Core Elements of Outpatient Antibiotic Stewardship

Implementing Antibiotic Stewardship Into Your Outpatient Practice

Katherine Fleming-Dutra, MD

Office of Antibiotic Stewardship
Division of Healthcare Quality Promotion
National Center for Emerging and Zoonotic Infectious Diseases
Centers for Disease Control and Prevention
Objectives

- Understand opportunities, barriers and effective interventions to improve outpatient antibiotic prescribing
Life-Saving Benefits of Antibiotics

- Once deadly infectious bacterial diseases are treatable, substantially reducing deaths compared to pre-antibiotic era

- Important adjunct to modern medical advances
  - Surgeries
  - Transplants
  - Cancer therapies
Antibiotic Resistance

$20 billion in excess direct healthcare costs annually

Antibiotic Use Drives Resistance

Date of antibiotic introduction

- **Penicillin**: 1943
- **Methicillin**: 1960
- **Vancomycin**: 1972
- **Levofloxacin**: 1996
- **Ceftaroline**: 2010

Date of resistance identified

- **1940**: Penicillin-R *Staphylococcus*
- **1962**: Methicillin-R *Staphylococcus*
- **1988**: Vancomycin-R *Enterococcus*
- **1996**: Levofloxacin-R *Streptococcus*
- **2011**: Ceftaroline-R *Staphylococcus*

http://www.cdc.gov/drugresistance/about.html
What is Antibiotic Stewardship?

- Antibiotic stewardship is the effort to:
  - Measure antibiotic prescribing
  - Improve antibiotic prescribing so that antibiotics are only prescribed and used when needed
  - Minimize misdiagnoses or delayed diagnoses leading to underuse of antibiotics
  - Ensure that the right drug, dose, and duration are selected when an antibiotic is needed

It’s about patient safety and delivering high-quality healthcare.
Core Elements of Outpatient Antibiotic Stewardship

## Initial Steps for Outpatient Antibiotic Stewardship

Identify one or more high-priority conditions for intervention.

High-priority conditions are conditions for which clinicians commonly deviate from best practices for antibiotic prescribing and include conditions for which antibiotics are overprescribed, underprescribed, or misprescribed with the wrong antibiotic agent, dose, or duration.

<table>
<thead>
<tr>
<th>Condition Category</th>
<th>Example(s)</th>
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<tbody>
<tr>
<td>Antibiotics are overprescribed</td>
<td>Acute uncomplicated bronchitis</td>
</tr>
<tr>
<td>Overdiagnosed</td>
<td>Acute sinusitis, Streptococcal pharyngitis</td>
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<tr>
<td>Wrong dose, duration or agent</td>
<td>Azithromycin for sinusitis</td>
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<tr>
<td>Watchful waiting or delayed prescribing is underused</td>
<td>Acute sinusitis, Acute otitis media</td>
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<tr>
<td>Antibiotics are underused</td>
<td>Sepsis or sexually transmitted infections</td>
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Diagnoses leading to antibiotics — United States, 2010–11

- Sinusitis, 11%
- Suppurative otitis media, 9%
- Pharyngitis, 9%
- Skin infections, 8%
- Urinary tract infections, 7%
- Pneumonia, 2%
- Bronchitis, 5%
- Viral URI, 5%
- Remaining diagnoses, 44%
Case Study: Acute Bronchitis

- High quality evidence demonstrates no benefit from antibiotics since 1990s
- National guidelines recommend against prescribing antibiotics
- HEDIS measure: Avoidance of Antibiotic Treatment in Adults with Acute Bronchitis (Goal: 100%)

Performance on Bronchitis Measure 2008-12

Case Study: Acute Sinusitis

- National guidelines emphasize strict diagnostic criteria
  - Unclear how many patients fit criteria
- Evidence on antibiotic effectiveness
  - No benefit to antibiotics in adults in randomized-controlled trials & some to no benefit in children
- Watchful waiting without antibiotics is treatment option after 10 days of symptoms
  - AAO-HNS recommends up to 7 days watchful waiting
  - AAP recommends up to 3 days watchful waiting
- Antibiotic selection is a major issue
  - First-line antibiotics prescribed in only 37% of sinusitis visits for adults

Initial Steps for Outpatient Antibiotic Stewardship

Identify barriers that lead to deviation from best practices.

