100 mg QID x 7 days (women) – contraindicated in renal failure <i>Or</i> Cephalexin 500 mg PO qid x 7 days <i>Or</i> Ciprofloxacin 500mg PO q12h or Levofloxacin 500mg PO q24h x 3 days (try to minimize overuse of this class)		30% of cultured <i>E. coli</i> isolates are resistant to trimethoprim/sulfamethoxazole
Women Recurrent Cystitis (3 or more episodes/year)	Enterobacteriaceae (<i>E. coli</i>) <i>Staph. saprophyticus</i> (Coagulase negative staphylococcus) (4%) Enterococci	Prophylaxis: Either self administration if symptoms occur or prophylactic post-coital antibiotics Post menopausal :topical estrogen	Antibiotic choice should be based on susceptibility results of previous culture	
Men Recurrent				Consider urologic evaluation
¹ Doses provided in this table are for patients with normal renal and hepatic function. Consult Antimicrobial Dosing Guidelines (pg. 36-41) for dosing adjustment required in renal dysfunction. ² For dosing of vancomycin and aminoglycosides, refer to Antimicrobial Dosing Guidelines (pg. 36-41) and sections on vancomycin monitoring (pg. 33) and aminoglycoside dosing and monitoring (pg. 34-35) ³ Severe PCN allergy defined as anaphylaxis, bronchospasm, and hives. Mild PCN allergy defined as non- IgE mediated (i.e. maculopapular rash or drug fever). ⁴ Fluoroquinolone=Ciprofloxacin or Levofloxacin unless otherwise noted ⁵ ID approval needed at SFVAMC				

Vaginitis

Diagnosis	Common Pathogens	Drug(s) of First Choice ¹	Alternative Drug(s) ¹	Comments
VAGINITIS				
Fungal	<i>Candida albicans</i>	Fluconazole ⁵ 150 mg PO X 1 dose	Butoconazole ⁵ (2% cream) X 3 days <i>Or</i> Terconazole ⁵ (0.8% cream or 80 mg suppository) X 3 days <i>Or</i> Miconazole ⁵ (200 mg suppository) once daily X 3 days	Single dose topical therapies are available but are less effective. Seven day courses of therapy are not superior to 3 day regimens
Protozoan	<i>Trichomonas vaginalis</i>	Metronidazole 2 g PO X 1 dose <i>Or</i> Metronidazole 500 mg BID PO X 7 days	Tinidazole ⁵ 2 g PO x 1	In treatment failures to metronidazole, retreat with metronidazole 500 mg PO BID x 7 days. Tinidazole 2 g PO x 1 may also be effective for metronidazole-resistant trichomoniasis.
Bacterial	<i>Gardnerella</i> , other anaerobes	Metronidazole 2 g PO X 1 dose <i>Or</i> Metronidazole 500 mg BID PO X 7 days	Clindamycin vaginal cream QD X 7 days <i>Or</i> Metronidazole vaginal gel BID X 7 days <i>Or</i> Clindamycin 300 mg BID PO X 7 days	A single 2 g dose of metronidazole is slightly less efficacious compared to the 7 day course of therapy. However, single dose therapy may be preferable due to compliance.
¹ Doses provided in this table are for patients with normal renal and hepatic function. Consult Antimicrobial Dosing Guidelines (pg. 36-41) for dosing adjustment required in renal dysfunction. ² For dosing of vancomycin and aminoglycosides, refer to Antimicrobial Dosing Guidelines (pg. 36-41) and sections on vancomycin monitoring (pg. 33) and aminoglycoside dosing and monitoring (pg. 34-35) ³ Severe PCN allergy defined as anaphylaxis, bronchospasm, and hives. Mild PCN allergy defined as non- IgE mediated (i.e. maculopapular rash or drug fever). ⁴ Fluoroquinolone=Ciprofloxacin or Levofloxacin unless otherwise noted ⁵ ID approval needed at SFVAMC				

III. Antibiotic Dosing Guidelines

a. **Vancomycin Monitoring**

Vancomycin dosing is based on the patient's **actual body weight** and requires adjustment in renal dysfunction. Monitoring of serum levels should not be performed routinely on all patients receiving vancomycin. However, a vancomycin trough may be needed in some instances prior to transfer (e.g. to Laguna Honda Hospital for prolonged antibiotic therapy). Consult I.D. or I.D. pharmacy with questions.

