Antimicrobial Stewardship
THE CLINICAL NURSE SPECIALIST AS STAKEHOLDER

Polly Hansen, RN, MN, CNS, CCNS, CCRN, PCCN
Critical Care

Dominic Chan, PharmD, BCPS AQ-ID
Infectious Diseases & Antimicrobial Stewardship
DISCLOSURES

• Dominic Chan
  • Financial: Contracted grant with the Oregon Health Authority and the CDC Antimicrobial Use Module; provides fee-for-service consultation for development and optimization of health system antimicrobial stewardship programs
  • Non-financial: Washington State Hospital Association antimicrobial stewardship steering committee. Dominic receives no compensation as a member.

• Polly Hansen
  • Polly has no relevant financial or nonfinancial relationships to disclose
Learning Objectives

• Summarize the goals of antimicrobial stewardship
• Explain the unique role nurses play in healthcare that enhance antimicrobial stewardship
• Identify and assess examples of opportunities for nurses in antimicrobial stewardship
• List 2 special considerations related to antibiotic therapy
Impact of Antimicrobial Consumption

At least 30% of inpatient antimicrobial consumption is unnecessary

The result?

1. Increased adverse events
   • Higher risk of Clostridium difficile (C. diff)
   • Drug toxicity (e.g., adverse drug reactions, rash)

2. Development of antimicrobial resistance
   • Higher risk of antibiotic-resistant organisms

3. Higher cost of care
   • Higher cost of pharmaceuticals
   • Increased length of stay due to complications
Antimicrobial Stewardship Programs Defined

ANTIMICROBIAL STEWARDSHIP PROGRAMS ARE

- Programs that aim to improve antibiotic prescribing in order to:
  - Improve outcomes of patients with infections
  - Minimize adverse effects such as C. diff and drug toxicity
  - Reduce healthcare costs

- Multidisciplinary teams that focus on treating patients with the right antibiotic at the right dose for the right duration of time

- Required by the Joint Commission to oversee and monitor antimicrobial use

- Recommended by the Centers for Disease Control and Prevention, the Infectious Disease Society of America and the Society for Healthcare Epidemiology of America
Antibiotic Resistance

“The time may come when penicillin can be bought by anyone in the shops. Then there is the danger that the ignorant man may easily underdose himself and by exposing his microbes to non-lethal quantities of the drug make them resistant.”

~Alexander Fleming
Discoverer of penicillin
Nobel Lecture, 1945

<table>
<thead>
<tr>
<th>Antibiotic</th>
<th>Introduced</th>
<th>Resistance Identified</th>
<th>Years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Penicillin</td>
<td>1942</td>
<td>1945</td>
<td>3</td>
</tr>
<tr>
<td>Tetracycline</td>
<td>1950</td>
<td>1959</td>
<td>9</td>
</tr>
<tr>
<td>Erythromycin</td>
<td>1953</td>
<td>1968</td>
<td>15</td>
</tr>
<tr>
<td>Methicillin</td>
<td>1959</td>
<td>1962</td>
<td>3</td>
</tr>
<tr>
<td>Gentamicin</td>
<td>1967</td>
<td>1979</td>
<td>11</td>
</tr>
<tr>
<td>Vancomycin</td>
<td>1972</td>
<td>1988</td>
<td>16</td>
</tr>
<tr>
<td>Imipenem</td>
<td>1985</td>
<td>1998</td>
<td>13</td>
</tr>
<tr>
<td>Ceftazidime</td>
<td>1985</td>
<td>1987</td>
<td>2</td>
</tr>
<tr>
<td>Levofoxacin</td>
<td>1996</td>
<td>1996</td>
<td>0</td>
</tr>
<tr>
<td>Linezolid</td>
<td>2000</td>
<td>2001</td>
<td>1</td>
</tr>
<tr>
<td>Daptomycin</td>
<td>2003</td>
<td>2005</td>
<td>2</td>
</tr>
<tr>
<td>Ceftaroline</td>
<td>2010</td>
<td>2011</td>
<td>1</td>
</tr>
</tbody>
</table>
Neisseria gonorrhea: A tale of resistance

- **Top:** Distribution of antibiotics used to treat gonorrhea
- **Bottom:** US Gonorrhea resistance rates
- Cipro not recommended:
  - 2000: Acquired in Asia
  - 2002: Acquired in CA
  - 2004: In MSM
  - 2006: **NEVER**

MMWR 2012; CDC 2016
Staphylococcus aureus: A tale of resistance

- **Penicillin**
  - Penicillin Resistant, Methicillin-Susceptible *S. aureus* (MSSA) [beta-lactamase]

- **Methicillin & Vancomycin**
  - Methicillin Resistant *S. aureus* (MRSA) [altered PBP]

- **Vancomycin reformulated**
  - Vancomycin Intermediate-Resistant *S. aureus* (VISA) [thickened cell wall] {MIC 4-16}

- **Daptomycin**
  - Vancomycin Tolerant *S. aureus* {MIC 2-4}
  - Vancomycin Resistant *S. aureus* (VRSA) [altered precursors] {MIC >32}
  - Daptomycin Resistant *S. aureus* [altered PBP]

Boucher & Sakoulas. CID 2007
Antimicrobial Stewardship Programs Defined

- Multidisciplinary teams that focus on treating patients with the right antibiotic at the right dose for the right duration of time

Who’s missing?
Nurses

Physicians

Pharmacists

Rita Olans, DNP, CPNP, APRN-BC
Nursing Influence Over Antimicrobial Stewardship

- Discipline closest to patient for longest period of time
- Positioned for patient education
- Established role as patient advocate
- Involved in most antimicrobial stewardship (AMS) activities
Staff Nurse

