Improving Antibiotic Use Across the Continuum of Care: Stewardship Opportunities in the Outpatient Setting

Chloe Bryson-Cahn, MD
Chief Fellow, Infectious Disease
University of Washington
UW Tele-Antimicrobial Stewardship Program (UW TASP)
• Recognize the role of antimicrobials in health care and how misuse leads to unintended consequences.

• Identify ways to improve antibiotic use in outpatient settings.

• Identify the Four Core Elements of Outpatient Antibiotic Stewardship and describe methods of achieving them.
Disclosures

• Financial Disclosures: None
19 year old man suffered a traumatic open leg injury in India arrives at Harborview Medical Center in Seattle for surgical revision of his amputation.

Wounds found to be infected with MDR Pseudomonas aeruginosa and Klebsiella pneumoniae.
Antibiotic Overuse

Antibiotics in humans and animals

2012
30% of antibiotics are consumed by humans
70% are consumed by animals

2010
63,200 tons

2030
105,600 tons

By 2030
Global consumption of antibiotics in livestock production to increase by two-thirds

Source: Review on antimicrobial resistance
Credit: Rebecca Robinson/LSHTM
Antibiotic Use and Resistance

Albrich, Emerg Infect Dis 2004
Antibiotics are in the top three drug classes leading to adverse drug event related ER visits for all ages.

Antibiotic resistant infections ->
  - higher healthcare costs
  - poor health outcomes
  - more toxic treatments

Antibiotic overuse strongly associated with the rise of C.diff infection
Dentists prescribe 10% of outpt antibiotics
15% of antibiotic associated C.diff infection cases in this study were dentist prescribed

Conclusion:
- Dental antibiotic prescribing rates and side-effects are likely underestimated
- C.diff infections from dentist prescribed antibiotics are not reported back

Antibiotic Prescribing for Dental Procedures in Community – Associated Clostridium difficile cases, Minnesota, 2009-2015
The Bright Side

- A 10% decrease in inappropriate antibiotic prescribing in the community -> nearly 20% reduction in C. diff infection.
- Effective stewardship programs
  - Decrease rates of antibiotic associated nephrotoxicity
  - Increase guideline concordant treatment (shown to impact mortality)
  - Decrease resistance at the population level

Dantes, OFID 2015
Schuts, Lancet 2016
Why Care about Outpatient Stewardship

Per Year in the US
- 35 million hospitalizations
- 141 million ED visits
- ~ 1 Billion outpatient visits
- 75%+ of antibiotic prescribing is done in the outpatient setting

https://www.cdc.gov/nchs/data/hus/hus16.pdf#076
Community Antibiotic Prescriptions per 1,000 Population by State - 2015

Each year 269.4 million antibiotic prescriptions are written in the United States; enough to give 4 out of every 5 people one prescription.

Data source: QuintilesIMS Xponent, 2015
ALASKA: LOWEST
533 prescriptions per 1,000 people

WEST VIRGINIA: HIGHEST
1,214 prescriptions per 1,000 people

Top 5 States with the Highest Antibiotic Use
1. West Virginia
2. Kentucky
3. Tennessee
4. Louisiana
5. Alabama

Source: Based on data obtained under license from IMS Health Xponent™ (Jan. 2006–Dec. 2007). IMS Health Incorporated. All Rights Reserved. The findings, conclusions, and views expressed do not necessarily reflect those of IMS Health or any of its affiliated or subsidiary entities.
Antibiotic Prescribing for Bronchitis

Figure. Antibiotic Prescribing for Acute Bronchitis in the United States by Site of Care, 1996-2010

<table>
<thead>
<tr>
<th>Period of Antibiotic Prescribing, y</th>
<th>Primary care</th>
<th>Emergency department</th>
</tr>
</thead>
<tbody>
<tr>
<td>1996-1998</td>
<td>80</td>
<td>70</td>
</tr>
<tr>
<td>1999-2001</td>
<td>70</td>
<td>60</td>
</tr>
<tr>
<td>2002-2004</td>
<td>60</td>
<td>50</td>
</tr>
<tr>
<td>2005-2007</td>
<td>50</td>
<td>40</td>
</tr>
<tr>
<td>2008-2010</td>
<td>40</td>
<td>30</td>
</tr>
</tbody>
</table>

No. of sampled visits

Barnett, JAMA 2014
Results from the Health Waste Calculator

Guess... Antibiotics for ARI, Pre-op Labs, PSA

Washington Health Alliance, “First Do No Harm”
CDC Core Elements – Antibiotic Stewardship

Nursing Home

Commitment

Action for policy and practice

Tracking and reporting

Education and expertise

Leadership commitment
Demonstrate support and commitment to safe and appropriate antibiotic use in your facility

