Antimicrobial Stewardship in the Long Term Care Setting

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Disclosures

• None
Objectives

- Describe antimicrobial stewardship (AS) and its purpose in the long term care setting
- Discuss the CDC Core Elements of AS for Nursing Homes
- Compare the various approaches to AS as described in the literature
- Apply knowledge to case scenarios
Antibiotics Use in Long Term Care Facilities

• Antimicrobial resistance is a public health crisis
• Estimated ~16,000 nursing homes in the US
  – ~1.4 million residents
• Infection prevalence ranges from 1.4-5.2 cases per 1000 care days (nearly 3 million/year)
• Up to 70% of residents treated with antimicrobials/yr
  ~50% considered inappropriate
• Inappropriate: defined as improperly used when indicated or not indicated at all

Antimicrobial Resistance

• Estimated 1 out of every 3 residents are colonized with an MDRO
  – *Staphylococcus aureus*
  – Enterobacteriaceae
  – *Pseudomonas aeruginosa*
  – Others

• **Challenge**: Clinical management, collateral damage (e.g. CDI), and financial burden

MDRO, multi-drug resistant organism; CDI, *Clostridium difficile* infection

Antimicrobial Stewardship

• Antibiotic stewardship (AS) refers to a set of commitments and activities designed to “optimize the treatment of infections while reducing the adverse events associated with antibiotic use.”

Nursing Homes and Assisted Living (LTC). CDC; The Core Elements of Antibiotic Stewardship for Nursing Homes. 2018.
Goals?

- Reduce inappropriate antimicrobial use
  - Reduce adverse drug events
  - Reduce the incidence of CDI
  - Reduce antimicrobial resistance
  - Reduce unnecessary hospitalizations
  - Improve clinical outcomes

Nursing Homes and Assisted Living (LTC). CDC; The Core Elements of Antibiotic Stewardship for Nursing Homes. 2018.
CDC Core Elements

1. Leadership Commitment
2. Accountability
3. Drug Expertise
4. Action
5. Tracking
6. Reporting
7. Education

CDC, Centers for Disease Control and Prevention

Nursing Homes and Assisted Living (LTC). CDC; The Core Elements of Antibiotic Stewardship for Nursing Homes. 2018.
Leadership Commitment

• Commit to improving antimicrobial use
• Statement supporting AS as a priority
• Financial support
  – Designated staff
  – Incorporate into job descriptions
    • Medical director, nurse leads, consultant pharmacists
• Establishing a culture
  – Communication, education, recognition
  – Minimize hierarchy among staff

https://commons.marymount.edu/theleaderinme/2014/05/10/reflection/

Nursing Homes and Assisted Living (LTC). CDC; The Core Elements of Antibiotic Stewardship for Nursing Homes. 2018.
Accountability

- Identify individuals accountable (leads) for AS

**Task:** Prescribing standards, protocol adherence, nursing empowerment, antimicrobial management, continuity of care

Nursing Homes and Assisted Living (LTC). CDC; The Core Elements of Antibiotic Stewardship for Nursing Homes. 2018.
Drug Expertise

• Infectious Diseases can be challenging
• Access to ID consultants and ID or AS-trained consultant pharmacists
  – Multiple training programs available
  – Partner with affiliated hospital (as applicable)
  – Contract with available consultants in community
Action

- Implement policies and modify practices to improve antimicrobial use
- CDC recommendations
  - Prioritize based on needs
  - Introduce in a step-wise fashion
  - Monitor and measure impact
  - Repeat as necessary
- Examples: Modify medication safety policies, empiric treatment recommendations, dosing algorithms, disease-state specific algorithms

Nursing Homes and Assisted Living (LTC). CDC; The Core Elements of Antibiotic Stewardship for Nursing Homes. 2018.
Tracking/Reporting

• Track antimicrobial prescribing data
  – Do they comply with protocols?

• Track amount of antimicrobial use
  – Any patterns that should be evaluated?
  – Days of Therapy (DOTs)
    • 1 DOT = 1 dose of a specific antibiotic over a 24 hour period

• Track clinical outcomes
  – Antibiotic resistance, CDI, adverse drug events
Education

• Most **important** component
• Include staff, resident, and family members
  – Goals of antimicrobial stewardship
  – Responsibilities
  – Harmful effects of antimicrobials
  – Disease state/treatment specific education
  – Feedback from initiatives
  – Etc.

