Antimicrobial Stewardship 201: It’s Time to Act

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Disclosure Statement of Financial Interest

I, Michael Klepser, DO have a financial interest/arrangement or affiliation with one or more organizations that could be perceived as a real or apparent conflict of interest in the context of the subject of this presentation, they are:

**Affiliation/Financial Interest:**
- Name of Organization (s):
  - National Association of Chain Drug Stores Foundation
  - Roche Diagnostics

**Consultant:**
- Arkray Diagnostics
- PTS Diagnostics
- ScriptGuide Rx

**Advisory Board:**
- National Association of Chain Drug Stores Foundation POCT Certificate

The American Pharmacists Association is accredited by the Accreditation Council for Pharmacy Education as a provider of continuing pharmacy education.
Learning Objectives

1. Explain strategies that can be used by pharmacists in ambulatory and community outpatient practice settings to support appropriate antibiotic use and reduce the development of antibiotic resistance.
2. Describe incentives for implementing programs aimed at improving antimicrobial use in the community.
3. Given a clinical scenario, identify strategies that may be employed to achieve the primary goals of antimicrobial stewardship.
Assessment Question

1. Core members of an outpatient antimicrobial stewardship program
   A. Must include an ID trained pharmacist.
   B. May also be members of an inpatient team.
   C. Should all be employed by a single institution.
   D. Must practice in the ambulatory care setting.
Assessment Question

2. The Prescribed Therapeutic Regimen (PTR) is determined
   A. By examining published guidelines.
   B. From pharmacy purchase data.
   C. From a published table from the WHO.
   D. By examining patient prescription records.
3. Which of the following activities might be reasonable to include in an outpatient antimicrobial program?
   A. Collaborative disease management programs.
   B. Post-discharge bridge calls.
   C. Delayed prescribing initiatives.
   D. Audit and feedback on prescribing patterns.
   E. All of the above are reasonable.
4. Which of the following can be considered an outpatient antimicrobial stewardship intervention?
   A. Recommending a vaccine to a patient.
   B. Educating patients about staying home when ill.
   C. Monitoring antibiotic use in a clinic and providing prescriber feedback.
   D. Implementing disease management programs that utilize CLIA-waived point-of-care tests.
   E. All of the above are examples.
Outpatient Antibiotic Use

- Approximately 450 million physician office visits annually.
  - >150 million result in prescription of an antibiotic
  - 60%-80% of antibiotic use occurs in the outpatient setting

- High rates of misuse.
  - 80% of adults with rhinosinusitis and >60% of adults with pharyngitis get antibiotics

Antibiotic resistance threats in the United States, 2013, Center for Disease Control and Prevention
Public Health Agency of Sweden and National Veterinary Institute
Outpatient Antibiotic Use

- National average was 833 antibiotic prescriptions per 1,000 persons.
- Penicillins and macrolides were the most frequently prescribed antibiotics.
Outpatient Antibiotic Use

Outpatient Antibiotic Prescribing by Provider Specialty, 2013
Percent of antibiotic prescriptions

- Other: 9%
- OB-GYN: 3%
- Emergency medicine: 5%
- Surgical specialties: 8%
- Dentistry: 9%
- 3% Dermatology
- 45% Primary care physicians
- 18% Nurse practitioners and physician assistants

Source: Centers for Disease Control and Prevention.
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Outpatient Antibiotic Use

- It has been estimated that as much of 50% of outpatient antibiotic usage is inappropriate (i.e., wrong agent, dose, duration).

- More than 25% of antibiotics in the ambulatory care setting are for conditions for which antibiotics are rarely indicated (i.e., bronchitis, acute sinusitis).
  - 38%-49% of residents got an antibiotic for the common cold.

