Antimicrobial Stewardship in Critical Access Hospitals

December 16, 2014

- Tara Dockery, MT (ASCP) Infection Prevention East Adams Rural Hospital
- Loria Pollack, MD, MPH, Division of Healthcare Quality Promotion, Centers for Disease Control and Prevention
- Eddie Stenehjem, MD MSc, Infectious Diseases and Antimicrobial Stewardship, Intermountain Healthcare

Presented at the Washington State Hospital Association Statewide ASP Initiative Webcast on December 16, 2014
• New web-based courses offered monthly
• Mentorship by experienced Infection Preventionists
• Collaborative action and improvement opportunities
• Turn-key resources (sample policies, templates, tools)
• Benchmarking of HAI data
• No cost to participants
• Enrollment begins in January!

Contact Qualis Health for information
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JamieM@QualisHealth.org
206-288-2512

Presented at the Washington State Hospital Association Statewide ASP Initiative Webcast on December 16, 2014
Statewide Antimicrobial Stewardship (ASP) Initiative – Three Tiers

All Washington hospitals and health systems will have an Antimicrobial Stewardship Program.
Common Barriers for Establishing ASP in CAH

- Infectious Disease Physician Support
- Full-time pharmacy support
- Standard definitions and treatment for common infections
- Provider engagement in antimicrobial stewardship
- Common understanding of Antibiograms and other sensitivity reports
- Staff understanding of drug classes and appropriate “bug/drug” match
- Current EMR systems do not have the capability to data mine
Core Elements of Hospital Antibiotic Stewardship Programs

Finding what fits

Loria Pollack, MD, MPH
Division of Healthcare Quality Promotion
Centers for Disease Control and Prevention
Objectives

- Review the rationale and goals of antimicrobial stewardship programs
- Understand the core elements of effective antimicrobial stewardship programs
- Learn how smaller hospitals can improve antibiotic prescribing
Between 20-50% of antibiotic prescriptions are either unnecessary or inappropriate:

- Given when they are not needed
- The wrong antibiotic is chosen to treat an infection
- Continued when they are no longer necessary
- Given at the wrong dose
- Broad spectrum agents are used to treat very susceptible bacteria

Consequences of Inappropriate Use

- Antibiotic exposure is the single most important risk for *C. 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
Antibiotic Use Drives Resistance

- For an individual, getting an antibiotic increases a patient’s chance of becoming colonized or infected with a resistant organism

- Increasing use of antibiotics in healthcare settings increases the prevalence of resistant bacteria in hospitals

How Antibiotic Resistance Happens

1. Lots of germs. A few are drug resistant.
2. Antibiotics kill bacteria causing the illness, as well as good bacteria protecting the body from infection.
3. The drug-resistant bacteria are now allowed to grow and take over.
4. Some bacteria give their drug-resistance to other bacteria, causing more problems.

CDC, Antibiotic resistance threats in the United States, 2013
CDC 2014 Report Highlights Issue

- CDC Vital Signs: Antibiotic Rx in Hospitals: Proceed with Caution
  - Encouraged hospital CEOs/medical officers to adopt an antibiotic stewardship program
  - Identified Core Elements for Hospital Antibiotic Stewardship

http://www.cdc.gov/vitalsigns/antibiotic-prescribing-practices/

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Antimicrobial Stewardship

- Strategic multidisciplinary and facility specific efforts to optimize antimicrobial prescribing
  - Right drug
  - Right dose
  - Right duration
  - Recognize when not needed

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Core Elements of Antimicrobial Stewardship Programs

- Leadership Commitment
- Accountability
- Drug Expertise
- Action
- Tracking
- Reporting
- Education
Leadership Commitment

- Leadership support for efforts to improve and monitor antibiotic prescribing
- Assurance that involved staff has time, authority, and accountability
- Funding can augment efforts
  - Staff time to accomplish goals
  - Training for staff
  - IT support
- Stewardship programs will often pay for themselves

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Accountability

- Stewardship program leader:
  - Identify a single leader who will be responsible for program outcomes
  - Physicians and/or pharmacists have been highly effective in this role
Key Supporters

- Clinician groups
- Infection preventionists
- Quality improvement staff
- Laboratory staff
- Nurses