Nursing Homes and Assisted Living (LTC). CDC; The Core Elements of Antibiotic Stewardship for Nursing Homes. 2018.
Unique Challenges

**Patient Level**
- Multiple comorbidities
- Aging immune system
- Functional dependence
- Cognitive impairment/communication deficiency
- Frequent hospitalizations

**Facility Level**
- Limited diagnostic testing/imaging access
- Inadequate staff
- Shared medical equipment
- Financial resources

Feldstein D. JAMDA 2018;19:110-16
Education

Prescribing Requirements

Area(s) of Opportunity

Staffing, Tracking, and Reporting

Standardization
Education

• Medical Staff
  – Principles of ASP, continuing medical education, treatment guidelines, audit and feedback, providing individualized data

• Nursing Staff
  – Principles of ASP, continuing medical education, signs of bacterial infections, antibiotic indications, approach to microbiological investigations

• Patient/Family
  – Harms/benefits of antimicrobials, indications

<table>
<thead>
<tr>
<th>Study</th>
<th>Setting Type of infection</th>
<th>Design</th>
<th>Intervention</th>
<th>Main outcomes</th>
<th>Impact of the intervention</th>
</tr>
</thead>
<tbody>
<tr>
<td>Naughton et al.</td>
<td>10 community-based LTCFs</td>
<td>Randomized controlled trial</td>
<td>Multifaceted <strong>educational</strong> intervention: small-group consensus process limited to physicians and a similar intervention that included <strong>physicians and nurses</strong></td>
<td>Antibiotic use at diagnosis compared with the guidelines</td>
<td>Increase in appropriate use of parenteral antibiotic therapy in the multidisciplinary group only</td>
</tr>
<tr>
<td></td>
<td>USA</td>
<td></td>
<td></td>
<td></td>
<td>No impact on oral antibiotic use</td>
</tr>
<tr>
<td></td>
<td>Pneumonia</td>
<td></td>
<td></td>
<td></td>
<td>Fewer courses of antimicrobials for suspected UTIs were prescribed in the intervention group, but not sustained over the 12 months post intervention</td>
</tr>
<tr>
<td>Loeb et al.</td>
<td>24 community-based LTCFs</td>
<td>Cluster randomized controlled trial</td>
<td>Multifaceted <strong>educational</strong> intervention: small group interactive sessions for nurses, videotapes, written material, outreach visits, and one-on-one interviews with physicians</td>
<td>Number of antimicrobials prescribed for suspected UTIs</td>
<td>No statistically significant impact on both outcomes</td>
</tr>
<tr>
<td>(2005)</td>
<td>Canada and USA UTIs</td>
<td></td>
<td></td>
<td></td>
<td>Decrease of non-compliant antibiotic prescriptions in the intervention group, but not sustained up to 6 months after the second intervention</td>
</tr>
<tr>
<td>Hutt et al.</td>
<td>2 LTCFs (one hospital-based, one community-based) USA</td>
<td>Before/after controlled</td>
<td>Multifaceted <strong>educational</strong> intervention: interactive educational sessions for nurses and academic detailing for physicians</td>
<td>Use of appropriate antibiotics Timely antibiotic initiation for unstable patients</td>
<td>Increase in compliant antibiotic prescriptions Decreased antibiotic use</td>
</tr>
<tr>
<td>(2006)</td>
<td>Pneumonia</td>
<td></td>
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<tr>
<td>Monette et al.</td>
<td>8 community-based LTCFs</td>
<td>Cluster randomized controlled trial</td>
<td>Multifaceted <strong>educational</strong> intervention: antibiotic guide sent to physicians along with their antibiotic prescribing profile (intervention performed twice) In-house pharmacists in all facilities</td>
<td>Antibiotic prescriptions compliant with the guidelines</td>
<td></td>
</tr>
<tr>
<td>(2007)</td>
<td>Canada UTIs, lower RTIs, SSTIs, and bacteraemia of unknown origin</td>
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</tr>
<tr>
<td>Schwartz et al.</td>
<td>One hospital-based LTCF</td>
<td>Before/after uncontrolled, with ITS analysis</td>
<td><strong>Educational</strong> intervention targeted at 20 salaried internists who provided most of the medical care. On-site laboratory and radiographic services. Multifaceted: national guidelines, hospital resistance data, and physician feedback (series of four teaching sessions given by ID specialists over 18 months plus booklets)</td>
<td>Antibiotic prescriptions compliant with guidelines Total antibiotic use</td>