Outpatient Antibiotic Use Drivers

- Patient persistence
  - May not be as big as previously thought.
- Prescriber lack of familiarity/adherence with treatment guidelines
- Lack of and use of diagnostic tools and microbiology data at the point of care
- Provider shortage
  - Pressure to see more patients
- Poor patient follow-up
  - Dismiss and done
- Free antibiotic programs
  - Remove a barrier to antibiotic access
  - Create a pressure to use agent suboptimal spectra of activity
- Fear
  - Missing something
  - Litigation
Antibiotic Use and Resistance

- Numerous studies have correlated antibiotic consumption with emergence of resistance.
- Resistance has been linked with:
  - Increased infection-related mortality
  - Increased cost ($20 billion excess treatment costs)
  - Increased use of broad spectrum agents
Impact of Outpatient Antibiotic Use

- Adverse effects associated with antibiotics are the most common drug-related causes for emergency department visits among individuals less than 18 years of age.
  - Responsible for one out of every five drug-related emergency department visits for all patients.
Antimicrobial Stewardship

- Inpatient antimicrobial stewardship programs have been around for decades and have:
  - Curbed inappropriate use of antibiotics
  - Decreased antibiotic expenditures
  - Improved patient outcomes
  - Not been definitely associated with reduced rates of resistance
Antimicrobial Stewardship

- Why have efforts to date focused almost exclusively on inpatient settings?
  - Trained personnel
  - Ability to track usage and outcomes
  - Carrots and sticks
Antimicrobial Stewardship in the Outpatient Setting

- The White House recently published two documents that focus on combating antibiotic resistance.
  - September 2014 “National Strategy for Combating Antibiotic-Resistant Bacteria”

https://www.whitehouse.gov/sites/default/files/docs/carb_national_strategy.pdf
https://www.whitehouse.gov/sites/default/files/docs/national_action_plan_for_combating_antibiotic-resistant_bacteria.pdf
National Goals for Antimicrobial Stewardship

- **Goal 1** - Slow the emergence of resistant bacteria and prevent the spread of resistant infections.
  - **Objective 1** - Implement public health programs and reporting policies that advance antibiotic-resistance prevention and foster antibiotic stewardship in healthcare settings and the community.
    - Implementation steps
      - Strengthen antibiotic stewardship in inpatient, outpatient, and long-term care settings.
      - Implement annual reporting of antibiotic use in inpatient and outpatient settings and identify geographic variations and/or variations at the provider and/or patient level that can help guide interventions.
National Goals for Antimicrobial Stewardship

- Anticipated outcome by 2020
  - Inappropriate outpatient antibiotic use for monitored conditions/agents will be reduced by **50%** from 2010 levels.

- Do you know how much antibiotics were used your clinics in 2010?
- Do you have any idea how to determine which antibiotics were used inappropriately and by whom?
CDC Core Elements for Outpatient Stewardship

- Core Elements of Outpatient Antibiotic Stewardship
  1. **Commitment**: Demonstrate dedication to and accountability for optimizing antibiotic use and patient safety
  2. **Action**: Implement at least one policy or practice to improve antibiotic use, assess whether it is working, and modify as needed
  3. **Tracking and reporting**: Monitor antibiotic prescribing practices and offer regular feedback to clinicians or perform self-assessment on antibiotic use
  4. **Education and expertise**: Provide educational resources to clinicians and patients on antibiotic use and ensure access to needed expertise on judicious antibiotic prescribing

- Actions to support the core elements recommended for implementation at clinician- and clinic/system-levels.
  - Should also develop and implement actions at the patient-level.

http://www.cdc.gov/getsmart/community/pdfs/16_268900-a_coreelementsoutpatient_508.pdf
CDC Core Elements for Outpatient Stewardship

- **Commitment**
  - **Clinicians** may write and display public commitments in support of antibiotic stewardship.
  - **Clinic and health-system leaders** may:
    - Identify a single leader to direct antibiotic stewardship activities within a facility.
    - Include antibiotic stewardship-related duties in position descriptions or job evaluation criteria.
    - Communicate with all clinic staff members to set patient expectations.
CDC Core Elements for Outpatient Stewardship

- **Action for Policy and Practice**
  - **Clinicians** may:
    - Use evidence-based diagnostic criteria and treatment recommendations.
    - Use delayed prescribing practices or watchful waiting, when appropriate.
  - **Clinic and health-system leaders** may:
    - Provide communications skills training for clinicians.
    - Require explicit written justification in the medical record for non-recommended antibiotic prescribing.
    - Provide support for clinical decisions.
    - Use call centers, nurse hotlines, or pharmacist consultations as triage systems to prevent unnecessary visits.