Vancomycin levels are recommended for:

- Patients with rapidly changing renal function
- Patients on intermittent or continuous hemodialysis
- Patients with severely altered volumes of distribution (e.g. morbid obesity, significant edema, burns)
- Initial and definitive therapy of suspected CNS infection, endocarditis, or osteomyelitis
- Patients with persistent bacteremia while on treatment or infections associated with an indwelling foreign body (other than intravenous catheters)
- Patients >60 yo

Trough levels only should be obtained. Vancomycin peaks have no clinical significance. Trough levels should be obtained **within 30 minutes before the 3rd or 4th dose of a new regimen.**

Doses should be adjusted to obtain a **trough level of 10-15mcg/ml** for most indications.

For management of **central nervous system infections, endocarditis, ventilator-associated pneumonia or osteomyelitis**, or in patients not responding to initial treatment, trough levels of 10-20 mcg/ml are suggested.

b. Aminoglycoside Dosing and Monitoring

Aminoglycoside antibiotics have limited tissue distribution and are renally cleared. Dosing is based on a patient's **ideal or adjusted body weight** and renal function. Careful selection of empiric dosing regimens and serum level monitoring when warranted are needed to ensure safety and efficacy of these drugs. Patients anticipated to receive aminoglycosides for >2 weeks should be considered for **audiometry**. There are several approaches to dosing aminoglycosides (does not cover special populations such as cystic fibrosis, pregnancy, or post-partum):

Ideal Body Weight: Males: IBW = 50 kg + 2.3 kg for each inch over 5 feet.
Females: IBW = 45.5 kg + 2.3 kg for each inch over 5 feet.

Adjusted Body Weight: ABW = IBW + 0.4 (actual weight - IBW)
Consider using ABW if actual weight is >30% of calculated IBW.

CrCl (mL/min) = $\frac{(140 - \text{Age}) \times \text{Wt (kg)}}{72 \times \text{SCr (mg/dl)}}$ [for females multiply by 0.85]

MULTIPLE-DAILY DOSING ("TRADITIONAL")

-This approach should be used for the treatment of Gram-negative infections when "once-daily" dosing is not appropriate.

Inclusion criteria:

- Patients with suspected or documented Gram-negative infections not eligible for "once-daily" dosing.
- Patients with documented serious Gram-negative infections (e.g. *Pseudomonas*) receiving aminoglycosides in combination with a beta-lactam agent.

Exclusion criteria:

- Patients using aminoglycosides for synergistic activity against Gram-positive organisms (see below).

Dosing:

CrCl	Dose (gentamicin, tobramycin)
>60 ml/min	1.5-1.7 mg/kg/dose IV q8h
40-60 ml/min	1.2 - 1.5 mg/kg/dose IV q12h
20-40 ml/min	1.2-1.5 mg/kg/dose IV q12-24h
<20 ml/min	2 mg/kg loading dose

- A 2mg/kg loading dose may be administered in patients with severe infections.
- Contact ID pharmacy for maintenance doses for patients with CrCl <20 ml/min.

Monitoring:

- Patients anticipated to receive aminoglycosides for >7 days should have levels monitored.
- For patients who require monitoring, draw **peak and trough level**.
- Peak levels should be drawn 30 minutes after the end of the infusion. Trough levels should be drawn immediately before the next dose. Levels should be drawn around the 3rd or 4th dose to allow the drug to reach steady-state.

	Desired level (gentamicin, tobramycin)
Trough	<2 mcg/ml (<1 mcg/ml optimal)
Peak	5-8 mcg/ml

HIGH-DOSE, EXTENDED-INTERVAL DOSING (“ONCE-DAILY”)

-This approach exploits the concentration-dependent killing and post-antibiotic effect of aminoglycosides, and is generally as efficacious as traditional dosing with possibly less toxicity. However, this strategy has not been adequately studied in all populations.

