

## Montefiore Antimicrobial Stewardship Program (ASP)

### Syndrome Specific Guidelines

(Antibiotic initiation, adult inpatients)

#### Notes:

- **Guideline is not intended to replace clinical judgment**
- **For most syndromes, this guideline offers initial dose recommendations only, ongoing dose and frequency may depend on renal function and weight** (e.g., IV vancomycin, gentamicin, acyclovir, SMX/TMP, etc.)
- Always send 8-10cc/ blood cx bottle as part of the initial fever workup
- Look at prior micro results to help guide you
- Recommendations may be amended during drug shortages
- Syndromes are listed in alphabetical order
- **ID assistance is recommended for severely ill patients, compromised hosts, pregnancy, etc.**

#### Abbreviations:

- MDRO = multidrug resistant organism
- PCN = penicillin
- Abx = antibiotics
- UCx = urine cultures; BCx = blood cultures

#### **Take a “time out” at 72hrs after starting antibiotics**

- ✓ Is this antibiotic still needed?
- ✓ Can it be narrowed in spectrum or switched to PO?
- ✓ How long do I plan to treat?
- ✓ Have I obtained appropriate diagnostics and followed up on results?
- ✓ Did I document antibiotic plan in the EMR?
- ✓ At transfer to another unit or discharge, did I communicate the correct REMAINING duration of antibiotics to avoid excess use?

#### **Clarifying an Antibiotic Allergy**

- ✓ **Non-IgE mediated penicillin reaction:** non-urticarial rash, injection site reaction, unknown/remote reaction (e.g., type IV, delayed hypersensitivity reaction)
- ✓ **IgE mediated/immediate hypersensitivity reaction:** (requires prior drug exposure) urticarial rash, dyspnea, hoarseness, bronchospasm, facial/tongue swelling, anaphylaxis
- ✓ 1 in 10 patients report an PCN allergy but 8 in 10 are no longer allergic after a 10-year period
- ✓ PCN-cephalosporin cross-reactivity rate:  $\leq 2.5\%$ ; benefit of cephalosporin likely outweighs risk
- ✓ **Take opportunity to challenge while in monitored setting - look back at administered meds from prior admits to see if  $\beta$ -lactam ever given  $\rightarrow$  if no reaction, you are good to go!**

## Colonization vs. True Infection

Colonization may predispose to infection, but does NOT always indicate active infection, and treatment does not prevent future infection:

- ✓ ***Asymptomatic pyuria and bacteriuria are common in elderly females and nursing home residents (altered mental status and falls are NOT symptoms of UTI)***
- ✓ Is the patient symptomatic with signs of active infection? (ex. dysuria, purulent sputum, fever, leukocytosis)
- ✓ Are symptoms persistent > 24 hours?
- ✓ Is this a condition that may not require abx or only a short course of abx? (ex: tracheitis, aspiration pneumonitis)
- ✓ Do radiographs support the presence of infection?
- ✓ Was the catheter changed on schedule?
- ✓ Is there a single dominant organism in culture with many WBC and low epithelial cells?
- ✓ Are antibiotics alone likely to cure the infection? Has source control been achieved?
- ✓ Can always call ID/ASP for assistance

## Aspiration

Obtain CXR, CBC, sputum culture if antibiotics required (aspiration is often caused by chemical irritation, not infectious process; treatment may not be required)

Refer to [Montefiore Respiratory Infection Guidelines](#)

## Catheter-associated Bloodstream Infection

Send at least 2 sets of blood cultures (culprit line and peripheral blood), remove the line, and send tip for culture

### Treatment

- IV Vancomycin 15-20mg/kg + Cefepime 1-2g
- **If severe PCN allergy:** IV Vancomycin 15-20mg/kg +/- Aztreonam 1-2g
- *\*If endocarditis is suspected remove the line, consult ID, and order TEE*
- *ID consult recommended for Staphylococcus aureus, Candida spp., Pseudomonas spp., and MDROs*

## Clostridioides difficile Infection (CDI)

Obtain CBC, BMP, abdominal Xray or CT if ileus, stool *C. difficile*, **STOP** unnecessary PPI, antibiotics, laxatives; *Surgery/GI/ID consult recommended for severe or fulminant disease*

Refer to [Montefiore C. difficile Guidelines](#)

## COPD Exacerbation

Refer to [Montefiore Respiratory Infection Guidelines](#)

## Community-Acquired Pneumonia

Refer to [Montefiore Respiratory Infection Guidelines](#)

## Hospital-Acquired Pneumonia

Refer to [Montefiore Respiratory Infection Guidelines](#)

