Antibiotic Stewardship
Optimizing Antibiotic Use in Inpatient Settings

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NHSN Training
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The Life-Saving Benefits of Antibiotic Use

- Once deadly infectious diseases are treatable, substantially reducing deaths compared to the pre-antibiotic era.
- Important adjunct to modern medical advances
  - Surgeries
  - Transplants
  - Cancer therapies
Facing the End of the Antibiotic Era

- No new types of antibiotics developed in over 10 years
- More toxic antibiotics being used to treat common infections
- Must treat antibiotics as precious and finite resource

Clin Infect Dis 2011 May; 52(suppl 5): S397-S42828
Unintended Consequences of Antibiotic Use: Antibiotic Resistance

- Some of the reasons for this are out of our control
  - The ability of bacteria to mutate to resist antibiotics
- BUT- some of the most important ones are very much in our control
  - Overuse of antibiotics
  - Spread of resistant organisms in healthcare settings through poor infection control practices
Unintended Consequences of Antibiotic Use: Adverse Events

- Antibiotic exposure is the single most important risk for *Clostridium difficile* Infections
  - Exposure to antibiotics increases the risk of *C. diff* infection by at least 3 fold for at least a month
  - Up to 85% of patients with *C. diff* infection have antibiotic exposure in the 28 days before infection

- Antibiotics account for nearly 1 in 5 drug-related adverse events
  - >140,000 ER visits/year due to adverse effect of antibiotics
  - Admission required for 6.1% of adverse events
In a 2011 single-day point prevalence survey in roughly 200 Emerging Infection Program Hospitals, 50% of patients were receiving at least one antibiotic.

Approximately 30% of antibiotic use in hospitals is unnecessary or inappropriate.
Antibiotic Stewardship Programs

- Antibiotic stewardship ensures that the patient only receives an antibiotic when needed AND the right drug, dose, and duration is prescribed
- CDC recommends that all hospitals should have antimicrobial stewardship programs
  - Programs will look different in various hospitals, depending on the size and complexity of the patient population

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)

| Infection Preventionists | • Risk assessment and prevention planning skills  
<table>
<thead>
<tr>
<th></th>
<th>• Collect, analyze and report antibiotic-related data</th>
</tr>
</thead>
</table>
| Laboratory               | • Input into specimen collection and proper use of relevant tests  
|                         | • Review information flow of results to clinicians  
|                         | • Create and interpret a facility antibiotic resistance report |
| Nursing                  | • Review medications as part of their routine duties  
|                         | • Could contribute through prompting discussions of antibiotic treatment, indication, and duration |
| Information Technology (IT) | • Create ways integrate guidelines and policies with decision support at point of care  
|                         | • Track antibiotic use through medication administration records |
National Healthcare Safety Network

Antibiotic Stewardship Programs

- Stewardship questions were added to NHSN for first time in 2015
  - >4,000 hospitals respondents
  - Questions applied to calendar year 2014

http://www.cdc.gov/nhsn/forms/57.103_pshospsurv_blank.pdf
Percentage of Facilities in Each State Meeting all 7 Core Elements, 2015

Overall: 48%
Key Findings

- Implementation of the Core Elements is increasing, but slowly:

- Factors associated with meeting all Core Elements
  - Bed size (66% >200 beds vs 31% <50 beds)
  - Teaching Status
  - Leadership support: having leadership support increases the chance of having all elements by 7-fold
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.aspx
The Joint Commission Standard

New Antimicrobial Stewardship Standard

Applicable to Hospitals and Critical Access Hospitals

Effective January 1, 2017

Medication Management (MM)

Standard MM.09.01.01
The [critical access] hospital has an antimicrobial stewardship program based on current scientific literature.

Elements of Performance for MM.09.01.01
1. Leaders establish antimicrobial stewardship as an organizational priority. (See also LD.01.03.01, EP 5)

Note: Examples of leadership commitment to an antimicrobial stewardship program include:
- Antimicrobial stewardship as a priority at the top management level
- Leadership accountability for implementation of the program
- Recognition and reward of success in antimicrobial stewardship

4. The [critical access] hospital has an antimicrobial stewardship multidisciplinary team that includes the following members, when available in the setting:
- Infectious disease physician
- Infection preventionist(s)
- Pharmacist(s)
- Practitioner

Note 1: Part-time or consultant staff are acceptable as members of the multidisciplinary team.

Note: An example of an educational tool that can be used for patients and families includes the Centers for Disease Control and Prevention’s Get Smart document, “Viruses or Bacteria—What’s got you sick? at http://www.cdc.gov/getsmart/community/downloads/getsmart-chart.pdf.

https://www.jointcommission.org/assets/1/6/New_Antimicrobial_Stewardship_Standard.pdf
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 antimicrobial use to provide risk-adjusted inter- and intra-facility comparisons

- Antimicrobial resistance (AR) Option also available
Standardized Antimicrobial Administration Ratio (SAAR)

- CDC’s 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)

- Experts in stewardship suggested that a variety of different SAARs would be useful.
- SAARs for different patient populations (adult, peds, ICU, non-ICU).
- SAARs for different groups of antibiotics:
  - Agents mainly for healthcare associated pathogens
  - Agents mainly for community pathogens
  - Agents active against MRSA
  - Agents frequently use for surgical prophylaxis
  - All agents
# Example SAARs Data

## National Healthcare Safety Network

**SAARs Table - All Standardized Antimicrobial Administration Ratios (SAARs) High-Level Indicators and High-Value Targets**

As of March 7, 2017 at 12:43 PM  
Date Range: All AU_SAAR

**All antimicrobials used in adult ICUs and wards**

<table>
<thead>
<tr>
<th>Facility Org ID</th>
<th>Summary Year/Month</th>
<th>SAAR Type</th>
<th>Antimicrobial Days</th>
<th>Predicted Antimicrobial Days</th>
<th>Days Present</th>
<th>SAAR</th>
<th>SAAR p-value</th>
<th>95% Confidence Interval</th>
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*EXAMPLE DATA ONLY*
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 should focus.
Key Point About the SAAR

- The SAAR only helps direct stewardship efforts to locations and antibiotics where use appears to deviate from expected.
  - 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
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.
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
- Many opportunities exist to improve prescribing
  - Guidelines, policies and education are a start, but not enough
  - Stewardship programs can exist in any hospital setting
- Infection Preventionists have an important role to play in antibiotic stewardship