Antimicrobial Stewardship Program
Empiric Treatment Guidelines for Common Infections in Adults

February 2017, 2nd Edition

Note: *All doses contained in this document should be adjusted for renal function (refer to the Antimicrobial Stewardship Program Adult Dosing Guidelines Pocket-card [10-110-6004])*

Bacterial Meningitis

Clinical Key Points

- When culture susceptibilities available change to PATHOGEN-DIRECTED therapy

Indication	Typical Pathogen(s) (Duration of therapy)	Empiric Treatment *(in order of preference)*
Age 18 to 50 years	*S. pneumoniae* **(10 to 14 days)** *N. meningitidis* **(7 days)** *H. influenzae* **(7 to 10 days)**	Ceftriaxone 2 g IV **q12h** + Vanco 25 mg/kg IV load, then 15 mg/kg IV q8 to 12h (target trough = 15 to 20)
	If severe penicillin allergy	Vanco as above + Meropenem **2 g** IV q8h
Age greater than 50 years, pregnant, immunocompromised, diabetes, renal failure	*S. pneumoniae* **(10 to 14 days)** *N. meningitidis* **(7 days)** *L. monocytogenes* **(21 days)** *Enterobacteriaceae* **(21 days)**	Ceftriaxone + Vanco (both as above) + Ampicillin 2 g IV q4h
	If severe penicillin allergy	Vanco as above + Meropenem 2 g IV q8h + SMX-TMP 5 mg/kg (TMP) IV q6h
Health care-Associated and or Head Trauma (e.g. Post-neurosurgery, shunt, drain, intrathecal pump placement, skull fracture or penetrating trauma)	As above **(10 to 14 days)** *P. aeruginosa* **(10 to 14 days)** Other gram negative bacilli **(10 to 14 days)** *S. epidermidis, S. aureus* *H. flu, Grp A strep* ***(fracture)***	1. Vanco as above + SMX-TMP as above + Ceftazidime** 2 g IV q8h **or** 2. Vanco + Meropenem (both as above)
	If severe penicillin allergy	1. Vanco (as above) + Cipro 400 mg IV q8h

For **Sepsis:** Emergency Adult Sepsis Protocol: 10-111-5102
For **Febrile Neutropenia:** Adult Febrile Neutropenia Order Set: 10-111-5100

Community-acquired Pneumonia (CAP)

Clinical Key Points

- Avoid using same class of antibiotics if used within previous **3 MONTHS**
- When culture susceptibilities available change to **PATHOGEN-DIRECTED** therapy
- Broader empiric regimens used when certain **CO-MORBIDITIES** present: Heart, lung, liver disease; diabetes; alcoholism; malignancies; asplenia; immunosuppression
- Consider **IV → PO** step down if afebrile x 24 to 48 hr, GI tract functioning, hemodynamically stable and clinical improvement while on IV treatment

