# PRMCE ANTI-INFECTIVES SELECTION GUIDELINES FOR ADULTS

## SKIN AND SOFT TISSUE INFECTIONS:

A. **Cellulitis:**
MRSA uncommonly causes cellulitis in the absence of a wound or abscess.
Add empiric anti-MRSA therapy if severe disease is present or if risk factors for MRSA are present:

**Risk factors:**

1. H/o MRSA or hospitalization or residence in a long term care facility within 1 year
2. Recent antibiotic therapy within 4 months
3. HIV infection or men who have sex with men or injection drug use
4. Hemodialysis
5. Incarceration
6. Military service
7. Sharing needles, razors or sharing sports equipment

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| Mild | **Cephalexin 500mg PO QID for 7-10 days**<br>*or*<br>Clindamycin 300mg PO QID for 7-10 days (if anaphylaxis to penicillin)[1] |
| Moderate (requires admission) | **Cefazolin (IV per protocol) 1g IV q8h equivalent for 10-14 days**<br>*or*<br>Clindamycin (IV per protocol) 900mg q8h equivalent (for anaphylaxis to penicillin) for 10-14 days |
| Severe (sepsis) | **Vancomycin (IV per protocol, goal trough 15-20)**<br>***plus***<br>**Cefazolin (IV per protocol) 1g q8h equivalent for 10-14 days** |
| Necrotizing soft tissue infections including necrotizing fasciitis | **Vancomycin (IV per protocol, goal trough of 15-20)**<br>***plus***<br>**Imipenem (IV per protocol) 500mg IV q6h equivalent**<br><br>***Duration of therapy*** is guided by clinical course/surgical intervention<br><br>***Note:*** Consider consultation with ID or general surgery for (1) pain disproportionate to the physical findings, (2) violaceous bullae, (3) cutaneous hemorrhage, (4) skin sloughing, (5) skin anesthesia, (6) rapid progression, and (7) gas in the tissue |

[1] Clindamycin substantially increases the risk for C. difficile associated diarrhea (OR=32) Dial S, Kezouh A, Dascal A, Barkun A, Suissa S. *CMAJ* 2008;179:767-772

B. **Community Acquired MRSA (CA-MRSA).**
If soft tissue abscess is present, assume MRSA is present; obtain cultures with I+D if no prior cultures are available on records.

***Duration of therapy:*** Treat for 14 days.

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| Mild | **Trimethoprim/sulfamethoxazole DS 1 to 2 tablets PO BID** ($1^{st}$ line)[2]<br>*or*<br>Clindamycin 300mg mg PO QID ($2^{nd}$ line)<br>*or*<br>Minocycline 100mg PO BID ($3^{rd}$ line)<br>*or*<br>Linezolid 600mg PO BID **(formulary restriction; ID approval)** |
| Moderate or Severe | **Vancomycin (IV per protocol, goal trough 10-15)**<br>*or*<br>Linezolid 600mg PO BID **(formulary restriction; ID approval)** |
| Recurrent MRSA abscesses >2 episodes | Outpatient ID consultation if patient has frequent MRSA soft tissue infections. Call 425-261-4905 to schedule. |

[2] Dose for patients >40kg is 2 tablets BID, however, minor infections may respond to lower dose with lower incidence of nausea

C. **Diabetic foot infection.**
Uninfected wounds do not require antibiotics, refer to outpatient podiatry for wound management. Obtain cultures for infected wounds.
***Duration of therapy:*** Based on clinical response and surgical intervention; generally 14 days.

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| Cellulitis without open wound | Treat as above for cellulitis |
| Infected diabetic foot ulcer (mild) | **Amoxicillin/clavulanate (Augmentin) 875mg PO BID x 7 days**<br>*or*<br>Cephalexin 500mg PO QID for 7-10 days (if rash with penicillin)<br>*plus*<br>Metronidazole 500mg PO TID<br>*or*<br>Clindamycin 300mg mg PO QID plus ciprofloxacin 500mg PO BID (anaphylaxis with penicillin) |
| Infected diabetic foot ulcer (Moderate-requiring admission) | **Ampicillin/sulbactam (Unasyn) 3g IV q6 hours equivalent**<br>*or*<br>Ceftriaxone 1g IV Q24 (if rash with penicillin)<br>*plus*<br>Metronidazole 500mg IV Q8 hours<br><br>***Note:*** Cellulitis extending >2cm, lymphangitic streaking, spread beneath the superficial fascia, deep-tissue abscess, gangrene, and involvement of muscle, tendon, joint or bone |
| Infected diabetic foot ulcer (Severe) | **Vancomycin (IV per protocol, goal trough 15-20)**<br>***plus***<br>**Piperacillin/Tazobactam (Zosyn IV per protocol) 4.5g IV q6 hours equivalent**<br>Severe includes fever, chills, tachycardia, hypotension, confusion, vomiting, leukocytosis, acidosis, severe hyperglycemia, or azotemia |