## Influenza

Obtain Influenza/RSV PCR, SARS-CoV-2 PCR to distinguish between viral syndromes, CXR; place in “droplet isolation”

**Treatment** (for patients at risk for severe illness and symptom onset within 72h): Oseltamivir (CrCl  $\geq$  60 ml/min: 75mg PO Q12h, CrCl 30-59 ml/min: 30mg PO Q12h, CrCl  $\leq$  29ml/min: 30 mg PO Q24h, HD 30mg after HD)

Severe influenza with respiratory failure in an ICU patient: consider ID consult for IV peramivir

## COVID-19

Obtain SARS-CoV-2 PCR, CXR, admission labs, and CT thorax as indicated; place patient in “special pathogens precautions” isolation (N95, gown gloves, eye protection)

Refer to [NIH COVID-19 Treatment Guidelines](#)

## Intra-abdominal Infection (non-CDI)

**Community acquired:** Ceftriaxone IV 1-2g (2g for BMI>30) + Metronidazole 500mg IV/PO, OR Cefoxitin 1-2g IV/PO +/- Metronidazole 500mg IV/PO, OR Ciprofloxacin 400mg IV/500mg PO + Metronidazole 500mg IV/PO (severe PCN allergy)

- ✓ Note: q12h dosing of Metronidazole is appropriate for most indications (except amebiasis and *C. difficile* infection)

**Severe Sepsis/Septic Shock or Risk for MDROs (extended hospital stay, extensive outpatient antibiotic exposure):** Piperacillin/tazobactam 4.5g IV (Aztreonam IV 1-2g + Metronidazole 500mg IV/PO if severe PCN allergy + Vancomycin 15-20mg/kg IV for Streptococcal/Enterococcal coverage)

## Meningitis/Encephalitis

Obtain LP, blood cultures, CT/MRI; **ID consult recommended**

### Meningitis:

- Age <50 **AND** normal host immunity: Vancomycin 15-20mg/kg IV Q8-Q24h + Ceftriaxone 2g IV Q12h
- Age >50 **OR** Immunosuppressed: Vancomycin 15-20mg/kg IV Q8-Q24h + Ceftriaxone 2g IV Q12h + Ampicillin 2g IV Q4h (if normal kidney function; dose adjust for diminished GFR, page ID/ASP for assistance)

### Suspect HSV Encephalitis:

Acyclovir 10 mg/kg IBW (or adjusted body weight for BMI >30) every 8 hours (if normal renal function; page ID/ASP for assistance); add to meningitis regimen above in at-risk patient if coverage of both meningitis and encephalitis required

### Anaphylaxis to Penicillin:

Vancomycin 15-20mg/kg x IV + [Levofloxacin 750mg IV or Ciprofloxacin 400mg IV Q8-12h]

- If *Listeria* coverage is needed, add SMX-TMP 5mg/kg q12h

## Neutropenic Fever

Look for focal sx/signs on exam and history, blood cultures, UA/UCx, CXR, CT especially if prolonged neutropenia

- ✓ Look back at clinical cultures from prior admits to select a targeted antibiotic regimen

**Treatment:** Cefepime 2g IV

\*If patient is hemodynamically unstable, or concern for multidrug resistant infection, begin meropenem 500 mg and consult ID

### MMC Criteria for adding IV Vancomycin

- Evidence of pneumonia on imaging
- Skin or soft tissue infection
- Suspected central line infection
- Known recent prior MRSA infection
- Gram positive bacteremia
- Septic shock

### Severe Penicillin allergy

Aztreonam 2g IV +/- tobramycin 5-7mg/kg IV q24h (if c/f MDRO or severe sepsis) + Vancomycin 15-20mg/kg IV per nomogram, *\*for intra-abdominal source, can add metronidazole 500mg IV*