Indication	Typical Pathogen(s)	Empiric Treatment *(in order of preference)*
CAP Outpatient (previously healthy) CURB-65: score 0 to 1 €*Consider baseline ECG to assess QTc*	*S. pneumoniae* *M. pneumoniae* *C. pneumoniae*	1. Doxycycline 100 mg PO BID x 5 to 7 days **or** 2. Azithromycin€ 500 mg PO daily x 3 days **or** If recent antibiotic use: **add** Amoxicillin 1 g PO TID
CAP Outpatient (comorbidities present) CURB-65: score 0 to 1 €*Consider baseline ECG to assess QTc*	As above *H. influenzae* *M. catarrhalis* *Legionella spp.* *Enterobacteriaceae* *S. aureus* (IVDU)	1. Amoxi-Clav** 875 mg PO BID + Doxycycline 100 mg PO BID x 5 to 7 days **or** 2. Amoxi-Clav** as above x 5 to 7 days + Azithromycin€ as above [** alt = cefuroxime 500 mg PO BID]
	If severe penicillin allergy	Moxifloxacin€ 400 mg PO daily x 5 to 7 days
CAP Inpatient Mild/Moderate CURB-65: score 2 €*Consider baseline ECG to assess QTc*	As above	1. Ampicillin 1 g IV q6h + Doxycycline** 100 mg PO BID or 2. Ceftriaxone 2 g IV q24h + Doxycycline** 100 mg PO BID [**alt = Azithro€ 500 mg PO/IV daily x 3 days]
	If severe penicillin allergy	Moxifloxacin€ 400 mg IV/PO daily
CAP Inpatient Severe (ICU) CURB-65: score 3 to 5 €*Consider baseline ECG to assess QTc*	As Above	1. Ceftriaxone 2 g IV q24h x 7 days + Azithro€ 500 mg IV daily x 5 days or 2. If recent macrolide use: Ceftriaxone 2 g IV q24h + Moxifloxacin€ 400 mg IV q 24h x 7 days
	MRSA suspected or known history	**Add** Vancomycin 25 mg/kg IV load, then 15 mg/kg IV q8 to 24h x 14 days (min.) for **confirmed** MRSA

Hospital-acquired (HAP) & Ventilator-associated pneumonia (VAP)

Clinical Key Points

- ***RISK FACTORS** for multi-drug resistant microbes: prior IV antibiotics within 90 days, recent cephalosporin use within 30 days; prolonged hospital stay (5 days or more), septic shock, ARDS or acute renal replacement therapy prior to VAP onset
- When culture susceptibilities available change to **PATHOGEN-DIRECTED** therapy
- Consider **DISCONTINUE** empiric therapy if lower resp. tract cultures negative at 48 to 72hr and clinical improvement
- Consider **IV → PO** step down (see criteria under Community-acquired Pneumonia)

Indication	Typical Pathogen(s)	Empiric Treatment *(in order of preference)*
Infection occurring 48 hours or less since admission	See community-acquired pneumonia section	Refer to empiric treatment for CAP inpatient
HAP (infection occurring greater than 48 hrs after admission) Low risk mortality; no risk factors (listed above*) for MDR microbes	*S. pneumoniae* *H. influenzae* *S.aureus* *E. Coli* *K. pneumoniae* *Enterobacter spp.* *Proteus spp.* *Serratia marcescens*	1. Levofloxacin 750 mg IV/PO daily x 7 days or 2. Ceftriaxone 2 g IV q24h + Cipro 750 mg PO BID (400 mg IV q12h) x 7 days
	MRSA suspected or known history See above RISK FACTORS*	**Add** Vancomycin 25 mg/kg IV load, then 15 mg/kg IV q8 to 24h x 14 days (min.) for confirmed MRSA
HAP - High risk of mortality or Risk factors* for MDR microbes including MRSA Treat x 14 days (min.) if **confirmed** P. aeruginosa	As above *P. aeruginosa* *K. pneumoniae (ESBL)* *Acinetobacter spp.*	1. Pip-tazo 4.5 g IV q6h +/- Vancomycin as above x 7 days **or** 2. Meropenem 1 g IV q8h +/- Vancomycin as above x 7 days ***(ESBL suspected or known history)***
VAP infection occurring greater than 48 hrs after intubation	*As above*	1. Pip-Tazo 4.5 g IV q6h + Cipro 400 mg IV q8h x 7 days or
	If severe penicillin allergy	1. Meropenem 1 g IV q8h + Cipro as above x 7 days
	If culture positive for ***stenotrophomonas maltophilia***	SMX-TMP 2 DS tab PO TID x 14 days
	MRSA suspected or known history See above RISK FACTORS*	**Add** Vancomycin 25 mg/kg IV load, then 15 mg/kg IV q8 to 24h x 14 days (min.) for **confirmed** MRSA

