Suggested Empiric Antimicrobial Agents of Choice In Ambulatory Patients

(1st Edition)

Aspirus Health
2022

System Antimicrobial Stewardship Subcommittee

System Pharmacy and Therapeutics Committee

Created By:
Tristan O'Driscoll, PharmD, MPH
Infectious Disease Pharmacist
System Antimicrobial Stewardship Coordinator

IC-042 (3/9/22)

ANTIMICROBIAL STEWARDSHIP PEARLS

Stewardship Approach: When prescribing antimicrobials, follow these stewardship principles:

- Utilize this guide to pick empiric therapies then NARROW (DE-ESCALATE) antimicrobials as far as possible if cultures are drawn and treat for the SHORTEST DURATION.
- Before initiating empiric therapy OR changing antibiotics due to lack of response to a current regimen, make certain that all relevant cultures have been obtained or repeated. Also, consider non-bacterial sources.
- SHORTER IS BETTER! Treat for the shortest duration possible to optimize patient outcomes.

Avoid Empiric Use of Fluoroquinolones (FQs) and Clindamycin:
Both are extremely high risk for *C. diff*, both have high resistance rates, and FQs have a black box warning against use for acute sinusitis, UTI, and AECB due to tendonitis, CNS effects, irreversible peripheral neuropathy, and aortic aneurysms.

Skin and Soft Tissue Infection Pearls:

- Oral vancomycin does not penetrate outside of the GI system and will not treat MRSA skin infections
- Skin that is red and swollen is not always due to cellulitis. Other diagnoses such as DVT, venous stasis dermatitis, venous insufficiency, lymphedema, contact dermatitis, gout, noninfectious phlebitis, insect bite hypersensitivity, fixed drug reaction, and herpes zoster should be considered as well.
- Bilateral lower-extremity cellulitis is exceedingly rare, noninfectious etiologies should be considered first.

UTI Pearls:

- Elderly patients with altered mental status, s/p a fall, or with weakness, AND with NO UTI signs and symptoms, fever, or hemodynamic instability, should NOT have a UA/UCx obtained and should NOT be treated with antibiotics
- Foul-smelling urine or cloudy urine are not reliable indicators of a UTI and should not be used alone to diagnose a UTI.
- **Asymptomatic bacteriuria and catheter-associated asymptomatic bacteriuria should NOT be tested for or treated,** except in pregnancy or prior to urologic procedures involving mucosal bleeding (e.g., TURP).
- Testing for asymptomatic bacteriuria prior to nonurologic surgical procedures is not recommended unless the patient has signs/symptoms of an active UTI.

Penicillin (PCN) Allergic Patients: >90% PCN allergies aren't accurate, always perform a thorough allergy history and assess for previous tolerance of penicillin and cephalosporins.

- Penicillin allergic patients (except for SJS, TEN) should receive cephalosporins as they provide no increased risk of a reaction compared to those without an allergy history. Stewardship order sets contain cephalosporin options.

Stewardship Intranet Site located under Communications tab:
http://aspirusintranet/MedStaff/Antimicrobial-Stewardship.aspx

SEXUALLY TRANSMITTED INFECTIONS

Bacterial Vaginosis

- Metronidazole 500mg PO q12h for 7 days
  OR Metronidazole gel 0.75%, one 5g applicator intravaginally q24h for 5 days
  OR Clindamycin cream 2%, one 5g applicator intravaginally at bedtime for 7 days

Cervicitis

- Doxycycline 100mg PO q12h for 7 days
- Alternate: Azithromycin 1g PO once

Chlamydial Infection

- Adults and adolescents: Doxycycline 100mg PO q12h for 7 days
- Pregnancy: Azithromycin 1g PO once

Epididymitis

- Acute epididymitis most likely caused by sexually transmitted chlamydia and gonorrhea: Ceftriaxone 500mg IM once PLUS Doxycycline 100mg PO q12h for 10 days

Gonococcal Infections: If a chlamydia infection has not been excluded, concurrent treatment with Doxycyline 100mg PO 12h for 7 days is recommended (during pregnancy use Azithromycin 1g PO once instead of doxycyline)

- Uncomplicated infections of the cervix, urethra, pharynx, and rectum in adults and adolescents
  <150kg: Ceftriaxone 500mg IM once
  ≥150kg: Ceftriaxone 1g IM once

Nongonococcal Urethritis (NGU)

