



UC Davis Health Antimicrobial Stewardship Program

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January-February 2023

The UC Davis Antimicrobial Stewardship Program (ASP) was first established in 1986 and then expanded in pediatrics in 2011 and hospital wide in 2013 in response to the growing challenge of antibiotic resistance. Due to increasing antibiotic resistance, patients are at a higher risk for adverse effects and poor outcomes and treatment strategies become more complex.

Antibiotics are life-saving drugs, and their use has important implications for patient care and public health. With this in mind, the UC Davis Health ASP strives to ensure all patients receive optimal antibiotic therapy when indicated. We thank you for your support in putting this very important program into action.

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ASM MicrobeLibrary © Cham

Image: *Bacillus anthracis*: String of Pearls Reaction.

<https://asm.org/Image-Gallery/Bacillus-Anthraxis-String-of-Pearls-Reaction>

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Community-Acquired Pneumonia (CAP)

Diagnosis

- Most patients have fever, cough and sputum production; many will also have chills (50%), tachypnea (45%), or pleuritic chest pain (30%)
- If symptoms are present, a chest x-ray (CXR) should be obtained; the absence of an infiltrate makes the diagnosis unlikely
- Infiltrate on CXR or chest CT without signs and symptoms of CAP is unlikely to represent CAP
- Microbiology: *Streptococcus pneumoniae*, *Haemophilus influenzae*, *Legionella pneumophila*
- Obtain sputum culture and *S. pneumoniae* urinary Ag for those with severe disease or risk factors for resistance
- Obtain *Legionella* urinary Ag for those with severe disease or significant immunocompromise
- Obtain blood cultures for those with severe disease or with evidence of parapneumonic effusion
- Obtain viral respiratory testing or PCT during respiratory virus season if it will change care

Treatment

• Empiric therapy

- Cover for *S. pneumoniae*, *H. influenzae*, *Legionella*
- Avoidance of antibiotics with strong association with *Clostridium difficile* infection is recommended (e.g., fluoroquinolones > ceftriaxone > ampicillin/sulbactam)
- In patient with a recent respiratory viral infection presenting with new pneumonia, coverage for *Staphylococcus aureus*, including methicillin-resistant *S. aureus* (MRSA) in addition to standard CAP antibiotics should be considered
- Consider coverage for *Pseudomonas aeruginosa* if patient is from a long-term care facility or has significant immunocompromise
- Ceftriaxone 2 g IV q24h + Doxycycline 100 mg IV/PO q12h
- If high risk for MRSA: add vancomycin
- If high risk for *Pseudomonas*: change ceftriaxone to cefepime 2 g IV q8hrs
- If severe PCN allergy: Levofloxacin 750 mg IV/PO q24h

• Narrowing and oral therapy

- Use sputum culture results to narrow therapy; if organism is susceptible to ampicillin or if the *S. pneumoniae* urinary antigen is positive, switch to ampicillin (IV) or amoxicillin (PO)
- Stop azithromycin after 3 days unless treating *Legionella*
- If cultures are negative or not obtained, narrow to amoxicillin/clavulanate or oral third-generation cephalosporins (reserve fluoroquinolones for severe PCN allergy)
- In most cases, stop antibiotics if viral respiratory testing is positive
- After clinical improvement is observed, convert from intravenous to oral therapy
- Amoxicillin/clavulanate 2 g PO BID
- If severe PCN allergy: Levofloxacin 750 mg PO q24h
 - The fluoroquinolones are associated with greater *C difficile* and side effects risks

Duration

- 5 days if clinical response by day 3 for most patients
- 7 days if patient is immunocompromised, has underlying structural lung disease, or did not have clinical response by day 3
- If the patient has *Legionella*, *P. aeruginosa*, or *S. aureus*, longer durations of therapy are usually required, particularly if there is associated bacteremia

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Azithromycin in CAP

A macrolide can be considered for the treatment of CAP in the *outpatient* setting if local *S. pneumoniae* resistance is low (< 25%, CA resistance is ~25%)^{1,2} and in the *inpatient* setting in combination with a beta-lactam antibiotic (due to data suggesting possible improved outcomes with combo Rx).²



