Containment and Prevention of MDROs in Post-acute and Long-term Care

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Speaker Disclosures

- Kara M. Jacobs Slifka, MD, MPH
  - No conflicts to disclose
  - The content of this presentation reflects my opinion and does not necessarily reflect the official position of the CDC

- Noreen Mollon, MS, CIC
  - No conflicts to disclose
Division of Healthcare Quality Promotion (DHQP)

- Investigate and respond to emerging infections and adverse events in healthcare facilities
- Support the enhancement of state infrastructure for elimination of HAIs
- Develop and disseminate evidence-based guidelines and recommendations to prevent and control HAIs, antibiotic resistance, and medication errors
- Provide healthcare facilities, states, and federal agencies with data for action through the National Healthcare Safety Network (NHSN), a tool for monitoring and preventing healthcare-associated infections, used by healthcare facilities in all 50 states

Prevention & Response Branch: Long-Term Care Team

- Improve infection surveillance, prevention, and antibiotic stewardship in nursing homes
- Define and measure antibiotic use and antibiotic resistance in nursing homes
- Prevent the spread of novel and emerging resistance
- Promote NHSN reporting as a part of SNF quality measurement programs
- Provide resources and assistance to state and local health departments, post-acute and long-term care facilities
MDROs in Post-acute and Long-term Care (PA/LTC)

- Contain and Prevent the spread of MDROs
- Develop updated guidance specific to PA/LTC working with regulatory partners
- Provide resources and assistance to state and local health departments, post-acute and long-term care facilities
- Develop a better understanding of the unique challenges faced by nursing homes, especially those providing high-acuity care
- Promote the development of standardized tools and educational materials

Noreen Mollon, MS, CIC
Surveillance for Healthcare-Associated and Resistant Pathogens (SHARP) unit
Communicable Disease Division
Bureau of Epidemiology and Population Health
Michigan Department of Health and Human Services

Surveillance for Healthcare-Associated and Resistant Pathogens (SHARP) Unit

- Objectives of the SHARP Unit:
  - Coordinate activities related to Healthcare-Associated Infection (HAI) surveillance and prevention in Michigan
  - Improve surveillance and detection of antimicrobial-resistant pathogens and HAIs
  - Identify and respond to disease outbreaks
  - Use collected data to monitor trends
  - Educate healthcare providers, state and local public health partners, and the public
  - Connect partners engaged in antimicrobial stewardship activities
SHARP Activities
• Outbreak Response
• Infection Control Needs Assessments
• Consulting/Education
• Surveillance and Reporting
• CRE Surveillance and Prevention Initiative
• Staphylococcus aureus
• Clostridium difficile
• Klebsiella pneumoniae

Outbreak Response
• The MDHHS SHARP staff are available to offer our services and expertise in healthcare-associated outbreak investigations
• MDHHS can help facilities coordinate molecular testing with the MDHHS Bureau of Laboratories to identify genetic-relatedness between patient isolates (at no cost)

Session Objectives
• Discuss the public health importance of multidrug-resistant organisms (MDROs) and emerging pathogens in the post-acute and long-term care settings
• Discuss risk factors for colonization and infection with MDROs
• Describe surveillance and prevention of MDROs in Michigan
• Describe strategies for preventing the spread of MDROs focused on infection prevention practices
  — Define the CDC’s containment strategy
  — Discuss Infection Control Assessment and Response Tool and Michigan findings
Case Example

- 70 year old admitted from a long-term acute care hospital to nursing home
  - Complicated hospital history including surgery, prolonged ICU stay, multiple courses of antibiotics
  - Spent 5 weeks in the LTACH
- On transfer, has tracheostomy, PEG tube, indwelling urinary catheter and partially healing sacral pressure ulcer
- One week later, on reviewing the chart, you find results of a culture sent from tracheostomy secretions

Case Example, continued

- Tracheostomy aspirate culture grew *Klebsiella pneumoniae*, >10⁵ cfu

<table>
<thead>
<tr>
<th>Drug</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amikacin</td>
<td>Intermediate</td>
</tr>
<tr>
<td>Ampicillin</td>
<td>Resistant</td>
</tr>
<tr>
<td>Amp/Sulfactam</td>
<td>Resistant</td>
</tr>
<tr>
<td>Aztreonam</td>
<td>Resistant</td>
</tr>
<tr>
<td>Cefazolin</td>
<td>Resistant</td>
</tr>
<tr>
<td>Cefepime</td>
<td>Resistant</td>
</tr>
<tr>
<td>Ceftazidime</td>
<td>Resistant</td>
</tr>
<tr>
<td>Ceftroxone</td>
<td>Resistant</td>
</tr>
<tr>
<td>Ceftriazone</td>
<td>Resistant</td>
</tr>
<tr>
<td>Gentamicin</td>
<td>Resistant</td>
</tr>
<tr>
<td>Leuflaxin</td>
<td>Resistant</td>
</tr>
<tr>
<td>Meropenem</td>
<td>Resistant</td>
</tr>
<tr>
<td>Piperacillin/Tazobactam</td>
<td>Resistant</td>
</tr>
<tr>
<td>Tobramycin</td>
<td>Resistant</td>
</tr>
<tr>
<td>Trimethoprim/Sulfa</td>
<td>Resistant</td>
</tr>
</tbody>
</table>
Carbapenem Resistant Enterobacteriaceae (CRE)

