Surveillance, Antibiotic Stewardship, and Risk Assessment... ...Oh My!

FADONA’s 28th Annual Convention
April 2, 2015
presented by
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Objectives

- To identify 15 key components of an infection prevention and control program in long-term care.
- To discuss the purpose of an infection control risk assessment.
- To review 3 key components of surveillance.
- To identify an antimicrobial stewardship opportunity in long-term care.
- To have all session attendees participate in a small group activity to practice using an infection control risk assessment tool.
Key Components

Infection Prevention and Control Program
Infection Prevention and Control Program

- Infection control coordinator
- Infection control multi-disciplinary team (i.e. Quality Assurance Performance Improvement [QAPI] committee)
- Infection control risk assessment
- Surveillance
- Outbreak control
- Standard and transmission-based precautions
Infection Prevention and Control Program

- Policies and procedures (i.e. hand hygiene, laundry, linens, waste management, cleaning and disinfection, aseptic technique, blood glucose monitoring, management of shared devices, etc.)
- Staff education
- Resident health (i.e. vaccinations)
I nfection Prevention and Control Programs

- Employee health (i.e. vaccinations, TB skin tests)
- Antibiotic stewardship
- Facility management (i.e. availability of supplies, security, etc.)
- Performance improvement
- Preparedness
- Regulatory compliance
Infection Control – Risk Assessment
Purpose

- Foundation of infection prevention and control plan
- Focus areas for surveillance activities
- Prioritize resources
Process

- Multi-disciplinary team

- Assign values to each risk
  - Probability of event occurring: known risks
  - Impact/severity of event: threat to life, loss of function, disruption of service, legal issues
  - Status of current systems: current policies and procedures, training status, process measures, resources

- Team discussion  ➔ consensus
Sample Infection Control Risk Assessment for Long-Term Care

<table>
<thead>
<tr>
<th>Event</th>
<th>Probability of Occurrence*</th>
<th>Impact or Severity of Event**</th>
<th>Status of Current Systems***</th>
<th>Total Risk Score</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>High (3)</td>
<td>High (3)</td>
<td>None (0)</td>
<td>None (4)</td>
</tr>
<tr>
<td>Staff non-compliance with hand hygiene</td>
<td>Med (2)</td>
<td>Med (2)</td>
<td>Low (1)</td>
<td>Poor (3)</td>
</tr>
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<td>Low (1)</td>
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<td>Fair (2)</td>
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<tr>
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<td>None (0)</td>
<td>None (0)</td>
<td>Total/Average</td>
<td>Good (1)</td>
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<td>Smooth (1)</td>
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<td>Smooth (1)</td>
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<tr>
<td>Non-compliance with isolation precautions</td>
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<td>Total/Average</td>
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Team assigns a score for each element of event.

Or, each team member assigns a score for each element.

- All team member scores are averaged together for each element.

Multiply the score for each risk element for total score.

A higher risk score indicates greater risk of event.
Risk Score Example

- Probability of hand hygiene non-compliance
  - High probability of occurrence = 3 and low = 1
  - 5 team members points total = 15
  - \( 15 \div 5 = 3 \)

- Repeat for impact of event and current systems
  - Impact of event = 2 (potential for permanent harm)
  - Current systems = 1 (well prepared to address event)

- Total risk score for hand hygiene non-compliance = \( 3 \times 2 \times 1 = 6 \)
Next Steps

- Create infection prevention and control plan
- Goals
- Measureable objectives
- Strategies for implementation
According to APIC, surveillance is defined as “the ongoing, systematic collection, analysis, interpretation, and dissemination of data regarding a health-related event for use in action to reduce morbidity and mortality and to improve health.”
Surveillance

- Collection of data
- Analysis of data collected
- Observation of staff
- Audits of practices
- Documentation
- Interpretation
- Dissemination of data
- Determine actions needed to be taken
- Follow-up again & again
Why Do Surveillance?

- Monitor for trends
- Identify an outbreak
- Take immediate action
- To develop a measure for learning about course of disease & risk groups
- Guide the planning of interventions
- Evaluate the effectiveness of interventions
- Protect residents and staff
Why Do Surveillance?

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- Protect residents and staff
Data Sources

- Clinical rounds
- Unit reports
- Lab/Radiographic Data*
  - CXR
  - Labs: WBC, U/A
    - *Correlated with clinical condition of resident
- INTERACT or other assessment tools
- Medical records
- Other: Antibiotic use and family members

*Correlated with clinical condition of resident
NOW WHAT?