Inclusion criteria:

-Patients with suspected or documented Gram-negative infections

Exclusion criteria:

- Creatinine clearance <60 ml/min
- Abnormal body composition (e.g. morbid obesity, burns)
- Meningitis, endocarditis, or osteomyelitis

Dosing:

CrCl	Dose (gentamicin, tobramycin)
>60 ml/min	5 mg/kg/dose IV q24h

Monitoring:

- Patients anticipated to receive aminoglycosides for >7 days should have levels monitored.
- For patients who require monitoring, draw a **single trough level**. Peak levels are not useful.
- Trough level should be drawn <30 minutes before next dose. It is not necessary to wait until before the third dose to draw this level.

	Desired level (gentamicin, tobramycin)
Trough	<1 mcg/ml (<0.3 mcg/ml optimal)

GRAM-POSITIVE COMBINATION DOSING (“SYNERGY”)

-Patients with serious Gram-positive infections may receive aminoglycosides in combination to achieve synergistic killing.

Inclusion criteria:

-Patients with serious Gram-positive infection (e.g. endocarditis) being treated with a β -lactam or vancomycin.

Exclusion criteria

-Patients with documented serious Gram-negative infections (e.g. *Pseudomonas*) receiving aminoglycosides in combination with a beta-lactam agent. (see above)

Dosing:

CrCl	Dose (gentamicin)
>60 ml/min	1 mg/kg/dose IV q8h

·Contact pharmacy for maintenance doses for patients with CrCl <60 ml/min.

Monitoring:

- Patients anticipated to receive aminoglycosides for \geq 7 days should have levels monitored.
- For patients who require monitoring, draw **peak and trough level**.
- Peak levels should be drawn 30 minutes after the end of the infusion. Trough levels should be drawn immediately before the next dose. Levels should be drawn around the 3rd or 4th dose to allow the drug to reach steady-state.

	Desired level (gentamicin)
Trough	\leq 1 mcg/ml
Peak	3 mcg/ml

c. **Standard Dosing and Adjustment in Renal Impairment** (see previous section for dialysis dosing)
 $CrCl (mL/min) = (140 - Age) \times Wt (kg) / 72 \times SCr (mg/dl)$ [for females multiply result by 0.85]

Acyclovir-Caspofungin

Drug	CrCl >50 mL/min	CrCl 10 - 50 mL/min	CrCl <10 mL/min (ESRD not on HD)
Acyclovir	<i>Herpes simplex infections</i> 5 mg/kg/dose IV Q8h	5 mg/kg/dose IV Q12 - 24h	2.5 mg/kg IV Q24h
	<i>HSV encephalitis/ Herpes zoster</i> 10 mg/kg/dose IV Q8h	10 mg/kg/dose IV Q12 - 24h	5 mg/kg IV Q24h
Amoxicillin	500 mg po TID	250-500mg po BID	250-500mg po QD
Amphotericin B	0.3 - 1.0 mg/kg IV Q24h	No Change	No Change
Amphotericin B Lipid Preps (ID approval required in most cases – see exceptions under Guidelines for Use)	Dose varies depending on indication. See Guidelines for Use.		
Ampicillin	1 - 2 g IV Q4 - 6h	1 - 1.5 g IV Q6h	1 g IV Q8 - 12h
Cefazolin	1 - 2 g IV Q8h	1 - 2 g IV Q12h	0.5 - 1 g IV Q24h
Caspofungin (ID approval required)	LD=70 mg x1, then 50 mg Q24h	No Change	
		For hepatic dysfunction give 70mg IV x1 then 35mg IV daily. Patients on concomitant rifampin or phenytoin may require 70mg daily due to drug interactions.	