“Nightmare bacteria”

CRE are a public health threat
1. CRE cause invasive infections with high mortality (up to 40-50%)
   – Urinary Tract Infections
   – Bloodstream infections
   – Wound infections
   – Pneumonia

2. Carry resistance genes on mobile genetic elements that confer high levels of resistance

3. Leave limited to no therapeutic options

4. Facilitate spread
Carbapenem-resistant Enterobacteriaceae (CRE)

- Multiple different mechanisms can cause resistance
  - Carbapenemase-producing (CP-CRE)
    - **KPC** – Klebsiella pneumoniae carbapenemase (most common in U.S.)
    - **NDM** – New Delhi Metallo-β-lactamase
    - **VIM** – Verona Integron-encoded Metallo-β-lactamase
    - **OXA** – Oxacillinase-48-type carbapenemase
    - **IMP** – Imipenemase Metallo-β-lactamase
  - Non-carbapenemase-producing (non-CP-CRE)

Carbapenemases in other Gram negative bacteria

<table>
<thead>
<tr>
<th>Year of Specimen Collection</th>
<th>Number of Isolates</th>
</tr>
</thead>
<tbody>
<tr>
<td>2011</td>
<td>0</td>
</tr>
<tr>
<td>2012</td>
<td>2</td>
</tr>
<tr>
<td>2013</td>
<td>4</td>
</tr>
<tr>
<td>2014</td>
<td>6</td>
</tr>
<tr>
<td>2015</td>
<td>8</td>
</tr>
<tr>
<td>2016</td>
<td>10</td>
</tr>
<tr>
<td>2017</td>
<td>12</td>
</tr>
</tbody>
</table>

- *Proteus mirabilis, Providencia rettgeri, Citrobacter freundii*
- *Acinetobacter baumannii*
- *Pseudomonas aeruginosa*
  - VIM: 86 patients, 12 states

CPOs are a public health threat

1. They cause invasive infections associated with high mortality rates
2. Carry resistance genes on mobile genetic elements that confer high levels of resistance
3. CRE have spread throughout the United States and other countries and have the potential to spread more widely

**Problem:** Antibiotic-resistant germs can spread like wildfire.
Healthcare networks driving outbreaks: Findings from public health investigations

- Post-acute care facilities with longer length of stay and high acuity of care (e.g., ventilator services, IV therapy, wound care) expand the burden of resistance within a region
- Gaps in IPC program infrastructure and practices can augment this problem


Carriage of CP-CRE (*Klebsiella pneumoniae*) among Hospitalized patients admitted from Post-acute/Long-term care, 2012

<table>
<thead>
<tr>
<th>Subtype</th>
<th>Prevalence (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SMF</td>
<td>1.5%</td>
</tr>
<tr>
<td>VGH</td>
<td>27.3%</td>
</tr>
<tr>
<td>LCH</td>
<td>33.3%</td>
</tr>
<tr>
<td>UCH</td>
<td>8.3%</td>
</tr>
</tbody>
</table>

Prevalence, N=604

Older adults are at high risk for infections with MDROs
Risk Factors for colonization with MDROs

- Indwelling medical device (urinary catheter, PEG tube, trach, central line)
- Lower functional status
- Presence of wounds or decubitus ulcers
- Antibiotic use in prior 3 months
- Fluoroquinolone use
- History of hospitalization
- Older age
- Comorbid medical conditions

Cassone, Mody, Curr Geriatr Rep, 2015

Nursing home setting provides opportunity for transmission

Carriage of ANY MDRO (Median %)

<table>
<thead>
<tr>
<th>Setting</th>
<th>MDRO carriage</th>
<th>CRE</th>
<th>UNKNOWN MDRO</th>
</tr>
</thead>
<tbody>
<tr>
<td>SNF</td>
<td>58%</td>
<td>0%</td>
<td>55%</td>
</tr>
<tr>
<td>vSNF</td>
<td>76%</td>
<td>10%</td>
<td>74%</td>
</tr>
<tr>
<td>LTACH</td>
<td>82%</td>
<td>8%</td>
<td>66%</td>
</tr>
</tbody>
</table>
Carbapenem-resistant *Enterobacteriaceae*
Surveillance and Prevention Initiative