http://www.cdc.gov/getsmart/community/pdfs/16_268900-a_coreelementsoutpatient_508.pdf
CDC Core Elements for Outpatient Stewardship

- **Tracking and Reporting**
  - **Clinicians** may:
    - Self-evaluate antibiotic prescribing practices.
    - Participate in continuing medical education and quality improvement activities to track and improve antibiotic prescribing.
  - **Clinic and health-system leaders** may:
    - Implement at least one antibiotic prescribing tracking and reporting system.
    - Assess and share performance on quality measures and established reduction goals addressing appropriate antibiotic prescribing from health care plans and payers.

http://www.cdc.gov/getsmart/community/pdfs/16_268900-a_coreelementsoutpatient_508.pdf
CDC Core Elements for Outpatient Stewardship

**Education and Expertise**

- **Clinicians** may:
  - Use effective communications strategies to educate patients about when antibiotics are and are not needed.
  - Educate patients about the potential harms of antibiotic treatment.
  - Provide patient education materials.

- **Clinic and health-system leaders** may:
  - Provide face-to-face educational training (academic detailing).
  - Provide continuing education activities for clinicians.
  - Ensure timely access to persons with expertise.

http://www.cdc.gov/getsmart/community/pdfs/16_268900-a_coreelementsoutpatient_508.pdf
Ambulatory Care Accreditation and Stewardship

- JACHO is currently developing an antimicrobial stewardship standard for ambulatory care and office-based surgery practices.

- As of 2016, the Accreditation Association for Ambulatory Health Care (AAAHC) requires accredited organizations to complete a written infection prevention risk assessment.
  - Likely to expand stewardship

The Society of Infectious Diseases Pharmacists published 2 papers on outpatient antimicrobial stewardship.

- Outlines a process for developing a program
- Identifies key stakeholders and members
- Identifies a means to quantify antibiotic use and assess appropriateness.
- Outlines various activities and interventions


Key Members of an Outpatient Antimicrobial Stewardship Team

Core Members

- Pharmacist
  - Training in ID preferred, but not essential.

- Physician
  - Training in ID preferred, but not essential.

Translational members

- Clinic leader
- Microbiologist/Laboratorian
  - Track pathogens and susceptibility patterns
  - Develop recommendations for use of POCT
- Public Health
- Information Technology Specialist

Outpatient Team Structure Considerations

- Single institution vs. community wide
  - Implications on data sharing and incentives
- View as an extension of inpatient stewardship activities
  - Leaders from the inpatient team can lead outpatient activities.
Steps for Establishing an Outpatient Antimicrobial Stewardship Program

- Identify program scope
- Create Stewardship Team
- Assess baseline practice and antibiotic use
- Develop program priorities
- Develop initiatives
- Develop and monitor progress and outcomes

Benchmarking Antibiotic Use in the Outpatient Setting

- Most data are at the community or greater population level.
  - Not appropriate for guiding clinic/prescriber level decisions.

- Inpatient parameters used to monitor consumption (i.e., DDD and DOT) may not be useful in the outpatient setting.
  - Rely on institutional pharmacy purchase data.
  - Prescription data may be more feasible in the community
Quantifying and Assessing Antibiotic Use in the Community

- Definitions
  - Prescribed Therapeutic Regimen (PTR)
    \[ \text{PTR} = \text{Antibiotic dose} \times \text{Frequency} \times \text{Duration} \]
  - Recommended Therapeutic Regimen (RTR)
    - RTR calculations based on regimens recommended in guidelines
    - RTR ranges were calculated
    - RTR parameters determined for various renal function, weight, etc.

Quantifying and Assessing Antibiotic Use in the Community

- Process
  1. Identify episodes of antibiotic use
  2. Collect patient information
     - Laboratory data, ICD codes, Allergies
  3. Collect prescription data
  4. Compare prescribed regimen with recommended regimen

Sample Case

- An episode of amoxicillin use was identified on December 12, 2014.

