Antimicrobial Stewardship Program (ASP)
http://www.einstein.yu.edu/departments/medicine/divisions/infectious-diseases/antimicrobial-stewardship/

Syndrome Specific Guidelines – Antibiotic Initiation, Adult Inpatients

Moses / Weiler / Wakefield
(can also be used across MHS depending on local formulary)

Notes:
- *This document is not intended to replace clinical judgment*
- *ID assistance recommended for severely ill patients, compromised hosts, pregnancy, organ transplant, etc.*
  - *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
- Look at prior micro results to help guide you
- MDRO = multidrug resistant organism
- PCN = penicillin
- Abs = antibiotics
- Recommendations may be amended during drug shortages
- Syndromes are listed in alphabetical order

<table>
<thead>
<tr>
<th>Take a “time out” at 48-72hrs after starting antibiotics</th>
</tr>
</thead>
<tbody>
<tr>
<td>✓ Is this antibiotic still needed?</td>
</tr>
<tr>
<td>✓ Can it be narrowed or switched to PO?</td>
</tr>
<tr>
<td>✓ How long do I plan to treat?</td>
</tr>
<tr>
<td>✓ Have I obtained appropriate diagnostics and followed up on results?</td>
</tr>
<tr>
<td>✓ Did I document antibiotic plan in the EMR?</td>
</tr>
<tr>
<td>✓ At discharge, did I communicate the correct REMAINING duration of antibiotics to avoid excess use?</td>
</tr>
</tbody>
</table>

Clarifying an Allergy

**Non-IgE mediated penicillin reaction:** non-urticarial rash, injection site reaction, unknown/remote reaction (hard to forget anaphylaxis!)

**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 within a 10-year period
- PCN-cephalosporin cross reactivity rate: ≤ 5%; benefit of cephalosporin may outweigh risk
Take opportunity to challenge while in monitored setting; look back at administered meds from prior admits to see if β-lactam ever given

Colonization vs. True Infection

Colonization may predispose to infection, but does NOT always indicate active infection:

- 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?
- Is there pyuria with bacteriuria, even after catheter is changed?
- 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 MMC Respiratory Infection Guidelines

Catheter-associated Bloodstream Infection

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

Treatment
- IV Vancomycin 15-20mg/kg + Cefepime 1-2g +/- Gentamicin 5-7mg/kg IBW x 1 (if sepsis or h/o MDRO);
- If HD OR severe PCN allergy: IV Vancomycin 15-20mg/kg +/- Gentamicin 5mg/kg IV IBW x 1
- *If endocarditis suspected remove line and consult ID!

Clostridium difficile Infection (CDI)

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

- First episode: PO Vancomycin 125mg Q6h (mild to moderate disease)
  - Severe disease: age >60, Temp > 101 F, WBC count >15K, ↓ HCO₃⁻, AKI, extensive colitis on CT, SBO/distension or ileus, albumin <2.5mg/dL; add IV Metronidazole 500mg q8h and consider higher dose of PO Vancomycin
- Fulminant disease: (ileus, hypotension, multi-organ failure, megacolon, ICU status): PO vancomycin 500mg, PR vancomycin 500mg, IV metronidazole 500mg q8h

**COPD Exacerbation**  
Refer to MMC Respiratory Infection Guidelines

**Community Acquired Pneumonia**  
Refer to MMC Respiratory Infection Guidelines

**Hospital Acquired Pneumonia**  
Refer to MMC Respiratory Infection Guidelines

**Influenza**  
Obtain Influenza/RSV PCR, SARS-CoV-2 PCR to distinguish between viral syndromes, CXR

*Please note that NYSDOH now requires co-testing for both Influenza AND SARS-CoV-2 PCR in patients presenting with respiratory symptoms consistent with either illness*

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

**COVID-19**  
Obtain BOTH Influenza/RSV PCR, SARS-CoV-2 PCR, CXR and refer to institutional guidelines for experimental COVID-19 treatments  

**COVID-19/Influenza Co-infection**  
Obtain BOTH Influenza/RSV PCR, SARS-CoV-2 PCR, CXR and refer to institutional guidelines for experimental COVID-19 treatments