- Began in 2012
- Voluntary reporting of CRE
  - Klebsiella pneumoniae and Escherichia coli resistant to any carbapenem (Sept 2012-Aug 2017)
  - Klebsiella spp., Enterobacter spp., Escherichia coli positive for carbapenemase production by a phenotypic or molecular test or those resistant to ANY carbapenem if no confirmatory testing done (Sept 2017 – current)
- Implementation of a CRE prevention plan
  - Facility-specific based on needs and resources
  - Examples: policy/procedure changes, education, communication, compliance monitoring (hand hygiene, contact precautions), CHG bathing

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CRE Surveillance and Prevention Initiative
Voluntary Participation

<table>
<thead>
<tr>
<th>Phase</th>
<th>Baseline Period</th>
<th>Intervention Period</th>
<th>Acute Care</th>
<th>LTAC</th>
<th>LTC/SNF</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phase 1</td>
<td>Sept 2012-Feb 2013</td>
<td>Mar 2013-Aug 2014</td>
<td>17</td>
<td>4</td>
<td>0</td>
<td>21</td>
</tr>
<tr>
<td>Phase 2</td>
<td>Mar 2014-Aug 2014</td>
<td>Sept 2014-Feb 2016</td>
<td>7</td>
<td>2</td>
<td>0</td>
<td>9</td>
</tr>
<tr>
<td>Phase 3</td>
<td>Sept 2015-Feb 2016</td>
<td>Mar 2016-Aug 2017</td>
<td>4</td>
<td>4</td>
<td>2</td>
<td>10</td>
</tr>
<tr>
<td>New facilities</td>
<td>Sept 2017-Feb 2018</td>
<td>Mar 2018-Aug 2019</td>
<td>14</td>
<td>7</td>
<td>0</td>
<td>21</td>
</tr>
</tbody>
</table>

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CRE Surveillance and Prevention Initiative Participation by County, Sept 2018

61 Facilities in 27 counties
Overall Inpatient CRE Incidence
Sept 2012 - Dec 2018

Inpatient CRE Prevalence Rate by Organism
Sept 2017 – Dec 2018

Carbapenemase-producing CRE Reporting
- Reportable disease in Michigan starting January 2018
- Surveillance definition endorsed by CSTE/CDC
- CP-CRE cases are reported using the Michigan Disease Surveillance System (MDSS)
  - Web-based communicable disease reporting system for the state of Michigan
  - Cases can be reported by:
    • Electronic laboratory report (ELR)
    • Manual case entry
CP-CRE Reporting Requirements

- Laboratories, infection prevention and Local Health Departments are required to report all cases of CP-CRE according to the following criterion for Klebsiella spp., E. coli, or Enterobacter spp.:
  - Healthcare record contains a diagnosis of Carbapenemase-producing Carbapenem-resistant Enterobacteriaceae (CP-CRE), KPC, NDM, OXA-48, IMP or VIM or other novel carbapenemase
  - Any isolate of Klebsiella spp., E. coli, or Enterobacter spp. demonstrating carbapenemase production by a phenotypic test (e.g., Carba NP, CIM, mCIM)
  - Any isolate of Klebsiella spp., E. coli, or Enterobacter spp. with a known carbapenemase resistance mechanism (e.g., KPC, NDM, OXA-48, IMP, VIM, or other carbapenemase gene) by a recognized molecular test (e.g., PCR, Expert Carba R)

- If laboratories are unable to detect CP-CRE, i.e., cannot test for carbapenemase production (phenotypic) or resistance mechanism (molecular test):
  - Report any isolate of Klebsiella spp., E. coli, or Enterobacter spp. with a minimum inhibitory concentration (MIC) of any of the following:
    - ≥4 mcg/ml for Meropenem
    - ≥4 mcg/ml Imipenem
    - ≥4 mcg/ml Doripenem
    - ≥2 mcg/ml for Ertapenem

Case Classification

CONFIRMED CP-CRE
- Klebsiella spp., E. coli, Enterobacter spp.
- Positive phenotypic test OR
- Positive carbapenem resistance mechanism

SUSPECT CP-CRE
- Klebsiella spp., E. coli, Enterobacter spp.
- Resistance to at least 1 carbapenem
- No phenotypic or molecular testing done

NOT a CASE
- BDL report is negative for phenotypic and molecular tests
- All carbapenems are susceptible (MICs don’t match case definition)
- Not Enterobacteriaceae

