Guidance for Pharmacists’ Involvement in Antimicrobial Stewardship in Long Term Care Facilities

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Objectives

- Recognize the importance and challenges of antimicrobial stewardship in long term care facilities (LTCF)
- Evaluate the successes and failures of previously reported antimicrobial stewardship programs
- Discuss the national initiatives and CDC Core Elements of antimicrobial stewardship in LTCF
- Apply the updated McGeer Criteria for infection surveillance in LTCF
- Identify opportunities for pharmacist involvement in antimicrobial stewardship in LTCF
The Scope of the Problem

- Antibiotics are one of the most commonly prescribed medications in a LTCF
- As much as 70% of long term care (LTC) patients receive a course of antibiotic each year
- Estimated cost of antibiotics range from $38-137 million per year
Antibiotic Resistance

Antibiotics kill pathogenic organisms along with protective organisms

Leaving resistant organisms to multiply and spread
Spread of Resistance

Examples of How Antibiotic Resistance Spreads

- Animals get antibiotics and develop resistant bacteria in their guts.
- Drug-resistant bacteria can remain on meat from animals. When not handled or cooked properly, the bacteria can spread to humans.
- Fertilizer or water containing animal feces and drug-resistant bacteria is used on food crops.
- Drug-resistant bacteria in the animal feces can remain on crops and be eaten. These bacteria can remain in the human gut.
- George gets antibiotics and develops resistant bacteria in his gut.
- George stays at home and in the general community. Spreads resistant bacteria.
- George gets care at a hospital, nursing home or other inpatient care facility.
- Resistant germs spread directly to other patients or indirectly on unclean hands of healthcare providers.
- Patients go home.
- Resistant bacteria spread to other patients from surfaces within the healthcare facility.

Simply using antibiotics creates resistance. These drugs should only be used to treat infections.
Consequences of Antibiotic Resistance

- CDC National Summary Data

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
Consequences of Antibiotic Resistance

- Prevalence of colonization of resistant organisms in LTCF

- Methicillin-resistant *Staphylococcus aureus* (MRSA)
  - 11% - 59%

- Multidrug resistant gram-negative bacteria (MDRGN)
  - 23% - 51%

- Vancomycin-resistant Enterococci (VRE)
  - 1% - 19%

- ↑ morbidity and ↑ mortality

Van Buul LW et al. JAMDA. 2013.
Adverse Events From Antibiotic Overuse

- Geriatric patients are susceptible to antibiotic related adverse events
  - Changes in pharmacokinetics
  - Complicated comorbidities
  - Polypharmacy
  - Dosage adjustments

Adverse Events From Antibiotic Overuse: *Clostridium difficile*

- Estimated number of illnesses and death due to *Clostridium difficile* infections (CDI) (yearly)

  **National summary data:**
  - 250,000 Illnesses
  - 14,000 Deaths

  **National incidence and outcomes of nursing home-onset CDI:**
  - 112,800 Illnesses
  - 8,700 Deaths

Hunter JC et al. Open Forum Infect Dis. 2016. || CDC
Potential Barriers to Appropriate Antibiotic Prescribing

**Diagnosis**
- Medically-complicated patients
- Delay or difficulty obtaining culture samples
- Inadequate provider coverage

**Social Factors**
- Family pressure to prescribe antibiotics
- Nursing pressure to prescribe antibiotics
- Physician autonomy

**Knowledge and Practice**
- Variable knowledge between doctors and nurses
- Unawareness of the consequences relate to poor antibiotic prescribing habits

Common Antibiotic Stewardship Interventions

**Education**
- Small group or individual educational sessions
- Easily accessible written information
- Audits and feedback

**Multidisciplinary Team**
- Infectious disease (ID) consultation service team
- Clinical pharmacist with training in ID

**Development of Guidelines**
- Multidiscipline teams developed consensus guidelines and algorithm

Nicolle L. Antimicrob Resist Infect Control. 2014.
# Efficacy of Antimicrobial Stewardship: Systematic Review

<table>
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<tr>
<th>Authors</th>
<th>Study Design</th>
<th>Intervention</th>
<th>Outcomes</th>
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<tbody>
<tr>
<td>Schwartz et al., 2007</td>
<td>Pre-post intervention (n=100) for all infections</td>
<td>Education + ID consultation + development of guidelines</td>
<td>1. Infection diagnosis met guidelines: 32% vs 62%, p = 0.006&lt;br&gt;2. Initial antimicrobial therapy met guidelines: 11% vs 39%; p &lt; 0.001&lt;br&gt;3. Antimicrobial days ↓29.7%, sustained 2 yr post-intervention</td>
</tr>
<tr>
<td>Jump et al., 2012</td>
<td>Pre-post intervention (n=250) for all infections</td>
<td>ID consultation weekly and via phone</td>
<td>1. Reduction in total antibiotics: 30.1%, p&lt;0.001&lt;br&gt;• Oral: 31.6%, p&lt;0.001&lt;br&gt;• IV: 25%, p&lt;0.001&lt;br&gt;2. Decrease in CDI: p=0.004</td>
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## Efficacy of Antimicrobial Stewardship: Systematic Review

