



Evidence-based Strategies to Avoid Prescribing Unnecessary Antibiotics

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Conflict of Interest Disclosure

Robert Redwood MD, MPH has no real or apparent financial relationships to report.

Aims and Outline

- Background on Antimicrobial Stewardship
- Identify common clinical scenarios where abx are overused
- Opportunities to not prescribe
- Opportunities to prescribe less

Core Principles of AMS

- Antimicrobials exert selective pressure on pathogens
- Top 3: Meat industry, vets, human medicine
- Worldwide: 700,000 annual deaths attributable to nosocomial-resistant organisms
- US: 2,049,442 illnesses and 23,000 deaths / yr
- Sequelae of AMR costs the US \$21-\$34 billion with 8 million additional patient-days in the hospital
- Right dx, right drug, right dose, right duration

Oh...and there's this

- 1980's: 16 new abx
- 1990's: 10 new abx
- 2000's: 5 new abx
- 2008-2012: 1 new abx
- Only 5 of 572 pharmaceutical companies have active antibacterial discovery programs



Oh...and then there's this

**Superbug resistant to every antibiotic
available in US kills Nevada woman
January 13, 2017**

*“It was tested against everything that’s available in the
United States... and was not effective”*

Dr Alexander Kallen, a medical officer with the CDC who
first reported the discovery of the superbug



<http://www.pbs.org/newshour/rundown/superbug-resistant-every-available-antibiotic-u-s-kills-nevada-woman/>

What is antibiotic overuse?

- Abx when a viral pathogen is known/suspected (except critical care)
- Abx that is unlikely to be effective against the suspected pathogen
- An overly broad spectrum abx for the suspected pathogen
- Double-coverage abx when single-coverage is recommended
- Abx for longer/higher dose than the literature recs
- Abx for infection prophylaxis without sufficient evidence

Treat or not? CASE #1

- 43yoM with bilateral sinus pressure and cough for 5 days. Thick yellow nasal drainage and fever of 100.2. Reports sinus infections every winter, usually gets a “Z-pack” with good results.



What is Acute Bacterial Rhinosynovitis?

- **Bacterial Sinus Infection**
 - *S. pneumoniae*, non-typeable *H. influenzae*, and *M. catarrhalis*
- 80% of true ABRS resolves within 2 weeks w/o tx
- NNT to relieve sx = 18
- NNH (side effects) = 8
- Incidence of
 - Brain abscess + Periorbital cellulitis + Meningitis = 3.7% among hospitalized pts
- Treat if:
 - 10 days of cough w/o improvement
 - *Severe* facial pain and fever for 3-4 days
 - URI with congestion then “doubling” of symptoms
 - 80% are hemophilus or Strep P → amox BID 10d

Why is it over treated?

- Viral sinusitis is misdiagnosed as ABRS.
 - 99% of sinusitis is viral
 - 81% of patients get abx
- True ABRS is treated more aggressively than necessary.
- Patient expectations

Clinical Pearl: What Works

- Saline irrigation 
- Intranasal steroids 
- Oral decongestants 
- Nasal decongestants 
- Antihistamines 
- Mucolytics 

Treat or not? CASE #2

- Healthy 3yoF with 2d of fever (101.5) and right ear pain. Rt TM looks like this.



What is Acute Otitis Media?

- **Bacterial Middle Ear Infection**
 - *S. pneumoniae*, nontypeable *H. influenzae*, and *M. catarrhalis*
- 60% of true AOMs resolve in 24h w/o tx
- NNT to relieve sx = 20
- NNT to prevent TM rupt = 33
- Incidence of
 - Mastoiditis = 0.004%
 - Meningitis = 0.00042%
- Parental dx (low spec)
- Erythematous TM (low spec)
- Pain (low spec)
- Bulging TM
- Purulence
- Air fluid levels
- Opaque TM
- Loss of light reflex
- Loss of bony landmarks
- Immobility on pneumatic otoscopy

Why is it over treated?

- Viral otitis media is misdiagnosed as AOM.
 - 51-78% of bacterial dx are truly bacterial
- Otitis externa is misdiagnosed or mistreated
- True AOM is treated more aggressively than necessary.

