Antimicrobial Stewardship in Long-Term Care

QCHF Infection Preventionist Training
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Outline

• Rationale for Antimicrobial Use Optimization in Long-term Care

• Regulatory Messages, Oversight and Infrastructure

• Implementation

• Examples

• Conclusions

Healthcare Continuum
Resistant Organisms are Common in Long-Term Care Facilities

<table>
<thead>
<tr>
<th>Organism</th>
<th>RG</th>
<th>IP</th>
</tr>
</thead>
<tbody>
<tr>
<td>MRSA</td>
<td>28/123 (21)</td>
<td>29/136 (21)</td>
</tr>
<tr>
<td>ESBL-producing Klebsiella</td>
<td>19/114 (17)</td>
<td>16/117 (14)</td>
</tr>
<tr>
<td>P. aeruginosa</td>
<td>28/114 (25)</td>
<td>14/117 (12)</td>
</tr>
<tr>
<td>E. coli</td>
<td>22/114 (19)</td>
<td>18/117 (16)</td>
</tr>
</tbody>
</table>


Antibiotic-Resistant E. coli

- LTCF strongest predictor of E.coli ST131 infection
  - LTCF residents had 8 times the risk of contracting E.coli ST131 compared with non-LTCF residents
- Risk factors in elderly:
  - Extensive antibiotic exposure, close contact with other antibiotic-exposed individuals, age and health-associated alterations in intestinal microbiota


High Rates of Multidrug-Resistant Organisms in Long-Term Care

- Frequent transfer from acute care hospitals
- Horizontal transmission of resistant organisms
- Widespread (often inappropriate) use of antimicrobials
**Antimicrobial Use in Long-Term Care**

- Antimicrobials prescribed frequently
  - 40% of all systemic drugs
  - 8% point prevalence
  - 50-70% likelihood resident will receive at least one course of systemic antimicrobials during one year period
  - Contributes to high costs

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**Horizontal Transmission**

- LTCF today can promote antimicrobial resistant infections and transmission to other high-risk patients
  - Invasive devices and procedures increased
    - Central lines, chronic resp therapy, feeding tubes, dialysis, IV antibiotics
  - Population includes more acute and subacute patients treated previously in hospitals
  - Staff not given appropriate education
  - Changing infection control provider without expertise

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**Antibiotic Pressure from Hospital**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Relative Risk (95% Confidence Interval)</th>
</tr>
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<tbody>
<tr>
<td>Methicillin-resistant <em>Staphylococcus aureus</em></td>
<td></td>
</tr>
<tr>
<td>Levofloxacin receipt*</td>
<td>1.6 (1.1–2.2)</td>
</tr>
<tr>
<td>Third-generation cephalosporin receipt*</td>
<td>2.0 (1.0–4.0)</td>
</tr>
<tr>
<td>Vancomycin-resistant enterococci</td>
<td></td>
</tr>
<tr>
<td>Transfer to or from another CPH unit*</td>
<td>1.2 (1.1–1.4)</td>
</tr>
<tr>
<td>Levofloxacin*</td>
<td>1.2 (1.0–1.5)</td>
</tr>
<tr>
<td>ESBL-producing <em>Klebsiella pneumoniae</em></td>
<td></td>
</tr>
<tr>
<td>Gastrostomy tube</td>
<td>1.2 (1.0–1.4)</td>
</tr>
<tr>
<td>ESBL-producing <em>Escherichia coli</em></td>
<td></td>
</tr>
<tr>
<td>Total dependence for activities of daily living</td>
<td>1.2 (1.0–1.3)</td>
</tr>
<tr>
<td>Levofloxacin receipt*</td>
<td>1.2 (1.0–1.4)</td>
</tr>
<tr>
<td>Third-generation cephalosporin*</td>
<td>1.4 (0.9–2.2)</td>
</tr>
</tbody>
</table>

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**Antimicrobial Use in LTCFs, ICHE 2000; 21: 537-646.**

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**Zimmer JG et al., J Am Geriatr Soc 1986;34:703-710**
25-75% of systemic antimicrobial use and 60% of topical antimicrobial use in long-term care is considered inappropriate


