Antimicrobial Stewardship:

Inpatient and Outpatient Elements

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Disclosure

• I have no relevant finances to disclose.
Objectives

• Review the core elements of antimicrobial stewardship in regards to inpatient facilities
• Explain practices and policies that can help meet Joint Commission requirements
• Compare/contrast new outpatient core elements with previously published inpatient requirements
• Create a plan to implement core elements at your facility
The Growing Problem

**ANTIBIOTIC RESISTANCE**
A type of drug resistance which renders the antibiotic ineffective in killing or controlling the bacterial growth.

**WHY IS ANTIBIOTIC RESISTANCE A PROBLEM?**

MORE THAN **40 MILLION** Antibiotic prescriptions in 2011 were unnecessary!

Nearlly **50%** of U.S. meat is contaminated with bacteria that is resistant to various antibiotics.

No new major antibiotic has been developed in the last 30 years.

**WHAT THE STATISTICS REVEAL?**

- **ONLY 10 PERCENT** adults are prescribed the correct antibiotic for Strep infections.
- **ONLY 0%** correct prescribing rate for acute bronchitis.
- **OVER 4%** increase in antibiotic prescription rates in last 14 years.

**PERCENTAGE OF ANTIBIOTICS CURRENTLY USED IN THE FOOD CHAIN.**

- 76% of antibiotics currently used in the food chain. Only 24% of antibiotics used in the U.S. are for humans.

76% OF ANTIBIOTICS IN THE U.S. ARE USED FOR LIVESTOCK ONLY. Out of this, only 6% accounts for therapeutic purpose!

[https://www.cdc.gov/getsmart/](https://www.cdc.gov/getsmart/)
Threat of Resistance

Estimated minimum number of illnesses and deaths caused annually by antibiotic resistance*:

At least 2,049,442 illnesses, 23,000 deaths

*bacteria and fungus included in this report

Carbapenem Resistance

Deaths from Resistance
First reported cases of bacterial resistance against key antibiotics


Accessed from: http://www.cddep.org/tools
Inpatient Stewardship

• Up to 50% of inpatient antibiotics are unnecessary or inappropriate

• 2014: CDC recommended that all acute care hospitals implement Antibiotic Stewardship Programs

• Benefits include:
  • Improved quality of patient care/safety
  • Increased infection cure rates/reduced treatment failures
  • Reduce hospital rates of *Clostridium difficile* infection
  • Reduce antibiotic resistance
  • Save hospitals money

https://www.cdc.gov/getsmart/healthcare/implementation/core-elements.html
Groups

• White house
  • National Action Plan for Combating Antibiotic-Resistant Bacteria is to reduce inappropriate antibiotic use by 50% in outpatient settings by 2020

• Joint Commission
  • Standards are now (2017) required in hospitals, including critical access, and nursing homes

• Centers for Medicare & Medicaid Services (CMS)
  • Required for reimbursement
Joint Commission

- Antimicrobial Stewardship program
  - Leadership support
  - Annual education of staff (those involved in administering, prescribing, dispensing, and monitoring)
  - Education for patients
  - Multidisciplinary team
  - Utilization of the CDC core elements of stewardship

https://www.jointcommission.org/assets/1/6/New_Antimicrobial_Stewardship_Standard.pdf
Leadership Support

- Formal statements that the facility supports efforts to improve and monitor antibiotic use
- Including stewardship-related duties in job descriptions and annual performance reviews
- Ensuring staff from relevant departments are given sufficient time to contribute to stewardship activities
- Supporting training and education
- Ensuring participation from the many groups that can support stewardship activities

https://www.cdc.gov/getsmart/healthcare/implementation/core-elements.html
Accountability

• Stewardship program leader:
  • Identify a single leader who will be responsible for program outcomes

• Pharmacy leader:
  • Identify a single pharmacy leader who will co-lead the program

https://www.cdc.gov/getsmart/healthcare/implementation/core-elements.html
Key Supporters

- Clinicians and department heads
- Infection preventionists
- Quality improvement staff
- Laboratory staff
- Information technology staff
- Nurses

https://www.cdc.gov/getsmart/healthcare/implementation/core-elements.html
Drug Expertise

• Formal training in infectious diseases and/or antibiotic stewardship benefits stewardship program leaders
  • MAD-ID and SIDP offer antimicrobial stewardship certificates

• Larger facilities have achieved success by hiring full time staff to develop and manage stewardship programs

https://www.cdc.gov/getsmart/healthcare/implementation/core-elements.html
Action

• Implement policies that support optimal antibiotic use
• Utilize specific interventions
• Prioritize interventions based on the needs of the hospital

https://www.cdc.gov/getsmart/healthcare/implementation/core-elements.html
Interventions