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Drug Expertise

- Identify a pharmacist to be involved
- Formal training in infectious diseases and/or antibiotic stewardship is beneficial
- Pharmacist can assist in
  - Identifying areas for improvement, and
  - Monitoring use

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Stewardship Program Functions

- Develop guidelines, policies, and protocols that support optimal prescribing

- Prioritize efforts
  - Specific conditions
  - Particular units or prescriber groups
  - Specific antimicrobial drugs

- Educate

- Monitor and report
Infection and syndrome specific interventions

- Community-acquired pneumonia
- Urinary tract infections (UTIs)
- Skin and soft tissue infections
- Tailoring treatment to culture results
- *Clostridium difficile* infections
Action: Guidelines

- Facility-specific guidelines, based on
  - National guidelines
  - Local susceptibility

- Select and review charts
  - What is current practice?
  - What can we improve upon?

- Involve prescribers

- Develop order-sets that incorporate guidelines
Actions: Interventions

- Guidelines, policies, and protocols alone will probably not change practice

- Active interventions are most effective
  - Prospective audit
  - Formulary restriction and preauthorization
  - Antibiotic ‘Time Out’
Prospective Audit

- An physician or pharmacist reviews orders and intervenes with modification of order and feedback to prescriber
- Results in improved use, decreased costs

Caveats:
- Time and labor intensive
- Many settings do not have capacity
- Providers may not be receptive
Formulary restriction and preauthorization

- Specific antibiotics cannot be ordered without authorization
- Useful in response to healthcare-associated outbreak

Impact of Fluoroquinolone Restriction on Rates of *C. difficile* Infection (CDI)

Pharmacy-driven Interventions

- Automatic changes from intravenous to oral antibiotic therapy
- Automatic alerts in situations where therapy might be unnecessarily duplicative
- Dose adjustments/optimization
- Time-sensitive automatic stop orders
Additional Core Elements

Tracking:
- Monitoring antibiotic prescribing and resistance patterns

Reporting:
- Regular reporting information on antibiotic use and resistance to doctors, nurses and relevant staff

Education:
- Educating clinicians about resistance and optimal prescribing
Antimicrobial Stewardship

Successful example
Antimicrobial Stewardship in a Rural Hospital

- **Setting:** 141-bed community hospital in rural Northwest
- **Team:** Pharmacist-led (non-ID), Remotely located ID physician
- **Intervention:**
  - Targeted review of six antimicrobials
    - Pip/Tazo, imipenam, cilastatin, ertapenam, vancomycin, linezolid, daptomycin
  - Weekly teleconference “rounding” with ID physician
  - Streamlined Therapy
    - Eliminated unnecessary combinations
    - Recommended more narrow spectrum
  - Dose optimization


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Antimicrobial Stewardship in a Rural Hospital

Outcomes

- Number of interventions increased from 2 to 7 per week
- Streamlining was most common intervention
  - 44% before program, 96% after program began
- C. diff infections decreased from 5.5 to 1.6 (cases/10,000 pt days)
- Antimicrobial purchase costs decreased
  - $13,521 per 1,000 pt days (baseline) to
  - $ 9,756 (2010) to
  - $ 6,583 (2011 Quarter 1-2)


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Every practitioner should embrace the responsibility to optimize antibiotic use

Starting point: Identify specific interventions that people can do to improve antibiotic use
Resources on Get Smart for Healthcare Website – For your use!

- Fact sheets
- Implementation resources
- Program examples

http://www.cdc.gov/getsmart/healthcare

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Thank you!

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Telephone, 1-800-CDC-INFO (232-4636)/TTY: 1-888-232-6348
E-mail: cdcinfo@cdc.gov  Web: www.cdc.gov

The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.
Advancing Antimicrobial Stewardship in Community Hospitals in Utah

Eddie Stenehjem, MD MSc
Infectious Diseases and Antimicrobial Stewardship
December 16th, 2014
Objectives

• Describe how antimicrobial usage in small, community hospitals compares to large urban centers

• Understand the basic concepts of Intermountain’s SCORE study and how it can apply to your hospital
Presidential Report

NATIONAL STRATEGY FOR COMBATING ANTIBIOTIC-RESISTANT BACTERIA

Vision: The United States will work domestically and internationally to prevent, detect, and control illness and death related to infections caused by antibiotic-resistant bacteria by implementing measures to mitigate the emergence and spread of antibiotic resistance and ensuring the continued availability of therapeutics for the treatment of bacterial infections.