Let’s look at an example of Urinary Tract Infection data…
According to the CDC:

- The point prevalence of asymptomatic bacteriuria in LTC residents can range from 25%–50%.
- True symptomatic UTIs account for 20%–30% of all infections reported by LTCFs.
Risk Factors for UTI and Asymptomatic Bacteriuria

- Age–Related changes to the genitourinary tract
- Incomplete bladder emptying
- Poor hygiene
- Incontinence
- Comorbid Conditions resulting in a neurogenic bladder
- Instrumentation required to manage bladder voiding
- Decline in immune response effectiveness
Criteria considered to be the standard of practice in long-term care.

Definitions: encompass clinical symptoms!

Consistent criteria to be used for valid comparison

Surveillance tool not a diagnostic tool!
Constitutional Criteria

Fever
• Single Oral Temp of >100F, or
• Repeated oral temps of 99F or Repeated rectal temps of 99.5F, or
• Single temperature of >2 degrees F over baseline from any site

Leukocytosis
• Neutrophilia >14,000 wbc, or
• Left Shift (>6% bands or >1500 bands/mm3)

Acute Change in Mental Status from baseline (all 4 criteria must be present)
• Acute Onset
• Fluctuating Course
• Inattention (unable to focus)
• Either disorganized thinking or altered level of consciousness

http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3538836/
Acute Functional Decline

A new 3–point increase in total ADL score from baseline based on the 7 ADL items listed below each scored from 0 (independent) to 4 (total dependent):

- Bed mobility
- Transfer
- Locomotion within facility
- Dressing
- Toilet use
- Personal Hygiene
- Eating

http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3538836/
Resident **without** an indwelling catheter (*Both criteria 1 and 2 must be present*)

1. At least 1 of the following sign or symptom subcriteria (1a or 1b or 1c):

   a. Acute dysuria or acute pain, swelling, or tenderness of the testes, epididymis, or prostate

   b. Fever or leukocytosis and at least 1 of the localizing urinary tract subcriteria:
      i. Acute costovertebral angle pain or tenderness
      ii. Suprapubic pain
      iii. Gross hematuria
      iv. New or marked increase in incontinence
      v. New or marked increase in urgency
      vi. New or marked increase in frequency

   c. In the absence of fever or leukocytosis, then 2 or more of the following:
      i. Suprapubic pain
      ii. Gross hematuria
      iii. New or marked increase in incontinence
      iv. New or marked increase in urgency
      v. New or marked increase in frequency

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http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3538836/
Residents **without** an indwelling catheter (*Both criteria 1 and 2 must be present*)

2. One of the following microbiologic subcriteria (2a or 2b)

   a. At least $10^5$ cfu/mL of no more than 2 species of microorganisms in a voided urine sample

   b. At least $10^2$ cfu/mL of any number of organisms in a specimen collected by in–and–out catheter

http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3538836/
Residents with an indwelling catheter (*Both criteria 1 and 2 must be present*)

1. At least 1 of the following sign or symptom subcriteria:
   a. Fever, rigors, or new-onset hypotension, with no alternate site of infection
   b. Either acute change in mental status or acute functional decline, with no alternate diagnosis *and* leukocytosis
   c. New-onset suprapubic pain or costovertebral angle pain or tenderness.
   d. Purulent discharge from around the catheter or acute pain, swelling, or tenderness of the testes, epididymis, or prostate

2. Urinary catheter specimen culture with at least $10^5$ cfu/mL of any organism(s)

Note: Urinary catheter specimens for culture should be collected following replacement of the catheter (if current catheter has been in place for >14 days).
Healthcare–Associated Infection (HAI)  
Community–Associated Infection (CAI)

- **HAI:**
  - When clinical signs of an infection are found to be present AFTER the resident has been in your facility for 2 calendar days

- **CAI:**
  - When clinical signs or symptoms are present on admission or manifest WITHIN 2 calendar days from date of admission.

http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3538836/
CDC NHSN Infection Reporting

National Healthcare Safety Network

http://www.cdc.gov/nhsn/faqs/FAQ_general.html
# Urinary Tract Infection (UTI) for LTCF

**Facility ID:**

**Event #:**

**Social Security #:**

Medicare number (or comparable railroad insurance number):

