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ASAP Community Network Pharmacy Coordinator
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Objectives

• List reasons for developing antimicrobial stewardship programs (ASP): the whys

• Outline the goals of ASP: the whats

• Describe the role of various personnel in ASP: the whos

• Introduce common ASP strategies: the hows
Why is ASP needed?
Development of Antibiotic Resistance

- Resistant bacteria are selected when colonizing or infecting bacteria are exposed to antibiotics.

- Longer exposure to antibiotics $\rightarrow$ more likely to become colonized with resistant organisms.

- Highest risk patients:
  - Immunocompromised
  - Hospitalized
  - Invasive devices
Where Does All This Resistance Come From?

- Changes in antibiotic use parallel changes in prevalence of resistant pathogens
- Resistance is more prevalent in healthcare- vs. community-acquired infections
- Most resistant pathogens arise in acute or long-term care facilities
- Hospitals/areas with highest rates of antibiotic use have the highest rates of resistance

Correlation between Penicillin Use and Prevalence of Penicillin Non-Susceptible S. pneumoniae

Evidence of Antibiotic Overuse in Long-Term Care Facility

- Review of 100 random course of antibiotics over 6 months
- Performed by 2 ID physicians in a 160-bed skilled nursing facility
- 1351 total days of therapy (DOTs); 43% of DOTs were unnecessary
- >60% of antibiotic courses were at least partly unnecessary

Reasons for Inappropriate Antimicrobial Prescribing in Urinary Tract Infections

• Evaluated antibiotic appropriateness for treatment of urinary tract infections
  o Does patient meet criteria to start antibiotic?
  o Is antibiotic regimen (agent, dose, frequency, duration) consistent with national guidelines?
  o Did patient develop *C difficile* infection (CDI)?

• Urinalysis sent for 172 patients
  o 146 (85%) did not meet treatment criteria; 70 started on antibiotics
  o Two out of five patients received antibiotic inappropriately

• 8x more likely to develop CDI with inappropriate antibiotic

Consequences of Antibiotic Overuse

Resistant Pathogens

Estimated minimum number of illnesses and deaths caused by antibiotic resistance*:

At least 2,049,442 illnesses, 23,000 deaths

* bacteria and fungus included in this report

Clostridium difficile Infections

Estimated minimum number of illnesses and death due to Clostridium difficile (C. difficile), a unique bacterial infection that, although not significantly resistant to the drugs used to treat it, is directly related to antibiotic use and resistance:

At least 250,000 illnesses, 14,000 deaths

- Estimated annual costs (in 2008 dollars)
  - $20 billion in excess direct healthcare costs
  - $35 billion in lost productivity

Limited New Antibiotic Options

![Graph showing the number of approved antibiotics per year.](image)

Target = ESKAPE
- *Enterococcus faecium*
- *Staphylococcus aureus*
- *Klebsiella pneumoniae*
- *Acinetobacter baumannii*
- *Pseudomonas aeruginosa*
- *Enterobacter species*

Theuretzbacher U. Recent FDA Antibiotic Approvals: Good news and Bad News.
Available at: [http://cddep.org/blog/posts/recent_fda_antibiotic_approvals_good_news_and_bad_news#sthash.adecdYpE.dpbs](http://cddep.org/blog/posts/recent_fda_antibiotic_approvals_good_news_and_bad_news#sthash.adecdYpE.dpbs).
Incidence of Adverse Drug Events in LTCF

• Evaluated adverse drug events (ADE) in two LTCF totaling 1229 beds

• 815 ADE identified among >1200 residents (9.8 events per 100 resident-months)
  o >25% of events were serious
  o 42% deemed preventable
  o Mostly from monitoring (80%) and ordering (59%) errors

• 105 (13%) from antimicrobial use
  o Quinolones, clindamycin, and TMP-SMX most commonly implicated


Risk Factors Associated with ADE

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Odd Ratio</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>On 6-8 medications*</td>
<td>1.4</td>
<td>0.9 – 2.0</td>
</tr>
<tr>
<td>On 9-11 medications*</td>
<td>1.7</td>
<td>1.1 – 2.6</td>
</tr>
<tr>
<td>On ≥12 medications*</td>
<td>2.1</td>
<td>1.3 – 3.5</td>
</tr>
<tr>
<td>Anticoagulants</td>
<td>3.1</td>
<td>1.7 – 5.6</td>
</tr>
<tr>
<td>Antipsychotics</td>
<td>2.4</td>
<td>1.7 – 3.5</td>
</tr>
<tr>
<td>Antimicrobials</td>
<td>1.9</td>
<td>1.3 – 2.8</td>
</tr>
</tbody>
</table>

* Compared to residents on 1-5 medications.
What Do We Do?

