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

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 reccs
- Abx for infection prophylaxis without sufficient evidence



Treat or not? CASE #1

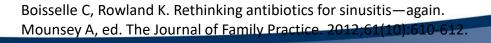
 43yoM with bilateral sinus pressure and cough for 5 days. Thick yellow nasal drainage and fever of 100.2. Reports sinus infections every winter, usually gets a "Z-pack" with good results.



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



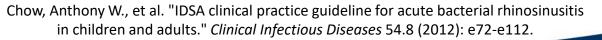












Treat or not? CASE #2

 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



Kronman, Matthew P., Chuan Zhou, and Rita Mangione-Smith. "Bacterial prevalence and antimicrobial prescribing trends for acute respiratory tract infections." *Pediatrics* 134.4 (2014): e956-e965.

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 bodyof evidence against this



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

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 "Most treatment periods that "Simple statement periods that "S

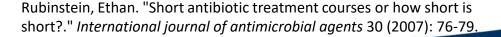
appear in textbooks are lacking scientific evidence"

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.