**Resident Name, Last:**

**First:**

**Middle:**

**Gender:** M  F  Other

**Date of Birth: / /**

**Ethnicity (specify):**

**Race (specify):**

**Resident type:** □ Short-stay  □ Long-stay

**Date of First Admission to Facility:** / /

**Date of Current Admission to Facility:** / /

**Event Type:** UTI

**Date of Event:** / /

**Resident Care Location:**

**Primary Resident Service Type:** (check one)

- □ Long-term general nursing
- □ Long-term dementia
- □ Long-term psychiatric
- □ Skilled nursing/Short-term rehab (subacute)
- □ Ventilator
- □ Bariatric
- □ Hospice/Palliative

**Has resident been transferred from an acute care facility to your facility in the past 3 months?** □ Yes  □ No

If Yes, **date of last transfer from acute care to your facility:** / /

If Yes, did the resident have an indwelling urinary catheter at the time of transfer to your facility? □ Yes  □ No
# Urinary Tract Infection (UTI) for LTCF

*Indwelling Urinary Catheter status at time of event onset (check one):

- [ ] In place
- [ ] Removed within last 2 calendar days
- [ ] Not in place

If indwelling urinary catheter status in place or removed within last 2 calendar days:
- [ ] Site where indwelling urinary catheter Inserted (check one):
  - [ ] Your facility
  - [ ] Acute care hospital
  - [ ] Other
  - [ ] Unknown

Date of indwelling urinary catheter Insertion: __/__/____

If indwelling urinary catheter not in place, was another urinary device type present at the time of event onset?  
- [ ] Yes
- [ ] No

If Yes, other device type:
- [ ] Suprapubic
- [ ] Condom (males only)
- [ ] Intermittent straight catheter

## Event Details

*Specify Criteria Used: (check all that apply)

### Signs & Symptoms

- [ ] Fever: Single temperature ≥ 37.8°C (>100°F), or > 37.2°C (>99°F) on repeated occasions, or an increase of >1.1°C (>2°F) over baseline
- [ ] Rigors
- [ ] New onset hypotension
- [ ] New onset confusion/functional decline
- [ ] Acute pain, swelling, or tenderness of the testes, epididymis, or prostate
- [ ] Acute dysuria
- [ ] Purulent drainage at catheter insertion site

### Laboratory & Diagnostic Testing

- [ ] Specimen collected from clean catch voided urine and positive culture with ≥ 10^2 CFU/ml of any microorganisms
- [ ] Specimen collected from in/out straight catheter and positive culture with ≥ 10^2 CFU/ml of any microorganisms
- [ ] Specimen collected from indwelling catheter and positive culture with ≥ 10^2 CFU/ml of any microorganisms
- [ ] Leukocytosis (> 14,000 cells/mm³), or Left shift (> 6% or 1,500 bands/mm³)
- [ ] Positive blood culture with 1 matching organism in urine culture

## Specific Event (Check one):

- [ ] Symptomatic UTI (SUTI)
- [ ] Symptomatic CA-UTI (CA-SUTI)
- [ ] Asymptomatic Bacteremic UTI (ABUTI)

Secondary Bloodstream Infection:  
- [ ] Yes
- [ ] No

Died within 7 days of date of event:  
- [ ] Yes
- [ ] No

*Transfer to acute care facility within 7 days:  
- [ ] Yes
- [ ] No

*Pathogens identified:  
- [ ] Yes
- [ ] No

*If Yes, specify on page 2
To Treat or Not To Treat?

UTIs result in a large amount of antibiotic use in Long Term Care Facilities.
Treating UTI while adopting Antimicrobial Stewardship

Perceived Barriers to Appropriate Antibiotic Use
- Pressure from nurse to order culture
- Pressure from family to order culture
- Resident cognitive impairment
- Lack of communication
Antibiotic Use in Long-Term Care

According to the CDC:

- Antibiotics are among the most commonly prescribed medications in nursing homes.
- Up to 70% of long-term care facilities’ residents receive an antibiotic every year.
- Estimates of the cost of antibiotics in the long-term care setting range from $38 million to $137 million per year.
Antibiotic Use in Long–Term Care

According to the CDC:

- Antibiotic overuse has caused increased development of drug-resistant organisms.
  
  [CDC Antibiotic Use](http://www.cdc.gov/getsmart/healthcare/factsheets/antibiotic-use.html)

- Antibiotic resistance in long–term care is associated with:
  - Increased risk of hospitalization
  - Increased cost of treatments
  - Increased risk of death

  [CDC Long-Term Care Antibiotic Resistance](http://www.cdc.gov/getsmart/healthcare/pdfs/GetSmartWeek_NursingHomes.pdf)
According to the CDC:

An effective Antibiotic Stewardship Program (ASP) helps ensure "patients receive the right antibiotic at the right time for the right duration" for the most optimal outcome in patient care.
Antibiotic Stewardship

PCAST: Report to the President – Sept 2014
Combating Antibiotic Resistance

CMS should use reimbursement incentives to drive AS in LTCFs and by the end of 2017 have CoP in place requiring a “robust antibiotic stewardship program” is in place.