**RESPIRATORY INFECTIONS:**

**Community Acquired Pneumonia (CAP) Use CAP Protocol**, MRSA is still uncommon in CAP, treat if risk factors are present, or if clinical course is suggestive of MRSA pneumonia: ie rapid progression of lung infection in an otherwise healthy patient, with lung necrosis or sepsis.

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| Ambulatory patients | **Azithromycin 500mg PO x 1, then 250mg PO x 4 days** (PO) (1st line)<br>*or*<br>Moxifloxacin 400mg PO q24h x 7 days (2nd line) |
| CAP needing hospitalization | **Ceftriaxone 1g IV q24 h *plus* Azithromycin 500mg PO q24** (1st line)<br>*or*<br>Moxifloxacin 400mg PO q24 hours (2nd line) |
| MRSA risk | **Vancomycin (IV per protocol, goal trough 15-20) *plus* Ceftriaxone 1g IV q24h *plus* Azithromycin 500mg PO q24h**<br>***Duration of therapy:*** Treat for 14 days for MRSA, if confirmed |

**D. Hospital Acquired Pneumonia (HAP)/Healthcare associated pneumonia, obtain sputum cultures:**

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| Hospitalized patients | **Vancomycin (IV per protocol, goal trough 15-20) *plus* Piperacillin/Tazobactam (Zosyn IV per protocol) 4.5g q6 hours equivalent**<br>***Duration of therapy:*** Treat for 7 days<br>14 days if: MRSA, Pseudomonas, or ESBL G-negative rods |

**E. Aspiration Pneumonia evaluate for risk factors for HAP/MRSA, obtain sputum cultures, and if no risk factors are present:**

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| Hospitalized patients | **Ampicillin/sulbactam (Unasyn) 3g IV q6 hours equivalent (1st line)**<br>*or*<br>Ceftriaxone 1g IV Q24 *plus* Metronidazole 500mg IV Q8 hours (2nd line)<br>***Duration of therapy:*** Treat for 7 days |

**URINARY TRACT INFECTION (UTI):**

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| Asymptomatic bacteriuria in pregnancy | **Macrodantin (Macrobid) 100mg PO BID x 5 days** (1st line)<br>*or*<br>Cefixime 200mg PO BID x 5 days (2nd line)<br>*or*<br>Amoxicillin 250mg PO q8h PO x 5 days (3rd line)<br>**Note: Test of cure should be obtained 7 days post treatment, and then monthly until completion of therapy** |
| Acute cystitis in women of childbearing age | **Macrodantin (Macrobid) 100 mg PO BID x 5 days**<br>*or*<br>Trimethoprim/sulfamethoxazole DS 1 tab PO BID x 3 days (2nd line) |

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| | *or*<br>Ciprofloxacin 250mg PO BID x 3 days (3rd line) |
| Mild pyelonephritis (low grade fever < 101.5, only slightly elevated WBC, no nausea/vomiting) | **Ciprofloxacin 500mg PO BID x 7 days**<br><br>***Note:*** If beta-lactams are used, duration of therapy is 14-21 days |
| UTI with sepsis/ complicated pyelonephritis | **Vancomycin (IV per protocol, goal trough 10-15)**<br>***plus***<br>**Zosyn ( IV per protocol) 3.375 IV q6 equivalent**<br>(14-day course of antimicrobial therapy is recommended; consider changing to ciprofloxacin orally if appropriate based on culture results) |
| Acute uncomplicated pyelonephritis in pregnancy | **Ceftriaxone 1g IV q24h**<br><br>**Note: all pregnant patients should be hospitalized for pyelonephritis and treated with parenteral antimicrobials until afebrile for 24 hours** |
| Prostatitis: | **Ciprofloxacin 500mg PO q12h**<br>*or*<br>Trimethoprim/sulfamethoxazole DS 1 tab PO BID<br><br>**Note:** Complete 21-28 days of therapy. Initial empiric antibiotics with follow-up in 1 week for culture results and assessment of clinical improvement as aggressive treatment of acute prostatitis can lessen the chance of developing chronic prostatitis |