Cefepime-Daptomycin

Drug	CrCl >50 mL/min	CrCl 10 - 50 mL/min	CrCl <10 mL/min (ESRD not on HD)
Cefepime	≥ 60 mL/min 1 - 2 g IV Q12h	<u>30-60 mL/min</u> 1 - 2g IV Q24h <u>10-30 mL/min</u> 0.5 - 1 g IV Q24h	0.25 - 0.5 g IV Q24h
<i>Febrile Neutropenia, Meningitis</i>	2g IV Q8h	1 - 2g IV Q12h 1g IV Q12h	0.25 - 0.5 g IV Q24h
Ceftazidime	1 - 2 g Q8h	1 - 2 g IV Q12 - 24h	0.5 g IV Q24h
Ceftriaxone	1g IV Q24h	No Change	No Change
<i>Meningitis</i>	2g IV Q12h		
<i>Endocarditis & Osteomyelitis:</i>	2g IV q24h		
Cefuroxime	0.75 - 1.5 g IV Q8h	0.75-1.5 g IV Q12-24h	0.5 g IV Q24h
Ciprofloxacin	400 mg IV Q12h 500 - 750 mg po Q12h	<u>30-50 mL/min</u> No Change <u>10-30 mL/min</u> 200-400mg IV Q12h No Change 250-500mg po Q12h	200 IV Q12h 250 mg po Q12h
The use of Q12h dosing intervals is recommended in ESRD due to the variability in half-life data observed in anephric patients. <i>Pseudomonas infections</i>	400mg IV q8h 750mg po Q12h	<u>30-50 mL/min</u> No Change <u>10-30 mL/min</u> 400mg IV Q12h No Change 500mg po Q12h	200 IV Q12h 250 mg po Q12h
Clindamycin	600 - 900 mg IV Q8h 300-450mg po TID-QID	No Change	No Change
Daptomycin (ID approval required)	Dosing varies by indication.		

Ethambutol-Gentamicin

Drug	CrCl >50 mL/min	CrCl 10 - 50 mL/min	CrCl <10 mL/min (ESRD not on HD)
Ethambutol	15 mg/kg po daily	7.5 - 10 mg/kg po daily	5 mg/kg po daily
Fluconazole Oral formulation is 100% bioavailable. IV use should be restricted to patients unable to take oral medications.	100 - 400 mg po/IV Q24h	50 - 200 mg po/IV Q24h	50 - 100 mg po/IV Q24h
Flucytosine (5FC) Steady-state serum 5-FC level measurements are difficult to obtain. However, they may be useful in guiding dosing of 5-FC in anuria. Bone marrow suppression has been associated with 2 hour post dose 5-FC peaks of >100 mg/L.	12.5 - 37.5 mg/kg/dose po Q6h	<u>25-50 mL/min</u> 12.5-37.5 mg/kg po Q12h <u>10-25 mL/min</u> 12.5-37.5 mg/kg po Q24h	12.5 - 25 mg/kg po Q24h
Ganciclovir	<u>≥ 80 mL/min</u> 5mg/kg/dose IV Q12h <u>50-79 mL/min</u> 2.5mg/kg/dose IV Q12h	1.25 - 2.5 mg/kg IV Q12-24h	1.25 mg/kg IV Q24h
Gentamicin See Aminoglycoside Dosing & Monitoring section pg 37-38 With traditional dosing of gentamicin, peak (5-8 mg/L) and trough (<2mg/L) levels are recommended in patients anticipated to receive aminoglycosides for ≥7 days for severe Gram (-) infection. Lower doses (1 mg/kg/dose Q8h) are suggested when aminoglycosides are used synergistically in Gram (+) infections. Those patients with CRCl<60 mL/min, obesity, or increased fluid volume should be monitored with serum gentamicin levels.	<u>≥ 60 mL/min</u> 5 mg/kg/dose IV Q24h The total daily dose of gentamicin can be administered as a single daily dose in patients with normal renal function (CrCl ≥ 60 mL/min). Patients with decreased renal function or abnormal body composition should have their doses adjusted according to the recommendations adjacent	<u>40-60 mL/min</u> 1.2-1.5 mg/kg IV Q12h <u>20-40 mL/min</u> 1.2-1.5 mg/kg IV Q12-24h	<u>≤ 20 mL/min</u> 2 mg/kg loading dose (<i>Consult pharmacy for maintenance dose</i>)