<td></td>
</tr>
<tr>
<td>(2007)</td>
<td>USA All infections</td>
<td></td>
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</tr>
<tr>
<td>Study</td>
<td>Type</td>
<td>Intervention</td>
<td>Outcome Measures</td>
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<tr>
<td>Zabarsky et al. [29] 2008</td>
<td>One hospital-based LTCFs USA UTIs (focus on asymptomatic bacteriuria)</td>
<td>Educational intervention: nurses (discourage the collection of urine cultures in the absence of symptoms) and physicians (no antibiotics for asymptomatic bacteriuria) Repeated sessions, with individual feedback</td>
<td>Appropriateness of urine culture collection and antibiotic treatment based on guidelines Total antibiotic use Decrease in inappropriate submission of urine cultures, overall rate of treatment of asymptomatic bacteriuria and total antibiotic use</td>
<td></td>
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<tr>
<td>Pettersson et al. [41] 2011</td>
<td>58 community-based LTCFs Sweden All infections</td>
<td>Multifaceted educational intervention: small educational group sessions with nurses and physicians, feedback on prescribing, presentation of guidelines and written materials</td>
<td>Proportion of quinolones prescribed for lower UTIs in women Proportion of recorded infections treated with an antibiotic Proportion of infections handled by physicians as ‘wait and see’ No significant decrease in the use of quinolones for UTIs Decrease in the overall prescribing of antibiotics Increase in proportion of infections handled by physicians as ‘wait and see’</td>
<td></td>
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<tr>
<td>Linnebur et al. [45] 2011</td>
<td>16 community-based LTCFs USA Pneumonia</td>
<td>Multifaceted educational intervention: educational sessions for nurses and academic detailing to physicians by pharmacists</td>
<td>Antibiotic prescriptions compliant with guidelines (timely administration, choice of antibiotic and duration) No impact on choice of antibiotic and duration Increase in timely administration of antibiotics</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Jump et al. [44] 2012</td>
<td>One hospital-based LTCF USA All infections</td>
<td>ID on-site consultation service (weekly round 4 available on the phone) All of the LTCF prescribers were full-time staff</td>
<td>Total systemic antimicrobial use Positive Clostridium difficile tests Decrease in total antimicrobial use and in C. difficile positive tests</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rummukainen et al. [32] 2012</td>
<td>64 hospital-based and community-based LTCFs Finland UTIs</td>
<td>Multifaceted educational intervention: academic detailing for physicians and head nurses (by a team with an ID specialist, an infection control nurse and a geriatrician), regional guidelines</td>
<td>Antibiotics prescribed for UTI prophylaxis No impact on curative antibiotic treatments, but decrease in UTI prophylaxis</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Zimmerman et al. [48] 2014</td>
<td>12 LTCFs USA UTIs, SSTIs and RTIs</td>
<td>Multifaceted educational intervention: quality improvement programme that involved training of physicians and nurses, information of residents and families, regular feedback on prescribing</td>
<td>Rates of antibiotic prescribing for presumed UTIs, SSTIs and RTIs Reduction in antibiotic prescribing rates</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fleet et al. [43] 2014</td>
<td>30 LTCFs UK All infections</td>
<td>Structural intervention: introduction of the ‘Resident Antimicrobial Management Plan’ tool, a form to be completed by nursing staff for all new antibiotic prescriptions (at the initiation and at around day 3)</td>
<td>Total antibiotic use (defined daily doses/1000 residents/day) Decrease in total antibiotic use (only for treatment of infection, not for prophylaxis)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Abbreviations: ID, infectious diseases; ITS, interrupted time series; LTCF, long-term care facility; RTI, respiratory tract infection; SSTI, skin and soft tissue infections; UTI, urinary tract infection.
IP Training and ASP

• Survey of 922 NH in the US (2013-2014)
• Specific IP training → AS policies in place