These might include clinician knowledge gaps about best practices and clinical practice guidelines, clinician perception of patient expectations for antibiotics, perceived pressure to see patients quickly, or clinician concerns about decreased patient satisfaction with clinical visits when antibiotics are not prescribed.
Why might providers prescribe antibiotics inappropriately?

- Lack of knowledge of appropriate indications
  - Providers generally know the guidelines

- Diagnostic uncertainty and fear of complications
  - Clinicians cite diagnostic uncertainty and fear of infectious complications

- Patient pressure and satisfaction
  - Providers universally cite patient requests for antibiotics

- Habit
  - Adult providers in the VA system vary in prescribing antibiotics for acute respiratory infection (ARI) diagnoses from ≤40% to ≥95% of their ARI visits (i.e. the same diagnoses)
Why might providers prescribe antibiotics inappropriately?

- Lack of knowledge of appropriate indications
  - Providers generally know the guidelines
  - *Education is important but alone is not very effective*
- Diagnostic uncertainty and fear of complications
  - Clinicians cite diagnostic uncertainty and fear of infectious complications
  - *Communicating about adverse events to providers and patients is key*
- Patient pressure and satisfaction
  - Providers universally cite patient requests for antibiotics
  - *Communication training can help clinicians use antibiotics appropriately & keep patients satisfied*
- Habit
  - Adult providers in the VA system vary in prescribing antibiotics for acute respiratory infection (ARI) diagnoses from ≤40% to ≥95% of their ARI visits (i.e. the same diagnoses)
  - *Peer comparisons & academic detailing is a key mitigation strategy for these habitual providers*

What if something bad happens? It’s a Matter of Patient Safety

- Without an antibiotic
  - Complications to common respiratory infections are very rare
  - Over 4400 patients with colds need to be treated to prevent 1 case of pneumonia

- With an antibiotic
  - Adverse events from antibiotics range from minor to severe
    - Side effects like antibiotic-associated diarrhea (5-25% of patients) or rash
    - Allergic reactions, including anaphylaxis (life-threatening)
  - 1 in 1000 antibiotic prescriptions leads to an emergency department (ER) visit for an adverse event
  - 142,000 ER visits per year for antibiotic-associated adverse events

How do antibiotics affect your microbiome?

01
A healthy microbiome helps protect you from infection. Improved antibiotic use and a healthy microbiome can keep us and our communities well.

02
Antibiotics disrupt your microbiome, wiping out both good and bad bacteria.

03
Resistant bacteria—like MRSA, CRE, and C. difficile—can take advantage of this disruption and multiply.

04
With this overgrowth, your body is primed for infection. Once colonized, you can easily spread the resistant bacteria with others.

It’s a matter of patient safety: *Clostridium difficile*

More recent estimate: 453,000 infections and caused 15,000 deaths in the US annually

Lessa NEJM 2015;372(9):825-34
Initial Steps for Outpatient Antibiotic Stewardship

Establish standards for antibiotic prescribing.

This might include implementation of national clinical practice guidelines and, if applicable, developing facility- or system-specific clinical practice guidelines to establish clear expectations for appropriate antibiotic prescribing.
Adult Treatment Recommendations

Antibiotic prescribing guidelines establish standards of care and focus quality improvement efforts. The table below summarizes the most recent recommendations for appropriate antibiotic prescribing for adults seeking care in an outpatient setting.

