OUTPATIENT ANTIBIOTIC STEWARDSHIP: CHALLENGES AND OPPORTUNITIES

Zach Willis, MD, MPH

NEED FOR OUTPATIENT STEWARDSHIP

80-90% of all antibiotic consumption by outpatients

At least **30%** of outpatient antibiotics are unnecessary

50% of antibiotics for acute respiratory infections are unnecessary

$10.7 billion spent annually on outpatient antibiotics

Nearly **five times** more antibiotics prescribed in highest-use state compared to lowest-use state

CDC Core Elements of Outpatient Stewardship

https://www.cdc.gov/antibiotic-use/community/pdfs/16_268900-A_CoreElementsOutpatient_508.pdf

HOW TO OVERUSE ANTIBIOTICS

Unnecessary antibiotics

Prescribing when not indicated

Excessive Spectrum

Treatment not targeted

Excessive Duration

Longer courses than necessary

What are the biggest needs in ambulatory antibiotic stewardship?

What are the most common problems you perceive?

How much antibiotic overuse is driven by patients vs providers?

How might prescribers, pharmacists, non-prescribing HCWs, and patients see this problem differently?

How will messaging be different for these groups?

How can different HCW stakeholders pull their weight in ambulatory antibiotic stewardship?

ANTIBIOTIC HARMS

Association Between Outpatient Antibiotic Prescribing Practices and Community-Associated *Clostridium difficile* Infection

Raymund Dantes,[1] Yi Mu,[1] Lauri A. Hicks,[1] Jessica Cohen,[1,2] Wendy Bamberg,[3] Zintars G. Beldavs,[4] Ghinwa Dumyati,[5] Monica M. Farley,[6,7] Stacy Holzbauer,[8] James Meek,[9] Erin Phipps,[10] Lucy Wilson,[11,12] Lisa G. Winston,[13,14] L. Clifford McDonald,[1] and Fernanda C. Lessa[1]

10% Reduction in:	Would reduce CA-CDI by:
Penicillins	12.1%
Clindamycin	7.6%
Cephalosporins	7.5%
Fluoroquinolones	4.8%
All antibiotic prescribing	**16.8%**

US Emergency Department Visits for Outpatient Adverse Drug Events, 2013-2014

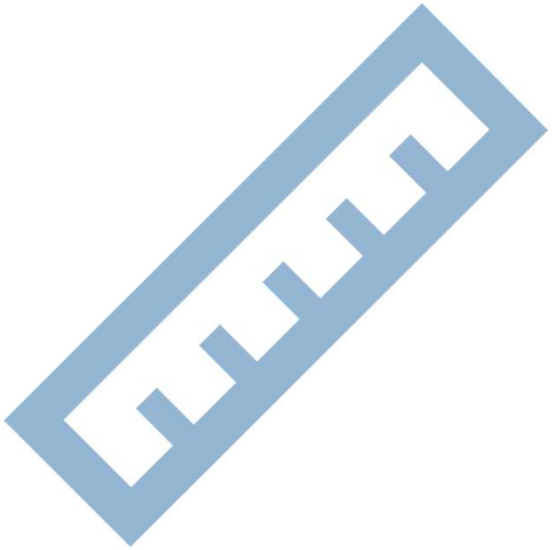
Shehab, et al., *JAMA* 2016

- ED-based surveillance, sampling nationwide
- Antimicrobials caused ~16% of ED visits for adverse drug events (ADEs)
  - #2, between anticoagulant/antiplatelet drugs and diabetes drugs
- 7% of cases required inpatient admission (14.5% of quinolone-related events)

