



# 2022 INFECTIOUS DISEASE CLINICAL GUIDE FOR ADULT PATIENTS

South Texas Health System  
Department of Pharmacy

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# Antimicrobial Stewardship Program Overview

Our ASP program was established in 2006 to promote appropriate use of antimicrobial therapy, improve patient outcomes, reduce microbial resistance, and decrease the spread of infections caused by multidrug-resistant organisms.

## Program Leaders:

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More information on the ASP program, clinical guidelines and antibiogram can be found on the Intranet – Pharmacy Department.



# Protected Antimicrobial Therapy

## A. Purpose

- The rationale for placing protection on antimicrobial therapies is:
  - o To limit the use of these agents to the treatment of infections caused by multi-drug resistant organisms (MDRO), patients with multiple drug allergies or contraindications to first line agents.
  - o To slow the development of anti-microbial resistance and minimize serious adverse effects.

## B. Procedure

- The pharmacist reviews all new orders for protected antimicrobials not placed by infectious disease (ID) physicians or ICU intensivists/pulmonologists (for select antibiotics).
- If the patient meets criteria for use of the agent, the pharmacist will verify the antibiotic for 48 hours and that an infectious disease consult has been ordered. The clinical pharmacy team will monitor the prescribing of these agents and identify opportunity for de-escalation/discontinuation.
- If the patient fails to meet criteria, the pharmacist will recommend an alternative agent that does not require ID or specialty approval if possible.
- If the physician insists on using a protected antimicrobial, he/she will be asked to obtain an Infectious Disease consult. The ID specialist will determine if the antimicrobial is indicated.

### C. Protected Antimicrobials List

Drug	Criteria For Use
<b>Cephalosporins</b>	
Ceftaroline (Teflaro <sup>®</sup> )	<ol style="list-style-type: none"> <li>1. Treatment of complicated skin and soft tissue infections, in patients who are intolerant to vancomycin IV, linezolid IV/PO, daptomycin IV</li> <li>2. Infectious Disease Physician</li> </ol>
Ceftazidime/Avibactam (Avycaz <sup>®</sup> )	Non-formulary at STHS, meropenem/vaborbactam considered first line for carbapenem-resistant enterobacteriaceae's (CRE's). Can be ordered via non-formulary method for MDR resistant <i>Pseudomonas aeruginosa</i> as alternative to Ceftolozane/Tazobactam or concomitant treatment of carbapenem-resistant enterobacteriaceae's and <i>Pseudomonas aeruginosa</i> .
Ceftolozane/Tazobactam (Zerbaxa <sup>®</sup> )	Infectious Disease Physician Consult Required to Initiate & for treatment of MDR <i>Pseudomonas aeruginosa</i>
<b>Carbapenems</b>	
Meropenem (Merrem <sup>®</sup> )	<ol style="list-style-type: none"> <li>1. Infectious Disease Physician Consult Required to Initiate or</li> <li>2. Ordered by ICU intensivists/pulmonologists</li> </ol>
Ertapenem (Invanz <sup>®</sup> )	<ol style="list-style-type: none"> <li>1. Should not be used for routine antimicrobial surgical prophylaxis.</li> <li>2. Infectious Disease Physicians, ICU intensivists/pulmonologists.</li> <li>3. Documented ESBL infections</li> </ol>
Meropenem/Vaborbactam (Vabomere <sup>®</sup> )	Infectious Disease Physician required to initiate & for treatment of carbapenem resistant enterobacteriaceae (CRE) infections
<b>Fluoroquinolones (for pediatrics)</b>	
Levofloxacin (Levaquin <sup>®</sup> )	Pediatric Infectious Disease Physician or Pediatric Intensivist in pediatric patients
Ciprofloxacin (Cipro <sup>®</sup> )	Pediatric Infectious Disease Physician or Pediatric Intensivist in pediatric patients
<b>Aminoglycosides</b>	
Amikacin	<ol style="list-style-type: none"> <li>1. Organism is resistant to other aminoglycosides</li> <li>2. Intra-ocular injection</li> <li>3. Infectious Disease Physician</li> </ol>
<b>Polymyxins</b>	
Polymyxin B IV	Infectious Disease Physician
Colistimethate	Infectious Disease Physician