- Doxycycline 100mg PO q12h for 7 days
- Alternate: Azithromycin 1g PO once

Pelvic Inflammatory Disease

- Ceftriaxone 500mg IM once PLUS Doxycycline 100mg PO q12h for 14 days PLUS Metronidazole 500mg PO q12h for 14 days

Scabies

- Permethrin 5% cream applied to all areas of the body (from neck down), wash after 8-14 hours
- Alternate: Ivermectin 1% lotion applied to all areas of the body (from neck down), wash after 8-14 hours; repeat treatment in 1 week if symptoms persist

Syphilis (primary, secondary, and early latent):

- Benzathine Penicillin G 2.4 million units IM once

Trichomoniasis

- Women: Metronidazole 500mg PO q12h for 7 days
- Men: Metronidazole 2g PO once

Aspirus Reference Laboratory Antibiogram Jan. 2021 - Dec. 2021
All Sources

# OF ISOLATES	GRAM NEGATIVE BACILLI REPORTED AS % SUSCEPTIBLE: JAN.2021 - DEC.2021	Ampicillin	Ampicillin/ Sulbactam	Piperacillin/ Tazobactam	Aztreonam	Cefazolin	Ceftriaxone	Ceftazidime	Cefepime	TMP/SMX	Levofloxacin	Gentamicin	Tobramycin	Nitrofurantoin	Ertapenem	Meropenem
35	*Acinetobacter sp.*			85			26	71	91	91	97	97	97			94
218	*Citrobacter freundii*		100	86	87		86	85	99	91	97	98	99	90	99	99
122	*Enterobacter (Klebsiella) aerogenes*			90	94		95	92	99	100	100	100	100	20	99	99
363	*Enterobacter cloacae complex*			88	87		86	86	99	91	99	99	99	30	99	99
7548	*Escherichia coli*	66	73	98	96	93	96	96	97	86	90	95	95	97	100	100
303	*Klebsiella oxytoca*		55	95	93	61	95	96	96	96	100	98	97	87	100	100
1011	*Klebsiella pneumoniae*		88	99	97	95	97	96	97	93	98	98	98	30	100	100
146	Other *Klebsiella sp.*		97	99	99	99	99	99	99	99	99	99	99	57	100	100
539	*Proteus mirabilis*	84	89	100	97	95	97	97	97	82	81	88	89		100	100
702	*Pseudomonas aeruginosa*			95			99	94	95			97	99			98
105	*Serratia marcescens*				99		99	99	99	99	98	99	93		100	100

# OF ISOLATES	GRAM POSITIVE COCCI REPORTED AS % SUSCEPTIBLE: JAN.2021-DEC.2021	Ampicillin	Oxacillin	Penicillin	Ceftriaxone	Clindamycin	Erythromycin	Levofloxacin	Gentamicin*	Nitrofurantoin	Rifampin*	Tetracycline	TMP/SMX	Vancomycin
61	*Enterococcus faecium*	41		36					86 SYN	33		38		72
786	*Enterococcus faecalis*	100		99					78 SYN	99		27		100
2465	*Staphylococcus aureus*		74			81	61	79	99	100	100	93	98	100
1818	MSSA (74% of *Staph aureus*)		100			85	75	91	96	99	100	94	99	100
647	MRSA (26% of *Staph aureus*)		0			69	16	42	99	99	99	85	93	100
87	*Staphylococcus coag negative*		71	46		63	52	85	99	100	90	90	96	100
452	*Staphylococcus epidermidis*		50	14		81	41	70	93	100	99	82	66	100
114	*Staphylococcus lugdunensis*		89	46		89	88	97	100	100	100	96	100	100
83	*Streptococcus agalactiae* (Grp B)			100		40						21		100
41	*Streptococcus pneumoniae*					88	48	100				85		100
	41 Non-Meningitis	97	97											
	0 Meningitis^													

CY 2021 ***Haemophilus influenzae*** 63 12% beta lactamase positive
*Should not be used alone to treat staphylococcal infections
SYN: Synergy with Ampicillin or Vancomycin
^*Strep pneumoniae* Meningitis breakpoints are lower than pneumonia/bacteremia

URINARY TRACT INFECTIONS (UTI)

UTI Signs and Symptoms warranting testing include: flank pain, CVA tenderness, dysuria, suprapubic pain, new and unexplained urgency and/or frequency, unexplained acute hematuria, scrotal/testicular pain, increased spasticity or autonomic dysreflexia in spinal cord patients, or unexplained fever (>100.4°F), hemodynamic instability, chills, or rigors without identifiable source.