Accountability
Identify physician, nursing and pharmacy leaders responsible for promoting and overseeing antibiotic stewardship activities in your facility

Drug expertise
Establish access to consultant pharmacists or other individuals with experience or training in antibiotic stewardship for your facility

Action
Implement at least one policy or practice to improve antibiotic use

Tracking
Monitor at least one process measure of antibiotic use and at least one outcome from antibiotic use in your facility

Reporting
Provide regular feedback on antibiotic use and resistance to prescribing clinicians, nursing staff, and other relevant staff

Education
Provide resources to clinicians, nursing staff, residents and families about antibiotic resistance and opportunities for improving antibiotic use

UWTASPP
Tetracycline antimicrobial stewardship program
“Demonstrate dedication to and accountability for optimizing antibiotic prescribing and patient safety.”

Opportunities/ Evidence based strategies:
- Identify a leader
- Regular meetings for priority setting
- Commitment from all team members
- Commitment posters
Public Commitment Letter

% of antibiotic inappropriate visits receiving antibiotics

Baseline Level

-20%

Control
55.7%

Intervention
33.7%

Meeker, JAMA 2014
Your health is important to me.

That’s why I’m signing the “Smart Use Guarantee.”

Antibiotics don’t work for viral infections like the common cold, most coughs, and most sore throats. Taking antibiotics when they don’t work can do more harm than good by causing stomach upset, diarrhea, or allergic reactions.

I guarantee I will do my best to prescribe antibiotics only when you need them.

Antibiotics can be life-saving, but bacteria are becoming more resistant. If we’re not careful about how we prescribe and use the antibiotics we’ve relied on for years, they might not work for us in the future. To learn more visit: cdc.gov.

Signature(s)

NEW YORK STATE  Department of Health

CDC Core Elements – Antibiotic Stewardship

- Commitment
- Action for policy and practice
- Tracking and reporting
- Education and expertise
• “Implement at least one policy or practice to improve antibiotic prescribing, assess whether it is working, and modify as needed.”

• Opportunities/ Evidence based strategies:
  • Use evidence-based diagnosis/treatment (IDSA, A2SC)
  • Local antibiograms
  • Diagnostic stewardship
  • Written justification
  • Improve triage systems
Improving Triage Systems

- 454,484 calls for URI symptoms managed by RN over the phone

Follow-up Outcome of Patients Receiving Advice

Harper, A J Manag Care, 2015
CDC Core Elements – Antibiotic Stewardship

- Commitment
- Action for policy and practice
- Tracking and reporting
- Education and expertise
“Monitor antibiotic prescribing practices and offer regular feedback to clinicians, or have clinicians assess their own antibiotic prescribing practices themselves.”

Goal: individual prescriber level, use data

Opportunities/ Evidence based strategies:
  • Monitor documentation of indication for Rx
  • Adherence to facility guidelines
  • Peer comparison
What are you Going to Measure?

- Measures of antibiotic use:
  - Prescription
  - Pharmacy dispense
  - Consumption (pill counts?)
- Inappropriate
- Guideline concordance
- Volume of antibiotic prescribed
- Prescription per unit time
- Percent prescribing by individuals/ season
What are you Going to Measure?

- Denominator
  - Per visit
  - Per population

- Primary Outcome
  - This is the real target of your stewardship project

- Secondary Outcome
  - Recommend eval for squeeze or dx shifting
  - All antibiotic prescribing
“You are a Top Performer”
You are in the top 10% of clinicians. You wrote 0 prescriptions out of 21 acute respiratory infection cases that did not warrant antibiotics.

“You are not a Top Performer”
Your inappropriate antibiotic prescribing rate is 15%. Top performers' rate is 0%. You wrote 3 prescriptions out of 20 acute respiratory infection cases that did not warrant antibiotics.
Peer Comparison

Adjusted Inappropriate Prescribing Rate, %

Days Relative to Intervention Start

Control
Peer comparison

Meeker, JAMA 2016
CDC Core Elements – Antibiotic Stewardship

- Commitment
- Action for policy and practice
- Tracking and reporting
- Education and expertise
“Provide educational resources to clinicians and patients on antibiotic prescribing, and ensure access to needed expertise on optimizing antibiotic prescribing.”

