Killing Bugs and Saving Drugs Across a Health System: A Multi-Hospital Shared Antimicrobial Stewardship Program

David P. Schmidt, Pharm.D., BCPS, DPLA
Bryan T. Alexander, Pharm.D., AAHIVP, BCPS
Dayla M. Boldt, Pharm.D., BCPS-AQ ID
Disclosures

All planners, presenters, reviewers, and ASHP staff of this session report no financial relationships relevant to this activity.
Learning Objectives

• Design an innovative plan to provide antimicrobial stewardship services within a single facility or across a multi-hospital network.
• Interpret clinical findings and key decision alerts to identify opportunities for intervention.
• Evaluate facility needs to target stewardship program activities for maximum results and program effectiveness.
• Assess the cost savings and clinical impact of a shared infectious disease pharmacist and integrated antimicrobial stewardship program.
Background

2007
- IDSA/SHEA - Guidelines for Developing an Institutional Program to Enhance Antimicrobial Stewardship

2010
- Antimicrobial Stewardship became clinical initiative in our health system.
- Clinical Decision Tool investment, minimal staff pharmacist training
- No dedicated pharmacist time, ID MD on call for questions

2012
- Creighton University Medical Center joined Alegent Health System
- Dedicated Antimicrobial Stewardship with ID provider and ID pharmacist
- Daily audit with feedback interventions

Dellit, T. H. Infectious Diseases in Clinical Practice 2017;15(4):263-264
• 14 Hospital Facilities
• 913 combined ADC
• Urban, Suburban, Rural
• Academic, Community, Critical Access

ADC = Average Daily Census
Models of Antimicrobial Stewardship within Health System

- ID trained pharmacist + ID Physician
- Non-ID pharmacists +/- ID Physician
- Critical Access, non-24/7 pharmacy, No ID physician
How were we doing?

$58.7$ M Drug Budget

Anti-infectives $5.8$M (~$10\%$)

AMC consistently out performing community hospitals
## Model Development & Resource Needs

**Goal:** Provide a robust ASP model across diverse Health System

- Meet TJC/CMS requirements of Antimicrobial Stewardship Program

<table>
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<th>Morris et al.</th>
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Medicare and Medicaid Programs; Hospital and Critical Access Hospital (CAH) Changes To Promote Innovation, Flexibility, and Improvement in Patient Care. (2016, June 16).
Model Development & Resource Needs

- Echevarria et al.
  - VA Health System staffing tool
  - Time breakdown - 70% Clinical & 30% program management activities

- Doernberg et al.
  - Each 0.50 increase in pharmacist and physician full-time equivalent support predicted a 1.48-fold increase in the odds of demonstrating effectiveness.
  - The effect was mediated by the ability to perform prospective audit and feedback.
  - Most programs noted significant barriers to success.

Think-Pair-Share

• How consistent is your health system at providing quality Antimicrobial Stewardship (Prospective Audit & Feedback) across all facilities regardless of size/resources?

• How consistent do you provide quality ASP within your facility, are all units included, challenges, areas for opportunity?

• How do your current staffing grids compare to those recommended in literature?
Program Structure
(900-1000 Average Daily Census)

- 0.5 FTE – ID physician
- 2.5 FTE – ID trained pharmacists
- PRN - Research/education pharmacist
- Facilities grouped by size and electronic medical record
Overall Workflow

• Antimicrobial stewardship pharmacists utilize various methods to identify patients for ASP review

• Daily stewardship rounds with ID physician to discuss more complicated patients

• Interventions and recommendations communicated to both providers and pharmacists involved in the patient's care
Think – Pair – Share

• How do you identify patients that may benefit from antimicrobial stewardship intervention?

• What kind of clinical decision support tools are available?
How to Identify Patients for ASP Review

• Use of clinical decision support software and electronic medical record

• Through other members of the healthcare team
  – Microbiology notification
  – Infection preventionists
  – By request from providers, too!
Clinical Decision Support Alerts

Clinical Pharmacist
- Pharmacokinetics
- IV to PO
- Renal dose adjustments
- Alternative dosing interchanges
- Appropriate use criteria
- High risk of *C. difficile*

ASP Pharmacist
- Positive cultures
- Broad-spectrum antimicrobials
- Redundant therapy
- >72 hr antimicrobial therapy
Common Reasons for ASP Review

• Disease state and/or positive culture
  – All positive blood cultures
  – Positive *C. difficile* results
  – Influenza

• Multi-drug resistant organisms
  – MRSA, VRE, ESBL, CRE
Common Reasons for ASP Review

• Targeted antimicrobials
  – Those with established appropriate use criteria (e.g. ertapenem, daptomycin, aztreonam)
  – Broad spectrum antibiotics
  – High cost agents

• Prolonged duration of therapy
  – 72hr timeout review
Clinical Decision Support Patient Identification

### Alert

**EZ Alert: NE- Positive Verigene**

**Admit Diagnosis:** ADULTGEN

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**Medications:** Lab Review  
**Lab Review:** Microbiology Review

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### Alert

**EZ Alert: NE- Positive Verigene**

**Admit Diagnosis:** INF LT FOOT WOUND

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**Medications:** Lab Review  
**Lab Review:** Microbiology Review
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<th>Days of Therapy</th>
<th>All Antibiotics</th>
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<th>Bug-Drug</th>
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EMR Patient Identification
Workflow Example

Review Reports and E-mail Alerts

Evaluate patient's history, medications, labs, radiology, etc.