**INTRA-ABDOMINAL INFECTIONS:**

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| Cholangitis/ Acute Cholecystitis | **Ampicillin/sulbactam (Unasyn IV per protocol) 3g IV q6 hours equivalent (1st line)**<br>*or*<br>Piperacillin/tazobactam (Zosyn) 3.375g IV q6h equivalent (2nd line)<br>*or*<br>Ciprofloxacin 400mg IV q12h equivalent (if beta-lactam allergy)<br>*plus*<br>Metronidazole 500mg IV q8h<br>***Duration of therapy:*** Treat for 10-14 days |
| Diverticulitis (mild-outpatient) | **Augmentin 875 PO BID (1st line)**<br>*or*<br>Ciprofloxacin (PO) 500mg PO BID (2nd line) (if beta-lactam allergy)<br>*plus*<br>Metronidazole 500mg PO TID<br>***Duration of therapy:*** Treat for 10-14 days |
| Diverticulitis (moderate) | **Ampicillin/sulbactam (Unasyn) 3g IV q6h equivalent (1st line)**<br>*or* |

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| | Ciprofloxacin 400mg IV q12h equivalent (2nd line)<br>*plus*<br>Metronidazole 500mg IV q8h<br>***Duration of therapy:*** Treat for 10-14 days |
| Diverticulitis with peritonitis (severe) | **Ampicillin 2g IV q6h (1st line)**<br>***plus***<br>**Gentamicin IV per protocol (once daily 5 mg/kg dosing)**<br>***plus***<br>**Metronidazole 500mg IV q8 hours**<br>*or*<br>Ciprofloxacin 400mg IV q12h equivalent (2nd line) (if beta-lactam allergy)<br>*plus*<br>Metronidazole 500mg IV q8h<br>***Duration of therapy:*** Treat for 10-14 days |
| Spontaneous Bacterial Peritonitis<br>(If **≥ 250 PMNs/mm$^3$,** peritonitis is confirmed – except in cases of peritoneal dialysis patients) | **Ceftriaxone 1gm IV q24hr**<br>*or*<br>**Aztreonam 1g IV q8h**<br>*plus*<br>**Vancomycin 1g IV q12h (per protocol, goal trough 10-15)**<br>***Duration of therapy:*** Treat for 10-14 days<br>**Note:** Send ascitic fluid for cell count/differential, albumin, total protein, glucose, LDH, gram stain (at least 1ml).<br>**To send ascitic fluid for culture:** At the bedside, inoculate 10ml of ascitic fluid into an aerobic blood culture bottle and 10ml into an anaerobic blood culture bottle |
| C. difficile associated disease (mild) | **Metronidazole 500mg PO TID for 10-14 days.**<br><br>Continue for one week past completion of additional antibiotics if they are being used for another concomitant diagnosis |
| C. difficile associated disease (moderate/severe) WBC > 20, >10 stools/24 hours | **Vancomycin 500mg PO q6h**<br>***plus***<br>**Metronidazole 500mg IV q8h**<br>***Duration of therapy:*** Based on clinical response<br>Consider ID/surgical consultation<br>Obtain C. difficile toxin on all patients admitted with diarrhea |

**SEPSIS:**

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| Initial treatment | **Vancomycin (IV per protocol, goal trough 10-15) (1st line)**<br>***plus***<br>**Piperacillin/tazobactam (Zosyn) 4.5 g q6h equivalent**<br>*or*<br>Imipenem IV 500mg q6h equivalent<br>*plus*<br>Vancomycin (IV per protocol, goal trough 10-15) (2nd line)<br>**Note:** See Sepsis preprinted order form (# 36723)<br>***Duration of therapy:*** Based on site of infection. If no source, treat for 10-14 days/consult infectious disease |

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| Bacterial endocarditis | **Vancomycin (IV per protocol, goal trough 15-20)**<br>***plus***<br>**Ceftriaxone 2g IV q24h**<br>**Note:** Consult ID |

**FEBRILE NEUTROPENIA:**

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| Initial treatment | **Imipenem 500 mg IV q6 hours equivalent**<br><br>**Add Vancomycin (IV per protocol, goal trough 10-15)** for:<br>1. Sepsis, 2. Mucositis, 3. Skin or catheter site infection,<br>4. History of MRSA colonization, 5. Recent quinolone prophylaxis<br>***Duration of therapy:*** Based on clinical course and neutrophiles recovery |

**BACTERIAL MENINGITIS:**

***Duration of therapy:*** Generally, for all age groups 2-3 weeks; depending on causative organism; consult infectious disease