Opportunities/ Evidence based strategies:
- Effective communication with patients
- Patient education
- Staff and clinician education
- Ensure access to expertise
## TABLE 2

**Multivariate logistic regression model predicting physicians’ perceptions that parents expected antibiotics and parents’ reports of their expectations**

<table>
<thead>
<tr>
<th>Independent variables</th>
<th>Prediction that physician perceived that parent expected antibiotics OR (95% CI)</th>
<th>Prediction that parent reported expectations for antibiotics OR (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parent suggests “candidate” diagnosis</td>
<td>5.23 (3.74–7.31)</td>
<td>1.48 (0.94–2.32)</td>
</tr>
<tr>
<td>Parent resists viral diagnosis</td>
<td>2.73 (1.97–3.79)</td>
<td>0.69 (0.46–1.02)</td>
</tr>
<tr>
<td>Parent resists bacterial diagnosis</td>
<td>0.36 (0.10–1.27)</td>
<td>0.96 (0.33–2.80)</td>
</tr>
<tr>
<td>Parent resists treatment recommendation for viral diagnosis</td>
<td>3.18 (0.15–68.82)</td>
<td>1.14 (0.96–1.36)</td>
</tr>
<tr>
<td>Parent resists treatment recommendation for bacterial diagnosis</td>
<td>0.87 (0.06–12.44)</td>
<td>2.54 (0.50–12.90)</td>
</tr>
</tbody>
</table>
Communication Education

• A forthcoming publication…
• Provide:

• Once weekly meeting between WA state critical access hospitals and UW
  • 2 ID trained faculty, many ID fellows
  • ID trained Pharmacists
  • Microbiology fellow
  • Pharmacy and Medical Students and Residents
  • Washington DOH
  • CE credits available (CME, CNE, and pharmacy)
Project ECHO: How it works

- 10-15 min didactic
- De-identified cases sent in advance
- Clinicians present cases to specialist panel
- Multi-specialty co-management
- “Learning Loops”
Hospital Stewardship Program Teams

- Infection Prevention
- Pharmacy
- Microbiology
- Physicians

Diagram showing the integration of various teams and departments within a hospital setting.
ZOOM: Face to face
Welcome to UW TASP!

The University of Washington Tele-Antimicrobial Stewardship Program (UW TASP) offers weekly video conferences to bring together UW physicians, pharmacists, and clinical microbiologists with hospitals across the western United States. UW TASP's innovative program will feature clinical didactics, antimicrobial stewardship (AS) policies and procedures, and case consultations drawn from the community. In addition, a robust toolkit will be shared with the community at large to be implemented by hospitals across the region. A targeted, individualized, guided implementation of the toolkit will serve as the basis to develop an onsite stewardship program. Our goal is to make UW TASP events highly-interactive working-group sessions that focus on pragmatic approaches to AS. For more information, or to join our program, contact: uwtsap@uw.edu | 206.885.1653

John Lynch, MD, MPH
Medical Director

Paul Pottinger, MD
TASP Faculty

Upcoming Meetings

- **Spine Infections**
  - Tuesday, February 13, 2018 - 9:00am to 10:00am (PST)

- **What Makes MRSA MR?**
  - Tuesday, February 20, 2018 - 9:00am to 10:00am (PST)

- **Do Abx Timeouts Work?**
  - Tuesday, February 27, 2018 - 9:00am to 10:00am (PST)

View more Calendar Events

Core Elements of TASP

1. Weekly telehealth sessions
2. Policies, protocols, and procedures (P3) toolkit
3. Targeted, individualized P3 implementation
4. Onsite survey and audit

Recent Resources

- Stewarding Respiratory Tract Infections
- ABSTRACT SUBMISSION RSV VACCINES FOR THE WORLD MEETING 2017
- Clinical Features to Suggest Increased Risk of CA-MRSA Pneumonia
- Comprehensive Guidance for Antibiotic Dosing in Obese Adults
- Dosing in Obesity
Resources to Achieve the Elements

JumpStart Stewardship

Implementing Antibiotic Stewardship in Ambulatory Settings

Jump Start Stewardship

- Baseline assessment, organized by Core Element
- Full of specific ideas for action/ tracking/ reporting
- Example Facility Profiles
- Educational Resources
- Free

Summary

• “Antibiotic use is the most important modifiable driver of antibiotic resistance”
• Fortunately antimicrobial stewardship works – implementation is tough
• Find a leader
• Assess your baseline
• Pick your (one) target and intervention
• Assess and reassess and reassess again
• Use your resources
Additional Resources

- Core Elements of Outpatient Stewardship
  https://www.cdc.gov/antibiotic-use/community/improving-prescribing/core-elements/core-outpatient-stewardship.html

- Educational Materials for Patients and Providers

- Print Materials for Healthcare Professionals
Questions about TSAP?