### Condition
- **Acute rhinosinusitis**: About 1 in 8 adults (12%) in 2012 reported receiving a diagnosis of rhinosinusitis in the previous 12 months, resulting in more than 30 million diagnoses.
- **Nasopharyngitis**: Ninety to eighty percent of rhinosinusitis cases are viral, and antibiotics are not generally recommended to help even if the rhinosinusitis is bacterial.

### Epidemiology
- **Diagnosis of acute bacterial rhinosinusitis** based on symptoms that are:
  - Severe (>7-14 days), such as fever >38°C (100.4°F) and purulent nasal discharge or facial pain.
  - Persistent (>10 days) without improvement, such as nasal discharge or daytime cough.
  - Worsening (3-4 days) such as worsening or new onset fever, daytime cough, or nasal discharge after initial improvement of a viral upper respiratory infection (URI) lasting 5-6 days.

### Management
- If a bacterial infection is established:
  - Watchful waiting is encouraged for uncomplicated cases for which reliable follow-up is available.
  - Amoxicillin or amoxicillin/clavulanate is the recommended first-line therapy.
  - Macrolides such as azithromycin are not recommended due to high levels of Streptococcus pneumoniae antibiotic resistance (~46%).
  - For penicillin-allergic patients, doxycycline or a macrolide (Amodipsin or azithromycin) are recommended as alternative agents.

### Adult Treatment

**A collection of evidence**

### Pediatric Treatment

**A collection of evidence**

### Inpatient Healthcare Professionals

**A collection of evidence**

### Continuing Education &

http://www.cdc.gov/getsmart/community/for-hcp/outpatient-hcp/index.html
The Core Elements of Outpatient Antibiotic Stewardship

- Commitment
- Action for policy and practice
- Tracking and Reporting
- Education and Expertise

Commitment

- Demonstrate dedication to and accountability for optimizing antibiotic prescribing and patient safety **by doing one of the following:**

<table>
<thead>
<tr>
<th>Clinicians</th>
<th>Organizational Leadership</th>
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<tr>
<td>• Write and display public commitments in support of antibiotic stewardship</td>
<td>• Identify a single leader to direct antibiotic stewardship activities within a facility</td>
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<td></td>
<td>• Include stewardship-related duties in position descriptions or job evaluation criteria</td>
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<td>• Communicate with all clinic staff to set patient expectations</td>
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Public Commitment Posters

- Simple intervention: poster-placed in exam rooms with clinician picture and commitment to use antibiotics appropriately
- Randomized-controlled trial
- Principle of behavioral science: desire to be consistent with previous commitments
- “Behavioral nudge” to make the right choice

“As your doctors, we promise to treat your illness in the best way possible. We are also dedicated to avoid prescribing antibiotics when they are likely do to more harm than good.”

- Adjusted absolute reduction in inappropriate antibiotic prescribing: -20% compared to controls, p=0.02

Commitment Posters from Illinois, Texas New York, and CDC

blogs.cdc.gov/safehealthcare/?p=5900
cdc.gov/getsmart/community/materials-references/print-materials/hcp/index.html
**Action**

- Implement **at least one** policy or practice to improve antibiotic prescribing, assess whether it is working, and modify as needed

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| - Use evidence-based diagnostic criteria and treatment recommendations  
- Use delayed prescribing practices or watchful waiting, when appropriate | - Provide communications skills training for clinicians  
- Require explicit written justification in the medical record for nonrecommended antibiotic prescribing  
- Provide support for clinical decisions  
- Use call centers, nurse hotlines, or pharmacist consultations as triage systems to prevent unnecessary visits |
Watchful Waiting and Delayed Antibiotic Prescribing

- Watchful waiting implies having the patient call or come back
- Delayed prescriptions can be filled if patient worsens or does not improve within a specified time
  - Pearl: Put an expiration date on the delayed prescription (e.g. 3-7 days after the date written)

- When are delayed prescriptions appropriate?
  - When recommended by guidelines
    - Acute sinusitis
    - Acute otitis media

- When are delayed prescriptions **not** appropriate?
  - When antibiotics are clearly not indicated
    - Acute bronchitis
    - Viral pharyngitis
What is the evidence for delayed prescribing?