Options

1. Create new drugs
2. Learn to use what we have more wisely
3. Infection prevention will also help

Antimicrobial Stewardship
What is an ASP?
What is Antimicrobial Stewardship?

• Rational, systematic approach to antibiotic use

• Using or implementing processes that are designed to optimize antibiotic use

• Includes interventions to guide clinicians:
  – When are antibiotics needed
  – Which antibiotics should be used
  – Optimal dose, route, and duration of therapy
Goals of Stewardship

• Primary goals:
  – Improve quality of patient care
  – Improve public health
  – Stabilize or reduce rates of resistance

• Financial goals are always secondary

Right drug
Right dose
Right duration
Cure/prevent infection
Minimize toxicity
Prevent emergence of resistance

CMS Requirement for Conditions of Participation

For long-term care facilities

- Rules finalized on 10/4/2016 as an overall effort to improve care in LTCF

- 42 CFR 483.80(a)(3)
  - “…Infection Prevention and Control Program (IPCP) that must include an antibiotic stewardship program that includes antibiotic use protocols and system to monitor antibiotic use.”

- 42 CFR 480.80(a)(4)
  - “…a system for recording incidents identified under the facility’s IPCP and the corrective actions taken by the facility.”

- Must be implemented in Phase 2 by 11/28/2017

ASP Core Elements - LTCF

Leadership Commitment
Accountability
  – MD, pharmacist, and nursing

Drug Expertise
  – MD with ID/ASP knowledge
  – Consultant pharmacist

Action
Tracking
Reporting
Education

http://www.cdc.gov/longtermcare/prevention/antibiotic-stewardship.html
## Antibiotic “Stewardess”
### Not that Far Off

<table>
<thead>
<tr>
<th>Airline Stewardess</th>
<th>Antimicrobial Stewardship</th>
</tr>
</thead>
<tbody>
<tr>
<td>Check security, start boarding process to begin journey</td>
<td>Assess residents before starting antibiotic course</td>
</tr>
<tr>
<td>Passport</td>
<td>Antibiogram is passport to facility microbiology</td>
</tr>
<tr>
<td>See the word at 35,000 ft</td>
<td>See use &amp; resistance in aggregate (35,000 ft vs. 1 resident at a time)</td>
</tr>
<tr>
<td>Your safety is their priority</td>
<td>Residents safety and outcomes are our priority</td>
</tr>
<tr>
<td>Hudson River plane landing – “miracle” vs. carefully planned system in place exercised by skilled team</td>
<td>Develop systems using a specialized team to promote antibiotic use</td>
</tr>
</tbody>
</table>

Adopted from Belinda Ostrowsky, MD, MPH, FSHEA, FIDSA. Circa 2010.
Who should be part of ASP?
The Stewardship Team

• Ideally anyone who prescribe, dispense, administer, or receive antibiotics

• Should be multidisciplinary

• Core members
  – Medical director
  – Director of Nursing
  – Infection preventionist
  – Consultant/dispensing pharmacist

• Additional members
  – Members of Quality Improvement
  – Nurses
  – Providers

http://www.cdc.gov/longtermcare/prevention/antibiotic-stewardship.html
Who is Available in the Real-World?