CP-CRE Cases Reported to MDSS Jan – Dec 2018

- 159, 42% Confirmed
- 217, 58% Suspect

CP-CRE Cases by Organism Jan – Dec 2018

<table>
<thead>
<tr>
<th>Organism</th>
<th>Confirmed</th>
<th>Suspect</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Klebsiella spp.</td>
<td>159 (69%)</td>
<td>89 (41%)</td>
<td>199 (53%)</td>
</tr>
<tr>
<td>Klebsiella pneumoniae</td>
<td>102</td>
<td>68</td>
<td>170</td>
</tr>
<tr>
<td>Klebsiella aerogenes</td>
<td>4</td>
<td>14</td>
<td>18</td>
</tr>
<tr>
<td>Klebsiella oxytoca</td>
<td>3</td>
<td>7</td>
<td>10</td>
</tr>
<tr>
<td>Klebsiella vericella</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Escherichia coli</td>
<td>23 (14%)</td>
<td>69 (32%)</td>
<td>92 (42%)</td>
</tr>
<tr>
<td>Enterobacter spp.</td>
<td>26 (16%)</td>
<td>36 (17%)</td>
<td>82 (23%)</td>
</tr>
<tr>
<td>Enterobacter cloacae</td>
<td>26</td>
<td>57</td>
<td>83</td>
</tr>
<tr>
<td>Enterobacter asburiae</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Enterobacter hormacelii</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

Confirmed CP-CRE Jan – Dec 2018

- 159 positive for carbapenemase production by a phenotypic test (e.g., mCIM, MHT)
- 146 results available for resistance mechanism
  - 132 KPC
  - 6 NDM-1
  - 6 OXA-48
  - 1 NDM-1 & OXA-48
  - 1 VIM
CP-CRE Cases by County*, 2018

Confirmed and Suspect CP-CRE

Confirmed CP-CRE only

- 1-25 cases
- 26-50 cases
- 51-79 cases
- 1-10 cases
- 11-20 cases
- 21-32 cases

*based on county of residence

CP-CRE and Novel Resistance Activity

- Carbapenemases:
  - Klebsiella pneumoniae carbapenemase (KPC)
  - New Delhi metallo-β-lactamase (NDM)
  - Verona integron encoded metallo-β-lactamase (VIM)
  - Imipenemase metallo-β-lactamase (IMP)
  - Oxacillinase-48 (OXA-48)

- Other resistance elements:
  - Mobile colistin resistance (mcr)

Confirmed Novel Resistance Cases

2014 - Current

<table>
<thead>
<tr>
<th>Resistance Type</th>
<th>Number of Cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>NDM-1</td>
<td>20</td>
</tr>
<tr>
<td>OXA-48</td>
<td>17</td>
</tr>
<tr>
<td>IMP</td>
<td>1</td>
</tr>
<tr>
<td>VIM</td>
<td>7</td>
</tr>
<tr>
<td>MCR-1</td>
<td>7</td>
</tr>
<tr>
<td>NDM-1 &amp; OXA-48</td>
<td>1</td>
</tr>
</tbody>
</table>

Number of Cases
**Confirmed Novel Resistance Cases by Year**

![Graph showing confirmed novel resistance cases by year](image)

**Novel Resistance Case Demographics**

- **Median Age, 62 yrs** (range 5 – 87 yrs)
- **Male, 32 (52%)**
- **Comorbid conditions**
  - Cardiovascular disease – 30%
  - Diabetes – 33%
  - Chronic lung disease – 21%
  - Renal failure, chronic wound – 20%
  - Malignancy, vent dependent – 11%
  - Urinary catheter – 10%
  - Dementia – 7%

**Common Risk Factors for Novel Resistance**

- **Healthcare Exposures**
  - 62% were hospitalized 6 months prior to positive culture
- **International Travel**
  - 53% had travel 6 months prior to positive culture
Carbapenemase and Resistance Mechanism Testing

- Laboratories are strongly encouraged to submit CRE isolates to the MDHHS Bureau of Laboratories
- Confirm organism identification
- Perform modified carbapenem inactivation method (mCIM) testing
- Perform PCR testing for KPC, NDM, OXA-48 like, IMP, VIM
  - If mCIM or PCR are positive, antimicrobial susceptibility testing (AST) will be performed

Candida can cause serious infections

- Candidemia is the most common HAI bloodstream infection
- 30% mortality
- Risk factors include:
  - Broad-spectrum antibiotic use
  - Central venous catheters
  - Immune compromise

Candida auris

There’s a fungus among us.
Candida auris presents new challenges

1. Often misidentified
2. Resistant to antifungal drugs
   - Azoles: 90% resistant
   - Echinocandins: 30% resistant
   - Polyenes: 3% resistant
3. Causes invasive infections with high mortality
Colonization poses a risk for:
• Invasive infection
• Transmission to others

C. auris Colonizes Skin and Other Body Sites

Risk Factors for *Candida auris*
- Older age
- Multiple healthcare stays (post-acute and long term)
- Prolonged healthcare stay
- Taking antibiotics and antifungals
- Tracheostomy
- Ventilator
- Feeding tubes
- Central lines

*Candida auris* colonizes the environment

C. auris Colonizes Skin and Other Body Sites

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C. auris Colonizes Skin and Other Body Sites

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- Ventilator
- Feeding tubes
- Central lines

*Candida auris* colonizes the environment
**Candida auris** presents new challenges

1. Often misidentified
2. Resistant to antifungal drugs
3. Causes invasive infections with high mortality
4. Can cause outbreaks in healthcare settings

All the makings of a fungal superbug!