Aspiration Pneumonia

Clinical Key Points

- ***RISK FACTORS** for bacterial infection secondary to inhalation of gastric contents: decreased level of consciousness, dysphagia, abnormality of upper GI tract, enteral feeds, gastroparesis, small bowel obstruction
- **RISK FACTORS** for anaerobes poor oral hygiene, severe periodontal disease or putrid sputum
- ****NO ROLE** for prophylactic antibiotics post aspiration – REASSESS patient 24 to 48 hrs after, if CXR abnormality PLUS above risk factors, consider antibiotics

Indication	Typical Pathogen(s)	Empiric Treatment *(in order of preference)*
Aspiration Pneumonitis	Sterile*	No antibiotics recommended**

Indication	Typical Pathogen(s)	Empiric Treatment *(in order of preference)*
Community acquired	S. pneumonia H. Influenza Enterobacteriaceae S. aureus Oral anaerobes Strep spp.	1. Amoxicillin-Clavulanate 875 mg PO BID x 7 days **or** 2. Clindamycin 300 mg PO QID (600 mg IV q8h) x 7 days
Hospital acquired #(if recent ventilator support and or multiple antibiotics previously)	Polymicrobial: S. pneumonia H. Influenza Enterobacteriaceae S. aureus Oral anaerobes P.aeruginosa# M. catarrhalis	**Mild/moderate with no recent antibiotic use:** As for community acquired above **or** Ceftriaxone 2 g IV daily + Metronidazole 500 mg IV/PO q12h x 7 days **(After 72 hrs of IV reassess for oral step down)**
		Severe (ICU) or recent antibiotic use: 1. Pip-Tazo 4.5 g IV q6h x 7 days **or** 2. Meropenem 1g IV q8h x 7 days
		Penicillin allergy: Clindamycin 600 mg IV q8h (300 mg PO QID) + Ciprofloxacin 400 mg IV q12h (750 mg po BID) x 7 days

Dental Infections

Clinical Key Points

- Prolonged use of chlorhexidine is **NOT** recommended as it may result in selection of resistant oral microbes
- Assess for IV → PO step down after 24 to 48 hr of IV treatment

Indication	Typical Pathogen(s)	Empiric Treatment *(in order of preference)*
Endodontic/ periodontal abscess	Polymicrobial (normal oral flora) e.g. aerobic (gram positive and negative) and anaerobic bacteria	1. **Incision and Drainage** 2. Pen V 600 mg PO QID +/- metronidazole 500 mg PO BID x7 days *Penicillin allergy:* • Clindamycin 300 mg PO QID x 7 days
Facial space infection		1. **Incision and Drainage** 2. Pen G 2 million units IV q4 to 6h + metro 500 mg IV q12h x 10 days (consider oral step down after 24 to 48 hr) Severe (septic): • Pip/Tazo 3.375 g IV q6h x 10 days (consider oral step down after 24 to 48 hr) *Penicillin allergy:* • Clindamycin 600 mg IV q8h x 10 days (consider oral step down after 24 to 48 hr)

Drug Name Abbreviations
Vanco = Vancomycin; **SMX-TMP =** Sulfamethoxazole-Trimethoprim; **Cipro =** Ciprofloxacin; **Pip-Tazo =** Piperacillin-Tazobactam, **Amoxi-Clav =** Amoxicillin-Clavulanate; **Azithro =** Azithromycin **Gent =** Gentamicin; **Tobra =** Tobramycin; **Metro =** Metronidazole, Clinda = Clindamycin

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10-110-6070 (IND Rev. 04/17)

Intra-abdominal Infection

Clinical Key Points

- When culture susceptibilities available change to **PATHOGEN-DIRECTED** therapy
- **DISCONTINUE** antibiotics at day **4 to 7** if adequate **SOURCE CONTROL** achieved and good clinical response
- If inadequate clinical response at day 4 to 7, consider **DIAGNOSTIC INTERVENTIONS**
- Antibiotics should be discontinued within **24 HOURS** in the following:
  - Acute appendicitis **WITHOUT** perforation, abscess or peritonitis
  - Bowel injury due to penetrating or blunt trauma repaired **WITHIN 12HR**