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| In Adults <50 yrs. | **Vancomycin (IV per protocol, goal trough 15-20)**<br>***plus***<br>**Ceftriaxone 2g IV q12 hours**<br><br>**Administer dexamethasone 0.15 mg/kg (up to 10mg) q6h IV (for 2 to 4 days); first dose to be given 10-20 minutes prior to antibiotics** |
| >50 yrs. or immunosuppressed | **add Ampicillin 2g IV q4h equivalent to above regimen** |
| | **Note:** CT scan recommended before lumbar puncture in the following cases:<br>1. >60yrs of age<br>2. Immunocompromised<br>3. History of CNS disease<br>4. Seizure within a week of presentation<br>5. Abnormal level of consciousness or mentation<br>6. Focal neurological deficits<br>*(NEJM 2001; 345:1727)* |

**STD TREATMENT:**

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| Chlamydia cervicitis | **Azithromycin 1gm PO x 1 dose**<br>*or*<br>Doxycycline 100mg PO BID x 7days | **Azithromycin 1 gm PO x dose**<br>*or*<br>Amoxicillin 500mg PO TID x 7 days |
| Gonorrhea cervicitis | **Ceftriaxone** 125 mg IM x 1 dose<br>*or*<br>**Cefixime** 400 mg PO x 1 dose<br>*or*<br>**Ciprofloxacin** 500 mg PO x 1 dose** | **Ceftriaxone** 125 mg IM x 1 dose |

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| Epididymitis | **Coverage for GC and CL as above if less than 35 yrs for STD suspected by clinical history**<br>**Coverage for UTI as above if STD not suspected** | **N/A** |
| PID – Outpatient | **Coverage for GC and CL as above *plus***<br>**Metronidazole 500mg PO q12h x 14 days** | N/A |
| PID – Inpatient | **Doxycycline 100mg PO *or* IV q12h *plus***<br>**Cefotetan 2g IV q12h**<br>or<br>Gentamicin 5mg/kg IV q24h<br>*plus*<br>Clindamycin 900mg IV q8h<br>***Duration of therapy:*** At least 48 hours after the patient improves; then continue outpatient treatment for 10-14 days*** | **Gentamicin 5mg/kg IV q24h *plus***<br>**Clindamycin 900mg IV q8h** |

* Recommend follow up testing 3 weeks after treatment in pregnancy

** Use only if other regimes are absolutely not possible; CDC no longer recommends use of fluoroquinolones to treat GC unless there are no other options

*** CDC guideline for PID treatment

**Note:** CDC guidelines recommend all partners within previous 60 days be treated and that intercourse be refrained from for 7 days after treatment is initiated.

**GENERAL NOTES:**

1. Obtain cultures where indicated (esp. sputum cultures if pneumonia suspected)
2. Be vigilant regarding previously documented resistant organisms that have been cultured.
3. Document specific allergy to Penicillin, if hives are allergy, generally it is OK to use cephalosporins.
4. Write parenteral antibiotics to be dosed per pharmacy protocol; pharmacy services will adjust all dosages for renal or hepatic functions (per target dose equivalent listed in the guideline above), which can vary widely during an admission.
5. Add indication for antimicrobial when writing. For example:
   "Ceftriaxone IV per protocol for meningitis" will result in 2g IV q12 hours dosing
6. Avoid clindamycin and fluoroquinolones where possible.
7. Use established hospital protocols for CAP and Sepsis.

**Restricted agents (indicate in orders reasoning for use) 1st dose will be administered; subsequent doses will require approval by Infectious Diseases:**

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| Linezolid | Tigecycline |
| Daptomycin | Quinupristin/Dalfopristin |
| Ertapenem (Exception: ICU) | Imipenem/Cilastatin (Exception: Neutropenic fever, ICU) |
| Aztreonam | Meropenem (Exception: NICU/pediatrics) |
| Voriconazole (Exception: ICU) | Caspofungin (Exception: ICU) |
| Telavancin | Micafungin |

**Agents which prompt review by Antimicrobial Therapy Monitoring Service (ATMS):**

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| Vancomycin | Tigecycline |
| Piperacillin/Tazobactam | Linezolid |
| Imipenem/Cilastatin | Quinupristin/Dalfopristin |
| Meropenem | Daptomycin |
| Ertapenem | Voriconazole |
| Aztreonam | Caspofungin |
| Telavancin | Micafungin |
| Clindamycin | |

**PRMCE ANTI-INFECTIVES SELECTION GUIDELINES FOR ADULTS:**
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