Antibiotic Stewardship Program

Creating a Comprehensive Program

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Director of Infection Control Programs
Rockport Healthcare Services
Objectives

- At the end of this session, participants will:
  - Understand the current urgency to developing an Antibiotic Stewardship Program (ASP)
  - Be able to understand how to utilize the CDC Core Elements of an ASP in Nursing Homes
  - Be able to discuss opportunities for process improvement utilizing laboratory tools in stewardship efforts
Are you dealing with dinosaurs in your facility?
"It is not the strongest of the species that survives, nor the most intelligent, but the one most responsive to change."

Charles Darwin
Did you know?

- 25-75% of systemic antimicrobial use and 60% of topical use of antimicrobial use in long-term care is considered inappropriate.
- 30% of antimicrobial use in acute care is either inappropriate or suboptimal.
- Studies have found that 70% of residents in LTCFs will receive at least one course of antibiotics each year.

3 Trivedi K, MD. Approaches to antimicrobial stewardship in LTC. September 2014.
Orange County CDI Collaborative – Facilities “Connectedness”
Could We Return to the Preantibiotic Era?

Photo credit: CDC/ Barbara Jenkins, NIOSH.
States with KPC-producing Carbapenem-Resistant Enterobacteriaceae (CRE)

Reported to the Centers for Disease Control and Prevention (CDC) as of February 2015

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**Antibiotic exposure is The Major Risk Factor for Clostridium difficile Infection (CDI)**

• Increases in CDI risk are observed with increased cumulative dose, number of antibiotics (ATB), and days of ATB therapy.

• Risk of CDI compared to resident on 1 antibiotic

<table>
<thead>
<tr>
<th>Number of Antibiotics</th>
<th>2 ATBs</th>
<th>3-4 ATBs</th>
<th>5+ ATBs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Risk</td>
<td>2.5 times higher</td>
<td>3.3 times higher</td>
<td>9.6 times higher</td>
</tr>
</tbody>
</table>

• Risk of CDI compared to resident on ATB <4 days

<table>
<thead>
<tr>
<th>Days of ATBs</th>
<th>4-7</th>
<th>8-18</th>
<th>&gt;18</th>
</tr>
</thead>
<tbody>
<tr>
<td>Risk</td>
<td>1.4 times higher</td>
<td>3.0 times higher</td>
<td>7.8 times higher</td>
</tr>
</tbody>
</table>

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8 Epson, E. Orange County CDI Prevention Collaborative: Antimicrobial Stewardship. CDPH. August 31, 2015
## Cost of Antimicrobial-resistant Infections (ARI)

<table>
<thead>
<tr>
<th></th>
<th>All Patients</th>
<th>Patients with ARI</th>
<th>Patients without ARI</th>
</tr>
</thead>
<tbody>
<tr>
<td>n (%)</td>
<td>1391</td>
<td>188 (13.5)</td>
<td>1203 (86.5)</td>
</tr>
<tr>
<td>APACHE II score</td>
<td>42.1</td>
<td>54.8*</td>
<td>40.1*</td>
</tr>
<tr>
<td>LOS (days)</td>
<td>10.2</td>
<td>24.2*</td>
<td>8.0*</td>
</tr>
<tr>
<td>HAI (n)</td>
<td>260</td>
<td>135*</td>
<td>125*</td>
</tr>
<tr>
<td>Cost per day ($)</td>
<td>1651</td>
<td>2098*</td>
<td>1581*</td>
</tr>
<tr>
<td><strong>Total cost ($)</strong></td>
<td><strong>19,267</strong></td>
<td><strong>58,029</strong>*</td>
<td><strong>13,210</strong>*</td>
</tr>
<tr>
<td>Death [n (%)]</td>
<td>70</td>
<td>34 (18.1)*</td>
<td>36 (3.0)*</td>
</tr>
</tbody>
</table>

*p<0.001

ASP Regulations

- Senate Bill 361 for California: passed October 2016
  - Mandate for ATB stewardship in California LTCFs began January 1, 2017!
- CMS Requirements of Participation for LTCFs throughout the country included in Phase 2 implementation—November 28, 2017
  - Mandates all states have a Stewardship Program in place by November 2017
  - Penalties for lack of ASP to begin in 2018
- Survey citations:
  - F-881 Antibiotic Stewardship
  - F-757 unnecessary medication
Core Elements

- Identify champions to lead your stewardship efforts (medical director, pharmacy consultant)
- Assign responsibility for overseeing activities in your facility
- Involve pharmacist or physician with drug expertise for ASP
- Choose a focus for your activities
- Monitor one process and correlate to outcomes observed through tracking
- Provide feedback to all providers in your facility as well as to your staff
- Educate families, clinicians, and nursing staff on your practices to improve antibiotic use