- For this episode the following data were retrieved:

  - Prescribed dose - 1,000 mg
  - Prescribed frequency - daily
  - Prescribed duration - 14 days
  - ICD-9 code 034.0 (Streptococcal sore throat)
  - No known drug allergies were identified
  - eGFR from November 18, 2014 was >60 ml/min
  - No diagnostic laboratory tests were ordered
  - Identified prescribing physician
Sample Case

- **Recommended Therapeutic Regimen (RTR)**
  - According to published guidelines, amoxicillin is recommended for streptococcal pharyngitis.
  - From a patient with normal renal function the recommended regimen is either 500 mg twice daily or 1,000 mg once daily for 10 days.
  - RTR = Dose x frequency x duration
    - RTR = 500 mg x 2 x 10 days = 10,000
    - RTR = 1,000 mg x 1 x 10 days = 10,000
  - RTR range for amoxicillin for streptococcal pharyngitis in a patient with normal renal function is 10,000
Sample Case

- Prescribed Therapeutic Regimen (PTR)
  - PTR = Dose x frequency x duration
    - PTR = 1,000 mg x 1 x 14 days = 14,000

- For this case, the antibiotic was recommended by the guidelines and the PTR falls within the range/equal to the RTR.
  - Choice of agent was appropriate
  - Choice of prescribed regimen inappropriate (PTR > RTR)

- No laboratory tests were ordered to establish diagnosis.
  - Only 5%-15% of adult pharyngitis cases are caused by group A streptococcus.
  - Area for education.
Value of Collecting Antibiotic Prescribing Data

- Establish baseline and ongoing metrics to assess use and measure impact of interventions.
- Estimate per-patient antibiotic prescribing rates and guideline adherence rates.
  - Compare with national, state, local, clinic, and prescriber data
- Generate usage reports by indication, clinic, and/or prescriber.
- Identify areas for intervention
### Using Prescription Data

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<tr>
<th>Advantage</th>
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<tbody>
<tr>
<td>▪ Provides measure of prescriber practices</td>
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<tr>
<td>▪ Available within existing databases</td>
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<tr>
<td>▪ Provides data at multiple levels (i.e., indication, patient, prescriber, clinic)</td>
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<table>
<thead>
<tr>
<th>Disadvantage</th>
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<tbody>
<tr>
<td>▪ Learning curve for data extraction</td>
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<tr>
<td>▪ Data may be messy</td>
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<tr>
<td>▪ Some systems report the strength of the formulation in a text field rather than a dose in a numeric field</td>
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Quantifying and Assessing Antibiotic Use in the Community

- This is the first step in moving stewardship out of the hospital.
- Efforts in this area help meet goals 1 and 2 of the White House action plan.
Outpatient Antimicrobial Stewardship Initiatives

- Data supporting various initiatives have been summarized
- Think broader than the system or clinician to have maximal impact.
- How do pharmacists fit in?

https://www.cdc.gov/getsmart/community/pdfs/16_268900-a_coreelementsoutpatient_appendix_508.pdf
Incorporating Antimicrobial Stewardship into Practice

- It is January and Marge is a 70 year-old female who presents to the pharmacy complaining of shortness of breath and cough.

- Her symptoms have been present for about a week and have been worsening.

- Social history:
  - Does not smoke
  - Drinks 1 to 2 cocktails/week
  - Allergies: Penicillin (rash)

- Current medications:
  - Lisinopril 20 mg daily
  - Metoprolol XL 100 mg daily
  - Spironolactone 25 mg daily

- Vaccinations:
  - Influenza (in October 2014)
  - Pneumococcal (June 2004)
What should we do next?
- Collect vital signs and examine the patient.
  - Physical findings:
    - Bilateral 2+ pitting edema in legs
  - Vital signs:
    - Temp: 98.8°F
    - BP 136/80 mmHg
    - Pulse 70 bpm
    - RR 22 breaths/min
    - Pulse oximetry on room air 93%

Critical Thresholds
- Temp > 103°F
- BP < 100 mmHg (systolic)
- RR > 25 breaths/min
- Pulse ox < 90%
Incorporating Antimicrobial Stewardship into Practice