Clinical Pearl:

- Viruses can cause eustachian tube spasm which creates a vacuum effect causing:
 - Pain
 - Effusion
 - Loss of bony landmarks
 - Occasionally retraction of TM

Treat or not? CASE #3

- 65yoF w/o symptoms grows pseudomonas on pre-op screening urine culture before TKA.



What is asymptomatic bacteriuria?

- An “asymptomatic urinary tract infection”
- an isolation of bacteria in an appropriately collected urine sample from an individual without signs or symptoms referable to a urinary infection

Epidemiology of asymptomatic bacteriuria

- Health women: 2-5%
- Pregnant women: 2-11%
- Diabetic women: 7-9%
- Elderly: nursing home: 5-50%
 - Varies widely because prevalence of ASB corresponds to level of functional impairment
- Spinal cord injury: 50%
- Long-term catheter: 100%
- 80% discordance between recommended practices and actual practices



Why is it over treated?

- Catheter myths: Foul smelling, dark, or sediment in foley catheter bag
- Convenience screening or non-evidence based screening (“The patient peed doc, send a UA?”)
- Contaminated sample incorrectly treated empirically or incorrectly sent for culture
- Protocol inertia: i.e. “Positive UA” on medical clearance for psych or jail (ED)

The three times it's ok to screen for and treat asymptomatic bacteriuria

- Once in early pregnancy
 - only treat if two positive cultures
- Pre-urologic procedure (usually TURP)
- Post-renal transplant
 - Although growing body of evidence against this

HALL PASS

Room Number: _____

Teacher: _____

Only ONE person may use this pass at any given time

Treat or not? CASE #4

- 49yoM with a deep, black fissure in his first pre-molar. Its been 10/10 pain for 5 days, gums are red and tender, (no fever, lymph node involvement, or diffuse swelling)



What is pulpal, periapical, & gingival pain?

- In this case it's a chronic apical abscess.
- Other causes of pulpal, periapical, & gingival pain that do not require antibiotics are:

Caries	Reversible pulpitis	Irreversible pulpitis
Apical periodontitis	Tooth impaction	Gingival recession
Gingivitis	Exostosis	Dry socket

Why is it over treated?

- Waste-basket diagnoses like “Dental infection” or “Dental abscess” are misleading and push providers towards unnecessary abx.
- Patient expectations
- When to treat with abx:
 - drainage is not possible AND there is evidence of spreading infection (PCN)
- Real treatment is source control and surgical debridement

Cope A, et al. Systemic antibiotics for symptomatic apical periodontitis and acute apical abscess in adults. Cochrane Database Syst Rev. 2014; 6.

Treat or not? CASE #5

- 14yoM presents to the clinic with fever of 102.2 for 2 days, cough, BL submandibular lymph nodes, and classmate with culture proven Group A Strep.



What is Group A Strep Pharyngitis?

- “Strep throat”
- Non-invasive bacterial infection of the pharyngeal epithelial cells (*usually S Pyogenes*)
- Improves w/o treatment in 3-4days, abx reduce length of symptoms by 16 hours
- 0.03% get a PTA, 0.00045% get Rheum fever

Why is it over treated?

- Viral pharyngitis is misdiagnosed as GAS.
- Clinicians either do not use or misuse CENTOR criteria
- With 5/5 Centor, chance of GAS is only 56%
- Culture for score of 2-3, Rapid test+culture for score of 4-5, Don't tx w/o test:
- C - Cough absent
- E - Exudate
- N - Nodes
- T - temperature (fever)
- OR - young OR old modifier

Coming Soon...Shorter Treatment Durations

“Most treatment periods that appear in textbooks are lacking scientific evidence”

Evidence-based short regimens exist for:

- S Pneumo CAP (3d vs 8d)
- Meningococcal men (3d vs 7d)
- Typhoid fever (3d vs 14d)
- VAP (8d vs 14d)

Patient Criteria for Short Abx Course

- Fully susceptible pathogen to the administered agent(s)
- Infectious site accessible to abx
- Acute infection with a single pathogen
- No foreign body
- No abscesses
- Extracellular pathogen
- Patient with normal defenses



Summary and Questions

- Treat sinusitis as viral unless strict criteria are met.
- Consider watch and wait prescriptions with acute otitis media (if diagnosis is uncertain).
- Avoid screening for and treating asymptomatic bacteriuria.
- Avoid antibiotics for routine dentalgia
- Use the modified Centor Score for pharyngitis.