September 2014
Executive Order

• Task Force for Combating Antibiotic Res.
  – By 2/14/2015: submit a National Action Plan

• Improved Antibiotic Stewardship
  – “By the end of calendar year 2016, HHS shall review existing regulations and propose new regulations …that require hospitals…to implement robust antibiotic stewardship programs that adhere to best practices.”
SCOPE

2005 United State Hospitals
4935 Registered Hospitals

72% have < 200 beds

Most of these are without antibiotic oversight

All will be included in Executive Order

AHA Statistics
http://www.aha.org/research/rc/stat-studies/index.shtml

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Since 1975
• 22 hospitals
• 2,784 licensed beds

Since 1983
• Health plans
• 700,000+ members

Since 1994
• 1,200 employed physicians
• 558 advanced practice clinicians

Since 1997
• 10 key service lines

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Intermountain Antibiotic Stewardship

Increased emphasis in the past 5 years at our large facilities

• Corporate AS Committee
  – Subcommittee of Infection Control Guidance Council

• Corporate Outpatient AS Committee
  – Subcommittee of Primary Care Clinical Program

• Individual ASP Committees at our large sites

• NO FOCUS ON OUR SMALLER HOSPITALS

Presented at the Washington State Hospital Association Statewide ASP Initiative Webcast on December 16, 2014
<table>
<thead>
<tr>
<th>Hospital</th>
<th>Staffed Bed Count</th>
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<tbody>
<tr>
<td>Intermountain Medical Center</td>
<td>472</td>
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<tr>
<td>Utah Valley</td>
<td>375</td>
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<tr>
<td>McKay-Dee</td>
<td>300</td>
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<td>Primary Children's</td>
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<td>Dixie Regional</td>
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<td>LDS</td>
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<td>Logan Regional</td>
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<tr>
<td>Riverton</td>
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<td>Alta View</td>
<td>66</td>
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<td>Valley View</td>
<td>48</td>
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<tr>
<td>Park City Medical Center</td>
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<tr>
<td>Cassia Regional</td>
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<tr>
<td>Sevier Valley</td>
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<td>Bear River Valley</td>
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<td>Heber Valley</td>
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<tr>
<td>Delta Community</td>
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<td>Garfield Memorial</td>
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<td>Sanpete Valley</td>
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<td>Fillmore Community</td>
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**Large Urban Hospitals**
- ASP focused
- Formal ID consultation available

**Small Community Hospitals**
- 15 Hospitals
- 597 Beds
- 25% of IHC Beds
- No formal ASPs
- No Infectious Diseases MD support
- All with full time pharmacy staff

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Antibiotic Usage
CDC AU Data

• How does usage differ across our system?
  – Small vs Large Hospitals
  – Usage and Case Mix Index (CMI)
  – Usage and Spectrum
Small vs. Large Hospitals
3 year average

Panel 1

Days of Therapy per 1000 Patient Days [Bars]

15 Small IHC Hospitals

3 Large IHC Hospitals

Measure Names
- Casemix Index
- Facility AU Rate

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## Usage and Spectrum

<table>
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<tr>
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<th>Broader</th>
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<tr>
<td>Penicillin</td>
<td>Amoxicillin/clavulanate</td>
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<tr>
<td>Oxacillin (nafcillin)</td>
<td>Aminoglycosides</td>
</tr>
<tr>
<td>Dicloxacillin</td>
<td>Fluoroquinolones</td>
</tr>
<tr>
<td>Ampicillin</td>
<td>Aztreonam</td>
</tr>
<tr>
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<td>Ceftazidime</td>
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<td>Cefazolin</td>
<td>Ertapenem</td>
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<tr>
<td>Nitrofurantoin</td>
<td>Ceftarolone</td>
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<td>Imipenem</td>
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<tr>
<td>Tetracyclines</td>
<td>Meropenem</td>
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<tr>
<td>Macrolides</td>
<td>Piperacillin/tazobactam</td>
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<tr>
<td>Trimethoprim/sulfamethoxazole</td>
<td>Ticarcillin/clavulanate</td>
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<td>Daptomycin</td>
</tr>
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<td>Cefuroxime</td>
<td>Linezolid</td>
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<td>Clindamycin</td>
<td>Tigecycline</td>
</tr>
<tr>
<td></td>
<td>Colistin</td>
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Usage and Spectrum