**Notes:**
- For intubated patients, consider sending lower respiratory tract influenza PCR and awaiting negative results prior to stopping neuraminidase inhibitor (oseltamivir or peramivir)
- Treatment of influenza is the same as above regardless of COVID-19 status
- No known interaction between neuraminidase inhibitors and remdesivir
- Inhaled zanamivir or oral baloxavir not recommended for hospitalized patients due to insufficient safety and efficacy data
- Steroids may prolong influenza replication; unknown how immunosuppressive medications for COVID-19 will impact co-infection
- For further information on influenza/COVID-19 co-infection, visit https://www.covid19treatmentguidelines.nih.gov/special-populations/influenza/

**Intra-abdominal Infection (non-CDI):**

**Community acquired:** Ceftriaxone IV 1g + 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)

**Risk for MDROs:** Piperacillin/tazobactam 2.25-4.5g IV (Aztreonam IV + Metronidazole 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 + Ceftriaxone 2g IV
- Age >50 OR Immunosuppressed: Vancomycin 15-20mg/kg IV + Ceftriaxone 2g IV + Ampicillin 2g IV

**Suspect HSV Encephalitis:**
Acyclovir 10 mg/kg IV based on IBW

**Anaphylaxis to Penicillin:**
Vancomycin 15-20mg/kg x IV + [Levofloxacin 750mg IV or Ciprofloxacin 400mg IV] – ID consult recommended!

**Neutropenic Fever**

Look for focal sx/signs on exam and history, blood cultures, UA/UCx, CXR

**Treatment:** Cefepime 2g IV

**MMC Criteria for adding IV Vancomycin**
- Blood cultures positive for GP organisms
- Clinically suspect catheter or skin source (cellulitis, chills with infusion through catheter)
- h/o MRSA or other MDRO infection
- Infiltrate on CXR
- Severe sepsis or hemodynamic instability

**Severe illness:** Can add Gentamicin 5-7 mg/kg x 1 IV IBW
Severe Penicillin allergy
Aztreonam 1-2g IV +/- Gentamicin 5-7mg/kg IV IBW (enhanced coverage of MDROs) + Vancomycin 15-20mg/kg IV (GP coverage)
*for intra-abdominal source, can add metronidazole 500mg IV

Skin & Skin Structure/Bone Joint Infections

<table>
<thead>
<tr>
<th>Syndrome</th>
<th>Regimen</th>
</tr>
</thead>
</table>
| **Uncomplicated Cellulitis OR Diabetic Foot Infection** | MRSA:  
  • PO: Bactrim 1-2 DS tabs, OR Doxycycline 100mg, OR Clindamycin 600mg  
  • IV: Vancomycin 15-20mg/kg  
  MSSA:  
  • PO: Dicloxacillin 500mg, OR Cephalexin 500mg, OR Amox/clav 500-875/125mg  
  • IV: Cefazolin 1-2g  
  Strep:  
  • PO: Cephalexin 500mg, OR Amoxicillin 500mg  
  • IV: Cefazolin 1-2g OR Ampicillin/subactam 1.5-3g (if anaerobic coverage needed)  |
| **Severe Soft Tissue OR Complicated Diabetic Foot Infection** | (Limb threatening, h/o MDRO or prior abx, toxic appearance) Vancomycin 15-20mg/kg IV + Piperacillin/tazobactam 2.25-4.5g IV  |
| **Suspect Necrotizing Infection** | Call Surgery/ID consult, add Clindamycin 900mg IV to severe regimen (refine later based on cultures)  |
| **Osteomyelitis** | Obtain CRP, ESR with routine labs, X-ray (or MRI if inconclusive), OR cultures if possible (wound cultures may not be accurate); DM associated = polymicrobial  
  **Consider holding antibiotics to increase bone/tissue culture yield if patient clinically stable and infection is chronic (e.g. chronic diabetic OM)**  
  Mild to Moderate:  
  • Ceftriaxone 2g (+/- metronidazole 500mg if necrotic, foul smelling) OR Ampicillin/subactam 1.5-3g  
  • +/- Vancomycin 15-20mg/kg (if prior MRSA or excess abx exposure)  
  Sepsis OR Suspect P. aeruginosa (i.e. foot puncture wound, water exposure, excess abx, past Pseudomonas):  
  • Piperacillin/tazobactam 2.25-4.5g IV OR Cefepime 1-2g IV (+/- metronidazole 500mg if necrotic, foul smelling) |
Urinary Tract Infection