<b>Gram Positive Agents</b>	
Daptomycin (Cubicin) *verify patient is not receiving statin medication concomitantly with daptomycin	<ol style="list-style-type: none"> <li>1. MRSA infection (excluding pneumonia) in a Vancomycin-intolerant patient</li> <li>2. VRE infection outside of the urinary tract</li> <li>3. Infectious Disease Physician</li> <li>4. Pharmacists may order weekly CK levels if not ordered by prescriber.</li> </ol>
<b>Macrolides</b>	
Fidaxomicin (Difcid)	Positive Clostridium difficile PCR of ID consult or GI Consult
<b>Miscellaneous Agents</b>	
Nitazoxanide (Alinia)	Infectious Disease Physician Consult Required to Initiate
Minocycline IV (Minocin)	Infectious Disease Physician
Tigecycline	Infectious Disease Physician
Eravacycline	Infectious Disease Physician
<b>Antifungals</b>	
Amphotericin B	Infectious Disease Physician unless used for bladder irrigation
Liposomal Amphotericin B	Infectious Disease Physician
Flucytosine	Infectious Disease Physician
Isavuconazole	Infectious Disease Physician
Micafungin	<ol style="list-style-type: none"> <li>1. Candidal infection (excluding candida UTI's &amp; candida parapsilosis) resistant to fluconazole</li> <li>2. Candidal infection in fluconazole-intolerant patient (excluding candida UTI's &amp; candida parapsilosis)</li> <li>3. Infectious Disease Physician or ICU Intensivist</li> </ol>
Itraconazole	Infectious Disease Physician Consult Required to Initiate
Posaconazole	Infectious Disease Physician
Voriconazole	<ol style="list-style-type: none"> <li>1. Documented Aspergillus infection</li> <li>2. Infectious Disease Physician</li> </ol>
<b>Antivirals</b>	
Ganciclovir	Infectious Disease Physician
Valganciclovir	Infectious Disease Physician



# Community Acquire Pneumonia (CAP)

## A. General

- Most likely pathogens: *S. pneumoniae*, *H. influenzae*, *M. pneumoniae*, MSSA, *Legionella* sp., *C. pneumoniae*, *M. catarrhalis*
- Sputum and blood cultures (x2) should be sent on all patients admitted to hospital with severe CAP or having risk factors for MRSA or *P. aeruginosa* before antibiotics are given
- *Legionella* and pneumococcal urine tests are recommended only when epidemiological outbreak or in patients with severe CAP
- Influenza PCR during flu season
- Severe CAP definition: must meet one major or 3 minor criteria
  - Major criteria: septic shock requiring vasopressor therapy or respiratory failure requiring mechanical ventilation
  - Minor criteria: respiratory rate  $\geq 30$ ;  $\text{PaO}_2/\text{FiO}_2 \leq 250$ ; multilobar infiltrates; confusion/disorientation; BUN  $\geq 20$  mg/dL; WBC  $< 4,000$ ; platelets  $< 100,000$ ; core temperature  $< 36^\circ\text{C}$ ; or hypotension requiring aggressive fluid resuscitation

## B. Risk factors for MRSA and *P. aeruginosa*

- Strong risk factors:
  - Prior respiratory isolation with MRSA or *P. aeruginosa*
  - Recent hospitalization with IV antibiotic use within 90 days

## C. Treatment Guidelines for Outpatient

Category	Treatment
No comorbidities or risk factors for MRSA or <i>P. aeruginosa</i>	- Amoxicillin 1g PO TID - Doxycycline 100mg BID
Comorbidities (chronic heart, lung, liver, or renal disease; diabetes mellitus; alcoholism; malignancy; or asplenia)	- Amoxicillin/clavulanate 500 mg/125 mg PO TID <u>OR</u> 875 mg/125 mg PO BID <u>OR</u> 2,000 mg/125 mg PO BID <u>OR</u> cefpodoxime 200 mg PO BID <u>OR</u> cefuroxime 500 mg PO BID <b><u>AND</u></b> - Azithromycin 500 mg PO on first day then 250 mg daily <u>OR</u> doxycycline 100 mg PO BID

## D. Treatment Guideline for Inpatient

Category	Empiric Treatment
Non-severe	- Ceftriaxone 1-2g IV daily + Azithromycin 500 mg IV/PO daily <u>OR</u> doxycycline 100 mg IV/PO daily - Anaphylactic PCN allergy: Levofloxacin 750mg IV/PO daily (not preferred)