<table>
<thead>
<tr>
<th>Policy/program</th>
<th>Total, N = 922 (%)</th>
<th>Specific training, n = 359 (%)</th>
<th>No specific training, n = 563 (%)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Written guidelines in place for antibiotic use</td>
<td>422 (46.5)</td>
<td>161 (45.5)</td>
<td>261 (47.1)</td>
<td>.63</td>
</tr>
<tr>
<td>Collection of data on antibiotic utilization</td>
<td>467 (51.4)</td>
<td>197 (55.7)</td>
<td>270 (48.7)</td>
<td>.04</td>
</tr>
<tr>
<td>Antibiotic prescribing guideline/order form</td>
<td>152 (16.7)</td>
<td>70 (19.8)</td>
<td>82 (14.8)</td>
<td>.05</td>
</tr>
<tr>
<td>Policies to restrict the use of specific antibiotics</td>
<td>65 (7.2)</td>
<td>44 (12.4)</td>
<td>21 (3.8)</td>
<td>&lt;.01</td>
</tr>
<tr>
<td>Providing feedback to clinicians on antibiotic prescribing</td>
<td>301 (33.2)</td>
<td>136 (38.4)</td>
<td>165 (29.8)</td>
<td>.01</td>
</tr>
<tr>
<td>Use of therapeutic formularies</td>
<td>153 (16.9)</td>
<td>73 (20.6)</td>
<td>80 (14.4)</td>
<td>.02</td>
</tr>
<tr>
<td>Review of cases to assess antibiotic appropriateness</td>
<td>395 (43.5)</td>
<td>179 (50.6)</td>
<td>216 (39.0)</td>
<td>&lt;.01</td>
</tr>
<tr>
<td>None of the above policies/programs on antibiotic use</td>
<td>105 (11.6)</td>
<td>31 (8.8)</td>
<td>74 (13.4)</td>
<td>.03</td>
</tr>
</tbody>
</table>

Patients

• Plenty of great resources... for FREE!

https://www.cdc.gov/longtermcare/resident/index.html
Prescribing Requirements

• Discourage antibiotic prescribing without proper clinical exam

• Mandate the documentation of indication and duration of treatment
  – ~40% of antimicrobials lacking indication

• 72-hour *time-out* (Audit and feedback)

•ASP Form (e.g. Loeb Minimum Criteria, others)
  – Avoid inappropriate testing/cultures

Feldstein D. JAMDA 2018;19:110-16.
Loeb Minimum Criteria

- Criteria proposed for skin and soft tissue infections, respiratory infections, urinary infections, and fever with unknown source

Table 4. Guidelines Providing Long-Term Care Facility (LTCF) Residents

<table>
<thead>
<tr>
<th>Reference</th>
<th>Procedure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Loeb et al.</td>
<td>Minimum criteria of antibiotic therapy</td>
</tr>
</tbody>
</table>

Results of urine culture?

- $>10^5$ CFU/mL (positive) or pending
- Negative (no growth or mixed)

Urinary catheter?

- Yes
- No

Is there one or more of the following?
- New costovertebral tenderness
- Rigors
- New onset of delirium
- Fever*

Is there dysuria or two or more of the following?
- Fever
- Urgency
- Flank pain
- Urinary incontinence
- Shaking chills
- Frequency
- Gross haematuria
- Suprapubic pain

If yes, begin antibiotics†. If no, do not treat for urinary tract infection

* >37.9°C (100°F) or 1.5°C (2.4°F) above baseline on two occasions over last 12 hours
† Stop antibiotics if urine culture is negative or no pyuria is present

Fig 2 Treatment algorithm for prescribing antimicrobials to nursing home residents in intervention arm

Area(s) of Opportunity

• Important to tailor AS to specific needs
• Urinary tract infections (UTI) and upper respiratory infections (URI) account for a large percentage of inappropriately prescribed antimicrobials
• Indication (~40%), treatment option (~40%), duration often inappropriate for UTI (~25%)