Imipenem-Quinupristin/dalfopristin

Drug	CrCl >50 mL/min	CrCl 10 - 50 mL/min	CrCl <10 mL/min (ESRD not on HD)
Imipenem	500 mg IV Q6-8h <i>max 50 mg/kg/day</i>	500 mg IV Q8h	≤ 20 mL/min 250-500 mg IV Q12h (or consider meropenem)
Isoniazid	300 mg po daily	No Change	No Change
Levofloxacin	250 - 500 mg po/IV Q24h	LD=500 mg x1, then 250 mg po/IV Q24h	LD=500 mg x1, then 250 mg po/IV Q48h
<i>Nosocomial pneumonia/ Pseudomonas infections</i>	750mg po/IV Q24h	LD=750 mg x1, then 750 mg po/IV Q48h	LD=750 mg x1, then 500 mg po/IV Q48h
Linezolid (ID approval required)	600mg po/IV BID	No Change	No Change
Meropenem	0.5-1 g IV Q8h	$\frac{25-50 \text{ mL/min}}{0.5 - 1 \text{ g IV Q12h}}$ $\frac{10-25 \text{ mL/min}}{0.5\text{g IV Q12h}}$	0.5 g IV Q24h
Metronidazole	500 mg po/IV Q8h	500 mg po/IV Q8h	500 mg po/IV Q12h Adjustment for ESRD only for patients not receiving hemodialysis.
Nafcillin	1 - 2 g IV Q4 - 6h	No Change	No Change
Penicillin G	2 - 3 MU IV Q4 - 6h	1 - 2 MU IV Q4 - 6h	1 MU IV Q6h
Piperacillin/tazobactam (Zosyn)	3.375 - 4.5 g IV Q6 - 8h	3.375-4.5 g Q6-8h	2.25-3.375 g Q8h
<i>Pseudomonas infections</i>	<i>4.5g Q6h for ClCr > 20 mL/min</i>		
Pyrazinamide	20 - 25 mg/kg/day po	No Change	No Change
Quinupristin/dalfopristin (Synercid) (ID approval required)	Dose varies depending on indication.		

Rifampin-Vancomycin

Drug	CrCl >50 mL/min	CrCl 10 - 50 mL/min	CrCl <10 mL/min (ESRD not on HD)
Rifampin	600 mg po daily	No Change	No Change
Tobramycin	See Gentamicin (above) and Aminoglycoside Dosing Section pg.37-38		
TMP/SMX TMP/SMX is »90% bioavailable orally. When switching to oral therapy, consider that a single-strength tablet has 80mg of TMP, a double-strength tablet 160mg of TMP.	<u>Systemic GNR infections</u> 10 mg TMP/kg/day IV divided Q6 - 12h <u>Pneumocystis pneumonia</u> 15 - 20 mg TMP/kg/day IV divided Q6 - 12h	5 - 7.5 mg TMP/kg/day IV divided Q12 - 24h 10 - 15 mg TMP/kg/day IV divided Q12 - 24h	2.5 - 5.0 mg TMP/kg IV Q24h 5 - 10 mg TMP/kg IV Q24h
Voriconazole PO should be used when possible, as oral bioavailability >95%. May require dose adjustment in hepatic dysfunction. Consult ID pharmacy.	<u>Oral dosing</u> LD=400 mg po Q12h x 1 day, then 200 mg po Q12h <u>IV dosing</u> LD=6 mg/kg/dose IV Q12h x 2 doses, then 4mg/kg/dose IV Q12h	No Change	No Change
Vancomycin For monitoring, see Vancomycin Monitoring section	<u>>60 mL/min</u> 10 - 15 mg/kg IV Q12h	<u>40-60 mL/min</u> 10 - 15mg/kg IV Q12 - 24h	<u>20-40 mL/min</u> 5-10 mg/kg IV Q24 <u>10-20mL/min</u> 5-10 mg/kg IV Q24-48h <u><10 mL/min</u> 10 - 15 mg/kg IV loading dose x 1, redose according to serum levels (<i>Consult ID pharmacy</i>)

d. Dosage Adjustments in Hemodialysis

Recommended doses are for critically ill patients with serious systemic infections. Lower doses may be used for less serious infections. Contact ID pharmacy for further assistance.