30% of antimicrobial use in acute care is either inappropriate or suboptimal


Take Home Message

Antibiotic exposures and infection control measures in the hospital influence residents’ health at LTCFs.
Antimicrobial Use Optimization

- Widely accepted in acute care settings:
  - Improve antimicrobial resistance patterns
  - Decrease patient toxicity
  - Decrease costs
- Limited literature and few studies in LTCFs
  - Efforts are necessary**

*SHEA/IDSA Guidelines, CID 2007 Jan;44(2):159-77
**Schwartz, DN et al., J Am Geriatr Soc. 2007;55:1236-1242

REGULATORY MESSAGES, OVERSIGHT AND INFRASTRUCTURE

Dept HHS: Antimicrobial Review in Long-Term Care

- With Center for Medicare and Medicaid Services (CMS)
- Effective September 30, 2009
- Interpretive Guidelines for Long-Term Care Facilities
  - “It is the physician’s responsibility to prescribe appropriate antibiotics and to establish the indication for use of specific medications. As part of the medication regimen review, the consultant pharmacist can assist with the oversight by identifying antibiotics prescribed for resistant organisms or for situations with questionable indications, and reporting such findings…”

**Antimicrobial Stewardship Program (ASP)**

- Promotes appropriate use of antimicrobials by selecting the appropriate agent, dose, duration and route of administration

- Objective:
  - Optimize the utilization of antimicrobial agents in order to:
    - Minimize acquired resistance
    - Improve patient outcomes and toxicity
    - Reduce treatment costs

**Infection Control Oversight**

<table>
<thead>
<tr>
<th>Acute Care Hospitals</th>
<th>Non-Acute Care Settings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Must meet CMS Infection Control Standards</td>
<td>Few are accredited by the Joint Commission or other Accrediting Organizations</td>
</tr>
</tbody>
</table>
| Most are accredited by the Joint Commission  
  - Survey every 3 years | Certain types must be Medicare-certified (e.g., most nursing homes, dialysis clinics, and ASCs) |
| Also subject to complaint or validation survey by State Survey Agencies (on behalf of CMS) | Variable state requirements re licensing. Many outpatient settings operate primarily under MD license, with limited oversight |

**Infection Control Infrastructure**

<table>
<thead>
<tr>
<th>Acute Care Hospitals</th>
<th>Non-Acute Care Settings</th>
</tr>
</thead>
</table>
| Infection Control Program  
  - Hospital Epidemiologist  
  - Full-time Infection Preventionists  
  - Infection Control Committee | ?  
  - Staff member with or without infection control training |
IMPLEMENTATION

Differences in ASP Implementation

- Many acute care hospitals have developed ASPs due to:
  - Increasing prevalence of HAIs coupled with decreased reimbursement and public reporting
  - Lack of new antimicrobials under development
- LTCFs have been slower to adopt ASPs due to:
  - Lack of necessary personnel
  - Funding
  - Paucity of well-validated strategies specific to LTCFs

Antimicrobial Movement in the Healthcare Setting

Patient Evaluation

Choice of Antimicrobial

Prescription Ordering

Dispensing Antimicrobial
**Difficulties in Patient Evaluation in Long-Term Care**

- Clinical diagnosis of infection is imprecise
  - Symptoms not expressed or misinterpreted
    - Hearing and cognition impairment
    - Comorbid medical illness may obscure infection
  - Fever response may be relatively impaired
  - Fever without source is frequent
  - Limitations in resources to support clinical assessment

**Difficulties in Patient Evaluation in Long-Term Care**

- Limited availability and use of laboratory and radiological testing
  - Leads to empiric treatment
  - Evidenced-based recommendations on use of antimicrobials in LTCFs are limited
    - Based on clinical criteria targeted for younger populations with less complex problems
    - Optimal treatment regimens have not been defined

**ASP Strategies**

- Patient Evaluation
- Choice of Antimicrobial
- Prescription Ordering
- Dispensing Antimicrobial
- Education/Guideline
- Formulary Restriction and Pre-authorization
- Computer-assisted strategies
- Review and Feedback
ASP Strategy Selection