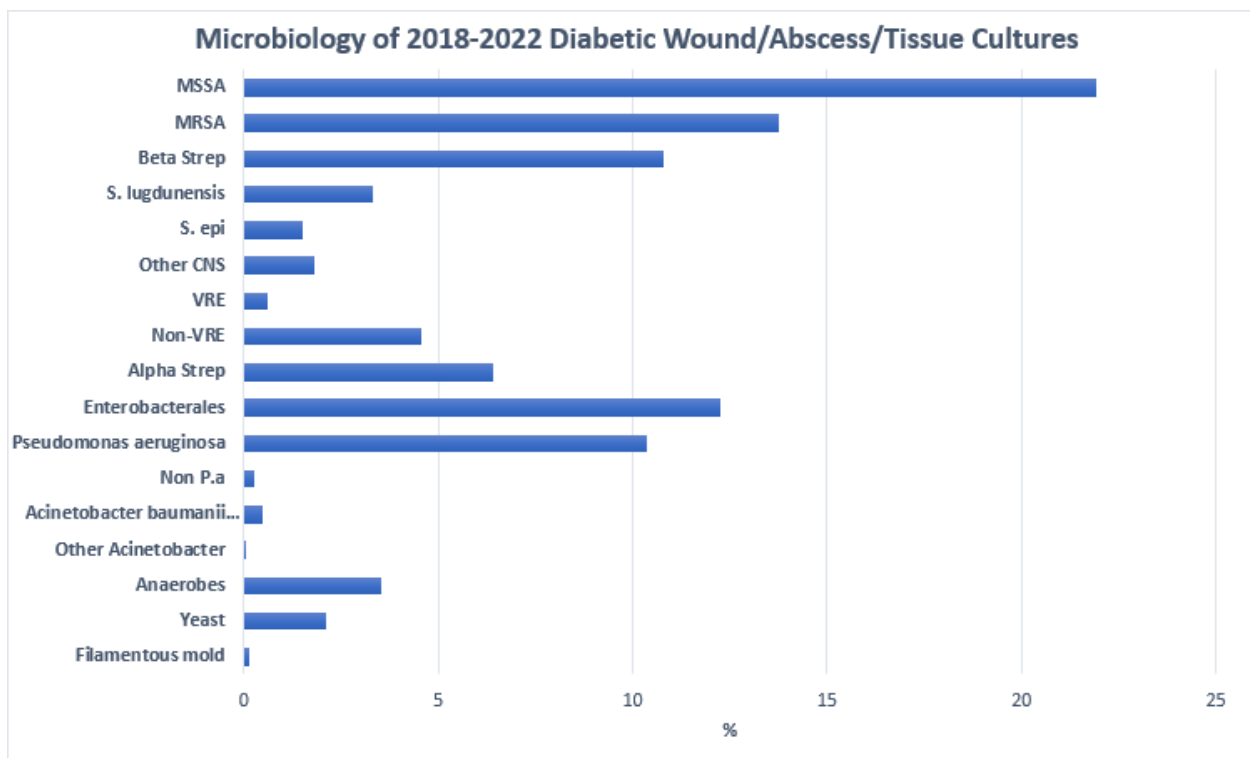
**Staphylococcus aureus bacteremia:**

Remove catheter if present, obtain daily blood cultures, TTE and potentially TEE

**ID consult strongly recommended** for assistance with work up, investigation for distant sites of infection, and management (sometimes dual antibiotic therapy, ophthalmology consult, additional tests like PET scan are recommended); OPAT follow-up recommended on discharge

**Skin & Skin Structure/Bone Joint Infections**

- ✓ *Obtain nares MRSA PCR which has negative predictive value >90% for MRSA clinical infection (e.g., if negative, can discontinue IV vancomycin)*
- ✓ *If patient is clinically stable and infection is chronic; hold antibiotics to increase bone/tissue culture yield*
- ✓ Here is a 5 – year retrospective review of microorganisms isolated from wound/abscess/tissue cultures from MMC’s micro lab (may be biased to sicker patients who had cultures sent); **note low Pseudomonas aeruginosa prevalence <15%**