	<ul style="list-style-type: none"> <li>- If prior respiratory isolation of MRSA, add MRSA coverage*</li> <li>- If prior respiratory <i>P. aeruginosa</i>, use <i>P. aeruginosa</i> regimen**</li> <li>- If recent hospitalization and IV antibiotic use or other risk factors, only start MRSA and <i>P. aeruginosa</i> therapy if culture results are positive</li> </ul>
<b>Severe</b>	<ul style="list-style-type: none"> <li>- Ceftriaxone 1-2g IV Q24H + (Azithromycin 500 mg IV/PO Q24H <u>OR</u> doxycycline 100mg IV/PO daily)</li> <li>- If with risk factors for MRSA, add MRSA coverage*</li> <li>- If with risk factors for <i>P. aeruginosa</i>, use <i>P. aeruginosa</i> regimen**</li> </ul>
<b>MRSA coverage*</b>	<ul style="list-style-type: none"> <li>- Vancomycin IV pharmacy to dose</li> <li>- Linezolid 600mg IV/PO BID</li> </ul> <p>Discontinue MRSA coverage if MRSA nasal swab (-)</p>
<b><i>P. aeruginosa</i> regimen **</b>	<p>Instead of ceftriaxone, use one of the therapies below:</p> <ul style="list-style-type: none"> <li>- Cefepime 2g IV Q8H extended infusion (EI)</li> <li>- Ceftazidime 2g IV q8H EI</li> <li>- Piperacillin-tazobactam 4.5 g IV Q8H EI</li> <li>- Anaphylactic PCN allergy: Aztreonam 2g IV Q6H</li> </ul>

#### E. Duration of therapy

- At least 5 days; 7 days for proven MRSA or *P. aeruginosa* CAP for clinically stable patient
  - Resolution of vital signs abnormality (HR < 100 beats/min, RR < 24 breaths/min, SBP > 90 mmHg, O<sub>2</sub> sat > 90%)
  - Mental status back to baseline
  - Ability to eat
- Longer course of antibiotics recommended for CAP complicated by meningitis, endocarditis, or other deep-seated infection; infection with less-common pathogens (*Burkholderia pseudomallei*, *Mycobacterium tuberculosis* or endemic fungi).

#### F. Reference

1. Metlay JP, Waterer GW, Long AC, 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. *Am J Respir Crit Care Med.* 2019;200:e45-e67.





# Bacterial Urinary Tract Infection (UTI)

## A. General

- Sign/symptoms of UTI:
  - New onset or worsening of fever, rigors
  - Altered mental status, malaise, or lethargy with no other identified cause
  - Flank pain (pyelonephritis)
  - Costovertebral angle tenderness
  - Acute hematuria, dysuria, urgent or frequent urination
  - Pelvic discomfort, suprapubic pain or tenderness
  - Increased spasticity, autonomic dysreflexia, or sense of unease in spinal cord injury patients
- Interpret UA and urine culture in context of symptoms

Urinalysis	Urine Culture
<ul style="list-style-type: none"><li>- Nitrites indicate bacteria in the urine</li><li>- Leukocyte esterase indicates white blood cells in the urine</li><li>- Pyuria: &gt; 10 WBC/hpf</li></ul> <p>NOTE: Positive urinalysis does <b>NOT</b> always indicate UTI, must correlate with signs/symptoms</p>	<ul style="list-style-type: none"><li>- If UA is negative for pyuria, then positive cultures are likely contamination</li><li>- Positive urine culture: clean catch urine culture with <math>\geq 100k</math> cfu of a single uropathogen; indwelling urinary catheter and culture with <math>\geq 10k</math> cfu of <math>\geq 1</math> bacterial species</li><li>- Lower colony counts may be significant in:<ul style="list-style-type: none"><li>• Patients on antibiotics at the time culture collected</li><li>• Symptomatic young women</li><li>• Suprapubic aspiration</li><li>• Men with pyuria.</li></ul></li></ul> <p>NOTE: Positive urine culture does <b>NOT</b> always indicate UTI, must correlate with signs/symptoms</p>

## B. General Treatment Guidelines

- Pyuria in culture (-) or asymptomatic patients usually requires no treatment. If pyuria persists, consider other causes (e.g., interstitial nephritis or cystitis; fastidious organisms)
- Follow-up urine cultures or UA should NOT be acquired routinely to monitor response to therapy
  - should only be obtained if ongoing symptoms
- Tailor antibiotic therapy based on culture and sensitivity results
- Catheter irrigation should not be done routinely