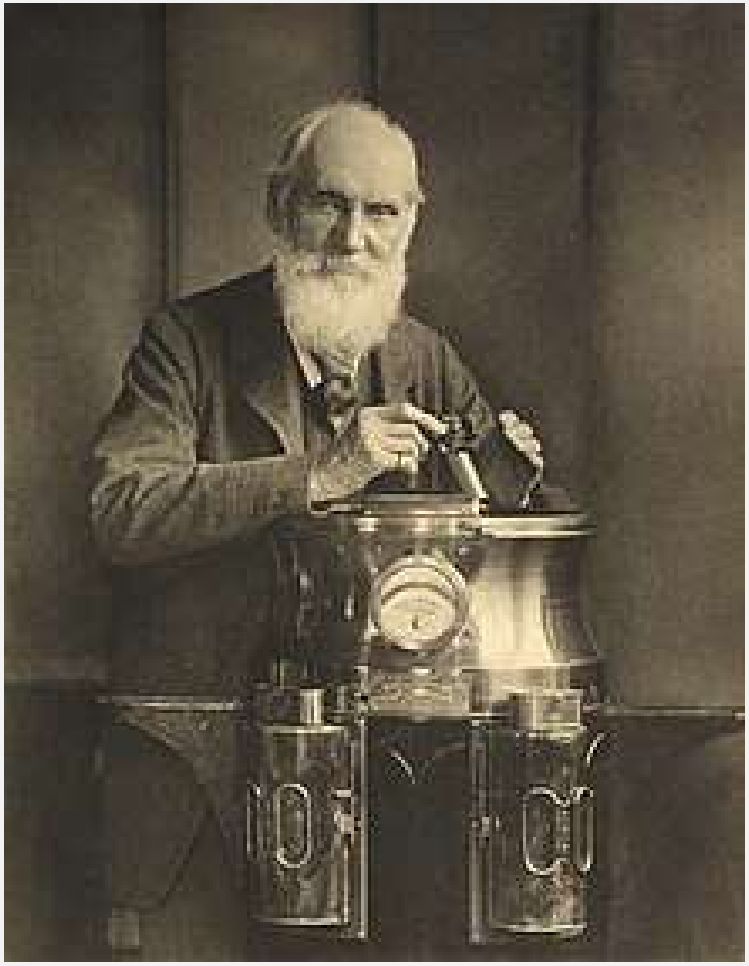
Have you done a QI or safety project in your current practice? Could similar strategies work for antibiotic stewardship?

What are the main obstacles to outpatient antibiotic stewardship?

What strategies might work to improve antibiotic prescribing?



MEASUREMENT



“If you can not measure it, you can not improve it”

Lord Kelvin

A GOOD TARGET SHOULD BE…

Common	Impactful	Measurable	Actionable
• Salient to clinicians • Measurable impact in reasonable timeframe	• Avoiding toxicity, preventing *C-diff* • Maximizing efficacy	• Data is available • Metric matches the desired change	• Clear plan for change • Sensible for stakeholders


S
Specific
M
Measurable
A
Attainable
R
Relevant
T
Time-Bound

STEWARDSHIP STRATEGIES

EVIDENCE-BASED STRATEGIES

Strategy	Example
Peer Comparison	Clinician Report Card: "You were in the 73rd percentile for antibiotic avoidance for bronchitis this quarter"
Clinical Decision Support	Diagnosis-based antibiotic suggestions in the EHR
Nudging Strategies	Pre-set most appropriate (short) duration on antibiotic orders
Communication Training	"It's just a virus" vs "Good news, there's no evidence of bacterial infection"

COMMUNICATION TRAINING FOR ANTIBIOTIC STEWARDSHIP

Review Findings	Review your physical exam findings • "Lungs sound nice and clear"
Deliver Diagnosis	Deliver a clear diagnosis • "You have bronchitis"
Two-Part Recommendation	Use a two-part negative/positive treatment recommendation • Negative: "This is caused by a virus that antibiotics won't touch" • Positive: what things the patient can do to feel better • Start with negative and then do positive – shift the focus away from antibiotics
Contingency	Provide a contingency plan • "If you don't feel better by Thursday, call me back."

What is the significance of antibiotic allergies in antibiotic stewardship?

The Impact of a Reported Penicillin Allergy on Surgical Site Infection Risk

Kimberly G. Blumenthal,[1,2,3,4] Erin E. Ryan,[5,6] Yu Li,[1,2] Hang Lee,[4,7] James L. Kuhlen,[8] and Erica S. Shenoy[2,4,5,6]

[1]Division of Rheumatology, Allergy, and Immunology, Department of Medicine, [2]Medical Practice Evaluation Center, and [3]Edward P. Lawrence Center for Quality and Safety, Massachusetts General Hospital, Boston, [4]Harvard Medical School, Boston, [5]Division of Infectious Disease, Department of Medicine, [6]Infection Control Unit, and [7]Biostatistics Center, Massachusetts General Hospital, Boston; and [8]Acadia Allergy and Immunology, Department of Medicine, University of South Carolina School of Medicine, Greenville, South Carolina

- Analysis of patients undergoing one of 5 common surgeries at Mass Gen
- Penicillin allergy: adjusted OR of 1.51 (1.02-2.22) for surgical site infection
  - Only 12% received cefazolin (92% of penicillin non-allergic)
  - 49% of penicillin-allergic received clindamycin and 35% received vancomycin

Patients reporting penicillin allergy had 51% higher odds of surgical site infection.