Uncomplicated UTI/Cystitis: Urgency, frequency, dysuria, suprapubic pain/tenderness in otherwise healthy, non-pregnant woman or child/adolescent

- Adult: Nitrofurantoin (Macrobid) 100mg PO q12h for 5 days (do NOT use if CrCl ≤ 30mL/min) OR Trim-sul 1DS PO q12h for 3 days OR Cephalexin 1000mg PO q12h for 3-7 days
- Pediatric: Cephalexin 12.5-25mg/kg/dose PO q8h (max 500mg/dose) for 3-5 days
  OR Nitrofurantoin suspension 1.25-1.75mg/kg/dose PO q6h (max 100mg/dose) for 3-5 days
  OR Nitrofurantoin tablet 100 mg PO q12h (>15kg and able to swallow pills) for 3-5 days OR Trim-sul 4-6 mg/kg/dose PO q12h (max 160mg Trim/dose) for 3-5 days

Complicated UTI (cUTI) and Catheter-Associated UTI (CA-UTI): Infection in the presence of an anatomical abnormality OR in the presence of a catheter

- Adult: Trim-sul 1DS PO q12h for 7 days
  OR Cephalexin 1000mg PO q12h for 7-14 days
  OR Amox-Clav 500mg PO q12h for 7-14 days
  (3 days duration for any of the above antibiotics if female ≤65yo and catheter has been removed)
- Pediatric: Cephalexin 12.5-25mg/kg/dose PO q8h (max 500mg/dose) for 7-10 days
  OR Trim-sul 4-6 mg/kg/dose PO q12h (max 160mg Trim/dose) for 7-10 days
  OR Amox-Clav 13.3mg/kg/dose PO q8h (max 500mg/dose) for 7-10 days

Pyelonephritis, Uncomplicated: Infection that has spread from bladder to kidneys in patient with no anatomical abnormalities. Signs and symptoms include fever, chills, flank pain, nausea, and vomiting

- Adult: Ceftriaxone 1g IM/IV q24h once followed by Trim-sul 1DS PO q12h for 10 days total OR Cephalexin 500mg PO q6h for 10 days total
- Pediatric: Cefixime 4mg/kg/dose PO q12h (max 200mg/dose) for 7-14 days
  OR Trim-sul 4-6 mg/kg/dose PO q12h (max 160mg Trim/dose) for 7-14 days
  OR Amox-Clav 13.3mg/kg/dose PO q8h (max 500mg/dose) for 7-14 days

Acute Bacterial Prostatitis: Less than 1% of all clinical prostatitis is acute bacterial prostatitis. Most antibiotics penetrate the acutely inflamed prostate fairly well, so alternate agents targeted to a known organism is reasonable.

- Preferred: Trim-sul 1DS PO q12h
- Alternate: Cipro 500mg PO q12h
- Duration = 2 weeks for mild cases with prompt response; 2-6 weeks if severe and/or delayed response

GASTROINTESTINAL INFECTIONS

Acute Uncomplicated Diverticulitis:
Antibiotics NOT recommended for immunocompetent patients

Acute Complicated Diverticulitis:

- Amox-Clav 875/125mg PO q12h
  OR Cefuroxime 500mg PO q12h AND Metro 500mg PO q8h
- Duration = 5-7 days

Clostridioides difficile Infection (C. diff): NAT/GDH positive, toxin A/B negative = Colonization, NO treatment. Only treat for toxin positive. Stop all unnecessary concurrent antibiotics to increase cure rate.

- *Initial episode:* Vancomycin 125mg PO q6h for 10 days
- *First recurrence:*
  - If metronidazole was used for first episode: Vancomycin 125mg PO q6h for 10 days
  - If vancomycin PO was used for first episode: Tapered and pulsed Vancomycin PO regimen
- *Second OR Subsequent Recurrence:* Tapered and pulsed Vancomycin PO regimen

LOWER RESPIRATORY TRACT INFECTIONS

Acute Uncomplicated Bronchitis: Almost always viral and antibiotics provide no benefit if bacterial

- NO Antibiotics indicated
- Symptomatic treatment recommended

Acute Exacerbation of Chronic Bronchitis (AECB): Antibiotics only recommended for acute exacerbations with increased cough, sputum volume AND sputum purulence.