Summary of Core Elements for Antibiotic Stewardship in Nursing Homes

- Leadership commitment
  - Demonstrate support and commitment to safe and appropriate antibiotic use in your facility

- Accountability
  - Identify physician, nursing and pharmacy leads responsible for promoting and overseeing antibiotic stewardship activities in your facility

- Drug expertise
  - Establish access to consultant pharmacists or other individuals with experience or training in antibiotic stewardship for your facility

- Action
  - Implement at least one policy or practice to improve antibiotic use

- Tracking
  - Monitor at least one process measure of antibiotic use and at least one outcome from antibiotic use in your facility

- Reporting
  - Provide regular feedback on antibiotic use and resistance to prescribing clinicians, nursing staff and other relevant staff

- Education
  - Provide resources to clinicians, nursing staff, residents and families about antibiotic resistance and opportunities for improving antibiotic use

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Leadership

- Formal, written statement in support of improving antibiotic use
- Communicate ASP program, monitor and enforce policies for ASP
- Create a culture which promotes stewardship
Accountability

- Empower your Stewardship director and ASP committee to set standards for antibiotic prescribing
- Empower Director of Nursing and Infection Preventionist (IP) to set practice standards for assessing, monitoring, and communicating changes in a resident’s condition by front-line staff
- Involve Pharmacist to report antibiotic data
Accountability (2)

• IP to review antibiotic resistance patterns, collect and analyze infection surveillance data
• Laboratory support for Multi-drug Resistant Organisms (MDRO) alert system, education and creation of antibiogram
Drug Expertise

- Involve consultant pharmacist trained in infectious disease (ID) or antibiotic stewardship
- Consider collaborating with acute care hospital ASP leaders
- Develop relationships with ID consultants to support your facilities stewardship efforts
Action

• Documentation of 5 D’s
  • Doctor, drug, dose, *duration*, & diagnosis

• Develop treatment recommendations based on guidelines and local susceptibility reports (pharmacist and medical director)

• Establish best-practices for your facility for use of microbiology testing
  • Over-use of lab testing can lead to unnecessary ATBs

• Review antibiotic agents on site
Actions (2)

- Interventions:
  - Develop and implement algorithms for assessment of residents suspected to have infection (clinical pathways)
  - Consider offering physician 48-hour observation period as an alternative to empiric ATB therapy
  - Utilize your antibiogram
  - Antibiotic time-out (review ATB at 48-72 hours)
  - Reduce prolonged ATB treatment courses for common infections
48-Hour Observation Order Set Example

- Vitals signs to be checked (TPR, BP, Pulse ox) every______ for 48 hours
- Record fluid intake each for shift
- Notify physician if fluid intake is less than____
- Offer resident ____ ounces of water/juice every ____ hours
- Contact physician/NP with an update on ______
<table>
<thead>
<tr>
<th>Infection/Diagnosis</th>
<th>Likely Pathogen</th>
<th>JHA Initial Treatment</th>
<th>IDSA Empiric Treatment</th>
<th>Alternative Treatment/Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cystitis (UTI) uncomplicated</td>
<td><em>E. coli</em>, <strong>Klebsiella</strong>, <em>Staph aureus</em>, coagulase negative staph</td>
<td>Cephalexin 250-500mg PO q6h x 3-7 days</td>
<td>Bactrim DS 1 tablet BID x 3 days</td>
<td>Penicillin allergy: Bactrim DS 1 tab BID x 3 days</td>
</tr>
<tr>
<td>Cystitis (UTI) complicated</td>
<td><em>E. coli</em>, <strong>Klebsiella</strong>, <em>Staph aureus</em>, coagulase negative staph</td>
<td>Cephalexin 250-500mg PO q6h x 7-14 days</td>
<td>Ciprofloxacin or Levofloxacin x 5-10 days</td>
<td>Penicillin allergy: Bactrim DS 1 tablet x 7 days</td>
</tr>
<tr>
<td>Pyelonephritis Uncomplicated</td>
<td>MRSA, <strong>Enterobacteriaceae</strong> (<em>E. coli</em>, <strong>Klebsiella</strong>, <strong>Proteus</strong>, <strong>Enterococcus</strong>)</td>
<td>Piperacillin/Tazobactam 2.25mg IV q6h</td>
<td>Ciprofloxacin or Levofloxacin (use only if <em>E. coli</em> sensitivity &gt;80% OR ↓)</td>
<td>Penicillin allergy: Aztreonam 500mg-1g IV q8-12h and Vancomycin IV (per pharmacy protocol)</td>
</tr>
<tr>
<td>Pyelonephritis Complicated (Foley, instrumentation, Underlying disease)</td>
<td><strong>Enterobacteriaceae</strong> (<em>E. coli</em>, <strong>Klebsiella</strong>, <strong>Proteus</strong>, <strong>Pseudomonas</strong>, <strong>Enterococci</strong>), Staph spp.</td>
<td>Piperacillin/Tazobactam 2.25mg IV q6h</td>
<td>Bactrim DS 1 Tablet PO BID (use only if E. coli sensitivity &gt;80%)</td>
<td>Remove change Foley/nephrostomy tube</td>
</tr>
</tbody>
</table>