Clinical Infectious Diseases, 2017

Recorded Penicillin Allergy and Risk of Mortality: a Population-Based Matched Cohort Study

Kimberly G. Blumenthal, MD, MSc[1,2,3,4], Na Lu, MPH[1,5], Yuqing Zhang, DSc[1,3,4,5], Rochelle P. Walensky, MD, MPH[2,3,4,6], and Hyon K. Choi, MD, DrPH[1,3,4]

- 63,690 patients with penicillin allergy; 237,167 patients without
- Median follow-up: 6 years
- Adjusted hazard ratio for mortality: 1.14 (1.12-1.17)

Patients reporting penicillin allergies were 14% more likely to die

Journal of General Internal Medicine, 2019

PENICILLIN ALLERGIES: IMPACT

- 10% of all patients report a penicillin allergy
- **Only 10% of allergy reporters are *actually* allergic**
- Reported penicillin allergy is associated with increased risk of:
  - Surgical-site infection
  - MRSA infection
  - C-diff
- Alternative antibiotics are often:
  - Broader-spectrum
  - Less effective
  - More likely to cause C-diff

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Toolkit A

Penicillin Allergy History

Patient ID/ Sticker:

Date of reaction: _____

Route of last administration: ☐ Oral ☐ Intravenous

Reaction details (check all that apply):

Intolerance histories

- ☐ Isolated GI upset (diarrhea, nausea, vomiting, abdominal pain)
- ☐ Chills (rigors)
- ☐ Headache
- ☐ Fatigue

Low-risk allergy histories

- ☐ Family history
- ☐ Itching (pruritus)
- ☐ Unknown, remote (> 10 yr ago) reaction
- ☐ Patient denies allergy but is on record

Moderate-high risk allergy histories (potential IgE reactions)

- ☐ Anaphylaxis
- ☐ Angioedema/swelling
- ☐ Bronchospasm (chest tightness)
- ☐ Cough
- ☐ Nasal symptoms
- ☐ Arrhythmia
- ☐ Throat tightness
- ☐ Hypotension
- ☐ Flushing/redness
- ☐ Shortness of breath
- ☐ Rash
- ☐ Syncope/pass out
- ☐ Wheezing
- ☐ Dizzy/lightheadedness

Type of rash (if known):

HIGH RISK: Contraindicated penicillin skin testing/challenge (potential severe non-immediate reactions)

- ☐ Stevens-Johnson syndrome (rash with mucosal lesions)
- ☐ Serum sickness (rash with joint pain, fever, myalgia)
- ☐ Thrombocytopenia
- ☐ Fever
- ☐ Organ injury (liver, kidney)
- ☐ Erythema multiforme (rash with target lesions)
- ☐ Dystonia
- ☐ Anemia
- ☐ Acute generalized exanthematous (rash with pustules)
- ☐ Drug reaction eosinophilia and systemic symptoms (rash with eosinophilia and organ injury)

Other symptoms:

Continue to second page

A
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Toolkit A (continued)

Patient ID/ Sticker:

Timing/onset:

- ☐ Immediate (< 4 hrs)
- ☐ Intermediate (4-24 hrs)
- ☐ Delayed (> 24 hrs)
- ☐ Unknown

Treatment:

- ☐ None/penicillin continued
- ☐ Steroids (IV or PO)
- ☐ Penicillin discontinued
- ☐ Other:
- ☐ Antihistamines
- ☐ Epinephrine
- ☐ IV Fluids

How long ago was the reaction:

☐ < 6 mo ☐ 6 mo-1 yr ☐ 2-5 yrs ☐ 6-10 yrs ☐ > 10 yrs ☐ Unknown

Other beta-lactam use:

☐ Previous use of a penicillin or beta-lactam (prior to course that caused reaction)

If yes, please list drugs:

☐ Subsequent use of a penicillin or beta-lactam (after the course that caused a reaction)

If yes, please list drugs:

History taken by

Print name: _____ Signature: _____ Date: _____

HOW CAN AMBULATORY PROVIDERS HELP PATIENTS REPORTING ANTIBIOTIC ALLERGY?

Easy	Refer beta-lactam-allergic patients to an Allergist • Confirm that they do penicillin allergy testing • Prioritize patients likely to require beta-lactams in the future
Medium	Take detailed histories and de-label zero-risk patients • Family History only • Tolerated the antibiotic since the reaction was observed • Intolerance only (e.g., mild-moderate GI symptoms)
Hard	Perform amoxicillin or cephalosporin graded oral challenges • Requires ability to recognize and treat symptoms of Type I hypersensitivity

In your experience, what diagnoses are the most important to target in antibiotic stewardship?

Is this different based on patient population?