- Statewide surveys of ASP practices in LTCFs (NE, MI)

<table>
<thead>
<tr>
<th>Parameters (Data Expressed as %)</th>
<th>NE (N = 37)</th>
<th>MI (N = 86)</th>
<th>Hospitals (N = 406)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Established ASP / ASP activities</td>
<td>60</td>
<td>17</td>
<td>51</td>
</tr>
<tr>
<td><strong>ASP Compositions</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Infection control professionals</td>
<td>68</td>
<td>85</td>
<td>51</td>
</tr>
<tr>
<td>Director of nursing or nurses</td>
<td>32</td>
<td>48</td>
<td>Not Reported</td>
</tr>
<tr>
<td>Medical director or ID physicians</td>
<td>27</td>
<td>48</td>
<td>71</td>
</tr>
<tr>
<td>Pharmacist or ID pharmacists</td>
<td>23</td>
<td>43</td>
<td>59</td>
</tr>
</tbody>
</table>

• Composition in LTCF typically different from hospitals

# Responsibilities of Stewardship Team Members

<table>
<thead>
<tr>
<th>Member</th>
<th>Primary Responsibilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medical Director</td>
<td>Set standard for antibiotic prescribing</td>
</tr>
<tr>
<td></td>
<td>Liaise with other medical staff</td>
</tr>
<tr>
<td>Director of Nursing</td>
<td>Set practice standard for nursing staff</td>
</tr>
<tr>
<td></td>
<td>Ensure adequate staffing / resources for IP and ASP activities</td>
</tr>
<tr>
<td>Infection Preventionist</td>
<td>Responsible for IPCP, which include ASP</td>
</tr>
<tr>
<td></td>
<td>Track infection trends (e.g., MDRO, CDI)</td>
</tr>
<tr>
<td></td>
<td>Provide ASP-related data to quality committee</td>
</tr>
<tr>
<td>Consultant Pharmacist</td>
<td>Perform medication regimen review</td>
</tr>
<tr>
<td></td>
<td>Report antibiotic use data</td>
</tr>
<tr>
<td></td>
<td>Assist with development of treatment guidelines</td>
</tr>
<tr>
<td>Nursing Staff</td>
<td>Employ standard clinical assessment and communication tools</td>
</tr>
<tr>
<td></td>
<td>Monitor patient response to therapy and availability of culture results</td>
</tr>
<tr>
<td></td>
<td>Perform antibiotic time-out</td>
</tr>
<tr>
<td>Other Providers</td>
<td>Support antibiotic prescribing practices set by facility ASP</td>
</tr>
<tr>
<td></td>
<td>Attend / participate in required ASP education and other activities</td>
</tr>
</tbody>
</table>

## Nurses in Antimicrobial Stewardship Activities

### ASP Task | Core Elements | Example of Nurse’s Role
--- | --- | ---
Triage/Isolation | Accountability Drug Expertise Education | Initially assess source of infection Identifies appropriate precaution
Early / appropriate culture | Accountability Drug Expertise Tracking | Obtain cultures before antibiotics Monitor/report culture results
Adverse events monitoring | Action Tracking Education | Monitor/report adverse events
Antibiotic dosing | Drug expertise Tracking Education | Obtain appropriate drug levels
Transition of care to different acuity level | Action Tracking Education | Communicate clinical information (diagnosis, management) to hospital/VNA

How to antibiotic stewardship?
ASP Core Elements - LTCF

Leadership Commitment
Accountability
  – MD, pharmacist, and nursing

Drug Expertise
  – Consultant pharmacist
  – Hospital partner with ASP
  – Regional ASP network

Action
Tracking

Reporting
Education

http://www.cdc.gov/longtermcare/prevention/antibiotic-stewardship.html
## IDSA/SHEA Stewardship Strategies

### General Interventions
- Prospective audit feedback
- Restriction/Pre-authorization
- Practice guidelines
- Antibiotic use based on syndrome
- Reduce use of CDI-associated antibiotics
- Clinical decision support system
- Educate prescribers to review antibiotic regimens

### Pharmacy-Based Interventions
- Pharmacokinetic monitoring service
- IV to PO conversion
- Use of PK/PD-optimized dosing regimens
- Allergy assessment
- Shortest effective duration of therapy

### Laboratory-Based Interventions
- Antibiograms based on sample source, location, age
- Selective susceptibility reporting
- Rapid testing for viral respiratory pathogens
- Rapid diagnostic for blood cultures
- Procalcitonin to reduce antibiotic use
- Fungal biomarkers to reduce antifungal use

### Population-Based Interventions
- Guideline for febrile neutropenia
- Antifungals in immunocompromised
- Long-term care facility interventions
- Neonatal ICU
- Terminally ill patients