Syndrome	Regimen
<p><b>Non-purulent cellulitis</b></p> <p><i>Non-purulent, streaky/diffuse = Streptococcus species</i></p>	<p><b>Mild:</b> PO: Cephalexin 500 mg <i>OR</i> cefuroxime 500 mg <i>OR</i> amoxicillin 500 mg</p> <p><b>Moderate:</b> IV: Cefazolin 1-2 g <i>OR</i> penicillin G potassium 4 million units</p>
<p><b>Purulent cellulitis</b></p> <p><i>Purulent cellulitis = Staphylococcus aureus</i></p> <p>*Note high local prevalence of MRSA</p>	<p><b>MRSA:</b> Mild: PO (Preferred): TMP/SMX 1-2 DS tabs <i>OR</i> doxycycline 100 mg PO (Alternative): clindamycin 600 mg</p> <p>Moderate: IV: Vancomycin 1 g</p> <p><b>MSSA:</b> Mild: PO: Cephalexin 500 mg <i>OR</i> cefuroxime 500 mg <i>OR</i> amoxicillin/clavulanate 875 mg <i>OR</i> dicloxacillin 500 mg</p> <p>Moderate: IV: Cefazolin 1-2 g</p>
<p><b>Severe SSTI/ suspected necrotizing fasciitis</b></p>	<p>Vancomycin 15-20 mg/kg IV + piperacillin/tazobactam 4.5 g IV</p> <p>If suspected necrotizing fasciitis: <b>Call Surgery/ID consult</b>, add <b>clindamycin 900 mg IV</b> to severe SSTI regimen above (refine later based on cultures); <b>during clindamycin shortage, IV linezolid 600 mg</b> can be used – <i>will cover MRSA AND neutralize GAS toxin</i></p>
<p><b>Diabetic Foot Infection</b></p>	<p>Chronic wound with no evidence of cellulitis or systemic signs of infection: <b>hold antibiotics</b></p> <p>Mild: PO: Amoxicillin/clavulanate 875 mg <i>OR</i> cefdinir + metronidazole <i>OR</i> [if anaphylaxis to penicillin] ciprofloxacin + clindamycin</p> <p>Moderate: <i>No recent hospitalizations or IV antibiotics, no history of Pseudomonas aeruginosa or MDR organisms</i> Ceftriaxone + metronidazole <i>OR</i> Ampicillin-sulbactam 3 g IV</p> <p>Severe or complicated DFI, history of <i>Pseudomonas aeruginosa</i> or MDR organisms Piperacillin/tazobactam 4.5 g <i>OR</i> cefepime + metronidazole</p> <p>History of MRSA/positive MRSA nares PCR</p>

	Add vancomycin 1 g
<b>Osteomyelitis</b>	<p>Obtain CRP, ESR with routine labs, X-ray (or MRI if inconclusive), tissue/bone cultures if possible (superficial wound cultures may not be accurate)</p> <p><b>Chronic osteomyelitis without evidence of cellulitis or systemic signs of infection: Hold antibiotics to increase bone/tissue culture yield to guide therapy</b></p> <p>Mild to Moderate:</p> <ul style="list-style-type: none"> <li>• Ceftriaxone 2g (+/- metronidazole 500mg if necrotic, foul smelling or <i>C. acnes</i> suspected for upper extremity infections) <b>OR</b> Ampicillin/sulbactam 3g</li> <li>• +/- Vancomycin 15-20mg/kg (if prior MRSA, +MRSA PCR, or excess past abx exposure)</li> </ul> <p>Sepsis OR Suspect <i>P. aeruginosa</i> (i.e., foot puncture wound, water exposure, excess abx, past Pseudomonas):</p> <ul style="list-style-type: none"> <li>• Piperacillin/tazobactam 4.5g IV <b>OR</b> Cefepime 1-2g IV (+/- metronidazole 500mg if necrotic, foul smelling)</li> <li>• +/- Vancomycin 15-20mg/kg IV (if high MRSA risk)</li> </ul> <p>Severe Penicillin allergy:</p> <ul style="list-style-type: none"> <li>• Aztreonam 1-2g IV <b>OR</b> ciprofloxacin 400mg IV <b>OR</b> levofloxacin 750mg IV</li> <li>• +/- Vancomycin 15-20mg/kg IV (GP coverage)</li> <li>• +/- metronidazole 500mg IV if necrotic, foul smelling</li> </ul>

## Urinary Tract Infection

Change foley, obtain UA/UCx, U/S of kidneys if suspect pyelonephritis or obstruction, BCx if febrile or meets sepsis criteria

**Cystitis:** Cephalexin 500mg PO, **OR** TMP/SMX 1 DS tab PO, **OR** Nitrofurantoin 100mg PO (for CrCl >30ml/min), **OR** Cefdinir 300mg PO, **OR** gentamicin 3mg/kg IV IBW x 1 (Amikacin 10 mg/kg IV IBW x 1 If suspected or confirmed *Pseudomonas aeruginosa*), **OR** Ciprofloxacin 500mg PO (severe PCN and sulfa allergy).