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Need for Stewardship

Antimicrobials are overused at my hospitals

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<th></th>
<th>Large</th>
<th>Small</th>
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</thead>
<tbody>
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<td>19%</td>
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<tr>
<td>Agree</td>
<td>42%</td>
<td>34%</td>
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<tr>
<td>No Opinion</td>
<td>19%</td>
<td>21%</td>
</tr>
<tr>
<td>Disagree</td>
<td>24%</td>
<td>24%</td>
</tr>
</tbody>
</table>

New antimicrobial development will keep up with our current resistance trends

<table>
<thead>
<tr>
<th></th>
<th>Large</th>
<th>Small</th>
</tr>
</thead>
<tbody>
<tr>
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<td>10%</td>
<td>9%</td>
</tr>
<tr>
<td>Agree</td>
<td>9%</td>
<td>9%</td>
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<tr>
<td>No Opinion</td>
<td>23%</td>
<td>26%</td>
</tr>
<tr>
<td>Disagree</td>
<td>56%</td>
<td>52%</td>
</tr>
<tr>
<td>Strongly Disagree</td>
<td>23%</td>
<td>26%</td>
</tr>
</tbody>
</table>

63%
Conclusions – Baseline analysis

• SCHs have similar antibiotic usage rates as large, urban hospitals.

• There is significant variation in antibiotic selection in SCHs.

• Antibiotic use rates are dependent, in part, on:
  – CMI
  – Unit types
Project Aim: SCORE

Stewardship in Community Hospitals Optimizing Outcomes and Resources

Define an antibiotic stewardship strategy for Intermountain’s smaller hospitals that optimizes outcomes while maximizing resources
Study Design:
Cluster Randomized Clinical Trial

Study sites: All smaller Intermountain hospitals (N = 15)

Intervention:
• Low Resource Utilization
• Medium Resource Utilization
• High Resource Utilization
### Low Resource

- Education Initiative - Pharmacy KAP survey
- **Topics Covered:**
  - Stewardship Basics
  - Antibiotic Time Out
  - IV to PO
  - Antibiotic Indications
  - Bug-Drug mismatch
  - When to call ID

### Medium Resource

- Education Initiative - Pharmacy KAP survey
- **Topics Covered:**
  - Stewardship Basics – all of those in Low, plus
    - De-escalation - mylearning
    - Anaerobes - mylearning
    - Restrictions - mylearning
    - Allergy Verification
    - Stewardship Pearls / Q and A

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- **PAF – lite:** Audit a limited number of antimicrobial agents* and provide feedback
- **Restriction** (local pharmacy review) of selected antimicrobials***

  - * Vancomycin, carbapenems, piperacillin/tazobactam, and cefepime

- **PAF:** Audit an expanded list of antimicrobial agents** and provide feedback
- **Restriction** (Infectious Diseases review) of selected antimicrobials***

  - **Vancomycin, carbapenems, piperacillin/tazobactam, cefepime, aminoglycosides, ciprofloxacin, levofloxacin, ceftriaxone, and ampicillin/sulbactam**

  - *** Restricted agents: Meropenem, linezolid, daptomycin, ceftaroline, tigecycline, antifungals.

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Antibiotic Best Practices

- IV to PO Conversion
- Antibiotic Indications
- 48 Hour Antibiotic “Timeout”
- Monthly Antibiotic Report
- Access to ID Consultation
IV to PO Conversion

Quick Reference Guide for Hospital Pharmacists

This quick reference guide describes the purpose, process, and inclusion/exclusion criteria for converting antibiotics from IV to PO.

What is IV to PO conversion?