11 This table was developed by the pharmacy department at Los Angeles Jewish Home for the Aging – Joyce Eisenberg Keefer facility. Permission to use this table granted by Jewish Home Organization July 29, 2016, Administrator Ilana Grossman. Acknowledgment given to Janice Hoffman PharmD, Florena Shakti RN, Fatemeh Pournavaendi PharmD Candidate 2017 and Shokooofeh (Nasha) Namiranian PharmD Candidate 2017.
Diagnosis and infection specific interventions to consider:

- **Reduce ATB use in asymptomatic bacteriuria (ASB)**
- **Reduce antibiotic prophylaxis for prevention of urinary tract infections (UTI)**
- **Optimize use of laboratory testing when change in mentation alone is the only presenting symptom**
- **Optimize use of superficial cultures for management of chronic wounds**
Tracking

- Monitor documentation for antibiotic use and clinical assessments to support use of ATB (process measures)
- Track new ATB starts
  - Be sure there is a stop date!
- Track ATB days of therapy per 1000 resident days (outcome measures)
Reporting

- Share facility-specific reports on ATB use with prescribers
  - Consider generating report which compares each prescriber’s ordering patterns to another
- Distribute antibiograms to providers and nursing staff
  - Educate nurses on how to assist physicians to use the antibiogram
- Involve pharmacist with direct communication with prescribers about how to improve ATB prescribing
Antibiotic Prescribing Patterns-March 2017

<table>
<thead>
<tr>
<th>Title</th>
<th>Doctor A</th>
<th>Doctor B</th>
<th>Doctor C</th>
<th>Doctor D</th>
<th>Doctor E</th>
<th>Doctor F</th>
</tr>
</thead>
<tbody>
<tr>
<td>DNMC</td>
<td>4</td>
<td>2</td>
<td>5</td>
<td>2</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>HAI</td>
<td>4</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>CAI</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Total</td>
<td>10</td>
<td>9</td>
<td>11</td>
<td>6</td>
<td>7</td>
<td>10</td>
</tr>
</tbody>
</table>

- DNMC: Drug-Related morbidity and mortality
- HAI: Hospital Acquired Infections
- CAI: Community Acquired Infections

Legend: DNMC - Drug-Related morbidity and mortality; HAI - Hospital Acquired Infections; CAI - Community Acquired Infections; Total - Cumulative count.
Nurse Receiving ATB Orders

<table>
<thead>
<tr>
<th>Nurse</th>
<th>HAI</th>
<th>DNMC</th>
<th>Low Colony</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nurse ABC</td>
<td>3</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>Nurse DEF</td>
<td>2</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>Nurse GHI</td>
<td>4</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Nurse JKL</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>
Education

- Provide education to residents, families, nursing staff and providers
LABORATORY TESTING CONSIDERATIONS

• Assess the rationale for urinalysis and culture & sensitivity (C&S) orders\textsuperscript{14,15}
  • Are non-specific changes driving urine testing? (i.e. mental confusion, cloudy urine)\textsuperscript{14}
  • Consider asking physician to order tests as UA, C&S, IF INDICATED

\textsuperscript{14} Stone N. Applying the Core Elements of Antibiotic Stewardship in Nursing Homes. Presented at Infection Prevention & Control Conference. March 31, 2015. Permission granted for use of this slide by Dr. Nimalie Stone.
\textsuperscript{15} Consultative collaboration between Dr. Rekha Murthy, Dr. Jake Scott, from Cedars Sinai (Cedars Sinai ASP Project) Dr. Amanda Kamali (CDC) and Dolly Greene (Diagnostic Laboratories). November 9, 2015. written permission to use this slide from Dr. Murthy
Laboratory Testing (2)

• Assess specimen collection practices before ATB started¹
  • Poor collection practices can lead to false positive results¹
  • Are follow-up or “test-for-cure” cultures ordered?
  • Diagnostic tests can be positive without being clinically significant¹⁴
  • Diagnostic tests which are positive may indicate colonization rather than infection but still drive ATB treatment¹⁴
Tools

- CDC Core Elements checklist
- SBAR
- Antiograms
- Develop laboratory data metrics for tracking stewardship efforts
SBAR

• Communication tool
  • Gather your assessment data for precise
• Provides guidance to nurse on what information should be reported to physician for better treatment outcomes
• Allows for opportunity for nurse to make suggestions to physician on how to proceed
An antibiogram is an overall profile of antimicrobial susceptibility testing results of specific organisms grown from cultures submitted by each individual facility (or a region) to a battery of antimicrobial agents.
What is an Antibiogram Used For?