CRRT: This assumes an ultrafiltration (UF) rate of 2L/h with continuous venous-venous hemofiltration [CVVH] and an UF rate of 1L/h and dialysate flow rate of 1L/h with continuous veno-venous hemodiafiltration [CVVHDF] and residual native GFR < 10 mL/min.

DRUG	CRRT	HD
Acyclovir	<i>Herpes simplex infections</i> 2.5 – 5.0 mg/kg IV Q24h <i>HSV Encephalitis/ Herpes Zoster</i> 5 – 7.5 mg/kg IV Q24h	<i>Herpes simplex infections</i> 2.5 mg/kg IV Q24h & post HD <i>HSV Encephalitis/ Herpes Zoster</i> 5 mg/kg IV Q24h & post HD
Ampicillin	1 g IV Q 6h	1 g IV Q 12h
Ampicillin/ sulbactam (Unasyn®)	1.5 g IV Q 6h	1.5 g IV Q 12h
Cefazolin	1 g IV Q12h	2 g IV post HD only
Cefepime	2 g IV Q 12h	2 g IV post HD only
Cefotetan	1 g IV Q 12h	2 g IV post HD only
Ceftazidime	2 g IV Q 12h	1 IV g post HD
Ciprofloxacin	400 mg IV Q 12h	200 mg IV Q12 h or 250 mg PO q12h
Fluconazole	400 mg po/IV Q 24 h	200 mg po/IV post HD only
Ganciclovir	2.5-5.0 mg/kg IV Q24h	1.25 mg/kg IV post HD only
Gentamicin	<u>Gram negative infections</u> 2 mg/kg Loading Dose <u>then</u> 1.5 mg/kg IV Q 24 h <i>Monitoring of serum levels is recommended; trough < 2mcg/mL</i>	<u>Gram negative infections</u> 2 mg/kg Loading Dose <u>then</u> 1 mg/kg IV post HD <i>Monitoring of serum levels is recommended; trough < 2mcg/mL</i>
Imipenem	500 mg IV Q 8h	250 mg IV Q 12h
Levofloxacin	500 mg Loading Dose <u>then</u> 250 mg po/IV Q24h	500 mg Loading Dose <u>then</u> 250 mg po/IV Q48h
Meropenem	1g IV Q12h	500 mg IV Q24h and post HD
Penicillin G	2 MU IV Q 4-6h	1 MU IV Q6h
Piperacillin/ tazobactam (Zosyn®)	3.375 g IV Q6h or 4.5g Q 8h	2.25 g IV Q 8h
Ticarcillin/ clavulanate (Timentin®)	3.1 g IV Q8h	2 g IV Q12h
Tobramycin	<u>Gram negative infections</u> 2 mg/kg Loading Dose <u>then</u> 1.5 mg/kg IV Q 24 h <i>Monitoring of serum levels is recommended; trough < 2mcg/mL</i>	<u>Gram negative infections</u> 2 mg/kg Loading Dose <u>then</u> 1 mg/kg IV post HD <i>Monitoring of serum levels is recommended; trough < 2mcg/mL</i>
TMP/SMX	5 – 7.5 mg TMP/kg/day divided q12h – 24h	2.5 – 5.0 mg TMP/kg Q24h
Vancomycin	7.5 – 15 mg/kg IV Q24 <i>Monitoring of serum levels is recommended; trough 10-15 mcg/mL</i>	Loading Dose 15 – 20 mg/kg <u>then</u> 500mg IV post HD only <i>Monitoring of serum levels is recommended; trough 10-15 mcg/mL</i>
Voriconazole	ORAL formulation should be administered when possible, as oral bioavailability >95%. The use of IV should be avoided in patients with CrCl<50 mL/min due to the accumulation of the IV vehicle (cyclodextran) and is contraindicated in ESRD. LD: 400 mg PO q12h x 2 doses only [>40 kg] MD: 200 mg PO q12h [<40 kg]	