• Please email: uwtasp@uw.edu
References

• Sanchez GV, Fleming-Dutra KE, Roberts RM, Hicks LA. Core elements of outpatient antibiotic stewardship. MMWR 2016; 65(6):1–12.
References

ICD-9 Codes for Antibiotic Inappropriate/ Appropriate Diagnoses

<table>
<thead>
<tr>
<th>ICD-9 Code</th>
<th>Diagnosis</th>
</tr>
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<tbody>
<tr>
<td>Inappropriate&lt;sup&gt;b&lt;/sup&gt;</td>
<td></td>
</tr>
<tr>
<td>460.x</td>
<td>Acute nasopharyngitis</td>
</tr>
<tr>
<td>465.8</td>
<td>Acute laryngitis without obstruction</td>
</tr>
<tr>
<td>465.0</td>
<td>Acute laryngopharyngitis</td>
</tr>
<tr>
<td>466.x</td>
<td>Acute bronchitis</td>
</tr>
<tr>
<td>465.8</td>
<td>Acute upper respiratory tract infections of other multiple sites</td>
</tr>
<tr>
<td>465.9</td>
<td>Acute upper respiratory tract infections not otherwise specified</td>
</tr>
<tr>
<td>490.x</td>
<td>Bronchitis not specified as acute or chronic</td>
</tr>
<tr>
<td>462.xx</td>
<td>Nonstreptococcal pharyngitis</td>
</tr>
<tr>
<td>487.1</td>
<td>Influenza with other respiratory manifestations</td>
</tr>
<tr>
<td>Appropriate&lt;sup&gt;c&lt;/sup&gt;</td>
<td></td>
</tr>
<tr>
<td>786.2</td>
<td>Cough</td>
</tr>
<tr>
<td>486</td>
<td>Pneumonia, organism not otherwise specified</td>
</tr>
<tr>
<td>461.9</td>
<td>Acute sinusitis not otherwise specified</td>
</tr>
<tr>
<td>382.9</td>
<td>Otitis media not otherwise specified</td>
</tr>
<tr>
<td>473.9</td>
<td>Chronic sinusitis not otherwise specified</td>
</tr>
<tr>
<td>463</td>
<td>Acute tonsillitis</td>
</tr>
<tr>
<td>034.0</td>
<td>Streptococcal sore throat</td>
</tr>
<tr>
<td>382.01</td>
<td>Acute suppurative otitis media with spontaneous rapture of eardrum</td>
</tr>
<tr>
<td>491.21</td>
<td>Obstructive chronic bronchitis with (acute) exacerbation</td>
</tr>
<tr>
<td>382.00</td>
<td>Acute suppurative otitis media without spontaneous rapture of eardrum</td>
</tr>
<tr>
<td>461</td>
<td>Acute sinusitis</td>
</tr>
<tr>
<td>491.9</td>
<td>Chronic bronchitis not otherwise specified</td>
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<tr>
<td>472.1</td>
<td>Chronic pharyngitis</td>
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<tr>
<td>381.4</td>
<td>Nonsuppurative otitis media, not specified as acute or chronic</td>
</tr>
<tr>
<td>475</td>
<td>Peritonsillar abscess</td>
</tr>
<tr>
<td>382.4</td>
<td>Unspecified suppurative otitis media</td>
</tr>
</tbody>
</table>
Checklist for Antibiotic Prescribing in Dentistry

Pretreatment
- Correctly diagnose an oral bacterial infection.
- Consider therapeutic management interventions, which may be sufficient to control a localized oral bacterial infection.
- Weigh potential benefits and risks (i.e., toxicity, allergy, adverse effects, *Clostridium difficile* infection) of antibiotics before prescribing.
- Prescribe antibiotics only for patients of record and only for bacterial infections you have been trained to treat. **Do not** prescribe antibiotics for oral viral infections, fungal infections, or ulcerations related to trauma or aphthae.
- Implement national antibiotic prophylaxis recommendations for the medical concerns for which guidelines exist (e.g., cardiac defects).
- Assess patients' medical history and conditions, pregnancy status, drug allergies, and potential for drug-drug interactions and adverse events, any of which may impact antibiotic selection.

Prescribing
- Ensure evidence-based antibiotic references are readily available during patient visits. **Avoid** prescribing based on non-evidence-based historical practices, patient demand, convenience, or pressure from colleagues.
- Make and document the diagnosis, treatment steps, and rationale for antibiotic use (if prescribed) in the patient chart.
- Prescribe only when clinical signs and symptoms of a bacterial infection suggest systemic immune response, such as fever or malaise along with local oral swelling.
- Revise empiric antibiotic regimens on the basis of patient progress and, if needed, culture results.
- Use the most targeted (narrow-spectrum) antibiotic for the shortest duration possible (2-3 days after the clinical signs and symptoms subside) for otherwise healthy patients.
- Discuss antibiotic use and prescribing protocols with referring specialists.

Patient Education
- Educate your patients to take antibiotics exactly as prescribed, take antibiotics prescribed only for them, and not to save antibiotics for future illness.

Staff Education
- Ensure staff members are trained in order to improve the probability of patient adherence to antibiotic prescriptions.