Daily rounds with ID MD

Continue to follow patient daily and make further recommendations as needed

Communication to prescriber via phone call and/or progress note

Phone call to pharmacist covering the unit to discuss recommendations
How Do Our Daily Activities Help Meet The Joint Commission Requirements?

• Leaders establish ASP as an organizational priority
• Education of providers
• Multidisciplinary team
• Core elements
• Organization approved multidisciplinary protocols
• Collect, analyze, and report data
• Take action on improvement opportunities
Identifying Facility-Specific Needs

- Infectious Disease consultation availability
- Prescribing patterns of targeted drugs
- Hospital-acquired infection rates
- Prolonged duration of therapy
<table>
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<th>Hospital# 1</th>
<th>Hospital#2</th>
<th>Hospital#3</th>
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<tr>
<td>• No ID consultation available</td>
<td>• Highest rate of hospital-acquired <em>C. difficile</em> in the division</td>
<td>• Often de-escalated appropriately, but continued for prolonged duration</td>
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<tr>
<td>• ASP reviews most complicated disease states and follows daily to provide recommendations</td>
<td>• ASP focused efforts to reduce the use of unnecessary empiric broad-spectrum antibiotics</td>
<td>• Educating providers about guideline recommendations for DOT and following up on antibiotic stop-dates</td>
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Different Provider Mix

Hospital #1
- Hospitalist
- Primary Care
- Pulm/ICU
- Other

Hospital #2
- Primary Care
- Hospitalist
- Pulm/ICU
- ID
- Other

Hospital #3
- Hospitalist
- Pulm/ICU
- ID
- Burn
- Primary Care
- Other
Think – Pair – Share

• What are some of the challenges of implementing programs at remote sites which you may visit rarely/ever?

• What are some strategies that have made (or you believe would make) you successful in accomplishing this?
Overcoming the Distance

• Keep communication open and visit often!
• Designate local physician and pharmacy champions
• Share ongoing antimicrobial stewardship initiatives at the local level
• Prepare regular reports to share with key stakeholders
• Provide educational presentations
Behavior Change Methodology as a Core Competency for ASP Programs

INNOVATION ADOPTION LIFECYCLE

"Diffusion of Innovation" by "Pnaultilus" is licensed under CC BY-SA 3.0. Accessed: Sept. 20, 2018
Rare - Theory of Change

- 350 conservation "Pride campaigns" in 56 countries, having impacted 10 million people

- Solutions that are local and create a collective will in favor of conservation
Provider Approaches Must be Adaptive

• Antimicrobials are the "drugs of fear"
• Providers need to emotionally connect with global ASP objectives

• Varied root causes for overprescribing
  – Uncomfortable with ID problems and antimicrobials
  – Inattentive to daily process of de-escalation/discontinuation
  – Reference their "long clinical experience" or prior institutional practices often
  – Disengaged or belligerent towards stewardship goals and personnel

• Be self-reflective in your communications
Think – Pair – Share

"How can I ensure that you don't make any recommendations on my patients in the future?"
CHI Health Criteria for Appropriate Use Policy

• Criteria for use developed for: aztreonam, ceftazidime/avibactam, ceftolozane/tazobactam, daptomycin, and ertapenem
• 24/7 enforcement across all CHI Health facilities
• These antibiotics were chosen:
  – Known suboptimal prescribing practices
  – Pre-existing criteria not being enforced
  – Definable criteria for use relatively straightforward
  – High-risk for impactful resistance development and superinfection
• Our goals:
  – Establish a process for appropriate use that can be expanded in the future
  – Develop a collective ownership of stewardship goals amongst all providers and clinical pharmacists
CHI Health Criteria for Appropriate Use Policy

• Procedure
  – Pharmacist closest to the bedside is responsible for evaluating appropriateness and contacting provider, if outside scope
  – Order is not processed until criteria have been assessed and documented. ASP pharmacists available for assistance once initial review is completed.