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**vSNF A Ventilator/Trach Floor**

**March 2017 C. auris PPS Results**

- C. auris colonization prevalence 1.5% (1/69)

- C. auris positive
- Screened negative for C. auris
- Not tested for C. auris (refused or not in room)

Slide courtesy of Chicago Department of Public Health

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**vSNF A Ventilator/Trach Floor**

**January 2018 C. auris PPS Results**

- C. auris colonization prevalence 43% (29/67)

- C. auris positive
- Screened negative for C. auris
- Not tested for C. auris (refused or not in room)

Slide courtesy of Chicago Department of Public Health
 Characteristics of MDROs in PA/LTC

<table>
<thead>
<tr>
<th>Resistance</th>
<th>Detection</th>
<th>Transmission</th>
<th>Spread</th>
</tr>
</thead>
<tbody>
<tr>
<td>CRE</td>
<td>INFECTIONS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CRPA</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pan-resistant organisms</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Candida auris</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Candida auris in Michigan**

- In 2019, CSTE and CDC passed a position statement to make C. auris nationally notifiable. Michigan followed suit and as of January 1, 2019 it is reportable in Michigan.
- Please report any patient or laboratory finding to MDHHS that meets either of the following criteria:
  - Detection of C. auris in a specimen using either culture or a culture independent diagnostic test (CIDT) (e.g., Polymerase Chain Reaction [PCR])
  - Detection of an organism that commonly represents a C. auris misidentification in a specimen by culture (e.g., Candida haemulonii)
- The important thing to note is Candida auris is bad. This is not your average yeast. This will require extensive investigation.

**Containment and Prevention of MDROs**
**CDC Containment Strategy**

- Systematic approach to slow spread of novel or rare multidrug-resistant organisms or mechanisms through aggressive response to ≥1 case
  - Pan-resistant organisms
  - Carbapenemase-producing organisms
  - mcr-1
  - *Candida auris*
- Response based on pathogen/resistance mechanism

**Antibiotic Resistance Laboratory Network (ARLN)**

- Tiered network established in 2016 to support nationwide lab capacity to rapidly detect antibiotic resistance in healthcare, food, and the community
- Public health laboratories in 50 states, 6 cities and Puerto Rico
  - Carbapenemase testing for CRE and CR-*Pseudomonas aeruginosa*

**ARLN: Enhanced Capacity Through Tiered Testing**

- Network of participating clinical laboratories
- State/Local PHL
  - Organism identification
  - Confirmatory AST
  - Phenotypic screening for carbapenemase production
  - Molecular detection of mechanism
- Regional Lab
- Healthcare-associated infections
  - Confirmatory testing: full directory
  - Colonization screening
  - Targeted surveillance for emerging AR threats
- CDC and CBPR
  - Confirmatory testing
  - Whole genome Sequencing
  - Applied research
MDHHS Bureau of Labs

- Bureau of Laboratories has expanded test offerings to include:
  - Enterobacteriaceae, Acinetobacter, and Pseudomonas aeruginosa
  - Confirmation of carbapenemase production and colistin resistance
  - Genetic markers for KPC, NDM, VIM, OXA-48, and MCR-1
  - Perform modified carbapenem inactivation method (mCIM) testing

Containment Strategy
Systematic public health response to slow the spread of emerging AR

Single case of emerging resistance
Containment Strategy
Systematic public health response to slow the spread of emerging AR

- Onsite assessment using standardized tools
- HAI programs = response capacity in every state

Available through ARLN for carbapenemase-producing organisms

Single case of emerging resistance

Regular infection control assessments and point prevalence surveys until transmission stops
What to expect during a response?