Appaneal HJ. JAGS 2017;65(12):2744-5.
Prospective pre-/post-implementation study

LTCF (n=3) in Northern California

ID consultant/pharmacist provided once weekly prospective audit/feedback

Loeb Minimum Criteria

Success (right) and barriers

# Infection Prevention and Antimicrobial Stewardship Knowledge for Selected Infections Among Nursing Home Personnel

Barbara W. Trautner, MD, PhD\textsuperscript{1,2}, M. Todd Greene, PhD, MPH\textsuperscript{3,4}, Sarah L. Krein, PhD, RN\textsuperscript{3,4}, Heidi L. Wald, MD, MSPH\textsuperscript{5}, Sanjay Saint, MD, MPH\textsuperscript{3,4}, Andrew J. Rolle, MPH\textsuperscript{6}, Sara McNamara, MPH\textsuperscript{4}, Barbara S. Edson, RN, MBA, MHA\textsuperscript{6}, and Lona Mody, MD\textsuperscript{3,4}

<table>
<thead>
<tr>
<th>Question or topic</th>
<th>No. of responses</th>
<th>% of responses that were correct</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CAUTI recognition and management</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Recognize fever but not urine color, odor, or cloudiness as a CAUTI symptom</td>
<td>813</td>
<td>61.4%</td>
</tr>
<tr>
<td>Recognize that screening urine cultures on admission are not indicated</td>
<td>815</td>
<td>60.1%</td>
</tr>
<tr>
<td>Recognize that fever and positive urine culture should be treated with antibiotics</td>
<td>816</td>
<td>95.6%</td>
</tr>
<tr>
<td>Recognize whether a CAUTI was present on admission in brief scenarios</td>
<td>811</td>
<td>39.1%</td>
</tr>
<tr>
<td>Understand the date of the CAUTI event in brief clinical scenarios</td>
<td>811</td>
<td>39.6%</td>
</tr>
<tr>
<td>Identify CAUTI was present on admission in a longer case study (cohort 2 only)</td>
<td>701</td>
<td>30.7%</td>
</tr>
<tr>
<td><strong>Asymptomatic bacteriuria and pyuria</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Recognize definition of ASB (cohort 1 only)</td>
<td>114</td>
<td>99.1%</td>
</tr>
<tr>
<td>Recognize that ASB is common in catheterized residents (cohort 2 only)</td>
<td>700</td>
<td>90.7%</td>
</tr>
<tr>
<td>Understand that pyuria does not distinguish ASB from urinary tract infection</td>
<td>814</td>
<td>36.1%</td>
</tr>
</tbody>
</table>
Continuity of Care

• It’s very frustrating. I’ll send someone...to the emergency department for chest pains. They get a diagnosis of UTI. I think it feeds the family problem because every time they go to the ED...the ED says they’re diagnosed with a UTI.”

— Nursing Home (F)
Need exists to verify all antimicrobial starts outside of facility
Consider contracted outpatient/ED providers
Standardization

• Develop evidence-based clinical and diagnostic criteria when initiating antimicrobials
  – Multidisciplinary protocols
  – Incorporate local epidemiology (e.g. antibiogram)

• Restricted Antimicrobial Protocol
  – Target medications of significance

• Clinical Decision Support Tool

Chopra T. CID 2015;60(S2):272-6.
Designated Personnel

Infection Preventionists (IPs)

ID Consultant

ID Pharmacist

AS Responsibilities

AS, antimicrobial stewardship; ID, Infectious Diseases

Feldstein D. JAMDA 2018;19:110-16.
• New England Sinai Hospital (212 bed LTACH)
• 4 year (pre-/post-intervention)
• Remote audit/feedback (1-2 hrs/wk) by ID-trained physician and pharmacist
• Review: Duration > 7 days of targeted antimicrobials
• Intervened on 700+ patients, 800+ recommendations
  – Clostridium difficile, Pseudomonas aeruginosa, MRSA

Limitation: Study did not mention additional interventions during the time period evaluated.
Figure 3. Antibiotic usage rates by month. C. difficile, Clostridium difficile; DDD, defined daily dose; MRSA, methicillin-resistant Staphylococcus aureus.
**Figure 1:** Recommendation acceptance frequency by month.
Tracking/Reporting

- Many studies looking at appropriate metric
- Pros and cons to each method
- CDC recommends tracking at least one metric
  - Incidence or Antibiotic Utilization Ratio (AUR)