- Doxycycline 100mg PO q12h for 5 days
  OR Azithromycin 500mg PO x1, then 250mg PO q24h x4 days

Community Acquired Pneumonia (CAP): Most pneumonias in infants and small children are viral, consider symptomatic management with close follow up in mild cases

- Adult, NO Comorbidities:
  - Amoxicillin 1g PO q8h OR Doxycycline 100mg PO q12h
- Adult, Comorbidities Present: (Malignancy, alcoholism, asplenia, diabetes, chronic heart/lung/liver/renal disease):
  - Amox-Clav 875/125mg PO q12hr
    OR Cefuroxime 500mg PO q12h (pick one)
    PLUS (add one to above) Doxycycline 100mg PO q12h
    OR Azithromycin 500mg PO x1, then 250mg PO q24 x 4 days
- Pediatric:
  - Amoxicillin 30mg/kg/dose PO q8h (max 1000mg/dose)
    OR Cefdinir 7mg/kg/dose PO q12h (max 300mg/dose)
  - If atypical organism suspected (>5yo and bilateral disease or subacute with symptoms >10 days: low-grade fevers, malaise, headache, sore throat, and cough, in the absence of rhinorrhea and congestion) ADD the following to the above:
    Azithromycin 10mg/kg/dose PO x1 on day 1 (max 500mg/dose), then 5mg/kg/dose PO q24 on days 2-5 (max 250mg/dose)
- Duration = 5 days

UPPER RESPIRATORY TRACT INFECTIONS

Acute Otitis Media (AOM): Should be considered in a child with a bulging TM or new-onset otalgia (not due to otitis externa), and a recent onset of ear pain. AOM should not be diagnosed in a child without middle ear effusion. Mild cases with unilateral symptoms in children 6-23 months of age or unilateral or bilateral symptoms in children >2 years may be appropriate for watchful waiting. In adults, the triad of otalgia, tympanic membrane erythema or bulging, and fever makes AOM likely.

- Adult first-line: Amox-Clav 500mg PO q8h
  OR 875mg PO q12h for 7-10 days
- Adult alternate for penicillin allergy: Cefdinir 300mg PO q12h OR 600mg PO q24h for 7-10 days
- Pediatric First-line: Amoxicillin 45 mg/kg/dose PO q12h (max 2g/dose)
  - If patient has used amoxicillin in previous 30 days or has concurrent purulent conjunctivitis: High-dose Amox-Clav 45mg/kg/dose (amox to clav ratio 14:1) PO q12h (max 2000mg amox/dose)
- Pediatric alternate for penicillin allergy: Cefdinir 14mg/kg/dose PO q24h (max 600mg/day)
- Pediatric Durations:
  - Age ≥ 6: 5 - 7 days
  - Age 2-5: 7 days
  - Age < 2: 10 days

Acute Bacterial Sinusitis: 98% are viral and when bacterial most resolve without antibiotics. Antibiotics do NOT prevent complications or progression to severe disease.

- Antibiotics only indicated if one of the following is met: Severe symptoms for ≥3-4 days, with fever (>102°F) and purulent nasal discharge or focal facial pain OR persistent symptoms and not improving for > 10 days OR initial improvement over 5-6 days, followed by worsening or "double sickening". Consider watchful waiting for persistent illness in pediatrics.
- Adult: Amox-Clav 875/125mg PO q12h for 5-7 days
  OR Doxycycline 100mg PO q12h for 5-7 days
- Pediatric - Mild-moderate AND ≥ 2 years of age, AND does NOT attend daycare, AND has not received antibiotics within the past 30 days:
  - Amoxicillin 45 mg/kg/dose PO q12h(max 2000mg/dose) for 5-7 days
- Pediatric - Severe OR mild-moderate with any of the following: < 2 years of age, attends daycare, received antibiotics in past 30 days:
  - High-dose Amox-Clav 45mg/kg/dose (amox to clav ratio 14:1) PO q12h (max 2000mg amox/dose) for 5-7 days
- Pediatric alternate: Cefdinir 14mg/kg orally once per day (max 600mg/day) for 5-7 days

Group A Strep Pharyngitis (GAS): Do NOT prescribe antibiotics for strep without a positive strep test (RADT or throat culture). The following are indicative of viral pharyngitis (testing and antibiotics NOT recommended): conjunctivitis, coryza, cough, hoarseness, viral exanthema, and diarrhea.