- You have a critical role in containing emerging antibiotic resistance
- If unusual resistance identified in a resident at your facility or who has been in your facility
  - The health department will reach out about infection control assessments (ICAR) and contact screening
  - Focus is on preventing spread of resistance

Common Themes from CRE and CRPA Responses

- Residents in long length of stay, high acuity settings at highest risk
- Factors in transmission
  - Gaps in adherence to hand hygiene and Contact Precautions
  - Environmental contamination, including improperly cleaned equipment from contracted providers
  - Resident supplies in sink splash zone
  - Failure to communicate resident status at transfer
- Larger clusters take longer to control
  - Multiple on-site visits to observe infection control and multiple rounds of PPS
  - Staff training on hand hygiene, PPE use, environmental cleaning

ICAR Goals

- Increase patient safety
- Expand infection control resources
- Increase the number of infection control consultations provided by the SHARP unit
Methods

• Used a CDC tool to conduct infection control needs assessments

• Review facility practices:
  • Infection Control Infrastructure
  • Infection Control Training, Competency, and Implementation of Policies and Practices
  • Systems to Detect, Prevent and Respond to Healthcare-Associated Infections and Multi-Drug Resistant Organisms

The CDC Evaluation Tool

Organized into 4 sections:
1. Facility demographics
2. Infection control program and infrastructure
   • 9 domains
3. Direct observation of facility practices (optional)
4. Infection control guidelines and other resources

Assessment and Response

Discuss findings with Infection Preventionists and other staff

Strengths
Areas for opportunity

Report facility findings back to facility leadership

Aggregate findings
Facility Recruitment: 2015-2018

- Voluntary participation
- Collaborative, NOT regulatory
- Advertised to interested facilities:
  - Website, flyers, emails
  - Professional societies (e.g. MSIPC, APIC GL, HCAM)
  - Meetings and conference presentations

Facility recruitment: 2019-

- Response to HAI outbreak
- Response to identification of a novel organism
- Volunteer!

Participating LTC Facilities

- 41 assessments completed in LTC from 2015-2018
- 28 (68%) assessments completed on-site
- All facilities were licensed by the state
- 39 (95%) were certified by CMS
- Mean licensed beds: 110 beds (range 46-260)
- Staff hours per week dedicated to IP: 22.4 hours (range 2-40)
ICAR Results

• Gaps were common
• Assessments identified at least 1 gap in each facility

Facilities with at Least 1 Gap by Domain

<table>
<thead>
<tr>
<th>Domain</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Antimicrobial Stewardship</td>
<td>95%</td>
</tr>
<tr>
<td>Environmental Cleaning</td>
<td>93%</td>
</tr>
<tr>
<td>Surveillance &amp; Disease Reporting</td>
<td>83%</td>
</tr>
<tr>
<td>Hand Hygiene</td>
<td>80%</td>
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<tr>
<td>Infection &amp; POC Testing</td>
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<tr>
<td>Respiratory Hygiene &amp; Cough Etiquette</td>
<td>63%</td>
</tr>
<tr>
<td>Infection Control &amp; Infrastructure</td>
<td>59%</td>
</tr>
<tr>
<td>Healthcare Personnel &amp; Resident Safety</td>
<td>49%</td>
</tr>
<tr>
<td>Healthcare Personnel &amp; Resident Safety</td>
<td>40%</td>
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</tbody>
</table>

Recommendations

• Antimicrobial Stewardship
  • 30 (73%) Develop policies and procedures
  • Develop education and training for staff

• Environmental Cleaning
  • 32 (78%) Develop policies and procedures for cleaning
  • 17 (43%) Improve regular training programs to include all staff that clean
  • 17 (41%) Develop audit/feedback process for cleaning

• Surveillance & Disease Reporting
  • 21 (51%) Develop policies and procedures for conducting surveillance
Recommendations

- **PPE**
  - 28 (68%) Develop an audit/feedback process - not just for contact precautions

- **Hand Hygiene**
  - 21 (51%) Provide feedback from audits, facility-level and individual-level
  - 15 (37%) Start more formal audit program

- **Injection Safety & Point of Care Testing**
  - 21 (51%) Develop a formal audit program
  - 20 (49%) Develop a formal feedback program
  - 16 (39%) Implement competency-based trainings

- **Respiratory hygiene/cough etiquette**
  - 21 (51%) Implement Health Department recommendations for signage

- **Infection Control Program & Infrastructure**
  - Specific training in infection control for IP staff

- **Healthcare personnel & Resident Safety**
  - 13 (32%) Develop or update policies and procedures for TB testing/screening, HCW influenza vaccination

Lessons Learned

- No program is perfect—always room for improvement
- Infection prevention involves a lot of departments—get to know your colleagues!
- ICAR is a great tool and free resource to enhance your program
How Can ICAR Help You?

- Collaborative process, NOT regulatory
- Focus on quality improvement
- Free consultation
- Strengthen your IP program
- Add another tool to your toolbox

How do we prevent MDROs and infections?