• Institution specific treatment guidelines

• Documentation of dose, duration, and indication for antibiotics

• Types
  • Broad
  • Pharmacy-driven
  • Infection/Syndrome specific

https://www.cdc.gov/getsmart/healthcare/implementation/core-elements.html
Broad Interventions

• Antibiotic “time outs”

• Prior authorization

• Prospective audit and feedback
Pharmacy-driven Interventions

- Automatic changes from IV to PO antibiotics
- Dose adjustments/optimization
- Automatic alerts for potentially inappropriate therapy
- Time-sensitive automatic stop orders
- Detection and prevention of drug interactions

https://www.cdc.gov/getsmt/healthcare/implement/materials/core-elements.html
Infection/Syndrome Specific Interventions

- Community-acquired pneumonia
- Urinary tract infections
- Skin and soft tissue infections
- Empiric coverage of methicillin-resistance staphylococcus aureus
- Clostridium difficile infections

https://www.cdc.gov/getsmart/healthcare/implementation/core-elements.html
Penicillin Skin Testing

• Only around 10% of penicillin allergies are real

• Penicillin skin testing has been proposed as a way to reduce use of broad spectrum antibiotics when a narrow beta lactam is preferred

• Testing involves a two-step process (with an optional third step) that takes approximately 45–60 minutes

Penicillin skin testing as an antimicrobial stewardship initiative

- Antimicrobial program initiated penicillin skin testing for patients with allergies

<table>
<thead>
<tr>
<th>Patients with penicillin allergy (n=36)</th>
<th>Skin test results</th>
<th>Patients switched to cephalosporin or penicillin</th>
<th>Reactions after starting beta-lactam</th>
</tr>
</thead>
<tbody>
<tr>
<td>36 (100%) negative</td>
<td>27/36 (75%)</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>

Rapid Diagnostic Testing

• Microbiology rapid diagnostics identify organism(s) and many possible resistance genes
  – BioFire, Nanosphere Verigene, MALDI-TOF

• Utilizing this technology shortens time to appropriate antimicrobial therapy for patients and reduces complications/length of stay

Nanosphere Verigene

• Organisms:
  – Gram-positives:
    • Staphylococcus aureus, epidermidis, lugdunensis
    • Streptococcus pneumoniae, pyogenes, agalactiae, sp. (other than those previously listed)
    • Enterococcus faecalis, faecium
    • Listeria sp.
  – Gram-negatives:
    • Escherichia coli
    • Klebsiella oxytoca, pneumoniae
    • Proteus sp.
    • Citrobacter sp.
    • Acinetobacter sp.
    • Pseudomonas aeruginosa
    • Enterobacter sp.

• Resistance genes:
  – Gram-positive:
    • MRSA/MRSE: MecA
    • VRE: VanA, VanB
  – Gram-negative:
    • ESBL: CTX-M
    • CRE: KPC, VIM, IMP, OXA, NDM
Tracking

- Monitoring antibiotic prescribing
- Antibiotic use process measures
- Antibiotic use measures
- Outcome measures

https://www.cdc.gov/getsmart/healthcare/implementation/core-elements.html
Reporting

- National Healthcare Safety Network (NHSN), CDC has developed an Antibiotic Use (AU) option that reports monthly days of therapy (DOT) data.

- DOT is an aggregate sum of days for which any amount of a specific antimicrobial agent is administered or dispensed to a particular patient (numerator) divided by a standardized denominator (e.g., patient days, days present, or admissions).

https://www.cdc.gov/getsmart/healthcare/implementation/core-elements.html

- 300 acute care hospitals provided antibiotic use data for over 34 million discharges representing 166 million patient-days

- Retrospectively estimated (DOT) per 1000 patient-days and the proportion of hospital discharges in which a patient received at least 1 dose of an antibiotic during the hospital stay

Results

• **55.1%** of patients received at least 1 dose of antibiotics during their hospital visit

• The overall national DOT was **755 per 1000** patient-days

• The following antibiotic classes increased significantly:
  - third- and fourth-generation cephalosporins
  - macrolides
  - glycopeptides
  - β-lactam/β-lactamase inhibitor combinations
  - carbapenems
  - tetracyclines

Education

• Antibiotic stewardship programs should provide regular updates on antibiotic prescribing, antibiotic resistance, and infectious disease management that address both national and local issues

• Annual education required by Joint Commission

https://www.cdc.gov/getsmart/healthcare/implementation/core-elements.html
Moving Forward

- Inpatient stewardship is now required in all hospitals
- Last fall, CDC released core elements for outpatient stewardship – not yet required
- Outpatient stewardship presents different challenges compared to inpatient stewardship
Outpatient Stewardship

• Approximately 60% of antibiotic use in the United States is in the outpatient setting