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<td>Linnebur et al., 2011</td>
<td>Non-randomized: 8 controlled vs intervention LTCF for pneumonia</td>
<td>Education + development of guidelines</td>
<td>1. Optimal antibiotic use pre/post: intervention 60% vs 66%; control 32% vs 39% (NS).&lt;br&gt;2. Duration of antibiotics, no difference.</td>
</tr>
<tr>
<td>Zabarsky et al., 2008</td>
<td>Pre-post, single center LTCF for urinary tract infections</td>
<td>Education</td>
<td>Decrease after 6 months of intervention:&lt;br&gt;1. Inappropriate urine cultures: $p&lt;0.04$&lt;br&gt;2. Treatment of asymptomatic bacteriuria: $p = 0.0017$&lt;br&gt;3. Total antimicrobial days: $p&lt;0.001$</td>
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Efficacy of Antimicrobial Stewardship: Systematic Review

- Discussions and Limitations
  - No standardized program
  - Many elements implemented at once
    - Difficult to determine which component was effective
  - Most studies showed improvement in antibiotic use
  - Studies did not evaluate antibiotic resistance or cost effectiveness of programs
  - Only one study describe sustainability of these programs beyond period of intervention

Nicolle L. Antimicrob Resist Infect Control. 2014.
Pharmacist-Led Antibiotic Stewardship

- Pre/post intervention
- Memorial Health Center Nursing Home
- Pharmacist interventions:
  - Evaluate appropriateness of initiating empiric therapy
  - Evaluate culture and sensitivity reports
  - Examine appropriate antibiotic dosing
- Phase 1: observational data collection (n=29)
- Phase 2: pharmacist intervention and prospective data collection (n=24)

Pharmacist-Led Antibiotic Stewardship: Results

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<th>Criteria</th>
<th>Phase 1</th>
<th>Phase 2</th>
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<td>Antibiotic did not cover expected pathogens; current guidelines recommend against using that antibiotic empirically</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Antibiotics were not changed to address resistance after culture and sensitivity report became available</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Dose of antibiotic was not adjusted to the patient’s renal function</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Attempt to treat asymptomatic bacteriuria; no evidence of infection</td>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>Inappropriate duration of therapy</td>
<td>0</td>
<td>1</td>
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Pharmacist-Led Antibiotic Stewardship: Results

| Chart Review Before and After Implementation of a Nursing Home Antibiotic Stewardship Program |
|-------------------------------------------------------------------------------|------------------|------------------|
| Residents evaluated for possible infection                                    | Phase 1 n (%)    | Phase 2 n (%)    |
|                                                                                | 29 (100)         | 24 (100)         |
| Residents treated with antibiotics                                             | 20 (69)          | 19 (79)          |
| Cases where antibiotics were prescribed inappropriately                        | 8 (40)           | 4 (21)           |

**Limitations to the study:**

- Lack of generalizability (sample size, single center)
- Lack of clinical and economical outcome data
- Pharmacist only intervened on patients with pending cultures

CDC Core Elements

- Antimicrobial stewardship initiative
- Originally for hospitals
- Adapted for LTCFs in 2015
- “optimize the treatment of infections while reducing the adverse events associated with antibiotic use.”
CDC Core Elements

- 40-75% inappropriate or unnecessary
- Step-wise fashion
  - Implement 1 or 2 activities
  - Gradually add new strategies over time
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
Leadership

“Leaders should commit to improving antibiotic use.”

Committee involvement
- Interdisciplinary stewardship or infection control / prevention

Communicate expectations
Create a culture of stewardship
Accountability

- Support antibiotic oversight
  - Medication regimen review
  - Reporting antibiotic use data
- Infection prevention program coordinator
Drug Expertise

- Specialized infectious disease or antibiotic stewardship training
- Partner with stewardship leads
- Help develop empiric prescribing tables
- Advise on
  - Side effects
  - Resistance patterns
Taking Action

- Standardize practices
  - When infection suspected
  - Using diagnostic testing
  - “Antibiotic time-out”

- Infection specific interventions
  - Asymptomatic bacteriuria
  - UTI prophylaxis
Education

- Prescribers, nurses, residents, families
- Importance of antibiotic stewardship
  - Costs of inappropriate use
- Prior to intervention
- Throughout – feedback
- In-services, flyers, emails, pocket guides

www.cdc.gov
Tracking and Reporting

- Prevalence surveys
- Use: Antibiotic starts, Days of therapy
- Rates of C. difficile infection
- Adverse Effects: Side effects, MRSA and CRE rates
- Costs: Lab testing, Labor