IV to PO conversion is a process of reviewing all patients on select IV antibiotics daily, assessing each patient’s eligibility for conversion to PO, and recommending conversion to the prescribing doctor.

Key Point:
You’ll review patients on IV antibiotics daily to assess eligibility for conversion.

Antibiotic Indications

Quick Reference Guide for Hospital Pharmacists

This quick reference guide describes the purpose, process, and requirements for including indications in HELP1 for every antimicrobial prescription. All antibiotics, antifungals, and antivirals are in the scope of these procedures; this card focuses on antibiotics.

The goal

To ensure that antibiotics are prescribed correctly. Ask yourself, is this...

• The RIGHT patient — Does the patient have an infection or need antibiotics based on an upcoming procedure?
• The RIGHT drug — Which antibiotic is most appropriate?
• The RIGHT dose — What dose is most appropriate?
• The RIGHT route — IV, oral, switch from IV to oral?
• The RIGHT duration — 3 days, 7 days, 6 weeks?

Key Point:
Knowing why the patient is receiving an antibiotic will enable you to assist the prescriber in providing the RIGHT care to the patient.
PHI:ABX TIMEOUT: Garfield Memorial Hospital

Sent: Mon 11/24/2014 7:31 AM
To: Whitney Buckel
Retention Policy: 90-day Message Retention - Inbox (90 days) Expires: 2/22/2015

ANTIBIOTIC TIME-OUT

Room: 111A
The above patient has been on the following antibiotics for greater than 48 hours:

LEVOFLOXACIN (LEVAQUIN), TABLET 750.

Please take a moment and review your patients available microbiology and clinical data to determine if antibiotics can be de-escalated or discontinued.
An ANTIBIOTIC TIME-OUT is considered to be an 'Antibiotic Best Practice' by the Centers for Disease Control and The Joint Commission.
Thank you.
Antibiotic Stewardship Team
Access to ID Clinicians

• Adults and Pediatrics
• One number: 1-801-50-SCORE

• Call: Anytime
  – Adults: Stenehjem
  – Pediatrics: Attending on call at PCMC
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### Low Resource

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**Restriction (local pharmacy review) of selected antimicrobials***

* Vancomycin, carbapenems, piperacillin/tazobactam, and cefepime

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**PAF:** Audit an expanded list of antimicrobial agents** and provide feedback

**Restriction (Infectious Diseases review) of selected antimicrobials***

ID study staff to review positive blood culture results and all cultures with MDROs.

**Vancomycin, carbapenems, piperacillin/tazobactam, cefepime, aminoglycosides, ciprofloxacin, levofloxacin, ceftriaxone, and ampicillin/sulbactam**

**Restricted agents:** Meropenem, linezolid, daptomycin, ceftaroline, tigecycline, antifungals.

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Prospective Audit and Feedback

Pharmacy will review the following medications after 48 hours of administration

- Vancomycin
- Carbapenems
- Piperacillin/tazobactam
- Cefepime
- Fluoroquinolones
- Aminoglycosides
- Ceftriaxone
- Ampicillin/sulbactam
Restrictions

• The following drugs will be restricted
  – Daptomycin, linezolid, ceftaroline
  – Imipenem/meropenem, tigecycline
  – Amphotericin, vori/posaconazole, micafungin

• Medium group – local pharmacy
• High group – ID pharmacist
High Group

• Infectious diseases involvement
  – Positive blood cultures
  – *S. aureus* bacteremia
  – CNS infections
  – MDRO
  – Home IV antibiotic therapy
Outcomes

• Primary Outcome:
  – Antimicrobial use

• Secondary Outcomes:
  – Stratified antimicrobial use
  – Incidence of *C. difficile* infection
  – Incidence of MDRO infections
    • (VRE, ESBL, CRE, MRSA, FQ R E. coli)
  – Feasibility
  – Cost
Significance

- One of the largest AS studies ever done
- First AS study to evaluate effectiveness of different intervention levels
- First randomized AS study done in small, community hospitals
Timeline

Jan/Feb 2014: Education

March 2014 – June 2015: Intervention

July 2015 – Aug 2015: Analyze Data

Sept 2015: Present Intermountain Plan
Thank You

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- 801-440-1545