- **Randomized controlled trial for acute otitis media in the pediatric emergency department**
  - Children 6 months to 12 years with were randomized to delayed versus immediate prescription
    - 66% of patients with delayed antibiotics did not fill prescription
    - 13% of patients with immediate prescription did not fill prescription, \( p < 0.001 \)
    - No difference in serious adverse events or unscheduled visits

- **Randomized controlled trial in Spanish family practice clinics using different antibiotic prescription strategies for adults with acute respiratory infections**
  - Percent of patients who used antibiotics during the acute respiratory infection
    - 91% who received immediate prescriptions
    - 33% who received a delayed prescription
    - 23% who were instructed to return to pick up a prescription if needed
    - 12% who received no prescription
  - Satisfaction was similar between all groups

Clinical decision support

- Effective intervention
  - Acute bronchitis: 12–14% reduction in antibiotic prescribing
  - Pharyngitis: reduced antibiotics use
  - Pneumonia: improved antibiotic selection

- Important considerations
  - Print and electronic tools are likely equally effective
  - Tools need to be used to be effective
    - In one study, tool was used in 6% of eligible visits
  - Alert fatigue is a problem

Behavioral Clinical Decision Support: Accountable Justification

- "Antibiotic justification note" in medical record
  - Triggered by diagnosis for which antibiotics are not indicated and antibiotic prescription
  - Free text field
  - If no text entered: "No justification given" appeared in medical record
  - Note disappeared if antibiotic prescription deleted

- Idea: Clinicians want to preserve their reputation

- Reduced inappropriate antibiotic prescribing from 23.2% to 5.2% pre and post-intervention (-7.0% difference in differences, p<0.001)

Tracking and Reporting

- Monitor antibiotic prescribing practices and offer regular feedback to clinicians or have clinicians assess their own antibiotic prescribing practices themselves

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<td>• Self-evaluate antibiotic prescribing practices</td>
<td>• Implement at least one antibiotic prescribing tracking and reporting system</td>
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<tr>
<td>• Participate in continuing medical education and quality improvement activities to track and improve antibiotic prescribing</td>
<td>• Assess and share performance on quality measures and established reduction goals addressing appropriate antibiotic prescribing from health care plans and payers</td>
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Tracking and Reporting with Peer Comparisons

- Effective feedback interventions often include peer performance comparisons
  - Comparing clinician’s antibiotic selection patterns for respiratory conditions to colleagues’ performance\(^1\)
    - Clinicians received quarterly e-mails with their performance and the average performance of their peers in their practice and in the network
    - Led to increased use of guideline recommended agents during the intervention period
    - Once intervention was withdrawn, performance returned back to baseline\(^2\)
  
  - Notifying clinicians that they prescribe more antibiotics than 80% of their peers, based on the percentage all visits leading to antibiotic prescriptions\(^3\)
    - Letter said: “Your practice is prescribing antibiotics at a rate higher than 80% of your local GP practices” and was from England’s Chief Medical Officer
    - Led to decreased overall antibiotic prescribing and cost-savings

Peer Comparison to Top Performers

- One randomized controlled trial sent monthly emails to intervention group comparing clinician based on number of antibiotic prescriptions written for acute respiratory infections that do not require antibiotics (e.g. colds, bronchitis)

- For clinicians in the top 10% (prescribed no antibiotics for these antibiotic-inappropriate conditions)
  - “You are a Top Performer”

- For those not in the top 10% of performers:
  - “You are not a Top Performer”

- Mean antibiotic prescribing decreased from 19.9% to 3.7% (-16.3%)
  - Statistically significant versus controls

What about Quality Measures?