Indication	Typical Pathogen(s)	Empiric Treatment *(in order of preference)*
Community-acquired **(Mild/moderate)** - Diverticulitis, cholecystitis, appendicitis & other infections	*Strep sp. Enterobacteriaceae (E. Coli, Klebsiella sp., Proteus sp, Serratia sp.) Anaerobes (B. Fragilis, Clostridium sp., fusobacterium sp. Lactobacillus sp., peptostreptococcus sp.)*	**1.** Cefazolin** 2 g IV q8h + Metronidazole 500 mg PO/IV q12h [**alt. Ceftriaxone 2g IV q24h] **or** **2.** Cipro 500 mg PO BID or 400 mg IV q12h + Metronidazole as above **OUTPATIENT** **1.** SMX-TMP 1 DS tab PO BID + Metro po as above x 7 days **or** **2.** Amoxi-Clav 875 mg PO BID x 7 days
Community-acquired **(Severe)** - Perforated or abscessed biliary tract - physiologic disturbance, advanced age or immunocompromised	As above	**1.** Cipro 500 mg PO BID or 400 mg IV q12h + Metronidazole as above **or** **2.** Piperacillin-Tazobactam 3.375 g IV q6h **or** **3.** Meropenem 1g IV q8h
Healthcare associated, complicated or recurrent	As above Acinetobacter MDR gram neg bacilli	**1.** Pip/tazo 3.375 g IV q6h **or** **2.** Meropenem 1g IV q8h
	If MRSA suspected or known history	Add Vancomycin 25 mg/kg IV load, then 15 mg/kg IV q8 to 24h

Clostridium difficile Infection (CDI)

Clinical Key Points

- **DISCONTINUE** current antibiotics if possible
- **DISCONTINUE** anti-peristaltics, laxatives, pro-motility agents, anti-inflammatories (NSAIDs)
- If present, **REASSESS** need for Proton Pump Inhibitor or Histamine-2 Receptor Antagonist

CDI Severity	Empiric Treatment
Mild/moderate	**1.** Metronidazole 500 mg PO/NG TID x 10 to 14 days. (If no improvement by day 4 or intolerant to PO metro, change to option 2) **or** **2.** Vancomycin 125 mg PO/NG QID x 10 to 14 days
Severe (WBC greater than 15, acute kidney injury (increase of 50% or more in creatinine), pseudomembranous colitis)	Vancomycin 125 mg PO/NG QID x 14 days
Fulminant (toxic megacolon, perforation, ileus, sepsis/shock, peritonitis, acute renal failure)	Vancomycin 250 mg PO/NG QID x 14 days + metronidazole 500 mg IV q8h x 14 days (if ileus or unable to take via PO/NG give vanco 500 mg in 100 mL NS retention enema QID rectally)
Recurrence/relapse (1st) • Mild	**1.** Metronidazole 500 mg PO/NG TID x 14 days. (If no improvement by day 4 or intolerant to PO metro, change to option 2) **or** **2.** Vancomycin 125 mg PO/NG QID x 14 days
• Severe	Vancomycin 125 mg PO/NG QID x 14 days
Recurrence/relapse (2nd or more) **CONSULT INFECTIOUS DISEASE**	Vancomycin 125 mg PO/NG QID x 14 days then taper over 4 weeks e.g. 125 mg BID x 7 days, 125 mg daily x 7 days, 125 mg q2 days x 7 days, 125 mg q3d x 7 days