COMMON DIAGNOSES AND PROBLEMS

Diagnosis	Common Stewardship Problems		
	Overdiagnosis	Antibiotics too broad	Antibiotics too long
Acute Bacterial Sinusitis	+++	+	+
Pneumonia	++	+	+
Strep Throat	++	+	+
Acute Otitis Media	+	+/-	+
UTI	+++	+	+
Skin and Soft-Tissue Infections	+		++

ACUTE BACTERIAL SINUSITIS: PROBLEMS

Overdiagnosis	• Apply strict diagnostic criteria
Excessively broad-spectrum antibiotics	• Amox-clav (or amox in peds) is first-line • Cephalosporins not recommended!
Excessive durations	• 7 days generally appropriate for adults

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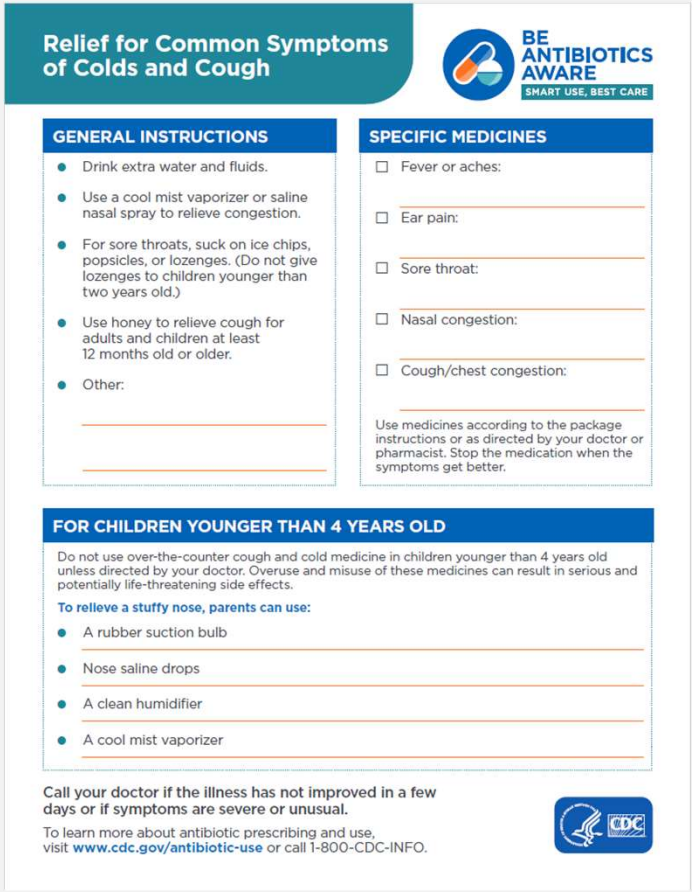
LOWER RESPIRATORY TRACT INFECTIONS: BRONCHITIS VS PNEUMONIA

Feature	Acute Bronchitis	Pneumonia
Fever	Uncommon, usually not >38.3	Common
Dyspnea and Tachypnea	None or mild	Mild to severe
Hypoxemia	Never	None to severe
Productive cough	Common	Common
Focal rales	Absent	Usually present
Chest X-ray (if done)	Normal or nonspecific bronchial thickening	Focal or multifocal consolidations

ACUTE BRONCHITIS: MANAGEMENT

- Effective pharmacologic interventions are limited
- Clinicians may use:
  - Benzonatate
  - Dextromethorphan
  - Guaifenesin
  - Acetaminophen or NSAIDs for myalgias, sore throat, etc.
- AVOID ANTIBIOTICS
- Identify and treat influenza and COVID-19



Relief for Common Symptoms of Colds and Cough

BE ANTIBIOTICS AWARE
SMART USE, BEST CARE

GENERAL INSTRUCTIONS

- Drink extra water and fluids.
- Use a cool mist vaporizer or saline nasal spray to relieve congestion.
- For sore throats, suck on ice chips, popsicles, or lozenges. (Do not give lozenges to children younger than two years old.)
- Use honey to relieve cough for adults and children at least 12 months old or older.
- Other:

SPECIFIC MEDICINES

- ☐ Fever or aches:
- ☐ Ear pain:
- ☐ Sore throat:
- ☐ Nasal congestion:
- ☐ Cough/chest congestion:

Use medicines according to the package instructions or as directed by your doctor or pharmacist. Stop the medication when the symptoms get better.

FOR CHILDREN YOUNGER THAN 4 YEARS OLD

Do not use over-the-counter cough and cold medicine in children younger than 4 years old unless directed by your doctor. Overuse and misuse of these medicines can result in serious and potentially life-threatening side effects.