- Opportunity in Centers for Medicaid and Medicare Service’s (CMS) Quality Payment Program to select measures that would fulfil the tracking and reporting Core Elements
- https://qpp.cms.gov/mips/quality-measures
- Search “antibiotic” in the keyword box
Education and Expertise

- Provide educational resources to clinicians and patients on antibiotic prescribing and ensure access to needed expertise on optimizing antibiotic prescribing.

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<tr>
<td>• Use effective communications strategies to educate patients about when antibiotics are and are not needed</td>
<td>• Provide face-to-face educational training (academic detailing)</td>
</tr>
<tr>
<td>• Educate about the potential harms of antibiotic treatment</td>
<td>• Provide continuing education activities for clinicians</td>
</tr>
<tr>
<td>• Provide patient education materials</td>
<td>• Ensure timely access to persons with expertise</td>
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Educating Patients Through Effective Communication

- Clinicians cite patient demand for antibiotics as a reason they prescribe inappropriately\(^1\)

- Overt requests for antibiotics are rare

- When physicians think parents want antibiotics, they are more likely to prescribe:
  - 62% when they thought parent wanted antibiotics
  - 7% when they thought parent did not want antibiotics

- Physicians are terrible at predicting which parents want antibiotics

Sanchez, EID; 2014; 20(12);2041-7.
Mangione-Smith *Pediatrics* 1999;103(4):711-8
Why do clinicians think patients want antibiotics?

- Physicians thought parents wanted antibiotics when
  - Parents suggested a candidate diagnosis
  - Parents questions non-antibiotic treatment plan

- Parents who questioned the treatment plan were equally likely to expect or not expect antibiotics

- Two different conversations
  - One that the physician understands
  - One that the patient is having

Patient satisfaction, antibiotics and communication

- Parents are still satisfied if they don’t get antibiotics
- Parents are dissatisfied if communication expectations are not met

- What do patients & parents want?
  - Explanation of why antibiotics are not needed + positive recommendations for symptom management
  - Contingency plan—i.e. when to call or return

- Tip: remember to be specific!

Communication Training as an Antibiotic Stewardship Intervention

- Enhanced communication training reduces antibiotic prescribing for respiratory infections in all ages while maintaining patient satisfaction.

- Communication goals
  - Understanding the patient’s expectations
  - Explaining why antibiotics will/will not help
  - Providing symptomatic recommendations
  - Discussing when to return if the patient is not better

- Effect appears to be sustainable over time.

CDC Materials for Acute Bronchitis

**Preventing and Treating Bronchitis**

Cough keeping you up at night? Soreness in your chest and feeling fatigued? You could have acute bronchitis, but be aware: an antibiotic will not help you get better.

What is Acute Bronchitis?

Bronchitis occurs when the airways of the lungs swell and produce mucus. That’s what makes you cough. Acute bronchitis, often called a “chest cold,” is the most common type of bronchitis. The symptoms last less than 3 weeks. If you’re a healthy person without underlying heart or lung problems or a weakened immune system, this information is for you.

Symptoms of Acute Bronchitis:

- Coughing with or without mucus production
- You may also experience:
  - Soreness in the chest
  - Fatigue (feeling tired)
  - Mild headache
  - Mild body aches
  - Watery eyes
  - Sore throat

Causes

- Acute bronchitis is usually caused by a virus and often occurs after an upper respiratory infection.
- Bacteria can sometimes cause acute bronchitis, but even in these cases antibiotics are NOT recommended and will not help you get better.

When to Seek Medical Care

See a healthcare professional if you or your child have any of the following:

- Temperature higher than 103.4°F
- Cough with bloody mucus
- Shortness of breath or trouble breathing
- Symptoms that last more than 3 weeks
- Repeated episodes of bronchitis

**Recommended Treatment**

Good news! Acute bronchitis almost always gets better on its own—without antibiotics. Using antibiotics when they aren’t needed can do more harm than good. Unnecessary consequences of antibiotics include side effects, like rash and diarrhea, as well as more serious consequences, such as an increased risk for an antibiotic-resistant infection or Clostridium difficile infection, sometimes deadly diarrhea.