Facility Level Prevention Strategies

- Hand hygiene
- Personal Protective Equipment
- Meticulous environmental disinfection
Barriers to Hand Hygiene (HH) adherence in NHs

- Workload
- Access
- Guidelines
- Confusion with gloves
- Lack of Education
Barriers to Hand Hygiene (HH) adherence in NHs

- Workload:Forgot HH because of workload
- Access:27.5% lack of alcohol-based hand rub
- Guidelines:Belief that HH guidelines aren’t applicable in LTC
- Confusion with gloves:No HH because of glove use
- Lack of Education:55% never/rarely received personal feedback on HH practices

The Truth about HH

- If hands are not visibly soiled, use alcohol-based hand rub (ABHR)

Literature:

- ABHR is a faster, more convenient method of HH for HCWs
- ABHR improved compliance, was more efficacious than soap and water in removing pathogens already present on HCW hands.

§483.80 Infection Control
Routes of Transmission of Infectious Pathogens

Direct and Indirect Contact Transmission
- Hepatitis B
- C. difficile

Droplet Transmission
- Influenza virus
- Group A Streptococcus

Airborne Transmission
- Mycobacterium TB
- Chicken Pox virus

Standard Precautions
- Group of infection prevention practices
  - Hand Hygiene
  - Respiratory hygiene: e.g., cough etiquette
  - Personal Protective Equipment
  - Environmental cleaning and disinfection
  - Safe injection practices
  - Reprocessing of reusable medical equipment

- Applies to all residents regardless of suspected or confirmed infection status
- All blood, body fluids, secretions, excretions except sweat, non-intact skin, and mucous membranes may contain transmissible infectious agents
Standard & Transmission-Based Precautions

**Standard Precautions**
- Hand hygiene
- PPE
- Safe injection practices
- Respiratory hygiene and cough etiquette
- Environmental cleaning and disinfection
- Reprocessing of reusable medical equipment

**Transmission-Based Precautions**

**Contact Precautions**

**Droplet Precautions**

**Airborne Precautions**

Transmission-Based Precautions
- Perform hand hygiene
- PPE donned before room entry
- PPE doffed and hand hygiene performed before room exit or provided care for another resident
- Ideally resident placed in private room
- Consider cohorting
- Clear signage, easy access to ABHR, PPE, restock supplies
Enhanced Barrier Precautions
- The use of gowns and gloves during high-contact resident care activities
  - Dressing
  - Bathing
  - Transferring
  - Providing hygiene
  - Changing linens
  - Changing briefs or assisting with toileting
  - Device care or use of a device (urinary catheter, central line, feeding tube, tracheostomy)
  - Wound care (any skin opening requiring a dressing)

MRSA Transmission to Gowns and Gloves of HCW during care of MRSA colonized residents
- Highest Risk:
  - Dressing
  - Transferring
  - Providing hygiene
  - Changing linens
  - Toileting
- Lowest Risk:
  - Giving meds
  - Glucose monitoring
Resistant Gram-negative Bacteria (RGNB) Transmission to Gowns and Gloves of HCW during care of RGNB colonized residents

- **Highest Risk:**
  - Showering
  - Hygiene
  - Toileting
  - Wound dressing changes

- **Lowest Risk:**
  - Assist feeding
  - Giving meds
  - Glucose monitoring

When to use Contact Precautions for MDRO colonized or infected residents

- Wounds, secretions, or excretions that are unable to be covered or contained,

- For preventing spread of rare and highly resistant pathogens,

- On units or in facilities where, despite attempts to control the spread of MDROs, ongoing transmission is documented or suspected.

Enhanced Barrier Precautions

- All residents infected or colonized with MDROs when Contact Precautions does not apply

  - During high-contact resident care activities:
    - Dressing
    - Bathing
    - Transferring
    - Providing hygiene
    - Changing linens
    - Changing briefs or assisting with toileting
    - Device care or use of a device: central line, urinary catheter, feeding tube, tracheostomy
    - Wound care: any skin opening requiring a dressing

  - Gloves and gown (must change between residents)
    - None.
Room for Improvement: Environmental Cleaning

- Multiple use devices reused without cleaning
- Insufficient time for cleaning/disinfection given staffing constraints
- Proximity of resident supplies to sink and toilet
- Inappropriately performed terminal cleaning
- Insufficient contact time after using wipes
- Lapses regarding separation of clean/dirty

Case Example

- 79 year old resident is admitted to an acute care hospital from the nursing home with a urinary tract infection
- Short-stay resident on nursing home’s skilled nursing unit for wound care
- Medical History: Type 2 Diabetes mellitus, hypertension, left leg wound, urinary retention requiring urinary catheter
- Urine culture on admission grows Acinetobacter resistant to Carbapenem antibiotics
- Further testing indicates OXA-23 carbapenemase production
Case Example, continued

- Health department notifies nursing home of laboratory result and recommends an investigation
  - Resident had no prior MDROs; not in Contact Precautions, has roommate
  - Laboratory lookback: 2 reports of resistant *Acinetobacter*
  - Point Prevalence survey: 3 residents with OXA-23
  - ICAR