### C. Patients WITHOUT a urinary catheter

Category	Definition	Empiric Treatment
<b>Asymptomatic bacteriuria</b>	<p>2 consecutive (women) or 1 (men) urine culture <math>\geq 100k</math> colonies without signs or symptoms</p> <p><b>NOTE:</b> Obtaining cultures in asymptomatic patients is not recommended unless <b>pregnant</b> or undergoing <b>urologic procedure</b>. May consider obtaining culture in:</p> <ul style="list-style-type: none"> <li>• Post renal transplant &lt; 1 month</li> <li>• High risk for neutropenia (neutrophils &lt; 100 or <math>\geq 7</math> days following chemotherapy)</li> </ul>	<p>No treatment unless patient is:</p> <ul style="list-style-type: none"> <li>• Pregnant <ul style="list-style-type: none"> <li>- First line: Nitrofurantoin 100 mg PO Q12h (do NOT use in patients <math>\geq 38</math> weeks pregnant)</li> <li>- Alternative: Cephalexin 250 to 500 mg PO every 6 hours</li> <li>- Duration 4 to 7 days</li> </ul> </li> <li>• Undergoing endoscopic urologic procedures associated with mucosal trauma <ul style="list-style-type: none"> <li>- Tailor antibiotic therapy to culture result (no empiric therapy) x 1 dose 30-60 minutes prior to surgery</li> </ul> </li> </ul> <p>Antibiotics do <b>NOT</b> decrease asymptomatic bacteriuria or prevent UTIs</p>
<b>Acute uncomplicated cystitis</b>	<p>Signs and symptoms (e.g., dysuria, urgency, frequency, suprapubic pain)</p> <p><b>AND</b> Pyuria (&gt; 10 WBC/hpf)</p> <p><b>AND</b> (+) urine culture <math>\geq 100,000</math> colonies</p>	<p>First line:</p> <ul style="list-style-type: none"> <li>- Nitrofurantoin 100 mg PO Q12H x 5 days (do NOT use in patients with CrCl &lt; 60ml/min)</li> </ul> <p>Alternative:</p> <ul style="list-style-type: none"> <li>- Amoxicillin/clavulanate 500mg PO BID x 3-7 days</li> <li>- Cefdinir 300 mg PO BID x 3-7 days</li> <li>- Fosfomycin 3g PO x 1 dose (if history of ESBL E. coli)</li> </ul>
<b>Acute complicated cystitis and pyelonephritis</b>	<p>Signs and symptoms (e.g. fever, flank pain)</p> <p><b>AND</b> Pyuria (WBC&gt;10/hpf)</p> <p><b>AND</b> (+) urine culture <math>\geq 100,000</math> colonies</p>	<p><b>Non- hospitalized patient:</b></p> <ul style="list-style-type: none"> <li>- Ceftriaxone 1g IV x 1 dose</li> <li>- Anaphylactic PCN allergy: Gentamicin 5mg/kg IV x 1 dose</li> </ul> <p>Then transition to one of the following oral therapies : (one of the therapies below)</p> <ul style="list-style-type: none"> <li>- Ciprofloxacin 500 mg PO BID x 7 days</li> <li>- Ciprofloxacin ER 1g PO BID x 7 days</li> <li>- Levofloxacin 750mg PO daily x 5 days</li> <li>- TMP/SMX 1 DS PO Q12H x 14 days</li> <li>- Cefdinir 300 mg BID x 10-14 days</li> </ul>



	<p>Many patients will have other evidence of upper tract disease (i.e., leukocytosis, WBC casts, or abnormalities upon imaging)</p>	<p><b>Hospitalized patient:</b></p> <ul style="list-style-type: none"> <li>- Ceftriaxone 1g IV Q24H</li> <li>- Cefepime 1g q8h EI if hospitalized &gt; 48H</li> <li>- Meropenem 1g IV Q8H EI (if history of ESBL in past 90 days)</li> <li>- Anaphylactic PCN allergy: Aztreonam 1g IV Q8H <b>OR</b> Gentamicin 5 mg/kg IV Q24H</li> </ul> <p>De-escalate to oral therapy (same medication and <b>total</b> duration as for patient not hospitalized) when culture result finalized and patient stable</p>
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## D. Patients WITH a urinary catheter

Category	Definition	Empiric Treatment
<b>Asymptomatic bacteriuria</b>	(+) urine culture $\geq 100k$ colonies with no signs or symptoms  NOTE: Obtaining cultures in asymptomatic patients is <b>NOT</b> recommended	Antibiotics do NOT decrease asymptomatic bacteriuria or prevent UTIs
<b>Catheter-associated UTI</b>	Signs and symptoms  <b>AND</b> Pyuria (WBC $>10$ /hpf)  <b>AND</b> (+) urine culture $\geq 10k$ colonies	Exchange or remove catheter when possible  Patient stable with no evidence of upper urinary tract disease: <ul style="list-style-type: none"> <li>- if catheter removed, consider observation alone</li> </ul> Patient severely ill, with evidence of upper urinary tract infection <ul style="list-style-type: none"> <li>- Cefepime 1g IV Q8H EI</li> <li>- Zosyn 4.5g IV Q8H EI</li> <li>- Meropenem 1g IV Q8H EI (if history of ESBL in past 90 days)</li> </ul> Duration: <ul style="list-style-type: none"> <li>- 3 days if catheter removed in female patients &lt; 65 years with lower tract infection only</li> <li>- 7 days if prompt resolution of symptoms</li> <li>- 10 – 14 days if delayed response</li> </ul>