IV. Outpatient Abscess Guidelines

General comments

- No need for antibiotics for uncomplicated abscess drainage
- High levels of MRSA (50-70% of *S. aureus*)
- Low threshold for culture: with moderate to severe disease; antibiotic allergy; patient has received frequent antibiotics; not responding to initial therapy
- Most abscesses are caused by *S. aureus*. However, group A streptococcus (*S. pyogenes*) is a concern with significant cellulitis and is not well covered by trimethoprim-sulfamethoxazole and may be resistant to doxycycline.
- Ill patients may require initial admission and IV therapy

Antibiotics Requiring Renal Dose Adjustment

Drug	CrCl > 50ml/min	CrCl 10-50ml/min	CrCl <10ml/min
Cephalexin	500mg qid	500mg tid-bid	250mg bid
Trimethoprim-sulfamethoxazole	2 DS tabs bid ≤50 kg: 1 DS tab tid	1 DS tab bid ≤50kg: 1 SS tab tid (Half of standard regimen)	Avoid

No culture available

Oral regimens

- Dicloxacillin 500 mg qid or cephalexin 500 mg qid, especially if group A streptococcus suspected
- Antibiotics when MRSA suspected:
 - Trimethoprim-sulfamethoxazole 2 DS bid (≤50 kg: 1 DS tid)
 - Doxycycline 100 mg bid
 - Clindamycin 300 mg tid
- Low threshold for culture if complicated disease, allergy, or failure to respond

MSSA

- Dicloxacillin 500 mg qid
- Cephalexin 500 mg qid
- Penicillin allergy: *review antibiotic sensitivities*
 - Clindamycin 300 mg tid

MRSA

- Review antibiotic sensitivities*
 - Trimethoprim-sulfamethoxazole 2 DS bid (≤ 50 kg: 1 DS tid)
 - Doxycycline 100 mg bid
 - Clindamycin 300 mg tid

V. Antibiotic Restrictions
a. Antibiotic Restrictions at UCSF Medical Center

Antibiotics listed below require approval of Infectious Diseases (ID) Pharmacy (415) 443-9421

Antibiotic	Restriction
AmBisome®(liposomal amphotericin)	All initial usage requires the approval of the ID Pharmacist
Caspofungin	All initial usage requires the approval of the ID Pharmacist
Cefepime	Treatment for > 5 days restricted to patients with multi-drug resistant gram negative pathogens (MDRP) In the absence of MDRP, approval by infectious diseases is required for continuation of cefepime
Ceftriaxone	Treatment ≥ 2grams/day restricted to endocarditis, osteomyelitis and meningitis
Daptomycin	All initial usage requires the approval of the ID Pharmacist
Drotrecogin (Activated Protein C, Xigris®)	All usage requires approval by the ID Consult Service and ICU Team and ID Pharmacy
Imipenem	Treatment for > 5 days restricted to patients with multi-drug resistant gram negative pathogens In the absence of MDRP, approval by infectious diseases is required for continuation of imipenem.
IV Fluconazole	Usage acceptable if patient is NPO
Linezolid	For the treatment of persons with systemic VRE infections or in patients intolerant of vancomycin. All initial usage requires the approval of the ID Pharmacist
Meropenem	Treatment for > 5 days restricted to patients with multi-drug resistant gram negative pathogens In the absence of MDRP, approval by infectious diseases is required for continuation of meropenem
Synercid ® (Quinupristin/dalfopristin)	All initial usage requires the approval of the ID Pharmacist
Vancomycin	Treatment for > 5 days restricted to patients with severe beta-lactam allergy with documented infection or documented MRSA, MRSE, ampicillin-resistant enterococcus If continuation of vancomycin desired in the absence of a beta-lactam allergy or gram-positive infection, approval by infectious diseases required
Voriconazole	Use on Heme-Onc, Lung Transplant Service, Pediatric Heme-one and Pediatric BMT, does not require approval when voriconazole used as monotherapy. All other services require approval. Injection: Only if patient is NPO. ALL combination (usually voriconazole with caspofungin) antifungal therapy requires approval
Combination therapy for gram-negative infection will be reserved for neutropenia or serious pseudomonal infection	Monotherapy shall be used in the treatment of presumed or documented gram-negative infection. In the absence of neutropenia or documented pseudomonal infection, 2-drug coverage will be narrowed to monotherapy in 3-5 days. If continuation of 2-drug coverage is desired and the patient is not neutropenic and/or with documented pseudomonal infection, continuation of combinations therapy requires approval by infectious diseases.
All antibacterials and antifungal continued for > 7 days will be reviewed for appropriateness	In those instances in which the use of the given agent is deemed inappropriate, discussion will take place with the primary team to clarify indication. If continuation of therapy is deemed inappropriate and the primary service requests continuation of therapy, direct discussion between the primary team and the ID fellow or ID attending will be required for continuation of therapy