*Not all are applicable to LTCF*

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Strategies for LTCF ASP

• Develop policies to support optimal antibiotic prescribing
  ▪ Ensure medication safety policy applied to antibiotic use
  ▪ Perform medication regimen review to check for
    ✓ Unnecessary medications (excess dose/duration; inadequate monitoring/indication)
    ✓ Medication-related problems, medication errors, other irregularities

• Board interventions to improve antibiotic use
  ▪ Standardize practices for residents suspected of having infections
    ✓ Use standardized methods to evaluate residents
    ✓ Communicate evaluation findings to providers
    ✓ Only request tests and/or antibiotic if appropriate
  ▪ Perform antibiotic review 72 hours after starting
    ✓ Reassess patient’s condition
    ✓ Check availability of culture results

http://www.cdc.gov/longtermcare/prevention/antibiotic-stewardship.html
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    ✓ Check availability of culture results

http://www.cdc.gov/longtermcare/prevention/antibiotic-stewardship.html
Example of Standard Assessment and Communication Tool

Clinical Assessment and Communication Tool Template for Suspected UTI

<table>
<thead>
<tr>
<th>Situation</th>
<th>Resident Label</th>
</tr>
</thead>
<tbody>
<tr>
<td>I am concerned about a suspected UTI for the above resident.</td>
<td></td>
</tr>
</tbody>
</table>

### B Background
- Indwelling catheter check
  - Yes, Urineiral
  - Suprapubic
- Incidence check
  - Yes, rocky new or wandering
  - Yes, old
- UTI in last 6 months
  - Yes, No
- Date
- Organism
- Treatment
- Active diagnosis (especially bladder, kidney, percutaneous condition; diabetes; receiving dialysis, antibiotics):
- Advance directives for limiting treatment (especially antibiotic use):
- Medication allergies:

### A Assessment

<table>
<thead>
<tr>
<th>Vital signs: BP</th>
<th>HR</th>
<th>Resp. rate</th>
<th>Temp.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Resident WITH indwelling catheter
- The criteria are met to initiate antibiotics if any of the following are selected:
  - No
  - Yes
  - Fever of 38.0°C (100°F) or repeated temperatures of 39.0°C (102°F)
  - New back or flank pain
  - Altered mental status
  - New onset delirium (new dramatic change in mental status)
  - Hypotension (significant change in baseline BP or SBP <90)
  - Acute suprapubic pain
  - Acute pain, swelling or tenderness of the scrotal area

#### Resident WITHOUT indwelling catheter
- The criteria are met to initiate antibiotics if any of the following are met:
  - No
  - Yes
  - Any one of the following two:
    - Acute dysuria alone (pain on urination or burning while urinating)
    - Acute pain, swelling or tenderness of the scrotal area
  - Single temp of 100°F (38°C) and at least one new or worrisome of the following:
    - Urgency
    - Suprapubic pain
    - Frequency
    - Gross hematuria
    - Back or flank pain
    - Urinary incontinence
  - No fever, but two or more of the following symptoms:
    - Urgency
    - Suprapubic pain
    - Frequency
    - Gross hematuria
    - Urinary incontinence

### R Recommendation
- Protocols criteria met: Resident may require UA and urine culture or an antibiotic.
- Protocol criteria are NOT met: Resident DOES NOT need immediate antibiotic but may need additional observation.

<table>
<thead>
<tr>
<th>Name's Signature</th>
<th>Date/Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Notification of Family/POA Name:</td>
<td>Date/Time</td>
</tr>
<tr>
<td>Patient Name:</td>
<td>Date/Time</td>
</tr>
</tbody>
</table>