- For urine isolates, cefazolin results predict results for the oral agents like cefdinir, cefpodoxime, cefuroxime, and cephalexin when used for therapy of uncomplicated UTI due to *E. coli*, *K. pneumoniae*, *P. mirabilis*
- For outpatients or patient's being discharged, call patient's pharmacy to **make sure prescribed antibiotic is in stock, otherwise there will be a treatment delay**

**Complicated UTI/pyelonephritis (without h/o MDRO):** Ceftriaxone 1g IV

- **Anaphylaxis to Penicillin:** Gentamicin 3mg/kg IV IBW (Amikacin 15 mg/kg IV IBW if suspected or confirmed *Pseudomonas aeruginosa*), **OR** Aztreonam 1-2g IV, **OR** Ciprofloxacin 400mg IV or 500mg PO (if from home ONLY)

## Suggested Antibiotic Durations

Syndrome	Median Duration
COPD exacerbation, meets criteria for antibiotics	3-5 days
CAP	5 days
Complicated CAP (empyema, bacteremia, <i>S. aureus</i> PNA, abscess, Legionella)	Duration variable up to several weeks (ID consult recommended); 7-21 days for Legionella based on severity
HAP/VAP (empiric treatment OR isolation of specific pathogen such as MRSA, Pseudomonas, MDRO, etc.)	7 days
Bacterial meningitis	7-21 days depending on organism isolated (ID consult recommended)
HSV encephalitis	14-21 days (ID consult recommended)
Catheter-related bloodstream infection (catheter removal recommended for source control)  For <i>Staph aureus</i> , Pseudomonas, Yeast, and/or recurrent bacteremia – ID consult recommended	<b>CoNS:</b> 5-7 days if transient; longer if persistent <b><i>S. aureus</i>:</b> up to 4-6 weeks <b>GNB</b> (not Pseudomonas): 7-14 days if neg BCx and source controlled <b><i>Candida spp.</i>:</b> at least 14 days from first neg BCx; 6 weeks or more for endocarditis
Influenza	Oseltamivir 5 days; up to 7-10 days only if critically ill
Uncomplicated UTI	3-5 days
Pyelonephritis/complex UTI	7-10 days; ≥14 days if renal abscess (ID consult rec.)
Intra-abdominal source	4-7 days <b>if source controlled</b>
Skin and soft tissue (if discrete lesion drained, often no further abx needed)	Pathogen/case specific; 5 to ≥ 14 days if systemic illness, deep infection, non-healing, unusual pathogen, compromised host – ID and Surgery input suggested
<i>C. difficile</i> colitis	10 days for first or second episode See Montefiore <i>C. diff</i> guideline for details
Osteomyelitis	4-6 weeks depending on source control/hardware; ID consult and OPAT referral recommended
Neutropenic fever (ID consult suggested)	Hold Abx once afebrile ≥ 48h with negative cultures, resolving neutropenia; if documented source, treat accordingly for site and organism



## Shorter Is Better

Diagnosis	Short (d)	Long (d)	Result	#RCT
CAP	3-5	5-14	Equal	14
Atypical CAP	1	3	Equal	1
Possible PNA in ICU	3	14-21	Equal	1*
VAP	8	15	Equal	2
cUTI/Pyelonephritis	5 or 7	10 or 14	Equal	9**
Intra-abd Infection	4	10	Equal	2
Complex Appendicitis	2	5	Equal	1
GNB Bacteremia	7	14	Equal	3 <sup>†</sup>
Cellulitis/Wound/Abscess	5-6	10	Equal	4 <sup>‡</sup>
Osteomyelitis	42	84	Equal	2
Osteo Removed Implant	28	42	Equal	1
Debrided Diabetic Osteo	10-21	42-90	Equal	2 <sup>¶</sup>
Septic Arthritis	14	28	Equal	1
AECB & Sinusitis	≤5	≥7	Equal	>25
Variceal Bleeding	3	7	Equal	1
Neutropenic Fever	AFx72h/3 d	+ANC>500/9 d	Equal	2
Post Op Prophylaxis	0-1	1-5	Equal	55 <sup>Ψ</sup>
Erythema Migrans (Lyme)	7	14	Equal	1
<i>P. vivax</i> Malaria	7	14	Equal	1

**Total: 19 Conditions**

**>125 RCTs**

\*Infiltrate on CXR but low CPIS score (≤6), both ventilated and non ventilated, likely CAP, HAP, and VAP combined;  
 \*\*2 RCT included males, the smaller one found lower 10-18 d f/up cure in males with 7 days of therapy but no difference at longer follow-up, larger exclusive male study found no diff in cure; <sup>†</sup>GNB bacteremia also in UTI/cIAI RCTs; <sup>‡</sup>3 RCTs equal, 1 (low dose oral flucox) <sup>↑</sup>relapses 2<sup>o</sup> endpoint; <sup>¶</sup>all patients debrided, in 1 study total bone resection (clean margins); <sup>Ψ</sup>Includes meta-analysis of 52 RCTs; refs at <https://www.bradspellberg.com/shorter-is-better>

Source:

<https://www.bradspellberg.com/shorter-is-better>