The following combinations should not be used:

- Clindamycin + metronidazole
- Penicillin + ceftazidime
- Piperacillin/tazobactam + clindamycin or metronidazole (exception: Piperacillin/tazobactam + clindamycin can be used in the treatment of necrotizing fasciitis)
- Ampicillin/sulbactam + Metronidazole
- Carbapenem + antipseudomonal beta-lactam

b. Antibiotic Restrictions at San Francisco General Hospital

As of 5/7/04 – Requires the Approval of the Infectious Disease (ID) Fellow at (415) 719-4737

Antibiotic	Restriction
Amikacin	Treatment > 48 hours restricted to: Isolates resistant to both gentamicin and tobramycin All other indications for amikacin require the approval of the ID Fellow.
Amphotericin B Cholesteryl Sulfate Complex	All usage requires the approval of the ID Fellow.
Azithromycin	Packet: Single one (1) gram dose to be dispensed without refill for use in treating Chlamydia infections or repeated doses for MAC prophylaxis. Tablets (600mg po) are restricted to 1200mg/week MAC prophylaxis.
Capreomycin	Usage requires the approval of the ID Fellow.
Ceftriaxone	Treatment ≥ 2grams/day requires the approval of the ID Fellow except after 8:00 PM, 1 dose is allowed. The 1gram vial of ceftriaxone is not restricted.
Ciprofloxacin	IV ciprofloxacin requires the approval of the ID Fellow.
Clarithromycin	Usage is restricted to: 1. Helicobacter pylori 2. Documented/prophylaxis for MAC All other indications require the approval of the ID Fellow.
Fluconazole	Injection: Requires the approval of the ID Fellow.
Itraconazole	Capsule restricted to: 1. Aspergillus 2. Histoplasmosis 3. Dermatologist Rx for eosinophilic folliculitis, bullous tinea or recalcitrant fungal infections. Solution requires approval of the ID Fellow.
Levofloxacin	Injection: Requires the approval of the ID Fellow. Tablet (750mg dose only): Requires approval of the ID Fellow. Restricted prescribing between 8pm-8am.
Linezolid	For the treatment of persons with systemic VRE infections. All usage requires the approval of the ID Fellow.
Meropenem/ Imipenem	All usage requires the approval of the ID Fellow.
Oseltamivir	Restricted to inpatient use in the management of influenza B outbreaks.
Rifampin	Injection: Requires the approval of the ID Fellow.
Tobramycin	Injection: Treatment for > 48 hours is restricted to: 1. Documented Pseudomonas aeruginosa infection 2. Isolates resistant to gentamicin 3. All other indications require the approval of the ID Fellow.
Trimetrexate	Usage requires the approval of the ID Fellow.

The following combinations should not be used:

- 1) Cefotetan + metronidazole
- 2) Ceftriaxone + clindamycin
- 3) Clindamycin + metronidazole
- 4) Doxycycline + levofloxacin
- 5) Penicillin + cefazolin
- 6) Ampicillin/sulbatam + metronidazole
- 7) Piperacillin/tazobactam + clindamycin or metronidazole or cefazolin

Dosing recommendations:

- 1) Metronidazole q8 hours
- 2) Meropenem 500mg IV q8 hours
- 3) Clindamycin 600mg IV q8 hours; 900mg IV q8 hours acceptable for PID

Automatic substitution by Pharmacy as approved by Pharmacy and Therapeutics Committee:

- 1) Piperacillin/tazobactam 3.375 gm q6h will be substituted with Piperacillin/tazobactam 4.5gm q8h
- 2) Metronidazole q6h will be substituted with Metronidazole q8h