Executive Order: Sept 18, 2014
Combat Antibiotic Resistant Bacteria

One strategy objective is to “strengthen antibiotic stewardship by expanding existing programs, developing new ones, and monitoring progress and efficacy”.
President’s 2016 Budget Proposal
January 27, 2015

More than $280 million at the CDC to support antibiotic stewardship, outbreak surveillance, antibiotic use and resistance monitoring, and research and development related to combating antibiotic resistance.

“In particular, improvements in antibiotic stewardship practices are important in the acute-care hospital setting and in ambulatory and long-term care settings, where stewardship efforts are not as well developed.”
CDC’s “Urgent” Threat Level Pathogens

- *Clostridium difficile* (C. diff)
- Carbapenem–Resistant Enterobacteriaceae (CRE)
- Multi–drug resistant *Neisseria gonorrhoeae*
**Clostridium difficile (C. difficile)** causes life-threatening diarrhea. These infections mostly occur in people who have had both recent medical care and antibiotics. Often, *C. difficile* infections occur in hospitalized or recently hospitalized patients.

**Resistance of Concern**
- Although resistance to the antibiotics used to treat *C. difficile* infections is not yet a problem, the bacteria spreads rapidly because it is naturally resistant to many drugs used to treat other infections.
- In 2000, a stronger strain of the bacteria emerged. This strain is resistant to fluoroquinolone antibiotics, which are commonly used to treat other infections.
- This strain has spread throughout North America and Europe, infecting and killing more people wherever it spreads.

**Public Health Threat**
- 250,000 infections per year requiring hospitalization or affecting already hospitalized patients.
- 14,000 deaths per year.
- At least $1 billion in excess medical costs per year.
- Deaths related to *C. difficile* increased 400% between 2000 and 2007, in part because of a stronger bacteria strain that emerged.
- Almost half of infections occur in people younger than 65, but more than 90% of deaths occur in people 65 and older.
- About half of *C. difficile* infections first show symptoms in hospitalized or recently hospitalized patients, and half first show symptoms in nursing home patients or in people recently cared for in doctors' offices and clinics.
Untreatable and hard-to-treat infections from carbapenem-resistant Enterobacteriaceae (CRE) bacteria are on the rise among patients in medical facilities. CRE have become resistant to all or nearly all the antibiotics we have today. Almost half of hospital patients who get bloodstream infections from CRE bacteria die from the infection.

**Resistance of Concern**

- Some Enterobacteriaceae are resistant to nearly all antibiotics, including carbapenems, which are often considered the antibiotics of last resort.
- More than 9,000 healthcare-associated infections are caused by CRE each year.
- CDC laboratories have confirmed at least one type of CRE in healthcare facilities in 44 states.
- About 4% of U.S. short-stay hospitals had at least one patient with a serious CRE infection during the first half of 2012. About 18% of long-term acute care hospitals had one.

**Public Health Threat**

An estimated 140,000 healthcare-associated Enterobacteriaceae infections occur in the United States each year; about 9,300 of these are caused by CRE. Up to half of all bloodstream infections caused by CRE result in death. Fortunately, bloodstream infections account for a minority of all healthcare-associated infections caused by Enterobacteriaceae. Each year, approximately 600 deaths result from infections caused by the two most common types of CRE, carbapenem-resistant Klebsiella spp. and carbapenem-resistant E. coli.

<table>
<thead>
<tr>
<th>Percentage of Enterobacteriaceae healthcare-associated infections resistant to carbapenems</th>
<th>Estimated number of infections</th>
<th>Estimated number of deaths attributed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbapenem-Resistant Klebsiella spp.</td>
<td>11%</td>
<td>7,900</td>
</tr>
<tr>
<td>Carbapenem-Resistant E. coli</td>
<td>2%</td>
<td>1,400</td>
</tr>
</tbody>
</table>

For more information about data methods and references, please see technical appendix.
**Neisseria gonorrhoeae** causes gonorrhea, a sexually transmitted disease that can result in discharge and inflammation at the urethra, cervix, pharynx, or rectum.