Example of Antibiotic Time-Out

SBAR Communication Tool Template for Antibiotic Time-Out

[Facility Logo] | Resident Label

<table>
<thead>
<tr>
<th>S</th>
<th>Situation: I am calling to follow-up on [residents name: __________________ ] who was started on antibiotic(s) recently.</th>
</tr>
</thead>
<tbody>
<tr>
<td>B</td>
<td>Background: This patient was started on:</td>
</tr>
<tr>
<td></td>
<td>Antibiotic #1: __________________ Start date: __________</td>
</tr>
<tr>
<td></td>
<td>Antibiotic #2: __________________ Start date: __________</td>
</tr>
<tr>
<td></td>
<td>For: ☐ UTI ☐ Pneumonia ☐ Bronchitis ☐ Skin Infection ☐ GI Infection</td>
</tr>
<tr>
<td></td>
<td>☐ Fever of unknown source ☐ Other, specify: __________________</td>
</tr>
<tr>
<td>Vitals at initial presentation were as follows: BP: __ / __ HR: __ Resp rate: __ Temp: __ O2 Sets: __</td>
<td></td>
</tr>
<tr>
<td>Symptoms and positive exam findings at that time were: __________________</td>
<td></td>
</tr>
<tr>
<td>The diagnosis was: ☐ McGeer criteria ☐ Local Criteria ☐ Neither ☐ Assessment tool not used</td>
<td></td>
</tr>
<tr>
<td>A</td>
<td>Assessment:</td>
</tr>
<tr>
<td></td>
<td>Since starting antibiotic(s), the resident:</td>
</tr>
<tr>
<td></td>
<td>☐ Now has new signs or symptoms of infection ☐ Has remained the same</td>
</tr>
<tr>
<td></td>
<td>☐ Has improved but continues to have signs and symptoms of __________________</td>
</tr>
<tr>
<td></td>
<td>☐ New onset concerning signs or symptoms of __________________</td>
</tr>
<tr>
<td>Microbiology culture result (fax microbiology report if available):</td>
<td></td>
</tr>
<tr>
<td></td>
<td>☐ Has not returned yet ☐ Has new growth ☐ Was not obtained</td>
</tr>
<tr>
<td></td>
<td>☐ Has positive Gram stain/growth of [specific Gram stain/microorganism: __________________ ]</td>
</tr>
<tr>
<td></td>
<td>Is susceptible to the antibiotic(s) prescribed: ☐ Yes ☐ No ☐ Don’t know</td>
</tr>
<tr>
<td></td>
<td>☐ Not tested by lab ☐ Not yet performed by lab</td>
</tr>
<tr>
<td>Other antibiotics the organism is sensitive to: __________________</td>
<td></td>
</tr>
<tr>
<td>R</td>
<td>Recommendation:</td>
</tr>
<tr>
<td></td>
<td>☐ Resident is not improving and needs further evaluation.</td>
</tr>
<tr>
<td></td>
<td>☐ Resident has improved and needs final antibiotic therapy plan.</td>
</tr>
<tr>
<td>Nurse’s Signature: __________________ Date/Time: __________________</td>
<td></td>
</tr>
<tr>
<td>Faxed or Called to: __________________ By: __________________ Date/Time: __________________</td>
<td></td>
</tr>
</tbody>
</table>

- Information to review include
  - Patient status after starting therapy
    - Improved
    - No change
    - Deteriorated
  - Microbiology data
    - Available or not
    - Positive or negative
    - If positive, is microbe susceptible to antibiotic prescribed

- Also provide visual reminder and script for communication

Strategies for LTCF ASP

• Other board interventions
  ▪ Require specific information on all antibiotic prescription
    ✓ Dose, frequency, duration
    ✓ Indication that is syndrome specific (should not just say ‘infection’)
    ✓ Indication that makes sense (A fib is not an appropriate indication for ciprofloxacin)

  ▪ Treatment protocols or guidelines
    ✓ Consider resistance pattern
    ✓ Consider whether agent is on formulary
    ✓ Work with prescribers, pharmacists to determine agent, dose, route, duration

http://www.cdc.gov/longtermcare/prevention/antibiotic-stewardship.html
Example of Indication and Duration
Strategies for LTCF ASP

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http://www.cdc.gov/longtermcare/prevention/antibiotic-stewardship.html
Example of Treatment Recommendation

Clinical Pathways

Antimicrobial Catheter Lock Protocols
- Antibiotic and Ethanol Catheter Lock Order Sets
- Institutional Guidelines for Ethanol Lock Technique
  - Refer to Nursing Policies/Procedures VAD-11 (Ethanol Lock Technique for Treatment in Prevention of Infection of Intravascular Devices) for nursing policy and instructions for ethanol administration
- IDSA Guidelines for the Management of Intravascular Catheter-related Infections