## E. Reference

1. Gupta K, Hooton TM, Naber KG, 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. Clin Infect Dis. 2011;52:e103-20
2. Hooton TM, Bradley SF, Cardenas DD, 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. Clin Infect Dis. 2010;50:625-63
3. Nicolle LE, Gupta K, Bradley SF, et al. Clinical Practice Guideline for the Management of Asymptomatic Bacteriuria: 2019 Update by the Infectious Diseases Society of America. Clin Infect Dis. 2019;68:e83-e110

# Skin and Soft-Tissue Infections (SSTI)

## A. Non-purulent cellulitis

- Includes cellulitis/necrotizing infection/erysipelas
- Usually caused by beta-hemolytic streptococci and MSSA
- Severity:
  - Mild: typical cellulitis/erysipelas with no focus of purulence
  - Moderate: typical cellulitis/erysipelas with systemic signs of infection\*
    - \*: Temperature >38°C, heart rate >90 beats per minute, respiratory rate >24 breaths per minute, WBC > 12,000 or < 4,000
  - Severe:
    - Patients who have failed oral antibiotic treatment and with systemic signs of infection
    - Immunocompromised patients
    - Those with clinical signs of deeper infection such as bullae, skin sloughing, hypotension, or evidence of organ dysfunction

Severity	Empiric Treatment								
<b>Mild</b>	<ul style="list-style-type: none"> <li>- Penicillin VK 500mg PO Q6H</li> <li>- Dicloxacillin 500mg PO Q6H</li> <li>- Cephalexin 500 mg PO Q6H</li> <li>- Anaphylactic PCN allergy: Clindamycin 300 mg PO Q6H</li> </ul>								
<b>Moderate</b>	<ul style="list-style-type: none"> <li>- Cefazolin 1-2 g IV Q8H</li> <li>- Ceftriaxone 1-2g IV Q24H</li> </ul> <p><u>Severe beta-lactam allergy</u></p> <ul style="list-style-type: none"> <li>- Clindamycin 600 mg IV Q8H</li> </ul>								
<b>Severe</b>	<p>Emergent surgical inspection/debridement (rule out necrotizing process)</p> <ul style="list-style-type: none"> <li>- Vancomycin - pharmacy to dose</li> </ul> <p><b>AND</b></p> <ul style="list-style-type: none"> <li>- Piperacillin/tazobactam 4.5g IV q8h extended infusion</li> </ul> <p><b><i>Definitive therapy for necrotizing infections once final culture results available:</i></b></p> <table border="1"> <tbody> <tr> <td>S. pyogenes or Clostridial sp.</td> <td> <ul style="list-style-type: none"> <li>- Penicillin G 4 million units IV Q4H</li> </ul> <p><b>AND</b></p> <ul style="list-style-type: none"> <li>- Clindamycin 900 mg IV Q8H</li> </ul> </td> </tr> <tr> <td>Vibrio vulnificus</td> <td> <ul style="list-style-type: none"> <li>- Doxycycline 100mg IV BID</li> </ul> <p><b>AND</b></p> <ul style="list-style-type: none"> <li>- Ceftazidime 2g IV Q8H EI</li> </ul> </td> </tr> <tr> <td>Aeromonas hydrophila</td> <td> <ul style="list-style-type: none"> <li>- Doxycycline 100mg IV BID</li> </ul> <p><b>AND</b></p> <ul style="list-style-type: none"> <li>- Levofloxacin 750mg IV daily</li> </ul> </td> </tr> <tr> <td>Polymicrobial</td> <td>Continue Vancomycin and Piperacillin/tazobactam</td> </tr> </tbody> </table>	S. pyogenes or Clostridial sp.	<ul style="list-style-type: none"> <li>- Penicillin G 4 million units IV Q4H</li> </ul> <p><b>AND</b></p> <ul style="list-style-type: none"> <li>- Clindamycin 900 mg IV Q8H</li> </ul>	Vibrio vulnificus	<ul style="list-style-type: none"> <li>- Doxycycline 100mg IV BID</li> </ul> <p><b>AND</b></p> <ul style="list-style-type: none"> <li>- Ceftazidime 2g IV Q8H EI</li> </ul>	Aeromonas hydrophila	<ul style="list-style-type: none"> <li>- Doxycycline 100mg IV BID</li> </ul> <p><b>AND</b></p> <ul style="list-style-type: none"> <li>- Levofloxacin 750mg IV daily</li> </ul>	Polymicrobial	Continue Vancomycin and Piperacillin/tazobactam
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Polymicrobial	Continue Vancomycin and Piperacillin/tazobactam								
<b>Duration 5 days, may extend up to 14 days if not resolved/slow response</b>									