To relieve a stuffy nose, parents can use:

- A rubber suction bulb
- Nose saline drops
- A clean humidifier
- A cool mist vaporizer

Call your doctor if the illness has not improved in a few days or if symptoms are severe or unusual.

To learn more about antibiotic prescribing and use, visit **www.cdc.gov/antibiotic-use** or call 1-800-CDC-INFO.

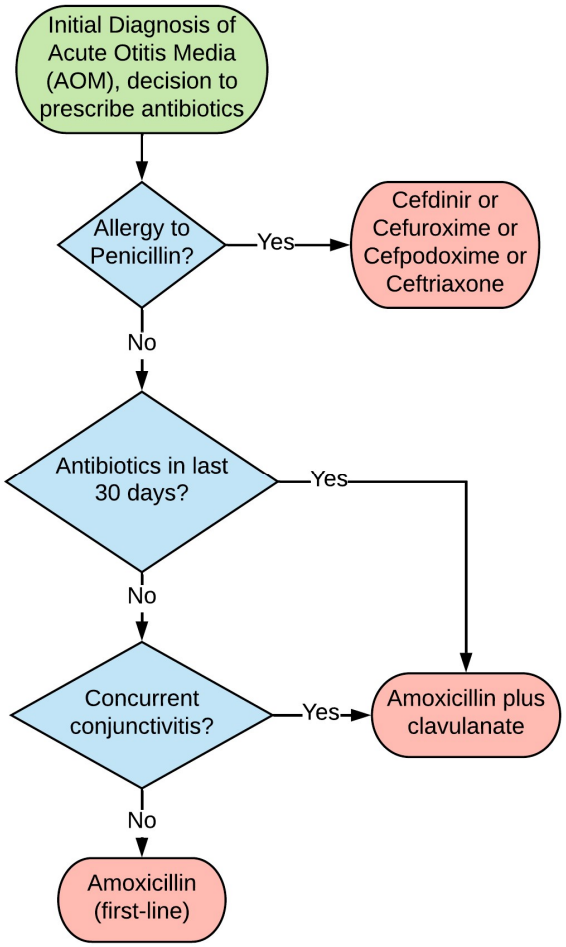
CDC

STREP THROAT: ANTIBIOTIC STEWARDSHIP OPPORTUNITIES

- Do NOT treat without a positive test
  - No presumptive treatment
  - Negative test → extremely unlikely to benefit from antibiotics
- Avoid over-testing
  - Ensure adequate pre-test probability
    - Centor criteria, screen for viral symptoms (cough, runny nose)
  - Avoid nurse-initiated throat swabs
- Use amoxicillin or penicillin unless allergic

ACUTE OTITIS MEDIA

- Amoxicillin is first-line unless:
  - Treated with amoxicillin in prior 30 days
  - *or* purulent conjunctivitis (usually *H. influenzae*)
  - Penicillin-allergic
- Duration:
  - <2 years or severe symptoms: 10 days
  - 2-5 years: 7 days
  - 6 years and up: 5-7 days
- Remember: oral cephalosporins are *much less* effective than high-dose amoxicillin against pneumococcus!
- Rarely recommended: azithromycin, TMP-SMX, clindamycin



URINARY TRACT INFECTION

- *Never* send a urine culture without urinalysis
- Avoid urine testing in patients with high likelihood of asymptomatic bacteriuria AND no specific symptoms of UTI
- Use cephalexin preferentially for patients who:
  - Do not require hospital admission
  - Do not have significant history of antibiotic-resistant UTI
- Stop antibiotics if urine culture is negative or mixed flora
- If initial broad antibiotics, target antibiotics in response to urine culture

SKIN AND SOFT-TISSUE INFECTIONS

CELLULITIS

- Narrow spectrum of therapy
  - Without MRSA risk factors, cephalexin highly effective
- 5-day duration as effective as 10 days
- Awareness of cellulitis mimics
  - E.g., venous stasis dermatitis

ABSCESS

- Most important: incision and drainage
  - Send cultures!
  - Sometimes drainage facilitated by warm compresses
- Antibiotics indicated if:
  - Fever or signs of sepsis
  - Immunocompromised patients, young infants, older adults
  - Multiple abscesses
  - Duration: 5 days

DISCUSSION

RESOURCES

- CDC Core Elements of Outpatient Antibiotic Stewardship
- Clinician Communication Training
  - DART: https://www.uwimtr.org/dart/
- NC DHS Antibiotic Prescribing Guidelines
  - Adult Antibiotic Prescribing Guidelines
  - Pediatric Antibiotic Prescribing Guidelines