- Facility dependent
  - Beds and acuity of care
  - Dedicated personnel
  - Funds
  - Pharmacy support
  - Electronic systems
  - Laboratory support

Stewardship Hierarchy in LTCF

<table>
<thead>
<tr>
<th>Level</th>
<th>Methodology</th>
<th>Characteristics</th>
</tr>
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<tbody>
<tr>
<td>Most Intrusive</td>
<td>Back End approach — Review of already prescribed antibiotics</td>
<td>Individual cases are concurrently reviewed for appropriateness, usually by an expert, with feedback to the provider. Individual case data with comparators and benchmarks is provided to prescribers regarding appropriate use.</td>
</tr>
<tr>
<td></td>
<td>Front End approach — Active direction of antibiotic selection</td>
<td>Reauthorization of antibiotics based on predetermined criteria. Review of case and immediate feedback on choice of antibiotics at initiation.</td>
</tr>
<tr>
<td></td>
<td>Front End approach — Passive direction of antibiotic selection</td>
<td>Guidelines, treatment algorithms, antibiotic formulary, antimicrobial order forms</td>
</tr>
<tr>
<td>Least Intrusive</td>
<td>Education</td>
<td>Classes or training sessions regarding antibiotic resistance, stewardship practices, etc. offered to LTCF employees or staff. Small group sessions with prescriber feedback and case discussions.</td>
</tr>
<tr>
<td></td>
<td>Passive monitoring</td>
<td>Measuring types and quantities of antibiotics used in the facility and the presence of antimicrobial resistance in cumulative laboratory culture and sensitivity reports.</td>
</tr>
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Criteria for Selecting Cases for ASP Review

- High cost agents
- Broad-spectrum agents (eg. FQs, Pip/Tazo)
- Site of infection (eg. CLABSI)
- Resistance profiles (eg. MDROs, MRSA)
- High risk of adverse effects (eg. Amphotericin)
- Novel agents
- Syndromic approach (eg. asymptomatic bacteriuria)
- High use agents (facility dependent)
- Double coverage of organisms (eg. anaerobes)
Syndromic Approach

• Useful in LTCFs to identify problem area and focus interventions:
  - Asymptomatic bacteriuria: positive urine cultures in absence of clinical signs/symptoms
    - Treatment indicated in pregnancy and after GU tract manipulation only
    - Multiple treatments often given in elderly
      - RCTs have shown no benefit
      - Does not decrease occurrence of symptomatic infection, chronic symptoms or alter mortality
      - Can lead to unnecessary adverse drug effects and colonization with MDROs


Asymptomatic Bacteriuria in Elderly

• 5-50% of elderly patients in LTCFs have bacteriuria
• Over 90% of elderly with bacteriuria have pyuria
  - No evidence of poor clinical outcomes with high levels of pyuria
    - Some individuals high levels of pyuria >1000 WBCs/mm³ of urine
      - May persist for months or years

Management of Asymptomatic Bacteriuria

• No need to treat asymptomatic bacteriuria with or without pyuria
  - For elderly or institutionalized
    - Remove indwelling catheter – replace with straight or condom catheter
    - No treatment unless clinical scenario warrants
    - Prevention measures important
Syndromic Approach

- An example of criteria for selecting cases for ASP review
  - Target every case of patient being treated for "asymptomatic bacteriuria"
  - Couple with education for clinical staff
  - "Low hanging fruit"

Proposed National Quality Measure: Time Out

- All antimicrobial orders need:
  - Dose
  - Duration (stop date)
  - Indication
  - Get cultures
  - Once the culture data comes back, take an antimicrobial time-out: Reassess therapy