Clostridium difficile Infection (CDI)
- Management Algorithm
  - Environmental Services Cleaning Protocol
  - SHEA/IDSA C. difficile Infection Guidelines

Invasive Candidiasis
- Institutional Guidelines for the Treatment of Invasive Candidiasis

Perinatal Group B Streptococcal Prevention
- Institutional Guidelines for the Prevention of Perinatal Group B Streptococcal Disease
  - CDC Guidelines for the Prevention of Perinatal Group B Streptococcal Disease

https://www.nebraskamed.com/for-providers/asp/plans
# Examples of Treatment Recommendation

## Table 2. Recommended Antibiotics for Treatment of Bacterial Pneumonia among Nursing Home Residents

<table>
<thead>
<tr>
<th>Context</th>
<th>Preferred Agent</th>
<th>Dosing</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1st Line</strong></td>
<td><strong>Uncomplicated Bacterial Pneumonia</strong>&lt;br&gt;Amoxicillin-Clavulanate</td>
<td>500/125 mg PO 3 times a day x 5d (give q12h for CCR &lt;30; give q24h for CCR &gt;30; give q48h for ESRD with an extra dose post each HD)</td>
<td>• Alternative dosing of Amoxicillin/Clavulanate 875 mg BID&lt;br&gt;• Penicillin resistance of invasive pneumococcus is ~ 10% in Monroe County</td>
</tr>
<tr>
<td><strong>2nd Line</strong></td>
<td><strong>Bacterial Pneumonia, severe community-acquired to 1st Line therapy</strong>&lt;br&gt;Levofloxacin</td>
<td>750 mg PO Q24h x 5d (give q48h for CCR 20-49; 500mg x 1, then 500mg q48h for CCR &lt;20 and ESRD)</td>
<td>• Quinolone antibiotics pose a higher risk of C. difficile infection&lt;br&gt;• Caution with anti-arrhythmic medications and prolonged QTc</td>
</tr>
<tr>
<td><strong>2nd Line</strong></td>
<td><strong>Moxifloxacin</strong>&lt;br&gt;Moxifloxacin</td>
<td>400 mg PO Q24h x 5d (no renal adjustment needed)</td>
<td></td>
</tr>
</tbody>
</table>

**Severe Pneumonia Symptoms, or Failure to Respond to Initial Therapy**

<table>
<thead>
<tr>
<th>1st Line</th>
<th>Ceftriaxone IM + Doxycycline</th>
<th>• May be given safely to patients with mild penicillin allergy (i.e. rash), cross reactivity is low&lt;br&gt;• Assess for de-escalation to oral regimen daily</th>
</tr>
</thead>
<tbody>
<tr>
<td>2nd Line</td>
<td>Levofloxacin</td>
<td>*May be used as 1st line agent for any patients with risk factors for Pseudomonas infection such as any of the following: recent (within 90 days) intravenous antibiotic exposure, very severe underlying COPD (FEV1 &lt;35% predicted), known bronchiectasis, previous respiratory infections with Pseudomonas</td>
</tr>
</tbody>
</table>
Pharmacy-Based Interventions

- Perform medication use review, including antibiotics
  - Review all antibiotic regimens for appropriateness

- Establish clinical/laboratory standard for monitoring adverse reactions from antibiotics
  - Monitor for common adverse reactions (e.g., rash, diarrhea)

- Review microbiology data to guide antibiotic selection
  - Based selection on antibiogram information
  - Prepare treatment guidelines/recommendations

http://www.cdc.gov/longtermcare/prevention/antibiotic-stewardship.html
Laboratory-Based Interventions

• Antibiogram
  ▪ Important to guide antibiotic selection

• Notify facility of positive culture results timely
  ▪ Phone calls
  ▪ Fax results

• Notify facility of MDRO, *C difficile* test results
  ▪ For prompt isolation
  ▪ For transfer to higher acuity setting
  ▪ For selection of appropriate treatment

http://www.cdc.gov/longtermcare/prevention/antibiotic-stewardship.html
# Example of Antibiogram

