Antibiotic Use and Resistance in Nursing Homes

GHINWA DUMYATI, MD
PROFESSOR OF MEDICINE
CENTER FOR COMMUNITY HEALTH
UNIVERSITY OF ROCHESTER MEDICAL CENTER
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Antibiotics are Intensively Used in Nursing Homes

- Most common prescribed medication:
  - 40% of all systemic drugs

- On a given day:
  - Approximately 8% (up to 15%) of residents are on antibiotics

- During a year:
  - 50-79% of residents will likely receive a course of systemic antibiotic

Van Buul L et.al, JAMDA 2012 (13) 568.e1-e568.e13
Pilot Surveillance for Antimicrobial Use in 9 Nursing Homes-2014

- 9 nursing homes >120 beds
- Prevalence of antimicrobial use: 11% (95% CI: CI 9.4-12.9%)
  - In Long Term Care: 10%
  - In Short Term Care: 22%
  - With Medical Device*: 23%
- 23% of antibiotic use is for prophylaxis

*Indwelling urinary catheter, vascular device, ventilator or tracheostomy, percutaneous endoscopic gastrostomy or jejunostomy tube

Thompson et al. JAMDA 2016 7(12):1151-1153
What Are Antibiotics Used For?

The 3 most common reasons for antibiotic use:

- Urinary tract infection (32%)
- Skin and soft tissue infection (29%)
- Pneumonia (26%)
Inappropriate Use of Antibiotics in LTCF

- 25-75% of systemic antimicrobials are used inappropriately

10 most Common Situations Where Antibiotics are Used and Rarely Necessary

**UTI**
1. Positive urine culture in asymptomatic patient
2. U/A and culture for cloudy or malodorous urine
3. Non specific symptoms or signs not referable to the urinary tract

**Respiratory Conditions**
4. Upper respiratory infections
5. Bronchitis without COPD
6. Suspected or proven influenza with no secondary infection
7. Respiratory symptoms in a terminal patient with dementia

**Skin Wounds**
8. Skin wound without cellulitis, sepsis or osteomyelitis
9. Small localized abscess without significant cellulitis
10. Decubitus ulcer in a terminal patient

http://www.annalsoflongtermcare.com/article/ten-clinical-situations-long-term-care-which-antibiotics-are-often-prescribed
Antibiotics are misused in a variety of ways:

- Given when they are not needed
- Continued when they are no longer necessary
- Given at the wrong dose
- The wrong antibiotic is given to treat an infection
- Broad spectrum agents are used to treat very susceptible bacteria

Courtesy Nimalie Stone, MD
Antibiotic Use is Challenging in the Nursing Home

- Clinical features of infections are poor
- Difficulty in obtaining a history due to cognitive, hearing and speech impairments
- Medical staff not available to perform an evaluation of the resident
- Low nurse to patient ratio and poor communication
- Diagnostic tests less readily available
- Colonization is common

Lead to diagnostic errors and overtreatment
Antibiotic Decision to Treat Is Complicated

Patient and Family Factors

Clinical Situation

Prescribing Decision

Facility and Staff Factors

Provider and Practice Factors

Why do we need to improve the use of antibiotics in the nursing homes?
We are Running Out of Antibiotics

Bad Bugs, No Drugs
As Antibiotic Discovery Stagnates ...
A Public Health Crisis Brews
Antibiotics Approved 1983-2004

Source: Spellberg et al., Clinical Infectious Diseases, May 1, 2004 (modified)
Combating Antibiotic Resistant Bacteria is A National Priority

NATIONAL ACTION PLAN FOR COMBATING ANTIBIOTIC-RESISTANT BACTERIA

MARCH 2015
Harms from antibiotic use and misuse affect individuals and communities

- **Side effects, drug interactions and adverse events**
  - 142,000 estimated visits to emergency departments for adverse events attributed to antibiotics

- **Major risk factor for *C. difficile* infection (CDI)**
  - >100,000 CDI have onset in NHs each year; 75% of residents with NH-onset CDI have received antibiotics

- **Primary driver of antibiotic resistance**
  - 74% of NH residents acquiring an antibiotic resistant organism received antibiotics

Shehab et al. Clinical Infectious Diseases 2008; 15:735-43

*Courtesy Nimalie Stone, MD*
Colonization with multidrug resistant organisms (MDRO) is much higher than patients in the hospital.

One study found that 43% of residents are colonized with one of these MDRO:

- Methicillin resistant *Staphylococcus aureus* (MRSA)
- Vancomycin resistant enterococcus (VRE)
- Multidrug resistant gram negative bacilli (MDRGN)

Colonization with MDRGN is on the rise.
## Prevalence of MDRO Colonization

<table>
<thead>
<tr>
<th>Organism</th>
<th>Prevalence</th>
</tr>
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<tbody>
<tr>
<td>MRSA</td>
<td>30%</td>
</tr>
<tr>
<td>VRE</td>
<td>5-20%</td>
</tr>
<tr>
<td>MDRGN</td>
<td>20%</td>
</tr>
<tr>
<td>ESBL</td>
<td>10-30%</td>
</tr>
<tr>
<td>CRE</td>
<td>1-2%</td>
</tr>
</tbody>
</table>

Murphy CR, et al. BMC Infectious Diseases 2012, 12:269
Van Buul L et.al, JAMDA 2012: 568.e1e568.e13
McKinnell JA, et al. ICHE 2016:1-4
Colonization vs. Infection

Colonization:
- Having a positive culture for MDRO but no signs or symptoms of infections

Infection:
- A person having a positive culture of MDRO and exhibit signs and symptoms of infections
Nursing Homes Serve as a Reservoirs for MDRO and Patient Movement Facilitates the Spread of these Organisms
The Nursing Homes are an Important Part of Hospital “Social Network” Facilitating the Spread of MDRO
Regional Spread Of Carbapenemase Producing *Klebsiella Pneumoniae*

Exposure network graphs delineating the relationships of cases to long-term acute care hospitals (LTACHs), acute care hospitals, and nursing homes during 3 epidemiologic periods.

Antibiotic Use is the most Common Risk for MDRO

- Indwelling Medical Device (urinary catheter, feeding tube)
- Assistance with ADL
- Decubitus ulcer or wounds
- Recent hospitalization
- Multiple comorbidities
- Antibiotics
- Lack of Infection Control policies
- Staffing issues

Van Buul L et.al, JAMDA 2012 (13) 568.e1e568.e13
Conclusion

- Overuse of antibiotics in nursing home is common
- The decision to use antibiotics in the nursing home is challenging
- Nursing homes are reservoirs for MDRO
- Improving the use of antibiotics to combat antimicrobial resistance is a national priority
What is Next?

- Overview of the methods to improve antibiotic use in the nursing homes:
  - Dr. Lutterloh
- Tracking of infection and antibiotic use to guide quality improvement
  - Drs. Nelson and Holahan
- Real world experience in improving the testing and treatment for UTI
  - Dr. Dumyati
Questions?