### Table 1
Antibiotic Use and Cost Metrics for Long-Term Care Facilities

<table>
<thead>
<tr>
<th>Metric</th>
<th>Definition*</th>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Incidence</td>
<td>Number of antibiotic courses started per 1000 resident care days</td>
<td>Provides rate of number of residents treated each month</td>
<td>Not a measure of length of therapy Requires resident-level data</td>
</tr>
<tr>
<td>Antibiotic utilization ratio</td>
<td>Ratio of total antibiotic days to total resident care days</td>
<td>Most common metric used in published studies (usually expressed as total days per 1000 resident days) Used by CDC NHSN</td>
<td>Not a measure of length of therapy Requires resident-level data</td>
</tr>
<tr>
<td>Cost per antibiotic day</td>
<td>Ratio of total antibiotic cost to total antibiotic days</td>
<td>May provide insight into prescribing of high cost antibiotics</td>
<td>Requires cost data and resident-level data</td>
</tr>
<tr>
<td>Cost per resident care day</td>
<td>Ratio of total antibiotic cost to total resident care days</td>
<td>May appeal to administrators because it relates cost to whole population</td>
<td>Requires cost data Not all residents treated with an antibiotic</td>
</tr>
</tbody>
</table>

CDC NHSN, Centers for Disease Control and Prevention National Healthcare Safety Network.

*Metric calculated on a monthly basis.

Tracking/Reporting

No. of Antibiotic Courses Started/1000 Resident Days

- More feasible of the two
- Track all new starts weekly
- Can use as benchmark when implementing intervention

Days of Therapy/1000 Resident Days

- May require more labor to acquire data
- Ask pharmacy contractor to supply data
- Metric used by NHSN
- Can use as benchmark when implementing intervention

Limitation: Neither take into account appropriateness or duration of treatment

Scenarios to Apply Knowledge
Scenario 1

You have been assigned to oversee the antimicrobial stewardship program at your LTCF. You and the team have implemented a protocol to improve the management of urinary tract infections (UTIs). Which of the following metrics would be most feasible to measure the impact?

- Total cost of antibiotics used per month
- Days of therapy/1,000 resident days
- Number of newly initiated antibiotics/1,000 patient days
- Total number of patients receiving antibiotics per month
Scenario 2

• John is a nurse who has recently been hired at your LTCF. You work alternating shifts and have noticed an increase in number of patients on antibiotics for UTIs. You ask John if he has noticed and he replies “I know, noticed a lot of cloudy urines, and every time I send a urine culture it grows something. I’m glad because then I inform the doctor and they prescribe the appropriate antibiotic.” What are some actions you can take to ensure proper AS?
Scenario 2 (continued)

- Ask John if he was using the Loeb minimum criteria to guide his decision on sending urine cultures
- Recommend to your supervisor that John receive AS training (in-house/online)
- Recommend to your supervisor that the prescribers receive AS training (in-house/online) if prescribing antibiotics for cloudy urine
- All of the above are appropriate actions to take
Scenario 3

• ET is a 92 year-old female resident at your LTCF. She is currently experiencing a productive cough, runny nose, and fatigue. Her son is demanding a Zpak which was prescribed 6 months for similar symptoms and worked. Which of the following would be appropriate for the provider to take?
  – Prescribe a Zpak, but for no more than 3 days
  – Provide education to the son regarding the harms of antibiotics when used inappropriately
  – Provide CDC resources for the patient to read
  – All of the above would be appropriate
Scenario 4

Mary is the CMO of a LTCF and has received full leadership support to initiate a ASP. Her first goal is to form a team. Which of the following positions must Mary hire to properly establish her program?

- ID pharmacist
- ID consultant
- Infection Preventionist
- All of the above

Any (not all) of the above would suffice (all 3 would be ideal, but not necessary)
Scenario 5

- Which of the following can/should be reviewed weekly to promote optimal AS?
  - Number of newly initiated antibiotics
  - Adherence to facility-wide protocols
  - Antibiotic durations > 7 days
  - Antibiotics continued from outside of the facility

All are excellent initiatives
(Important to introduce in step-wise approach, consider specific needs)
Conclusion

• ASP priority is to improve patient care
• Reduction in antimicrobial use without compromised outcomes
• Outcomes regarding mortality and CDI still to be determined
• Dynamic, many resources, lots of experience in the literature

Good Luck!

Antimicrobial Stewardship in the Long Term Care Setting

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