- Intake assessment
- Medication history
  - Home meds
  - Recent antibiotics
  - Medication reconciliation
- Medical history
  - Recent infections
- Isolation status
- Allergies

Clinical Nurse Specialist

- Develops intake form or document flowsheet
- Implement medication reconciliation process
- Infection Control CNS collaborates to develop isolation policies

AMS Opportunities: On Admission
AMS Opportunities: Daily Care

**Staff Nurse**
- Obtaining cultures
- Timely ordering and administration
  - Sepsis; Pneumonia
  - Vaccinations: Flu; Pneumonia
- Documentation serves to communicate
- Monitors adverse events of antibiotic administration
- Acknowledge/Review orders for prescribed antibiotics
- Handoff communication
- Participate in rounds
- Care-team communication

**Clinical Nurse Specialist**
- Education re: culturing procedures
- Develops sepsis recognition tools
- Develops/implements nurse-driven vaccination protocols
- Writes prescriptions for ABOs
- Establishes patient rounds
- Facilitates provider communication
AMS Opportunities: Upon Discharge

Staff Nurse

• Discharge readiness assessment
  • Begin on admission
  • Transition from IV to PO route
  • Assess ability to manage PO meds

• Post discharge success
  • Patient education
  • Follow up visits

• Provide after visit summary

Clinical Nurse Specialist

Implement teach-back method of education

Develop patient education materials

Develop after visit summary
Implement strategies to increase medication adherence
Clinical Studies

Harold Standiford and team looked at monitoring the cost of using antimicrobial agents over a seven year period

- Costs decreased from $44,181 at baseline to $23,933 (a 45.8% decrease)
- There was a reduction of approximately $3 million within the first 3 years, mostly from decreasing antifungal use in patients with cancer.
- One year after the program was discontinued, antimicrobial costs increased from $23,933 to $31,653 (a 32.3% increase within 2 years) mostly in the antibacterial category.

Clinical Studies

Elizabeth Gillespie and team looked at the involvement of nurses as a means of improving AMS. The attitudes and antimicrobial stewardship knowledge of nurses were assessed before and after an education intervention that focused on antimicrobial management.

- Following education there was an articulated increase from 14% to 42% of instances where nurses said they would question the need for intravenous antibiotics.
- There was improved awareness of the risk of development of resistance from 59% to 79%.
- Knowledge of the associated risk of line-related infection with intravenous therapy increased from 38% to 70%.
Declining Antibiotic Approvals in the Past 30+ Years
Next Steps

- Engage in Four Core Actions
- Find out how we can become more involved with AMS as CNSs
  - What’s out there?
  - How do we position ourselves in decision making roles
- Identify the impact of the CNS on AMS
  - Research
  - Clinical Inquiry
- Provide education about AMS and nursing activities related to AMS
- Facilitate the development of new antibiotics

FOUR CORE ACTIONS

1. PREVENTING INFECTIONS, PREVENTING SPREAD.
2. TRACKING RESISTANCE PATTERNS.
3. IMPROVING USE OF ANTIBIOTICS.
4. DEVELOPING NEW ANTIBIOTICS AND DIAGNOSTIC TESTS.
Next Steps in Action: Classic Real Life Story

- Adult in LTC loses glasses
- More confused
- Urinanalysis + Cipro *
- Nauseated
- Urine culture * + Ceftriaxone
- ED
- Dehydrated
- Improves on IV fluids
- Urine Culture: CTX resistant Kleb *
- Cefepime
- Clostridium difficile

*Opportunities to intervene
Bacteruria: The presence of bacteria in urine

There is **NO TEST** to differentiate asymptomatic bacteruria (ASB) versus UTI

BACTERURIA

ASB  UTI

Signs and symptoms differentiate ASB versus UTI
## Urinary Tract Infections

<table>
<thead>
<tr>
<th>Some common “signs” are not true criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fever</td>
</tr>
<tr>
<td>Rigors</td>
</tr>
<tr>
<td>Malaise/lethargy</td>
</tr>
<tr>
<td>Flank pain/CVA tenderness</td>
</tr>
<tr>
<td><strong>Foul-smelling urine</strong></td>
</tr>
<tr>
<td>Acute hematuria</td>
</tr>
<tr>
<td>Pelvic discomfort</td>
</tr>
<tr>
<td><strong>Change in urine color</strong></td>
</tr>
<tr>
<td><strong>Cloudy urine</strong></td>
</tr>
<tr>
<td><strong>Urinary sediment</strong></td>
</tr>
<tr>
<td>Delirium</td>
</tr>
<tr>
<td>Dysuria, urgency, frequency</td>
</tr>
</tbody>
</table>

Why:
Pyelonephritis and Bacteruria: A Major Problem in Preventative Medicine

Why:
Chronically-catheterized pts have bacteriuria 98% of the time.
John Warren, JID 1982
Challenging Commonly Held Beliefs

The bladder is likely NOT a sterile site

- 98% Urine cultures from catheterized non-infected patients grew bacteria
- Yet, 30 – 68% of asymptomatic patients with positive urine are treated
When encountering an “infected” patient:

• Consider the presenting symptoms
  – Ask questions.

• Consider the “positive” laboratory results
  – Ask questions.

• Consider the antibiotic order
  – Ask questions.
Good nursing is good stewardship and good antibiotic stewardship is good nursing
References


• Standiford, H., Chan, S., Tripoli, M., Weekes, E., & Forrest, G. (2012). Antimicrobial Stewardship at a Large Tertiary Care Academic Medical Center: Cost Analysis Before, During, and After a 7-Year Program. Infection Control & Hospital Epidemiology, 33(4), 338-345. doi:10.1086/664909