EXAMPLES
Education Can Work to Reduce Treatment of Asymptomatic Bacteriuria

<table>
<thead>
<tr>
<th></th>
<th>3-Months Pre-intervention</th>
<th>7 to 30 Months Post-intervention</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total urine cultures sent/1000 patient days</td>
<td>3.7 (2.8 – 4.9)</td>
<td>1.3 (1.1 – 1.5)</td>
</tr>
<tr>
<td>Inappropriate cultures, n (%)</td>
<td>34 (69%)</td>
<td>75 (46%)</td>
</tr>
<tr>
<td>ASB treated, n. (%)</td>
<td>23 (68%)</td>
<td>33 (44%)</td>
</tr>
<tr>
<td>ASB treated/1000 patient days</td>
<td>1.7 (1.1 – 2.6)</td>
<td>0.3 (0.2 – 0.4)</td>
</tr>
<tr>
<td>Antimicrobial days of therapy/1000 patient days</td>
<td>187.7</td>
<td>109</td>
</tr>
</tbody>
</table>

CDPH Investigation in LTCF: 2010

- Point prevalence study in LTCF with high rate of MDR Acinetobacter baumannii
  - Baseline colonization rate 19%
    - 36% colonized residents MDR (resistant to cephalosporins, FQ, aminoglycosides)
  - Implemented strict infection control practices
    - HH, cohorting, contact precautions
  - Enhanced environmental cleaning
  - Follow-up six month colonization rate remained 19%
    - 36% colonized residents negative 6 months previous
    - 71% colonized residents MDR

Mortensen, E et al., unpublished data; Trivedi, K et al., unpublished data

CDPH: ASP in LTCF Study 2011-2012

- Goal: characterize the benefit of implementing a formal ASP in LTCF
- Establish ASP in three LTCFs
  - Post-prescriptive review and feedback with pharmacist and ID physician
  - Establish feasibility and effectiveness
  - Specify effects of ASP on antimicrobial utilization, susceptibility patterns and rates of Clostridium difficile over time

Doernberg, S et al. ID Week. 2012; poster presentation
**CDPH: ASP in LTCF Study**

**Results**

- Urinary catheters were uncommon
- Patients rarely had signs/symptoms consistent with UTI
- Rare empiric therapy
- Pressure from RNs and families to send UA/Ucx for “soft” indications
- Pressure to treat positive cultures regardless of symptoms
- Antibiotic use was most often inappropriate
  - Indicated in only 18% of cases

Doernberg, S et al. ID Week. 2012; poster presentation

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**NY Antimicrobial Stewardship Project 2009**

- Greater NY Hospital Association, United Hospital Fund, NY State Department of Health
- Objectives:
  - Establish ASPs in 3 LTCFs using existing personnel through collaboration with acute care hospital partners
    - Emphasis on implementing strategies without expending significant new resources
  - Develop and pilot tools and materials for ASP development and implementation

Calfee DP, et al. SHEA Annual Meeting. 2011; poster presentation

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**NY Antimicrobial Stewardship Project 2009**

- Project sponsors provided LTCFs with access to ID and Pharmacy consultants, technical support and tool kit materials
  - Monthly conference calls and site visits x 8 months
- Each LTCF created
  - ASP team
  - Assessed baseline practices
  - Identified 1-2 areas of intervention
  - Implemented strategies to reach goals

Calfee DP, et al. SHEA Annual Meeting. 2011; poster presentation
NY Antimicrobial Stewardship Project 2009

• All LTCFs identified inappropriate treatment of asymptomatic bacteriuria
• 2/3 LTCFs reported qualitative improvement
• Successful ASP implementation associated with:
  ▪ Motivated team, support from administration and medical leadership, collaboration with hospital partner, ability to provide antimicrobial use and resistance data

### ASPs in Long-Term Care

- **Essential:**
  - High rates of resistance, variable infection control, overuse of antimicrobials
  - CMS established regulatory guidance to prioritize optimizing antimicrobials
  - Implementation of ASPs difficult
    - Elderly population complex
    - Patient evaluation, diagnosis difficult
    - Guidelines sparse

### ASPs in LTCF

- Criteria such as syndromic approach may be “low hanging fruit”
  - E.g., Pneumonia or UTI
  - Education strategies must include nurses, patients, and their families
  - ASP interventions must be tailored to the environment

### Recommendations: Partnership

- Acute care and long-term care should work together
  - Improve interfacility communication
    - Interfacility transfer form
  - Share resources
    - ID, infection control and PharmD expertise
  - Goal is a standardized regional approach to ASP implementation and infection control