**Resistance of Concern**

*N. gonorrhoeae* is showing resistance to antibiotics usually used to treat it. These drugs include:

- cefixime (an oral cephalosporin)
- ceftriaxone (an injectable cephalosporin)
- azithromycin
- tetracycline

**Public Health Threat**

Gonorrhea is the second most commonly reported notifiable infection in the United States and is easily transmitted. It causes severe reproductive complications and disproportionately affects sexual, racial, and ethnic minorities. Gonorrhea control relies on prompt identification and treatment of infected persons and their sex partners. Because some drugs are less effective in treating gonorrhea, CDC recently updated its treatment guidelines to slow the emergence of drug resistance. CDC now recommends only ceftriaxone plus either azithromycin or doxycycline as first-line treatment for gonorrhea. The emergence of cephalosporin resistance, especially ceftriaxone resistance, would greatly limit treatment options and could cripple gonorrhea control efforts.

In 2011, 321,849 cases of gonorrhea were reported to CDC, but CDC estimates that more than 800,000 cases occur annually in the United States.

<table>
<thead>
<tr>
<th></th>
<th>Percentage</th>
<th>Estimated number of cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gonorrhea</td>
<td>30%</td>
<td>820,000</td>
</tr>
<tr>
<td>Resistance to any antibiotic</td>
<td>30%</td>
<td>246,000</td>
</tr>
<tr>
<td>Reduced susceptibility to cefixime</td>
<td>&lt;1%</td>
<td>11,480</td>
</tr>
<tr>
<td>Reduced susceptibility to ceftriaxone</td>
<td>&lt;1%</td>
<td>3,280</td>
</tr>
<tr>
<td>Reduced susceptibility to azithromycin</td>
<td>&lt;1%</td>
<td>2,460</td>
</tr>
<tr>
<td>Resistance to tetracycline</td>
<td>23%</td>
<td>188,600</td>
</tr>
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</table>

Source: The Gonococcal Isolate Surveillance Project (GISP) 5,500 isolates tested for susceptibility in 2011.

For more information about data methods and references, please see technical appendix.
CDC’s “Serious” Threat Level Pathogens

- Multidrug-Resistant Acinetobacter
- Drug-Resistant Campylobacter
- Fluconazole-Resistant Candida
- Extended Spectrum β-Lactamase (ESBL)-Producing Enterbacteriaceae
- Vancomycin-Resistant Enterococcus
- Multidrug-Resistant Pseudomonas aeruginosa
- Drug-Resistant Non-Typhoidal Salmonella (Notifiable to CDC)
- Drug-Resistant Salmonella enterica serovar Typhi (Notifiable to CDC)
- Drug-Resistant Shigella (Notifiable to CDC)
- Methicillin-Resistant Staphylococcus aureus (MRSA)
- Drug-Resistant Streptococcus pneumoniae (Notifiable to CDC)
- Drug-Resistant Tuberculosis (Notifiable to CDC)
CDC’s “Of Concern” Threat Level Pathogens

- Vancomycin–Resistant Staphylococcus aureus (Notifiable to CDC)
- Erythromycin–Resistant Group A Streptococcus
- Clindamycin–Resistant Group B Streptococcus
Antibiograms
An antibiogram is an “overall profile of antimicrobial susceptibility results” of bacteria to a battery of antimicrobial agents.
An Antibiogram is an essential tool for any clinician when treating an infection empirically
- Empiric treatment occurs prior to determination of a causative bacterial agent or its susceptibility results are known.

An Antibiogram can serve as an alternative to a C&S report until the results of a C&S are available

An Antibiogram can serve as an alternative to a C&S report if no organism is grown out of a C&S despite high clinical suspicion of an infection
The greater the number of isolates, the more accurate the sensitivity results for the given organism.

Minimum should be 10.
An antibiotic with a greater % susceptibility will be more likely to eradicate the organism than an antibiotic with a lower % susceptibility.
Conclusion

- Infection Control and Prevention is a multifaceted discipline in which diligent and consistent surveillance, risk assessment, and antibiotic stewardship should be employed together for the most effective outcomes.

- Recent Federal support and funding of a National Strategy to combat antibiotic-resistant bacteria include mention of long-term care facilities, which could lead to future regulations with financial penalties surrounding antibiotic stewardship programs.

- Use of an antibiogram is a core element of an antibiotic stewardship program.
QUESTIONS?
Small Group Activity

- Practice using infection control risk assessment tool.
- Work in groups of 5–8 people.
- Identify 3 additional events to include on example risk assessment tool.
- Discuss each event and score.
- Report to large group on events added and top ranking events.
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