3 days

Short Regimen

500 mg daily x 3 days



vs

5+ days

Traditional "Z-Pack"

500 mg x 1 → 250 mg daily x 4 days

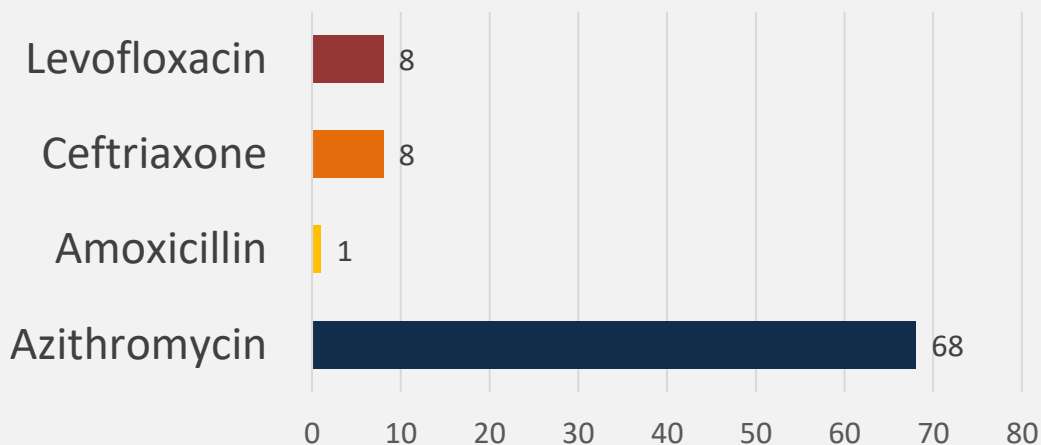


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Due to azithromycin's long half life, shorter courses (3 days) have been studied for CAP, and to date been found to be non-inferior to longer courses (5+ days).³⁻⁵

CAP Antibiotic Half Lives (hrs)



Test Your Knowledge

Would you like to win a \$10 gift certificate to Starbucks? Complete the following post-newsletter quiz and submit to hs-ASP@ucdavis.edu to be entered into a raffle for a free lunch!

A 63-year-old female with Type II diabetes is seen in the ED following 24 hours of cough and shortness of breath. She is hemodynamically stable, but febrile to 101 °F. Exam is notable for some lower right-sided crackles on auscultation of her lungs, but she is otherwise non-toxic appearing. Her CBC is unremarkable. She is admitted overnight for observation.

1. What empiric antibiotic course is most appropriate for this patient?
 - a. Cefepime 2 g IV q8h + Vancomycin 15 mg/kg IV x 1
 - b. Ceftriaxone 2 g IV q24h + Doxycycline 100 mg IV/PO q12h
 - c. Ciprofloxacin 500 mg PO q12h
2. True or False: In patients with uncomplicated pneumonia and no risk factors for drug resistance, a respiratory fluoroquinolone will have the same *C difficile* and side effect risks as amoxicillin-clavulanate with equal efficacy and easier compliance?
3. What is the duration of treatment for this patient's CAP assuming improvement by day 3?
 - a. 5 days
 - b. 7 days
 - c. 10 days
4. True or False: for CAP, 3 days of azithromycin 500 mg daily is as effective as longer courses due to its long half-life.

Answers to last Newsletter's quiz: 1. C, 2. F, 3. B, 4. T

ASP Gold Star Winners for January 2023



The following staff have been recognized by the ASP team for their dedication to combatting antimicrobial resistance and commitment to the principles of antimicrobial stewardship:

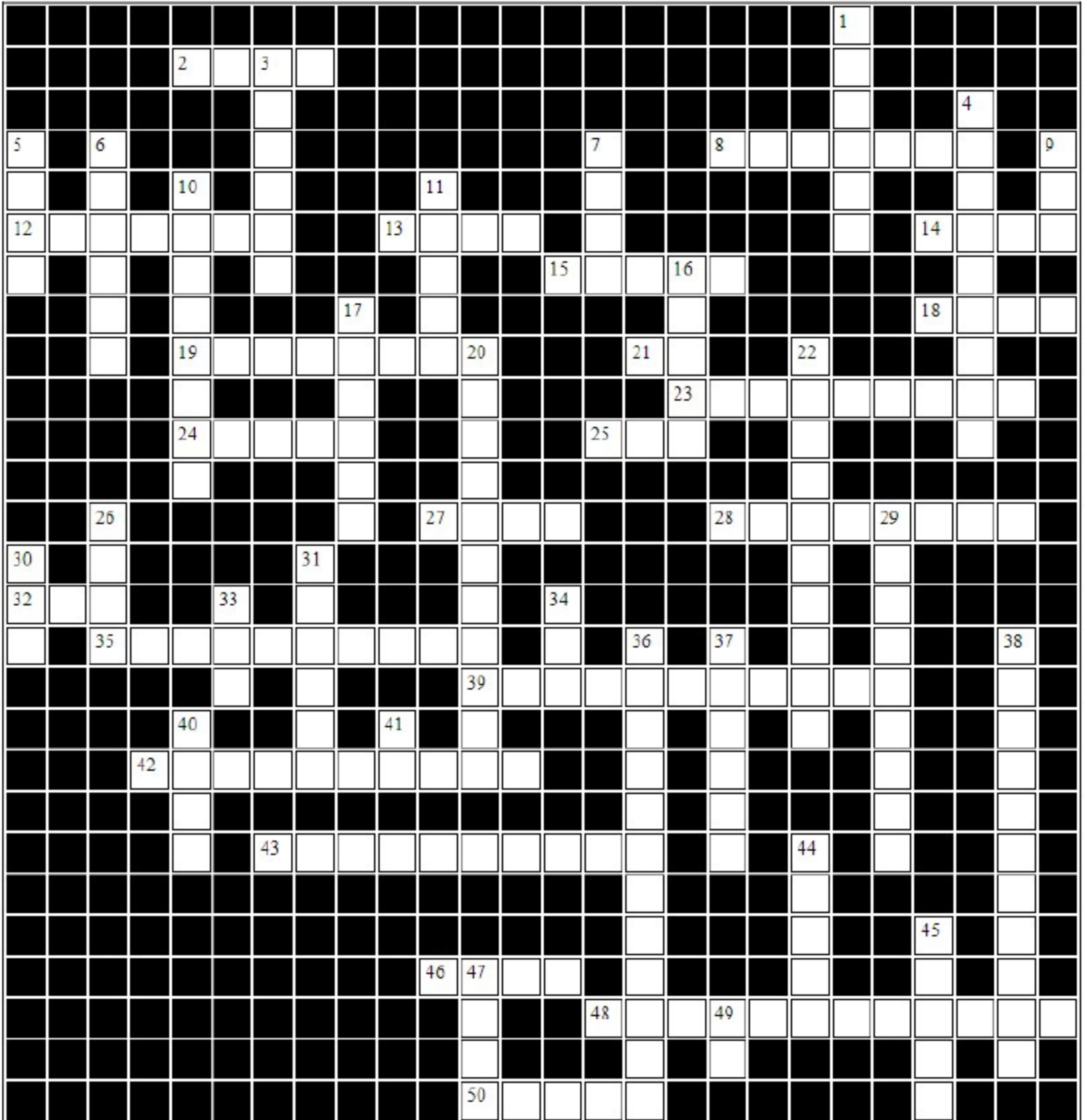
- Monica Wright
- Jennifer McGrath

Quick Antibiotic Fact:

Amox-Clav

Ideal for animal bites, odontogenic disease, and uncomplicated GI infections, clindamycin for anaerobes is going the way of the dodo.