To Feel Better:

- Get plenty of rest
- Drink plenty of fluids
- Use a clean humidifier or cool mist vaporizer
- Breathe in steam from a bowl of hot water or shower
- Use lozenges (do not give lozenges to children younger than 4 years of age)
- Ask your healthcare professional or pharmacist about over-the-counter medicines that can help you feel better

Remember, always use over-the-counter medicines as directed. Do not use cough and cold medicines in children younger than 4 years of age unless specifically told to do so by a healthcare professional.

Your healthcare professional will most likely prescribe antibiotics for a diagnosis of whooping cough (pertussis) or pneumonia.

Prevention

- Practice good hand hygiene
- Make sure you and your child are up to date with all recommended vaccines
- Don’t smoke and avoid secondhand smoke, chemicals, dust, or air pollution
- Always cover your mouth and nose when coughing or sneezing
- Keep your distance from others when you are sick, if possible

And Remember:

Antibiotics will not treat acute bronchitis. Using antibiotics when not needed could do more harm than good.
CDC materials for Watchful Waiting and Delayed Prescribing

**What is Delayed Prescribing?**

**WAIT.** Do not fill your prescription just yet. Your healthcare professional believes your illness may resolve on its own.

First, follow your healthcare professional’s recommendations to help you feel better without antibiotics and continue to monitor your own symptoms over the next few days.

- Rest
- Drink extra water and fluids
- Use cool mist vaporizer or saline nasal spray to relieve congestion
- For sore throats in older adults and children, try ice chips, sore throat spray, or lozenges

If you do not feel better in ___ days/hours, or get worse, go ahead and fill your prescription.

If you feel better, you do not need the antibiotic, and do not have to risk the side effects.

Waiting to see if you really need an antibiotic can help you take antibiotics only when it is actually necessary. Antibiotics can cause side effects like a skin rash, diarrhea, a yeast infection, or worse.

Antibiotics can also make future bacterial infections stronger and harder to treat. You can protect yourself and others by learning when antibiotics are and aren’t needed.

For more information visit www.cdc.gov/getsmart

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**What is Watchful Waiting?**

**Good news!** Your healthcare professional believes your illness will likely resolve on its own.

You should watch and wait for ___ days/hours before deciding whether to take an antibiotic.

In the meantime, follow your healthcare professional’s recommendations to help you feel better and continue to monitor your own symptoms over the next few days.

- Rest
- Drink extra water and fluids
- Use cool mist vaporizer or saline nasal spray to relieve congestion
- For sore throats in older children and adults, try ice chips, sore throat spray, or lozenges
- Use honey to relieve cough. Do not give honey to an infant less than 1 year of age.

If you feel better, no further action is necessary — you don’t need antibiotics.

If you do not feel better, experience new symptoms, or you have other concerns, call your healthcare professional ___ to discuss if you need a recheck or if you need antibiotics, which may be prescribed over the phone.

It may not be convenient to visit your healthcare professional multiple times, but it is critical to make the right choice. Antibiotics can cause side effects like a skin rash, diarrhea, a yeast infection, or worse.

Antibiotics can also make future bacterial infections stronger and harder to treat. You can protect yourself and others by learning when antibiotics are and aren’t needed.

For more information visit www.cdc.gov/getsmart
Summary

- Antibiotic stewardship is one of the most important strategies to combat antibiotic resistance and keep our patients safe.

- The *Core Elements of Outpatient Stewardship* provides a framework for improving outpatient antibiotic prescribing.

- Start by identifying high-priority conditions to tackle, barriers to appropriate prescribing, and by establishing standards.
  - It is about more than just education, we have to help clinicians change their behavior.

- Use evidence-based interventions to implement the Core Elements.
For more information, contact CDC
1-800-CDC-INFO (232-4636)

www.cdc.gov/getsmaart
GetSmart@cdc.gov

The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.