## B. Purulent cellulitis

- Includes furuncle, carbuncle, abscess
- Usually caused by *S. aureus* (MSSA and MRSA)
- Severity
  - Mild: incision and drainage (I&D) if indicated
  - Moderate: patients with purulent infection with systemic signs of infection\*
  - Severe:
    - Patients who have failed I&D plus oral antibiotics and with systemic signs of infection\*
    - Immunocompromised patients

Severity	Empiric Treatment	Definitive Treatment
<b>Mild</b>	I&D	
<b>Moderate</b>	<ul style="list-style-type: none"> <li>- TMP/SMX 1-2 DS tab PO BID</li> <li>- Doxycycline 100 mg PO</li> </ul>	MRSA <ul style="list-style-type: none"> <li>- SMX/TMP 1-2 DS tab PO BID</li> </ul> MSSA <ul style="list-style-type: none"> <li>- Dicloxacillin 500mg PO Q6H</li> <li>- Cephalexin 500 mg PO Q6H</li> </ul>
<b>Severe</b>	<ul style="list-style-type: none"> <li>- Vancomycin IV– pharmacy to dose</li> <li>- Linezolid 600mg IV BID</li> </ul>	MRSA <ul style="list-style-type: none"> <li>- No change</li> </ul> MSSA <ul style="list-style-type: none"> <li>- Nafcillin 1-2g IV Q4H</li> <li>- Cefazolin 1-2g IV Q8H</li> </ul>
<ul style="list-style-type: none"> <li>- <b>Duration at least 5 days, may extend up to 14 days depending on severity and clinical response</b></li> <li>- <b>Recurrent abscesses: I&amp;D. Antibiotic based on isolated pathogen x 5-10 days</b></li> </ul>		

## C. Other SSTI

Infection	Organism(s)	Laboratory	Antimicrobial
<b>Anthrax, cutaneous</b>	<i>Bacillus anthracis</i>	Cultures of lesions positive > 80%	Naturally acquired: <ul style="list-style-type: none"> <li>- Penicillin VK 500mg PO Q6H x 7-10 days</li> </ul> Bioterrorism aerosol exposure <ul style="list-style-type: none"> <li>- Ciprofloxacin 500mg PO BID</li> <li>- Levofloxacin 500mg PO Q24h</li> <li>- Duration 60 days</li> </ul>
<b>Bacillary angiomatosis and Cat Scratch Disease</b>	<i>Bartonella henselae</i> or <i>quintana</i>	PCR, Warthin-Starry silver stain of infected lymph node tissue to confirm diagnosis	Cat Scratch: <ul style="list-style-type: none"> <li>- &gt; 45 kg: azithromycin 500mg D1, 250mg D2-5</li> <li>- &lt; 45 kg: azithromycin 10mg/kg D1, 5mg/kg D2-5</li> </ul> Bacillary angiomatosis: <ul style="list-style-type: none"> <li>- Erythromycin 500mg PO Q6H</li> <li>- Doxycycline 100mg PO BID</li> </ul>