WORLD ANTIMICROBIAL AWARENESS WEEK ^{2.0} CROSSWORD CHALLENGE



WORLD ANTIMICROBIAL AWARENESS WEEK CROSSWORD CHALLENGE

2.0

Across

- '_____penem': carbapenem lacking coverage against Acinetobacter, Pseudomonas, and Enterococcus
- Alternative for PJP prophylaxis; avoid in patients with G6PD deficiency
- Dental plaque, endocarditis, and infections involving prostheses
- '_____conazole': an azole with activity against Aspergillus spp. And Zygomycetes spp.
- '_____cycline': associated with photosensitivity and esophagitis
- Group of fastidious Gram-negative bacteria that are commensals of the human oropharynx and associated with infective endocarditis
- '_____conazole': an azole associated with photopsia or flashes of light
- '_____azole': activity against anaerobic bacteria and protozoa such as Giardia lamblia and Entamoeba histolytica
- Avoid macrolides, aminoglycosides, and fluoroquinolones in patients with this condition
- Associated with thrombocytopenia and serotonin syndrome
- '_____conazole': an azole associated with shortening of the QT interval
- Asymptomatic Bacteriuria: Symptom Free _____, Let it Be (National campaign from Association of Medical Microbiology and Infectious Disease Canada)
- First name of Irish American cook known to have infected between 51 and 122 people with typhoid fever
- Contraindicated in patients with HLA-B*5701 allele given risk of potentially life-threatening hypersensitivity reaction
- Produced during a type 1 hypersensitivity reaction to an allergen
- Discovered by Sir Alexander Fleming in 1928 and treatment of choice for syphilis
- Third-generation cephalosporin with activity against Pseudomonas spp.
- Inhibits daptomycin
- With which Amphotericin B binds in a fungal cell membrane
- '_____cycline': glycylicycline binds to 30S ribosomal subunit; FDA issued black box warning for increased risk of death
- Class of antifungals that poorly penetrate the CSF, urine, and eyes
- Emerging Candida spp. with multi-drug resistance, first described in 2009

Down

- Candida spp. inherently resistant to fluconazole
- Used for prophylaxis and treatment for Pneumocystis pneumonia (PJP) in patients with HIV with CD4 counts
- Associated with Fanconi's syndrome
- Enzymes produced by some Enterobacteriales that can render penicillins and cephalosporins ineffective
- _____ sensing: bacterial cell to cell communication process
- Possesses the mecA gene which produces penicillin binding protein 2a (PBP2a)
- '_____clovir': antiviral with activity against HSV-1, HSV-2, and VZV; can cause crystal-induced acute kidney injury when given intravenously
- Causes an orange or red-orange discoloration of body fluids such as urine, sweat, and tears
- Staphylococcus aureus: Gram positive _____ in clusters
- _____ effect: reduced anti-bacterial effect of beta-lactams with high inoculum of bacteria
- '_____gravir': associated with small increased risk of neural tube defects in women who became pregnant while taking this integrase inhibitor
- Long acting lipoglycopeptide, MRSA activity; treatment of acute bacterial skin and skin structure infections (ABSSSI)
- Aminoglycoside associated with ototoxicity and nephrotoxicity
- Emtricitabine/tenofovir disoproxil fumarate, emtricitabine/tenofovir alafenamide, cabotegravir are options for HIV _____
- Monobactam with no cross-resistance with beta-lactams
- Lowest concentration at which a drug prevents visible growth of a bacteria
- '_____mycin': lincosamide associated with high risk of Clostridioides difficile infection
- Undetectable = untransmissible (U = U)
- Trimethoprim inhibits reduction of dihydrofolic acid (DHF) to _____
- When this Streptococcus spp. is cultured in the blood, consider colonoscopy; note taxonomic reclassification in 2003
- '_____micin': a macrocyclic antibiotic with activity against Clostridioides difficile
- Antimicrobial _____: efforts to improve antimicrobial prescribing practices
- Fosfomycin inhibits this enzyme
- Prolongation with fluoroquinolones, macrolides, and azoles
- '_____mycin': associated with rhabdomyolysis and eosinophilic pneumonia
- '_____mycin': nicknamed "Mississippi Mud"
- '_____conazole': an azole associated with congestive heart failure due to negative inotropic effects
- Improved patient outcomes when consulted for Staphylococcus aureus and Enterococcus spp. bacteremia, and candidemia

Contact Us

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Antibiotic questions? Contact us.

<https://health.ucdavis.edu/antibiotic-stewardship/>

See the On-Call Schedule for the ASP attending/fellow of the day

Contact the ASP Pharmacist at 916-703-4099 or by Vocera "Infectious Disease Pharmacist"