• 143,000 annual ED visits from antibiotic complications

• 35% of adult and 70% pediatric C. diff infections are community acquired

Guidelines

Identify high priority conditions
- Ex: bronchitis, ear infections, asymptomatic bacteriuria

Identify barriers
- Ex: knowledge gaps, patient expectations

Establish prescribing standards
- Ex: clinical practice guidelines, institution specific guidelines

Commitment

• Write and display public commitments in support of stewardship
• Identify a single leader to direct stewardship activities
• Include antibiotic stewardship-related duties in position descriptions or job evaluation criteria
• Communicate with all clinic staff members to set patient expectations

Nudging guideline-concordant antibiotic prescribing

- Randomized clinical trial
  - 15 prescribers
  - 5 outpatient clinics
- Intervention: Poster containing a public commitment to use antibiotics judiciously with clinician picture and signature displayed in examination rooms at point of clinician-patient encounter
- Outcome: Antibiotic prescribing rates for acute respiratory infections (ARIs) for which antibiotics are inappropriate

### Results

- **19.7% decrease in inappropriate prescribing for acute respiratory infections**

<table>
<thead>
<tr>
<th>Intervention</th>
<th>% Inappropriate prescriptions</th>
<th>P-value: 0.02</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commitment Posted</td>
<td>33%</td>
<td></td>
</tr>
<tr>
<td>Control Group</td>
<td>52.7%</td>
<td></td>
</tr>
</tbody>
</table>
Action for Policy and Practice

• Use evidence-based diagnostic criteria and treatment recommendations

• Use delayed prescribing practices or watchful waiting

• Provide communications skills training for clinicians

Action for Policy and Practice

• 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

https://www.cdc.gov/getsmtart/community/improving-prescribing/core-elements/core-outpatient-stewardship.html
Effect of behavioral interventions on inappropriate antibiotic prescribing among primary care practices

- 3 interventions:
  - Suggested alternatives to antibiotics in electronic medical record
  - Accountable justification required in medical record for non-recommended antibiotic prescribing
  - Peer comparison to top-performing peers

- 248 clinicians, 47 primary care clinics

Results

• 31,712 visits for acute respiratory tract infections for which antibiotics are not indicated
  • 14,753 during baseline
  • 16,959 during intervention

<table>
<thead>
<tr>
<th>Antibiotics Prescribed</th>
<th>Suggested alternatives</th>
<th>Accountable justification</th>
<th>Peer comparison</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intervention group</td>
<td>6.1%</td>
<td>5.2%</td>
<td>3.7%</td>
</tr>
<tr>
<td>Control group</td>
<td>22.1%</td>
<td>23.2%</td>
<td>19.9%</td>
</tr>
</tbody>
</table>

Tracking and Reporting

• Self-evaluate antibiotic prescribing practices

• Participate in continuing medical education and quality improvement activities to track and improve antibiotic prescribing

Tracking and Reporting

• 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
Education and Expertise

- 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

Education and Expertise

• Provide face-to-face educational training (academic detailing)

• Provide continuing education activities for clinicians

• Ensure timely access to persons with expertise

Outpatient Parenteral Antimicrobial Therapy (OPAT)

• Allows for appropriate management of patients requiring long term antibiotics

• Reduces complications and helps prevent readmissions

• IDSA published practice guidelines
Development and implementation of a pharmacist-managed OPAT program

- Collaborative Practice Agreement (CPA)
- Pharmacist sees patients in clinic and determines appropriate therapy changes

Summary

• Joint Commission requires inpatient stewardship as of 2017
  • Stewardship playbook
  • IDSA guidelines
  • CDC core elements checklist

• Not enough Infectious Diseases trained pharmacists
  • MAD-ID and SIDP offer stewardship certificates

• Outpatient stewardship not yet require, but likely in the future
Assessment Questions
Question #1

• True/False: An Infectious Diseases physician is required to be the stewardship program leader?

A. True
B. False
Question #1

• True/False: An Infectious Diseases physician is required to be the stewardship program leader?

A. True
B. False
Question #2

• Which of the following is a barrier to stewardship?

A. Patient expectations for antibiotics
B. Knowledge gaps for specific disease states
C. Lack of antibiotic usage data
D. All of the above
Question #2

- Which of the following is a barrier to stewardship?

A. Patient expectations for antibiotics
B. Knowledge gaps for specific disease states
C. Lack of antibiotic usage data
D. All of the above
Question #3

• True/False: Simple interventions can have drastic effects on prescribing practices?

A. True
B. False
Question #3

• True/False: Simple interventions can have drastic effects on prescribing practices?

A. True
B. False
Question #4

• Which of the following activities can be performed by pharmacists in an OPAT clinic?

A. Patient visit
B. Billing under CPA
C. Adjusting antimicrobial dosing
D. All of the above
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