Urinary Tract Infections (UTI) in Non-pregnant Adults

Clinical Key Points

- Malodorous/cloudy urine alone is **NOT** a sign/symptom of UTI and is **NOT** an indication for urine cultures
- Positive urine cultures in asymptomatic patients should **NOT** be treated **EXCEPT** in pregnancy or prior to urologic/gynecologic surgery
- Delirium or change in behaviour **REQUIRES** clinical assessment to **RULE OUT** dehydration, adverse effect of new medication, trauma, hypoxia, hypoglycemia or other infection (do not assume UTI)
- Urine cultures should **ALWAYS** be collected mid-stream or by in/out catheter
- Risk factors** for ESBL: frequent hospitalizations, residence in care facility, advanced age, male gender, and recent (within 30 day) cephalosporin use, and recurrent UTIs

Symptoms:
- New onset or worsening urgency, dysuria, incontinence, fever, rigors, altered mental status, malaise, flank pain, costovertebral angle tenderness, acute hematuria, and/or pelvic discomfort.

Indication	Typical Pathogen(s)	Empiric Therapy *(in order of preference)*
Uncomplicated cystitis (premenopausal female with no urological abnormalities or co-morbidities)	*Enterobacteriaceae (including E. coli) Enterococcus sp.*	**1.** SMX-TMP 1 DS tab po BID x 3 days **or** **2.** Nitrofurantoin (MacroBID®) 100 mg PO BID x 5 days [**ONLY USE if CrCl 40 mL/min or greater**] **or** **3.** Amoxi-Clav 875 mg PO BID x 7 days
Complicated cystitis (all males, females 65 yrs and older or with urologic abnormalities or co-morbidities)	As above (higher risk for resistant organisms)	**1.** SMX-TMP as above x 10 days **or** **2.** Amoxi-Clav as above x 10 days **or** **3.** Cipro 500 mg PO BID x 7 days **or** **4.** Cefixime 400 mg PO daily x 10 days **or** **5.** Nitrofurantoin as above x 10 days (for use in females only)
Mild pyelonephritis (outpatient)	As above	**1.** Cefixime 400 mg PO daily x 10 to 14 days or **2.** Cipro 500 mg PO BID x 7 to 10 days
Moderate pyelonephritis (inpatient) **Obtain blood cultures x2 prior to 1st dose**	As above	**1.** Ciprofloxacin 400 mg IV q12h x 7 to 10 days (step down to oral when stable) **or** **2.** Ceftriaxone 2 g IV q24h x 10 to 14 days **(step down to oral when stable)**
Urosepsis/severe pyelonephritis (Blood cultures x 2 as above)	As above	**1.** Ceftriaxone 2g IV q24h **(step down to oral when stable)**
	ESBL **suspected/ known (all severities)	**1.** Meropenem 1 g IV q8h **(step down to oral when stable)**
	ESBL outpatient treatment	**1.** Ertapenem 1 g IV q24h x 10 to 14 days **(consult pharmacist or ID physician)**

Skin and Soft Tissue Infections (Cellulitis and Diabetic Foot)

Clinical Key Points

- Avoid using same class of antibiotics if used within previous **3 MONTHS**
- Superficial skin swabs **NOT** recommended
- Cellulitis usually **PROGRESSES** 24 to 48 hr after initiation of treatment **BEFORE** it improves
- **ELEVATE** affected area whenever possible
- **STEP DOWN** to PO when resolution of systemic symptoms or no further progression

Indication	Typical Pathogen(s)	Empiric Therapy *(in order of preference)*	
Non-purulent Cellulitis	Strep Grp A, B, C, G	Mild/ Moderate	**1.** Amoxicillin 0.5 to 1 g PO TID x 5 to 7 days **or** **2.** Cephalexin 0.5 to 1 g PO QID x 5 to 7 days
		Severe Outpatient	Cefazolin 2 g IV q24h PLUS probenecid 1 g PO daily x 72 hrs then reassess for oral step down x 7 to 10 days total
Purulent Cellulitis or Abscess	*S. aureus*	I&D if abscess present; Cloxacillin 0.5 to 1 g PO QID x 7 to 10 days or Cephalexin 0.5 to 1 g PO QID x 7 to 10 days	
	CA-MRSA suspected or known	**1.** Doxycycline 100 mg PO BID x 10 days **or** **2.** SMX-TMP 2 DS tab PO BID x 10 days	