- Adult First-Line: Penicillin VK 500mg PO q12h for 10 days
  OR Amoxicillin 1000mg PO q24h for 10 days
  OR Benzathine Penicillin G 1.2 million units IM once
  - Alternates: Cephalexin 500mg PO q12h for 10 days
    OR Azithromycin 500mg PO q24h for 3 days
- Pediatric First-Line: <60 lbs (<27 kg): Amoxicillin 50mg/kg/dose PO q24h (max 1000mg/dose) for 10 days
  OR Benzathine Penicillin G 600,000 units IM once
- >60 lbs (>27 kg): Amoxicillin 50mg/kg/dose PO q24h (max 1000mg/dose) for 10 days
  OR Benzathine Penicillin G 1.2 million units IM once
  - Alternates: Cephalexin 20mg/kg/dose PO q12h (max 500mg/dose) for 10 days
    OR Clindamycin 7mg/kg/dose PO q8h (max 300mg/dose) for 10 days

TICKBORNE DISEASES

Lyme Disease (Prophylaxis): use if < 72h following removal of Ixodes species tick attached for ≥ 36h

- Doxycycline (within 72h post-tick bite)
  - Adult: 200mg PO x1 dose
  - Pediatric: 4.4 mg/kg PO x1 dose (max 200mg)

Lyme Disease (Treatment): Pick one agent from below

- Doxycycline
  - Adult: 100mg PO q12h
  - Pediatric: 4.4mg/kg PO q12h (100mg max)
- Amoxicillin
  - Adult: 500mg PO q8h
  - Pediatric: 50mg/kg PO q8h (500mg max)
- Cefuroxime
  - Adult: 500mg PO q12h
  - Pediatric: 30mg/kg PO q12h (500mg max)
- Ceftriaxone (IV for initial use in carditis and neurologic Lyme disease)
  - Adult: 2g IV q24h
  - Pediatric: 50-75mg/kg IV q24h (2g max)
- Duration:
  - Erythema migrans: 10 days doxycycline, 14 days amoxicillin and cefuroxime
  - Carditis and neurologic disease: 14-21 days
  - Arthritis: 14-28 days ceftriaxone; 28 days amoxicillin, doxycycline, and cefuroxime

Babesiosis

- Adult: Atovaquone 750mg PO q12h PLUS Azithromycin 500mg PO x1, then 250mg PO q24h
- Pediatric: Atovaquone 20mg/kg PO q12h (750mg max) PLUS Azithromycin 10mg/kg (500mg max) PO x1, then 5mg/kg (250mg) PO q24h
- Duration = 7-10 days

Anaplasmosis and Ehrlichiosis

- Adult: Doxycycline 100mg PO q12h
- Pediatric: Doxycycline 4.4mg/kg PO q12h (100mg max)
- Duration = 7-10 days (at least >3d after last fever)

SKIN AND SOFT TISSUE INFECTIONS (SSTI)

Nonpurulent Cellulitis:

- Adult: Cephalexin 500mg PO q6h
  OR Dicloxacillin 500mg PO q6h
- Pediatric: Cephalexin 15mg/kg/dose PO q8h (max 500mg/dose)
  OR Dicloxacillin 12.5mg/kg/dose PO q6h (max 500mg/dose)
- Duration: 5 days

Abscess and Purulent Cellulitis:

- Adult: Trim-sul 1-2DS tab PO q12h (5mg/kg IV q12h)
  OR Doxycycline 100mg IV/PO q12h
- Pediatric: Trim-sul 4-6 mg/kg/dose PO q12h (max 160mg Trim/dose)
  OR Doxycycline 2mg/kg PO q12h (max 100mg/dose)
- Duration: 5 days

Diabetic Foot Ulcer (Mild): Only skin/tissue and erythema ≤ 2 cm

- Cephalexin 500mg PO q6h
  OR Dicloxacillin 500mg PO q6h
  - If history of MRSA: ADD TMP/SMX 2DS PO q12h OR Doxy 100mg PO q12h AND MRSA PCR-SSTI
- Duration: 5-14 days

Animal Bite Prophylaxis and Treatment: Indications for antibiotic prophylaxis include: Severe injury < 8h, crush injury, bone or joint penetration, wound of the face/hands/genitals, immunosuppressed host, asplenia, or advanced liver disease

- Adult first-line: Amox-Clav 875/125mg PO q12h
- Adult alternate: Doxycycline 100mg PO q12h
- Pediatric First-line: Amox-Clav 25 mg/kg/dose PO q12h (max 875mg/dose)
- Pediatric alternate for penicillin allergy: Clindamycin 10 mg/kg/dose PO q8h (max 450mg/dose) PLUS Trim-sul 5 mg/kg/dose PO q12h (max 160mg/dose)
- Duration:
  - Prophylaxis: 3 days
  - Treatment of mild infection: 5 days
  - Treatment with delayed response: 5-14 days