<table>
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<tr>
<th>IX. Environmental Cleaning</th>
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<tr>
<td>Elements to be assessed</td>
<td>Assessor</td>
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<tr>
<td>A. The facility has written cleaning/disinfection policies which include routine and terminal cleaning and disinfection of resident rooms.</td>
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Transitions of Care

**INFECTION CONTROL TRANSFER FORM**

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<th>Value</th>
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<tbody>
<tr>
<td>Date</td>
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<tr>
<td>Resident Name</td>
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<tr>
<td>Date of Discharge</td>
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<tr>
<td>Recieving Facility</td>
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<tr>
<td>Name</td>
<td></td>
</tr>
<tr>
<td>Phone</td>
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<td>Isolation Precautions</td>
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<td>Yes</td>
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<td>MDRO Infection</td>
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<td>Yes</td>
<td>No</td>
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<tr>
<td>Invasive Device</td>
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</tr>
<tr>
<td>Minimize Use</td>
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<tr>
<td>Antibiotic Steward</td>
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<tr>
<td>Use Resources</td>
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<tr>
<td>Engagement</td>
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Facility-level Prevention

- Surveillance: Be aware of MDROs
- Policies and procedures: infection prevention, EVS, Resident & staff health programs
- Education & competency-based training for healthcare providers
- Communication at transitions of care
- Minimize use of invasive devices, appropriate device care
- Promote antibiotic stewardship

- Use your resources!
- Engagement at all levels is essential

**CDC Nursing Home IP Training Course**

- 23 web-based, self-study modules; close to 20 CE hours
- Curriculum designed to cover the core activities and practices of a NH IPC program
- Based on CDC guidance and best-practice recommendations
- Target audience – nursing home staff given responsibility for IPC program implementation

*Image: CDC Nursing Home IP Training Course [Link]*

*Image: CDC Infant Feeding Transfer Form [Link]*

*Image: CDC Transitions of Care [Link]*
Lessons Learned and Moving Forward

- How can we better address prevention and containment of MDROs?
- What steps have you taken?
- Roadblocks? Successes?
- How can we provide further support?
- What resources would be most useful?
- Feedback on Enhanced Barrier Precautions

What Facilities Can Do

- Plan for unusual resistance arriving in your facility. Find resources: www.cdc.gov/hai/outbreaks/mdro
- Leadership: Work with the health department to stop spread of unusual resistance. Review and support infection control in the facility.
- Clinical labs: Know what isolates to send for testing. Establish protocols that immediately notify the health department, healthcare provider, and infection control staff of unusual resistance. Validate new tests to identify the latest threats. If needed, use isolates from www.cdc.gov/ARIsolateBank.
- Healthcare providers, epidemiologists, and infection control staff: Place patients with unusual resistance on contact precautions, assess and enhance infection control, and work with the health department to screen others. Communicate about status when patients are transferred. Continue infection control assessments and colonization screenings until spread is controlled. Ask about any recent travel or health care to identify at-risk patients.

Resources

- Interim Guidance to Contain Novel MDROs: https://www.cdc.gov/hai/containment/guidelines.html
- CDC CRE Toolkit: https://www.cdc.gov/hai/containment/guidelines.html
- Vital Signs on Containment: https://www.cdc.gov/mmwr/volumes/67/wr/mm6713e1.htm?s_cid=mm6713e1_w
- CDC Candida auris webpage: https://www.cdc.gov/fungal/diseases/candidiasis/candida-auris.html
- Find your state HAI Coordinator and AE expert: https://www.cdc.gov/hai/state-local/index.html
### Contact Precautions

- All residents infected or colonized with MDROs in specific situations:
  - Presence of wounds, secretions, or excretions that are unable to be covered or contained
  - With rare and highly resistant pathogens (novel, pan-resistant)
  - On units or in facilities where, despite attempts to control the spread of MDROs, ongoing transmission is documented or suspected

- **Required PPE:** Room restriction
- Gloves and gown on EVERY room entry
- Yes, except for medically necessary care.

### Enhanced Barrier Precautions

- All residents infected or colonized with MDROs when Contact Precautions do not apply
- During high-contact resident care activities:
  - Dressing
  - Bathing
  - Transferring
  - Providing hygiene
  - Changing linens
  - Changing briefs or assisting with toileting
  - Device care or use of a device: central line, urinary catheter, feeding tube, tracheostomy
  - Wound care: any skin opening requiring a dressing

- Gloves and gown (must change between residents)
- None.

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**Questions?**

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Email: http://www.cdc.gov/longtermcare

Applies to: PPE used for these situations: Required PPE Room restriction