## Antibiotic Susceptibility Report for Most Frequently Isolated Gram-Negative Organisms (January 2015 to December 2016)

<table>
<thead>
<tr>
<th>Pathogen</th>
<th>Isolate Tested</th>
<th>Ampicillin</th>
<th>Ampicillin/ Sulbactam</th>
<th>Piperacillin/ Tazobactam</th>
<th>Cefotaxim</th>
<th>Cefotaxim/ Tazobactam</th>
<th>Ceftriaxim</th>
<th>Ceftriaxim/ Tazobactam</th>
<th>Aztreonam</th>
<th>Ertapenem</th>
<th>Meropenem</th>
<th>Anilin Ace</th>
<th>Gentamicin</th>
<th>Tobramycin</th>
<th>Capreomycin</th>
<th>Levetimycin</th>
<th>Trimethoprim/Sulfa</th>
<th>Nitrofurantoin</th>
<th>Fosfomycin</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Escherichia coli</em></td>
<td>111</td>
<td>53</td>
<td>53</td>
<td>59</td>
<td>99</td>
<td>98</td>
<td>98</td>
<td>97</td>
<td>91</td>
<td>98</td>
<td>100</td>
<td>100</td>
<td>91</td>
<td>91</td>
<td>58</td>
<td>59</td>
<td>76</td>
<td>99</td>
<td>77</td>
</tr>
<tr>
<td><em>Klebsiella pneumoniae</em></td>
<td>41</td>
<td>--</td>
<td>78</td>
<td>98</td>
<td>93</td>
<td>95</td>
<td>98</td>
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<td>95</td>
<td>95</td>
<td>93</td>
<td>63</td>
<td>83</td>
<td></td>
</tr>
<tr>
<td><em>Proteus mirabilis</em></td>
<td>41</td>
<td>98</td>
<td>98</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
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<td>75</td>
<td>75</td>
<td>75</td>
<td>75</td>
<td>50</td>
</tr>
<tr>
<td><em>Pseudomonas aeruginosa</em></td>
<td>31</td>
<td>--</td>
<td>97</td>
<td>--</td>
<td>97</td>
<td>--</td>
<td>--</td>
<td>84</td>
<td>--</td>
<td>90</td>
<td>100</td>
<td>74</td>
<td>77</td>
<td>71</td>
<td>--</td>
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</tr>
</tbody>
</table>

--- Denotes organism has intrinsic resistance to this antimicrobial

1. Nitrofurantoin is reported for urine sources only

## Summary for Gram-Negative Organisms

During the 2-year period between January 2015 and December 2016, a total of 111 *E. coli* were identified, making it the most commonly identified Gram-negative pathogen. Antibiotic susceptibility of these *E. coli* can be summarized as follows:

1. Oral antibiotics with the highest susceptibilities (in descending order) were:
   a. Nitrofurantoin (99%)
   b. Cefuroxime (91%)
   c. Ceftazidime (86%, as indicated by cefazolin susceptibility)
   d. Trimethoprim/sulfamethoxazole (76%)

2. Susceptibilities of antibiotics available only in intravenous formulation (e.g., ceftriaxone) exceed 90%, except:
   a. Ampicillin/sulbactam (59%)
   b. Cefazolin (86%)

Antibiotic susceptibility data can be useful for guiding selection of empiric antibiotic therapy for residents in whom culture and susceptibility data from the past few months are not available.
Selecting a Strategy

- Should be based on
  - Size of facility
  - Availability of personnel / expertise (IP, pharmacist, micro, ID)
  - Financial resources / manpower
  - Electronic ordering / clinical decision support systems
  - Goals

- Customize
  - One size will not fit all
# Tiered Implementation of ASP Activities

## Implementation of Antimicrobial Stewardship Components
**Stratified by Level of Resources**

### Basic Antimicrobial Stewardship Components
- Obtain leadership commitment via formal written statement
- Appoint physician and consultant pharmacist as program leaders
- Develop policy and implement practices to improve antibiotic use
- Track and report antibiotic prescribing practices and outcome measures
- Educate providers, residents, and/or family on appropriate antibiotic use