			<ul style="list-style-type: none"> <li>- Duration 2 weeks to 2 months</li> </ul>
<b>Bubonic plague</b>	<i>Yersenia pestis</i>	Culture of aspirate from lymph node	<ul style="list-style-type: none"> <li>- Streptomycin 15mg/kg IM Q12h</li> <li>- Doxycycline PO 200mg x 1 then 100mg BID</li> <li>- Duration 10-14 days and afebrile for at least 2 days</li> </ul>
<b>Dog or cat bites</b>	Pasteurella sp., Staphylococcus, Strep, Capnocytophaga		<p>Preemptive antibiotic therapy x 3-5 days for immunocompromised, asplenic, advanced liver disease, edema of affected area, moderate-severe injuries to hands or face, penetrating injuries to periosteum or joint capsule.</p> <p>First line:</p> <ul style="list-style-type: none"> <li>- Amoxicillin/clavulanate 875mg PO BID</li> <li>- Ampicillin/sulbactam 3g IV q6h</li> </ul> <p>Alternative:</p> <ul style="list-style-type: none"> <li>- Doxycycline 100mg PO BID</li> <li>- Ertapenem 1g IV daily</li> </ul> <p>Determine post-exposure prophylaxis for rabies if needed. Add Tdap if dirty wound and not given within 5 years, or clean wound if not given within 10 years.</p>
<b>Erysipeloid</b>	<i>Erysipelothrix rhusiopathiae</i>	Culture aspirate and/or biopsy of lesion	<ul style="list-style-type: none"> <li>- Penicillin 500mg PO QID</li> <li>- Amoxicillin 500mg PO TID</li> <li>- Duration 7-10 days</li> </ul>
<b>Glanders</b>	<i>Burkholderia mallei</i>		Treat based on susceptibility
<b>Human bite</b>	<i>Strep, S. aureus, Eikenella corrodens, Fusobacterium, Peptostreptococcus, Prevotella, Porphyromonas sp.</i>		<ul style="list-style-type: none"> <li>- Antibiotic therapy same with dog/cat bites</li> <li>- Duration 5-14 days</li> <li>- Add Tdap if dirty wound and not given within 5 years, or clean wound if not given within 10 years.</li> </ul>



<b>Impetigo and ecthyma</b>	<i>S. aureus</i> , $\beta$ -hemolytic <i>Streptococcus</i>	No cultures	Impetigo, topical preferred: <ul style="list-style-type: none"> <li>- Topical mupirocin OR retapamulin BID x 5 days</li> </ul> Oral therapy for patients with numerous lesions or in outbreaks: <ul style="list-style-type: none"> <li>- MSSA: Dicloxacillin 500mg PO Q6H or Cephalexin 500mg PO Q6H</li> <li>- MRSA: doxycycline 100mg PO BID, OR SMX/TMP 1-2 DS tab PO BID</li> <li>- Strep: Penicillin VK 500mg PO Q6H</li> <li>- Duration 7 days</li> </ul>
<b>Pyomyositis</b>	<i>S. aureus</i> (90%), Group A strep, <i>S. pneumoniae</i> , GNR	MRI preferred, CT or US helpful. Blood and abscess cultures and I&D necessary.	<ul style="list-style-type: none"> <li>- Vancomycin (+ piperacillin/tazobactam for immunocompromised patients or open trauma to muscles).</li> <li>- Duration 2-3 weeks</li> </ul>
<b>Tularemia</b>	<i>Francisella tularensis</i>	Serology or PCR	Mild: <ul style="list-style-type: none"> <li>- Doxycycline 100mg PO BID</li> </ul> Severe: <ul style="list-style-type: none"> <li>- Streptomycin 15 mg/kg IM Q12h</li> <li>- Gentamicin 1.5mg/kg IV Q8h</li> <li>- IV therapy until acute illness is controlled, then to oral therapy</li> </ul> Duration 14 days

Reference

1. Practice Guidelines for the Diagnosis and Management of Skin and Soft Tissue Infections: 2014 Update by the Infectious Diseases Society of America.





# Diabetic Foot Infection (DFI)

## A. Clinical Manifestation and Severity

- Definition of local infection: meet 2 of the following:
  - o Local swelling or induration
  - o Erythema
  - o Local tenderness or pain
  - o Local warmth
  - o Purulent discharge (thick, opaque to white or sanguineous secretion)

Severity	Signs/symptoms
<b>Mild</b>	<ul style="list-style-type: none"> <li>- Local infection involving only the skin and the subcutaneous tissue ONLY. If erythema, must be &gt;0.5 cm to ≤2 cm around the ulcer</li> </ul> <p><b>AND</b></p> <ul style="list-style-type: none"> <li>- Must exclude other causes (trauma, gout, acute Charcot neuro-osteoarthropathy, fracture, thrombosis, venous stasis)</li> </ul>
<b>Moderate</b>	<ul style="list-style-type: none"> <li>- Local infection with erythema &gt; 2 cm, or involving structures deeper than skin and subcutaneous tissues (abscess, osteomyelitis, septic arthritis, fasciitis)</li> </ul> <p><b>AND</b></p> <ul style="list-style-type: none"> <li>- No systemic inflammatory response signs</li> </ul>
<b>Severe</b>	Local infection with at least 2 signs of SIRS: <ul style="list-style-type: none"> <li>- Temperature &gt;38°C or &lt;36°C</li> <li>- Heart rate &gt;90 beats/min</li> <li>- Respiratory rate &gt;20 breaths/min or PaCO<sub>2</sub> &lt;32 mm Hg</li> <li>- WBC &gt;12 000 or &lt;4000 cells/μL or ≥10% immature (band) forms</li> </ul>

