Antibiotic Stewardship: Optimizing Antibiotic Use in Inpatient Setting

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Antibiotic Use in Hospitals

1 in 2 patients receives an antibiotic for at least one day during an average hospital stay.
Antibiotic Use in Hospitals

- Thirty percent of antibiotic use is unnecessary or inappropriate.

- Poor prescribing practices are placing patients at unnecessary risk for antibiotic-resistant infections, *Clostridioides difficile* infections, allergic reactions and other adverse events.

CDC’s Approach in Improving Antibiotic Use

Examples of CDC’s Approach to Improving Antibiotic Use

Data for Action
- Providing data about facility-level antibiotic use in outpatient settings, hospitals, and nursing homes to help healthcare providers identify opportunities to improve prescribing.
- Working with partners to develop a benchmark for hospitals to assess their antibiotic use and monitor the impact of antibiotic stewardship programs.

Implementation
- Providing recommendations for antibiotic stewardship programs and practices in multiple healthcare settings.
- Providing tools to help organizations incorporate antibiotic stewardship principles into antibiotic use guidelines.
- Developing tools and providing expertise to support and expand local implementation.
- Providing expertise to, and coordinating with, other federal partners to develop guidance and tools to implement antibiotic stewardship.
- Engaging a broad network of partners in healthcare, such as healthcare professional organizations, hospitals, health systems, and industry, to implement antibiotic stewardship.

Innovation
- Funding universities and healthcare partners to identify novel ways to implement stewardship activities and improve the implementation of CDC’s Core Elements of Antibiotic Stewardship in hospitals, nursing homes, outpatient settings, and small hospitals in rural areas.
- Advancing the development of diagnostic tests to identify and characterize resistant bacteria by accelerating research and development for new antibiotics.

Education
- Leading a national effort to educate Americans about appropriate antibiotic use, and strategies to protect themselves from antibiotic resistance.
- Spearheading an annual global observance promoting appropriate prescribing and use.
- Developing an educational effort to emphasize the early recognition, treatment, and reassessment of therapy of sepsis as an important part of antibiotic stewardship.

Data for Action
Data for Action

- Measurement has long been a challenge for hospital stewardship programs.
- What to measure? How to do it?
- Internal measures to assess progress are important and a bit easier.
- Comparative measures are strongly desired, but much harder to develop.
NHSN Antimicrobial Use (AU) Option

- **Objective:** Measure antibiotic use to provide risk-adjusted inter- and intra-facility comparisons
Standardized Antimicrobial Administration Ratio (SAAR)

- CDC developed a benchmarking measure for antibiotic use.
- Similar in principle to the Standardized Infection Ratio (SIR).
- SAAR expresses observed antibiotic use compared to predicted use.
- CDC worked with many partners to develop the SAAR measure to try and make it most useful for stewardship.
Standardized Antimicrobial Administration Ratio (SAAR)

- SAARs for different patient populations (e.g., adult, peds, ICU, non-ICU).
- SAARs for different groups of antimicrobials:
  - Agents mainly for hospital-onset infections
  - Agents mainly for community-acquired infections
  - Agents mainly for resistant Gram-positive infections
  - Narrow spectrum beta-lactam agents
  - Azithromycin (peds only)
  - Antifungals mainly for invasive candidiasis
  - Antibacterial agents posing the highest risk for CDI infection
  - All antibacterial agents
Role of SAAR

- Experts agree that benchmark measures are extremely helpful in driving hospital improvements.
  - Can provide broader context to internal measures.
  - What if your use is going down by 5% per year, but you find your use is twice as high as other, similar hospitals?
- SAAR data can also help quickly identify locations in the hospital and agents where stewardship programs can focus.
SAAR Analysis within a Given Facility

Example data
Key Point About the SAAR

- The SAAR only helps direct stewardship efforts to locations and antibiotics where use appears to deviate from predicted.
  - High use might be perfectly justified, low use might be harming patients.
Using the SAAR to Inform Investigations and Interventions

- CDC and The Pew Charitable Trusts partnered with stewardship experts to design an assessment tool that can assist explorations of high SAAR values (or other measures of high use).

- The tool identifies high-yield opportunities to improve use, based on past experience.