- Is there any information you would like to know in order to develop a care plan?
  - Influenza activity in the community is high.
  - No exposure to sick person.
  - No recent antibiotic use or hospitalization.
Incorporating Antimicrobial Stewardship into Practice

- What is your assessment and plan for Marge?
  - Presentation consistent with heart failure exacerbation; refer to physician
  - When stable:
    - Screen patient for hepatitis C
    - Administer 2nd dose of pneumococcal vaccine
    - Administer influenza vaccine
    - Evaluate need for Zoster and Tetanus vaccines
    - Eligible for a comprehensive medication review
Stewardship Initiatives
- Patient education
- Promote immunizations
- Promote preventive medicine and wellness initiatives

Stewardship Initiatives
- Avoided antibiotic use

Stewardship Initiatives
- Patient education
- Consultation with a pharmacist
Doug is a 42-year old male who comes to the pharmacy in December complaining of a terrible headache and feeling achy and tired.

Symptoms started today. First thing noted was headache.

Social history:
- Smokes 1 to 2 cigarettes daily
- Has about one drink daily

Family history:
- Married with one child (5 years old)

Medications:
- Advair Diskus 250/50-1 puff twice daily
- Albuterol 1 to 2 puffs every 4 to 6 hours as needed
Incorporating Antimicrobial Stewardship into Practice

- What should we do next?
  - Collect vital signs and examine the patient.
    - Physical findings:
      - Cough, headache, myalgia, fatigue
    - Vital signs:
      - Temp: 102.3°F
      - BP 122/74 mmHg
      - Pulse 75 bpm
      - RR 24 breaths/min
      - Pulse oximetry on room air 98%

Critical Thresholds
- Temp > 103°F
- BP < 100 mmHg (systolic)
- RR > 25 breaths/min
- Pulse ox < 90%
Incorporating Antimicrobial Stewardship into Practice

- What do we do next?
  - Ask about exposure to sick people.
    - Yes, wife
  - Ask if he has received the influenza vaccine this year.
    - No

- Is there any information you would like in order to develop a care plan?
  - Sporadic influenza activity has been reported in the community.
Incorporating Antimicrobial Stewardship into Practice

- Symptoms of influenza-like illness:
  - Cough (Yes)
  - Fever (Temp 102.3°F)
  - Body aches (Yes)
Incorporating Antimicrobial Stewardship into Practice

- What is your assessment and plan for Doug?
  - Dispense oseltamivir according to collaborative practice agreement
  - Administer influenza vaccine
  - Inquire about pneumococcal immunization
  - Discuss smoking cessation
  - Family: need for prophylaxis for child, immunizations
Baseline Health

Decision to use and select an Antibiotic

Stewardship Initiatives
- Patient education
- Promote immunizations
- Promote preventive medicine and wellness initiatives

Dispensing of the Antibiotic

Stewardship Initiatives
- Patient education
- Promote immunizations and wellness initiatives

Post-encounter Care

Stewardship Initiatives
- Telephone follow-up 72 hours following encounter
  - Safety net

Recognition of Illness

Stewardship Initiatives
- Patient education
- Consultation with a pharmacist

Decision to Seek Care

Stewardship Initiatives
- Performed POCT
- Avoided antibiotic use

Stewardship Initiatives
- Patient education

Stewardship Initiatives
- Promote immunizations and wellness initiatives

Safety net

Stewardship Initiatives
- Performed POCT
- Avoided antibiotic use

Stewardship Initiatives
- Patient education

Stewardship Initiatives
- Consultation with a pharmacist
Parting Thoughts on Community Antimicrobial Stewardship

- Need partnerships across healthcare.
- Leadership likely to come from inpatient antimicrobial programs or public health.
- There is not a one size fits all solution.
- Need to think about illness as a cycle.
Recommended Readings

  
  http://www.pewtrusts.org/~/media/assets/2016/05/antibioticuseinoutpatientsettings.pdf

- CDC’s Core Elements of Outpatient Antibiotic Stewardship

  http://www.cdc.gov/getsmart/community/pdfs/16_268900-a_coreelementsoutpatient_508.pdf


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