Diabetic foot infections: **Mild:** local infection with erythema greater than 0.5 cm and less than or equal to 2 cm around ulcer; **Moderate:** local infection with erythema greater than 2 cm or deeper infection with NO systemic symptoms; **Severe:** as moderate PLUS signs of systemic infection

Diabetic foot ulcer	(no sign of infection)	Wound care only – no antibiotics required
Diabetic foot infection (Mild) *** **Try to treat as outpatient***	*S. aureus* *Strep sp*	**1.** Cloxacillin or Cephalexin 0.5 to 1 g PO QID x 1 to 2 wks **or** **2.** Amoxi-Clav 875 mg PO BID (if recent antibiotic use) x 1 to 2 wks
Diabetic foot infection (moderate) **Rule out osteomyelitis** *Treat as outpatient if possible*	As above Enterobacteriaceae Anaerobes	**1.** Amoxi-Clav 875 mg PO BID x 2 to 3 wks **or** **2.** Moxifloxacin 400 mg PO daily x 2 to 3 wks (If beta-lactam allergic)
Diabetic foot infection (Severe)	As above	**1.** Pip-Tazo 3.375 g IV q6h x 4 days then reassess **or** **2.** Meropenem 1g IV q8h x 4 days then reassess
Rule out osteomyelitis	***Outpatient treatment ID consult needed***	**3.** Ertapenem 1 g IV q24h x 4 days then reassess for oral step down therapy
CA-MRSA suspected or known (all severities)		**1. Add** Doxycycline 100 mg PO BID x 1 to 2 wks **or** **2. Add** SMX-TMP 2 DS tabs PO BID x 1 to 2 wks **or** **3. Add** Vancomycin 25 mg/kg IV load, then 15mg/kg IV q8 to 24h **(for moderate/severe)** x 4 days then reassess for oral step down therapy

Catheter-associated UTI (CA-UTI)

***Diagnosis: Presence of SIGNS/SYMPTOMS** (see below) plus positive urinalysis and **GROWTH** of 1 or more bacterial species in a single catheter urine specimen or midstream void within 48 hr of catheter removal.*

Clinical Key Points

- **DO NOT** treat a positive culture in absence of symptoms
- **DISCONTINUE** catheter as soon as appropriate
- When culture susceptibilities available change to **PATHOGEN-DIRECTED** therapy

Symptoms:
- If catheter recently removed (48 hrs) ➔ dysuria, urgency or frequency, suprapubic pain/tenderness
- spinal cord injury patients ➔ increased spasticity, sense of unease or autonomic dysreflexia

Catheter Replacement
- Assess continued need for catheter – remove if possible
- If catheter still indicated and has been in place for greater than 1 week, replace and repeat urine culture prior to starting antibiotics

Culture and Sampling
- Obtain urine sample for analysis and culture from new catheter prior to antimicrobial therapy
- If catheter removed, collect sample voided mid-stream

Typical Pathogen(s)

Short-term catheter: *E.Coli, Klebsiella, Serratia, Citrobacter, Enterobacter, enterococcus*, coag. neg *staph*

Long-term catheter: As above (often polymicrobial), *pseudomonas, proteus, morganella, providencia*

Empiric Therapy

(treat for 7 days if prompt response; 10 to 14 days if delayed response)

Mild/Moderate:
Cefixime 400 mg po daily **or** Amoxicillin-Clavulanate 875 mg po BID **or** Ciprofloxacin 500 mg po BID

Severe (febrile/systemically unwell):
1. Ampicillin 1 to 2 g IV q6h + (Ceftriaxone 2 g IV q24h **or** Gentamicin 5 to 7 mg/kg IV q24h)
2. Piperacillin-Tazobactam 3.375 g IV q6h +/- Gentamicin 5 to 7 mg/kg IV q24h **(septic)**