SAAR or other indicators of antibiotic use show higher than expected values

General Assessments
- Search for specific agents driving overall high use.
- Assess for unnecessary combinations.
- Look for specific providers with high prescribing rates.
- Assess use to see if high use reflects large numbers of starts or prolonged courses.
- Compare antibiotic use to resistance patterns.
- Discuss antibiotic use in high use locations.

Narrow investigation targets

Medication use evaluations

Detailed Reviews
- Review indications for prescribing.
- Review treatment of specific infections.
- Review use of agents to treat resistant gram-positive infections.
- Review selected courses of broad-spectrum therapy.
- Review prolonged courses of antibiotics.

Stewardship Actions
- Feedback
- Education
- Intervention
NHSN AU Case Examples

- Community Hospital uses SAARs to reduce Fluoroquinolone use

AU Option Case Examples

Targeting a Reduction in Fluoroquinolone Use within a Community Hospital

Submitting data into the NHSN Antimicrobial Use (AU Option) since 2016, Wilson Medical Center, a community hospital in North Carolina, used AU Option data to identify an area of high fluoroquinolone use. Once the area of high use and hospital locations were pinpointed, they developed an intervention to address the issue. [Read More]

Posted On: January 30, 2019

- Plan to add additional examples in the coming months

https://www.cdc.gov/nhsn/au-case-examples/index.html
Development of SAARs for Newborn Stewardship

- Working with experts in neonatology and infectious diseases through Vermont Oxford Network
  - Neonatal SAAR categories
  - NHSN survey questions to capture facility-level information potentially necessary for predictive modeling

Breakdown of Mean Antibiotic Usage in Level II/III Neonatal Critical Care Units (n=44)

- Ampicillin: 44.1%
- Gentamicin: 35.9%
- Vancomycin: 4.6%
- Cefotaxime: 8.7%
- Other: 2.5%
Implementation
Core Elements of Hospital Antibiotic Stewardship Programs

- Leadership Commitment
- Accountability
- Drug expertise
- Action to improve use
- Tracking
- Reporting
- Education

https://www.cdc.gov/getsmart/healthcare/pdfs/core-elements.pdf
# Core Contributors to Stewardship Programs (in addition to physicians and pharmacists)

<table>
<thead>
<tr>
<th>Role</th>
<th>Responsibilities</th>
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<tbody>
<tr>
<td><strong>Infection Preventionists</strong></td>
<td>• Risk assessment and prevention planning skills</td>
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<tr>
<td></td>
<td>• Collect, analyze and report antibiotic-related data</td>
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<tr>
<td><strong>Laboratory</strong></td>
<td>• Input into specimen collection and proper use of relevant tests</td>
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<td></td>
<td>• Review information flow of results to clinicians</td>
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<td></td>
<td>• Create and interpret a facility antibiotic resistance report</td>
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<tr>
<td><strong>Nursing</strong></td>
<td>• Review medications as part of their routine duties</td>
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<tr>
<td></td>
<td>• Could contribute through prompting discussions of antibiotic treatment, indication, and duration</td>
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<tr>
<td><strong>Information Technology (IT)</strong></td>
<td>• Create ways integrate guidelines and policies with decision support at point of care</td>
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<tr>
<td></td>
<td>• Track antibiotic use through medication administration records</td>
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NHSN Annual Hospital Surveys 2014-2017:
Number and percentage of hospitals meeting all 7 Core Elements

<table>
<thead>
<tr>
<th>Year</th>
<th>Number of Hospitals</th>
<th>Meeting all 7</th>
<th>Not meeting all 7</th>
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<tbody>
<tr>
<td>2014</td>
<td>4,184</td>
<td>40.9%</td>
<td>59.1%</td>
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<tr>
<td>2015</td>
<td>4,569</td>
<td>51.9%</td>
<td>48.1%</td>
</tr>
<tr>
<td>2016</td>
<td>4,781</td>
<td>64.1%</td>
<td>35.9%</td>
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<tr>
<td>2017</td>
<td>4,992</td>
<td>76.4%</td>
<td>23.6%</td>
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Help with Implementing Core Elements