• An antibiogram is an essential tool for any clinician when treating an infection empirically
  • Empiric treatment occurs prior to determination of a causative bacterial agent
• An antibiogram can serve as an alternative to a C&S report if no organism is grown out of a C&S despite high clinical suspicion of an infection
The greater the number of isolates, the more accurate the sensitivity results for the given organism.

Minimum should be 10-30

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Only a resident’s treating physician or non-physician practitioner can determine if and when empiric antibiotic treatment should be implemented.

Proper use of an antibiogram may lead to higher levels of empiric efficacy, thus faster treatment, and better resident clinical outcomes leading to potential financial savings as well.
Cedars Sinai Medical Center ASP

- Cedars Sinai Medical Center (CSMC) started an ASP with their network of 8 skilled nursing facilities
  - The CSMC team visited each facility and assessed their infection control practices
  - The team assessed how orders were given for ATBs and the frequency of developing CDI
  - Antibiograms were reviewed

17 Consultative collaboration between Dr. Rekha Murthy, Dr. Jake Scott, from Cedars Sinai (Cedars Sinai ASP Project), Dr. Amanda Kamali (CDC) and Dolly Greene (Diagnostic Laboratories). November 9, 2015. Written permission to use this slide from Dr. Murthy
Cedars Sinai Medical Center Metrics

Number of urine tests ordered
Number of urine tests negative
Number of ATBs ordered for colony counts under 100,000
Number of ATBs ordered for events that DNMC
Number of ATB ordered empirically

Number of urine tests ordered
Number of days of ATB therapy
Number of Clostridium difficile tests ordered
Number of positive Clostridium difficile tests
Number of new MDROs identified

17 Consultative collaboration between Dr. Rekha Murthy, Dr. Jake Scott, from Cedars Sinai (Cedars Sinai ASP Project) Dr. Amanda Kamali (CDC) and Dolly Greene (Diagnostic Laboratories). November 9, 2015. Written permission to use this slide from Dr. Murthy
### Sequential Quarterly Results – Facility 1

<table>
<thead>
<tr>
<th>Scottsdale XXXX YYYY</th>
<th>4Q2014</th>
<th>1Q2015</th>
<th>2Q2015</th>
</tr>
</thead>
<tbody>
<tr>
<td># Urine C&amp;S orders</td>
<td>56</td>
<td>31</td>
<td>37</td>
</tr>
<tr>
<td># Urine C&amp;S negative</td>
<td>20</td>
<td>15</td>
<td>19</td>
</tr>
<tr>
<td># Antibiotic Rx</td>
<td>24</td>
<td>12</td>
<td>5</td>
</tr>
<tr>
<td># Rx with low colony count</td>
<td>10</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td># Meeting standardized clinical criteria</td>
<td>1</td>
<td>(7)</td>
<td>1</td>
</tr>
<tr>
<td># Days of Antibiotic Therapy (DOT)</td>
<td>186</td>
<td>88</td>
<td>36</td>
</tr>
<tr>
<td># Days of Inappropriate Therapy (IDOT)</td>
<td>TBA</td>
<td>TBA</td>
<td>TBA</td>
</tr>
<tr>
<td># Antibiotic Rx - empiric</td>
<td>TBA</td>
<td>TBA</td>
<td>TBA</td>
</tr>
<tr>
<td># C. difficile orders</td>
<td>10</td>
<td>8</td>
<td>3</td>
</tr>
<tr>
<td># C. difficile positive</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>
Things to consider when resident is confused:

- **D**- Drugs (new medication, changes in dosage) or discomfort
- **E**- Ear, Eyes, Environment (check hearing aids, glasses), emotions
- **L**- Low oxygen (heart attack, or stroke)
- **I**- Infection (pneumonia, symptomatic UTI, cellulitis)
- **R**- Retention (constipation, urinary retention)
- **I**- Ictal state (seizure)
- **U**- Under (dehydrated, malnutrition)
- **M**- Metabolic (diabetes, check blood sugar)
- **S**- Subdural hematoma (head trauma, fall)

Share the Data

- Develop relationship with your acute care partners
- Participate in collaboratives with Public Health partners
- You are not alone!
- Share your data
  - Give regular feedback to your team
  - Data is most powerful when shared!
“Synergy is better than my way or your way”

Stephen Covey
American educator, author, and businessman
In Summary

- Over utilization and inappropriate use of antibiotics contributes to the increasing problem of multi-drug resistant microorganisms.
- We are running out of antibiotics to treat the most serious infections.
- Utilize the tools available for antibiotic stewardship programs.
- Engage all members of your team e.g., medical directors, pharmacist, DON, IP, nurses, families and residents.
Antibiotic Stewardship is a Team Sport!