• Pharmacist Education
  – Provide criteria for use with specific clinical examples, common alternatives, scripting for provider communications, and documentation templates
  – Live in-service presentations for each site with Q&A opportunity
  – Prior to go-live, online competency assessment
  – Emphasize empowerment, available support from ASP, and accountability
CHI Health Criteria for Appropriate Use Policy

• Implementation
  – Requests frequent initially
  – E-mail reminders for missed evaluation and/or documentation
  – Focus of post-prescription review

• Initial Results (Omaha)
  – 2nd to 3rd Quarter of full ASP implementation
  – Aztreonam usage down 57%-94%
    • Attention to PCN allergy evaluation
  – Cost savings - $12,200
    • Single quarter for four hospitals

Clinical pharmacists developing collective ownership and pride for a stewardship process and outcome
AHRQ Safety Program for Improving Antibiotic Use

Follow a Comprehensive Safety Approach to Reduce Harm Associated with Antibiotic Use

The AHRQ Safety Program for Improving Antibiotic Use: A National Program for Antibiotic Stewardship

The Agency for Healthcare Research and Quality (AHRQ), in conjunction with the Johns Hopkins Medicine Armstrong Institute for Patient Safety and Quality and NORC at the University of Chicago, created the AHRQ Safety Program for Improving Antibiotic Use to develop and implement a bundle of interventions designed to improve antibiotic stewardship and antibiotic prescribing practices across acute care, long-term care, and ambulatory care facilities across the United States.

Antibiotics are a precious resource and can be critical for improving the outcomes of patients with serious infections. However, antibiotics also have the potential to cause patient harm, including allergic reactions, *Clostridium difficile* infections, and antibiotic resistance both at the individual patient level and for society as a whole. We want antibiotics to be effective for future generations, and that is only possible if we use antibiotics judiciously.

https://safetyprogram4antibioticstewardship.org
AHRQ Safety Program for Improving Antibiotic Use

• Statement of administrative/institutional support
• Structured daily patient review
• Monthly webinars on practical and clinical ASP topics
• Monthly "office hours" conference calls with clinical leads
• Monthly check-in calls with program coordinators
• Clinical templates, brief topic reviews, and promotional materials
• Quarterly antimicrobial usage and *C. difficile* incidence data evaluation
Enrolled the Hospitalist service at a single CHI Health hospital

- Visibility for new stewardship program within the institution
- Set rounding expectations and formalize ASP clinical evaluation process
- Improve provider topic area clinical knowledge
- Obtain preliminary benchmarking data on antimicrobial use

Providers developing collective ownership and pride for a stewardship process and outcome
Behavior Change is an Ongoing (Never-ending!) Process

• Reversion to "wild type" applies with clinicians as well as microbes...

• Implementation of an ASP program in 2001, and was active 2002-2008
  – Yearly antimicrobial expenditures averaged a 31% decrease from baseline ($2.4 million)

• ASP program was terminated in 2009
  – Within 2 years antimicrobial expenditures had increased by $1.5 million

Program Results

Total Drug Budget
- $58.7M → $61.7 M → $66.5 M

Anti-infective Spend
- $5.9M → $5.6M → $4.4 M
  - 21% reduction in year 1
Clostridium Difficile Infection 30-Day Readmission

30-Day CDR Rates for Healthcare System

30-Day CDR Rate for AMC
Shows FY18 improved over FY16 baseline
$1.2 million antimicrobial savings in first year
KEY TAKEAWAYS

1) DEDICATED ANTIMICROBIAL STEWARDSHIP RESOURCES DEPLOYED ACROSS MULTIPLE FACILITIES CAN IMPROVE PROGRAM OUTCOMES

2) CLINICAL DECISION SUPPORT ALERTS COMBINED WITH PROSPECTIVE AUDIT WITH FEEDBACK INTERVENTIONS CAN OPTIMIZE PATIENT OUTCOMES AND REDUCE ANTIMICROBIAL EXPENDITURES

3) COLLECT AVAILABLE DATA ENDPOINTS TO DETERMINE PROGRAM EFFECTIVENESS AND SPECIFIC FACILITY NEEDS
Antimicrobial Stewardship Team
ACKNOWLEDGEMENTS & CONTACT INFO

ASP TEAM MEMBERS
-Renuga Vivekanandan, MD
-Jennifer Anthone, Pharm.D.
-Christopher Destache, Pharm.D.

LEADERSHIP TEAM
-Michael Tiesi, RP, VP Pharmacy
-Gary Gorby, MD, ID-Chair
-Cary Ward, MD, CMO
-Cliff Robertson, MD, SVP, CEO

PRESENTERS
David Schmidt, Pharm.D., BCPS, DPLA
David.Schmidt2@alegent.org

Bryan Alexander, Pharm.D., BCPS, AAHIVP
Bryan.Alexander@alegent.org

Dayla Boldt, Pharm.D., BCPS-AQ ID
Dayla.Boldt2@alegent.org