Change foley, obtain UA/UCx, U/S of kidneys if suspect pyelo or obstruction, BCx if febrile

**Cystitis**  
Cephalexin 500mg PO, **OR** TMP/SMX 1 DS tab PO, **OR** Nitrofurantoin 100mg PO (for CrCl >30ml/min), **OR** cefdinir 300mg PO, **OR** Ciprofloxacin 250mg PO (severe PCN and sulfa allergy)

**Complicated UTI/pyelonephritis** (without h/o MDRO): Ceftriaxone 1g IV
- **Anaphylaxis to Penicillin:** Gentamicin 3mg/kg IV IBW, OR Aztreonam 1-2g IV, OR Ciprofloxacin 400mg IV or 500mg PO (if from home ONLY)

**Severe Illness OR h/o MDRO:** Cefepime 1-2g IV +/- Gentamicin 3mg/kg IV IBW x1

### Antibiotic Durations

(variations may apply; consult ID if additional guidance needed)

<table>
<thead>
<tr>
<th>Syndrome</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>COPD exacerbation, meets criteria for antibiotics</td>
<td>3-5 days</td>
</tr>
<tr>
<td>CAP</td>
<td>5-7 days</td>
</tr>
<tr>
<td>Complicated CAP (empyema, bacteremic, S. aureus PNA, abscess, Legionella)</td>
<td>Duration variable up to several weeks (ID consult recommended); 7-21 days for Legionella based on severity</td>
</tr>
<tr>
<td>HAP/VAP (empiric treatment OR isolation of specific pathogen such as MRSA, Pseudomonas, MDRO, etc.) [See IDSA/ATS 2016 HAP/VAP guidelines for details]</td>
<td>Approximately 7 days (ID input suggested for complicated cases or if double coverage being considered)</td>
</tr>
<tr>
<td>Bacterial Meningitis</td>
<td>7-21 days depending on organism isolated (ID consult recommended)</td>
</tr>
<tr>
<td>HSV Encephalitis</td>
<td>14-21 days (ID consult recommended)</td>
</tr>
<tr>
<td>Condition</td>
<td>Notes</td>
</tr>
<tr>
<td>------------------------------------------------</td>
<td>-----------------------------------------------------------------------</td>
</tr>
</tbody>
</table>
| Catheter-related bloodstream infection (catheter removal recommended for source control) | **CoNS**: 5-7 days if transient; longer if persistent  
**S. aureus**: up to 4-6 weeks  
**GNB** (not Pseudomonas): 7-14 days if neg BCx and source controlled  
**Candida spp.**: at least 14 days from first neg BCx; 6 weeks or more for endocarditis |
| For *Staph aureus*, Pseudomonas, Yeast, and/or recurrent bacteremias – ID consult recommended |  |
| Influenza                                      | Oseltamivir 5 days; up to 7-10 days only if critically ill            |
| Uncomplicated UTI                              | 3 days (Bactrim, ciprofloxacin), 5 days (nitrofurantoin for females [7 days for males], b-lactams) |
| Pyelonephritis/complex UTI                     | 7-10 days; ≥14 days if abscess (ID consult rec.)                      |
| Intra-abdominal source                         | 4-7 days **if source controlled**                                      |
| 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 |
|                                                                 | Initial episode & 1st recurrence: 10 days  
2nd recurrence: PO Vancomycin x 14 days, then taper over several weeks; consider fidaxomicin for compromised hosts – see ASP homepage, *C. diff* guideline for details |
| Neutropenic fever (ID consult suggested)       | Hold Abx once afebrile ≥ 48h with negative cultures, resolving neutropenia; if documented source, treat accordingly for site and organism |
|                                                                 | 4-6 weeks; ID consult and OPAT referral recommended                   |