CDC Core Elements of Antibiotic Stewardship for Nursing Homes.
The McGeer Criteria

- Developed to guide infection surveillance
  - Nursing homes and LTCFs
- Updated in 2012 by Stone and colleagues
- Not for
  - Long-term acute care
  - Inpatient rehabilitation
  - Pediatric LTCFs

McGeer Criteria

- 3 conditions must be met
  - New symptoms OR acutely worse
  - Alternative (non-infectious) causes considered
  - Diagnosis based on entire clinical picture

Constitutional Signs of Infection

TABLE 2. Definitions for Constitutional Criteria in Residents of Long-Term Care Facilities (LTCFs)

A. Fever
   1. Single oral temperature >37.8°C (>100°F)
   OR
   2. Repeated oral temperatures >37.2°C (99°F) or rectal temperatures >37.5°C (99.5°F)
   OR
   3. Single temperature >1.1°C (2°F) over baseline from any site (oral, tympanic, axillary)

B. Leukocytosis
   1. Neutrophilia (>14,000 leukocytes/mm³)
   OR
   2. Left shift (>6% bands or ≥1,500 bands/mm³)

C. Acute change in mental status from baseline (all criteria must be present; see Table 3)
   1. Acute onset
   2. Fluctuating course
   3. Inattention
   AND
   4. Either disorganized thinking or altered level of consciousness

D. Acute functional decline
   1. A new 3-point increase in total activities of daily living (ADL) score (range, 0–28) from baseline, based on the following 7 ADL items, each scored from 0 (independent) to 4 (total dependence):
      a. Bed mobility
      b. Transfer
      c. Locomotion within LTCF
      d. Dressing
      e. Toilet use
      f. Personal hygiene
      g. Eating

Lower Respiratory Tract Infections

- Pneumonia
  - CXR demonstrating new infiltrate
  - ≥1 respiratory symptom
  - ≥1 constitutional criteria

- Lower respiratory tract infection
  - CXR without infiltrate
  - ≥2 respiratory symptoms
  - ≥1 constitutional criteria

Urinary Tract Infections

- Remove and replace indwelling catheter
- Localized symptoms
- Fever or leukocytosis + localized symptom
- Positive urine culture
- Repeat cultures NOT recommended
Skin and Soft Tissue

- **Cellulitis**
  - Pus, heat, erythema, etc.
  - ≥1 constitutional criteria

- **Conjunctivitis**
  - Pus for ≥ 24 hours
  - New or ↑ erythema
  - New or ↑ conjunctival pain ≥ 24 hours

Gastrointestinal

- Gastroenteritis
  - Nausea, vomiting, diarrhea, abdominal pain
  - +/- positive stool specimen
- C. difficile colitis
  - Liquid or water stools (3+/24 hours)
  - OR toxic megacolon
  - PLUS positive C. diff toxin lab
  - OR Pseudomembranous colitis

The McGeer Criteria

- In summary ...
  - Antimicrobial stewardship relies on appropriate infection diagnosis and surveillance
  - Careful attention to signs and symptoms is required in LTCFs due to atypical presentation in geriatric patients

Other Educational Resources

- [http://www.leadstewardship.org/resources.php](http://www.leadstewardship.org/resources.php)
  - Associated with ASHP
  - Includes free online on-demand activities

  - Includes free antimicrobial educational programs appropriate for staff training

- [http://www.sidp.org/page-1442823](http://www.sidp.org/page-1442823)
  - Society for Infectious Diseases Pharmacists antibiotic stewardship certificate program

- [http://mad-id.org/antimicrobial-stewardship-programs/](http://mad-id.org/antimicrobial-stewardship-programs/)
  - Basic and advanced programs
  - MAD-ID
Pharmacist’s Role in Antimicrobial Stewardship

- No guidelines for antimicrobial stewardship in a LTCF

- Infectious Diseases Society of America (IDSA) and American Society Health-Systems Pharmacists
  - Endorse pharmacist role in antimicrobial stewardship in an acute care setting
ASHP Statement on Pharmacist Responsibilities

1. Promote optimal use of antimicrobials
   - Direct patient care
   - Antibacterial-use procedures

2. Reduce the transmission of infections
   - Encourage immunizations

3. Education

Centers of Medicare & Medicaid Services LTCF Requirements

- **July 2015**

  - Pharmacists to medication review
    - Routine monthly medication reviews
    - New patients to facility
    - Patients being transferred

  - Pharmacists could participate in antimicrobial stewardship

  - Pharmacists to evaluate
    - Chart for documented infection
    - Proper indication for antibiotic
    - Proper duration for antibiotic therapy

Create a Culture!

- Create and post informative flyers
- Perform antibiotic utilization reviews
  - And disseminate to staff
- Provide in-services to staff
- Educate residents and families
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