- NQF Hospital Antibiotic Stewardship playbook outlines specific actions that have been taken by other hospitals to implement the CDC Core Elements, barriers and solutions.
- Released in May 2015

http://www.qualityforum.org/Publications/2016/05/National_Quality_Partners_Playbook__Antibiotic_Stewardship_in_Acute_Care.asp
<table>
<thead>
<tr>
<th>Facility Type</th>
<th>≤50 beds</th>
<th>51 - 200 beds</th>
<th>&gt;200 beds</th>
<th>Non-teaching</th>
<th>Major teaching</th>
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<tr>
<td>Critical access hospital</td>
<td>57.8%</td>
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<tr>
<td>Surgical hospital</td>
<td></td>
<td>82.5%</td>
<td>90.7%</td>
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<tr>
<td>General acute care hospital</td>
<td>77.3%</td>
<td>86.0%</td>
<td>86.4%</td>
<td>71.4%</td>
<td></td>
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<tr>
<td>Children's hospital</td>
<td></td>
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<td>61.4%</td>
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Implementing Core Elements in Small and Critical Access Hospitals


https://www.cdc.gov/getsmart/healthcare/implementation/core-elements-small-critical.html
Improve the Measurement of Implementation of Hospital Stewardship Programs

- The NHSN annual facility survey stewardship questions present an important opportunity to advance our understanding of program implementation.
- Now that the majority of hospitals have the basics, we revised the survey to try and go deeper.
  - More details on program structure and support
  - What specific actions and practices are hospitals implementing?
- CDC sought input from the stewardship community
Antimicrobial Stewardship Programs

- Ultimately, improving antibiotic use comes down to implementing interventions that will improve prescribing.

- The goal of a stewardship program is to create an environment where improvement interventions will be most successful.
Key Moments for Antibiotic Stewardship to Act

- Patients with *C. difficile*
- Patients with positive blood cultures
- Patients being given IV antibiotics at discharge
- Patients on unnecessarily duplicative therapy
- Patients being treated for:
  - Community acquired pneumonia (CAP)
  - Urinary tract infection (UTI)
  - Skin and soft tissue infections
- Patients who have gotten 3 days of therapy.
Innovation -
Examples on Advancing SAAR Measure
Advancing the SAAR Measure

- The Duke Antimicrobial Stewardship Outreach Network (DASON) was awarded funding to enroll a group of hospitals in NHSN AU option and then implement and/or expand stewardship efforts.
  - Does the AU rates and/or SAAR change in response to stewardship?

- VA Salt Lake City was awarded funding to electronically assess appropriateness and correlate with SAARs across VA facilities.
Advancing the SAAR Measure

- Duke University was awarded funding to identify patient- and facility-level factors predictive of antimicrobial use that can be used in risk adjustment strategies for benchmarking antimicrobial use.

- Oregon State University/Oregon Health & Science University College of Pharmacy in collaboration with Virginia Commonwealth University School of Pharmacy for advancing data visualizations for AU and SAARs.
CDC Training on Antibiotic Stewardship

- Focused on outpatient antibiotic prescribing and aimed at frontline providers with the objective to:
  - Optimize antibiotic prescribing
  - Inform healthcare professionals about proper antibiotic use
  - Encourage open discussion among clinicians and patients
- Fulfills Improvement Activities Patient Safety and Practice Assessment (PSPA_23 and PSPA_24) under CMS’s Merit-Based Incentive Payment Program (MIPS)

[Visit CDC Training website: https://www.train.org/cdctrain/training_plan/3697]
Engage all hospital pharmacists in stewardship
- Webinar held in Nov 2018
- Available for on-line in Spring 2019

1. Verify Penicillin Allergy
2. Avoid Duplicative Anaerobic Coverage
3. De-escalate Anti-MRSA Coverage
4. Avoid Treatment of ASB
5. Limit Antibiotic Duration
Mark you Calendar!

BE ANTIBIOTICS AWARE
SMART USE, BEST CARE

U.S. ANTIBIOTIC AWARENESS WEEK
November 18–24, 2019
www.cdc.gov/antibiotic-use
Be Antibiotics Aware Materials

Materials for healthcare providers and consumers include:

- Fact sheets
- Posters
- Brochure
- Video, radio, and print public service announcements (PSAs)
- Shareable GIFs and graphics
- Animated video

These materials are located on CDC’s website:
https://www.cdc.gov/antibiotic-use/community/materials-references/index.html
Conclusions

- Antibiotics are commonly used and misused in hospitals.

- Improving antibiotic use is an important public health priority and a healthcare quality and patient safety issue.

- CDC’s approach in improving antibiotic uses focuses on data for action, implementation, innovation and education.