### Table: Action and Resources

<table>
<thead>
<tr>
<th>Action</th>
<th>Low Level of Resources</th>
<th>Moderate-to-High Level of Resources</th>
</tr>
</thead>
<tbody>
<tr>
<td>Survey</td>
<td>Current antibiotic prescribing practices and issues</td>
<td>As in low-level of resources, <em>PLUS one or more of the following:</em></td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Criteria for testing and starting antibiotics for skin/soft tissue and respiratory tract infections</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Effective communication strategy to providers (SBIAR model)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Antibiotic time-out</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Bug-drug mismatch</td>
</tr>
<tr>
<td>Educate</td>
<td>- Why, what, and how of antibiotic stewardship</td>
<td>- As in low-level of resources, <em>PLUS at least one additional example interventions listed below</em></td>
</tr>
<tr>
<td></td>
<td>- Minimum criteria for testing for UTI</td>
<td>(but are not limited to):</td>
</tr>
<tr>
<td></td>
<td>- Minimum criteria for initiating antibiotic for UTI</td>
<td>- Facility specific prescribing guidelines</td>
</tr>
<tr>
<td></td>
<td>- <em>Prevention of C. difficile</em> infection</td>
<td>- Standard provider communication tool</td>
</tr>
<tr>
<td></td>
<td>- Any other topic identified based on the survey</td>
<td>- Antibiotic time-out and review processes</td>
</tr>
<tr>
<td>Implement</td>
<td>- Basic stewardship components (see above) <em>PLUS</em></td>
<td>- Antibiotic prescribing report cards for providers</td>
</tr>
<tr>
<td></td>
<td>- Facility antibiogram (if feasible)</td>
<td></td>
</tr>
</tbody>
</table>
Things to Remember with Strategy Implementation

• Formulate a plan
  ▪ Enlist others to help
  ▪ DO NOT implement everything all at once (3 at most at one time)

• Made plan known
  ▪ Advertise what will be implemented, when, why, and goal
  ▪ Educate all staff member
  ▪ Don’t leave out providers

• Ask and/or negotiate
  ▪ Request monthly antibiotic use report from pharmacy
  ▪ Annual antibiogram from contract lab
  ▪ Put it in writing (i.e., in contract)
Metrics to Measure ASP Activities

Measurement for usage
- Days of therapy (DOT) / 1000 resident-days
- Antibiotic starts / 1000 resident-days
- Can be summarized as overall, by antibiotic class, by individual agents

Measurement for process
- Compliance to assessment, treatment algorithms
- Compliance to antibiotic prescription (dose, frequency, duration, indication)

Measurement for clinical outcomes
- \textit{C difficile} infection rates
- Adverse reaction rates
- Antibiotic resistance rates (e.g., MDRO)

http://www.cdc.gov/longtermcare/prevention/antibiotic-stewardship.html
Other Metrics to Show ASP Efforts

- **Time spent performing**
  - Tracking facility infection
  - Obtaining antibiotic use data
  - Summarizing data for meetings

- **Number of people educated on ASP, appropriate use**
  - Prescribers
  - Nurses
  - Residents / family members

- **Number of internal and external outreach activities**
  - Infection control fair
  - Community health fair
Summary

• Antimicrobial resistance is increasing and leads to increased morbidity and mortality for patients and overall healthcare costs

• ASPs are necessary
  – Unnecessary use of antibiotics is common
  – Antibiotic use is the key driver of resistance
  – Regulatory requirements

• Primary goal of ASPs is to improve patient care and public health

• Key recommendations for ASPs include
  – Establishing a multidisciplinary team
  – Implementing general interventions as well as pharmacy-, and laboratory-based strategies
Assessment Question 1

Which of the following is not a consequence of antibiotic misuse?

A. Development of resistant pathogens

B. Secondary infections

C. Decreased length of stay and costs

D. Adverse drug reactions
Assessment Question 2

Which of the following is not a primary goal of antimicrobial stewardship programs?

- A. Limit facility spending on antibiotics
- B. Improve public health
- C. Prevent development of resistance
- D. Improve patient care and outcomes
Assessment Question 3

Which of the following is/are antimicrobial stewardship strategies that can be implemented in LTCF?

A. Prepare antibiogram
B. Use standard clinical assessment and communication tool
C. Monitor antibiotic use
D. All of the above
Need More Nebraska ASAP?

For additional resources, visit

https://asap.nebraskamed.com