## B. Collection of Specimens for Culture

- Obtain an appropriate specimen for culture
  - o Cleanse and debride the wound before obtaining specimen(s) for culture
  - o Obtain a tissue specimen for culture by scraping with a sterile scalpel or dermal curette (curettage) or biopsy from the base of a debrided ulcer
  - o Aspirate any purulent secretions using a sterile needle and syringe
  - o Promptly send specimens, in a sterile container or appropriate transport media, for aerobic and anaerobic culture (and Gram stain, if possible)
- Procedure to AVOID
  - o Culture a clinically uninfected lesion, unless for specific epidemiological purposes



- Obtain a specimen for culture without first cleansing or debriding the wound
- Obtain a specimen for culture by swabbing the wound or wound drainage

### C. Risk factors for MDRO

- Risk factors for MRSA:
  - History of colonization or infection with MRSA
  - Severe DFI
- Risk factors for Pseudomonas:
  - Warm climate
  - Frequent exposure of the foot to water (soaking feet)
  - Severe DFI

### D. Treatment Guideline

Category	Organisms	Empiric Treatment
<b>Mild</b>	MSSA, Streptococcus sp.	<ul style="list-style-type: none"> <li>- Cephalexin 500 mg PO QID</li> <li>- Amoxicillin/clavulanate 875 mg PO BID</li> <li>- Dicloxacillin 500 mg PO QID</li> <li>- PCN allergy: Clindamycin 300 mg PO TID</li> </ul>
	MRSA	<ul style="list-style-type: none"> <li>- Doxycycline 100mg PO BID</li> <li>- SMX/TMP 1-2DS tab PO BID</li> </ul>
<b>Moderate</b>	MSSA, Streptococcus sp., Enterobacteriaceae, obligated anaerobes	<ul style="list-style-type: none"> <li>- Ampicillin/sulbactam 3g IV Q6H</li> <li>- Anaphylactic PCN allergy: Levofloxacin 750 mg IV/PO Q24H + Clindamycin 600 mg IV Q8H then 300mg PO QID or 450 mg PO TID*</li> <li>- Ertapenem 1g IV 24H</li> </ul> <p>*Avoid fluoroquinolones in patients who were on them as outpatients</p> <p>If patient at risk for MRSA, add MRSA coverage**</p> <p>If patient at risk for Pseudomonas, use Pseudomonas agent***</p>
	**MRSA coverage	<ul style="list-style-type: none"> <li>- Vancomycin pharmacy to dose</li> <li>- Daptomycin 4-6mg/kg IV Q24H (need ID consult)</li> <li>- Linezolid 600mg IV/PO BID (increased risk of toxicity if use &gt; 2 weeks)</li> </ul>
	***Pseudomonas coverage	<ul style="list-style-type: none"> <li>- Piperacillin tazobactam 4.5g IV Q8H EI</li> </ul>



<b>Severe</b>	- MRSA, Enterobacteriaceae, Pseudomonas, and obligate anaerobes	MRSA coverage** AND one of the following: - Zosyn 4.5 IV Q8H EI - Cefepime 2g IV Q8H EI + Metronidazole 500 mg IV Q8H - Ceftazidime 2g IV Q8H EI + Metronidazole 500 mg IV Q8H - Anaphylactic PCN allergy: Aztreonam 2 g IV Q6H + Metronidazole 500 mg IV Q8H
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**E. Duration**

- Change to oral regimen when patient is stable
- Soft tissue only
  - o Mild: 1-2 weeks, may extend up to 4 weeks if slow to resolve
  - o Moderate: 1-3 weeks
  - o Severe: 2-4 weeks
- Bone or joint involvement
  - o No residual infected tissue (post clean amputation): 2-5 days
  - o Residual infected soft tissue but not bone: 1-3 weeks
  - o Residual infected but viable bone: 4-6 weeks
  - o No surgery or residual dead bone postoperatively: at least 3 months

**F. Reference**

1. Lipsky BA, Berendt AR, Cornia PB, et al. 2012 Infectious Diseases Society of America clinical practice guideline for the diagnosis and treatment of diabetic foot infections. Clin Infect Dis. 2012;54:e132-73

