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
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National Center for Emerging and Zoonotic Infectious Diseases (NCEZID)
Centers for Disease Control and Prevention (CDC)
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

www.michigan.gov/hai
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 HAI
  • 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

Klebsiella pneumoniae

Clostridium difficile
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*, >10^5 cfu

<table>
<thead>
<tr>
<th>Drug</th>
<th>Result</th>
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</thead>
<tbody>
<tr>
<td>Amikacin</td>
<td>Intermediate</td>
</tr>
<tr>
<td>Ampicillin</td>
<td>Resistant</td>
</tr>
<tr>
<td>Amp/Sulbactam</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>
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<tr>
<td>Ceftazidime</td>
<td>Resistant</td>
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<tr>
<td>Ceftriaxone</td>
<td>Resistant</td>
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<tr>
<td>Cefuroxime</td>
<td>Resistant</td>
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<tr>
<td>Gentamicin</td>
<td>Resistant</td>
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<tr>
<td>Levofoxacin</td>
<td>Resistant</td>
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<tr>
<td>Meropenem</td>
<td>Resistant</td>
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<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
CRE 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.

Leave limited to no therapeutic options

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

**Proteus mirabilis, Providencia rettgeri, Citrobacter freundii**

![Bar chart showing the number of isolates, by year of specimen collection](chart.png)

- **Number of isolates**: 86 patients, 12 states
- **Year of Specimen Collection**: 2011 to Q1 2017
- **Organisms (CPOs)**: Carbapenem-Producing Organisms

**Pseudomonas aeruginosa**

![Image of Pseudomonas aeruginosa](image.png)

- **VIM**: 86 patients, 12 states

**Acinetobacter baumannii**

![Image of Acinetobacter baumannii](image.png)
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
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

Average Prevalence and 95% confidence limits

- **SNF**: 1.5%
- **VSNF**: 27.3%
- **LTACH**: 33.3%
- **LTCF overall**: 8.3%

Prabakar, Lin, McNally et al. Infect Control Hosp Epi 2012, 33:12
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

https://fee.org/articles/the-nursing-home-is-an-experiment-with-centrally-planned-society/
Carriage of ANY MDRO (Median %)

- **SNF**
  - 58% MDRO carriage
  - UNKNOWN MDRO: 55%
  - CRE: 0%

- **vSNF**
  - 76% MDRO carriage
  - UNKNOWN MDRO: 74%
  - CRE: 10%

- **LTACH**
  - 82% MDRO carriage
  - UNKNOWN MDRO: 66%
  - CRE: 8%

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
## 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>
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<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>
<tr>
<td><strong>Combined Cohort</strong></td>
<td>Sept 2017-Feb 2018</td>
<td>Mar 2018-Aug 2019</td>
<td><strong>42</strong></td>
<td><strong>17</strong></td>
<td><strong>2</strong></td>
<td><strong>61</strong></td>
</tr>
</tbody>
</table>
CRE Surveillance and Prevention Initiative Participation by County, Sept 2018

61 Facilities in 27 counties
Inpatient CRE Prevalence Rate by Organism

Sept 2017 – Dec 2018

Prevalence Rate per 1,000 Admissions

- Klebsiella spp.
- Enterobacter spp.
- Escherichia coli
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)
**CP-CRE Reporting Requirements**

- 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:
    - $\geq 4$ mcg/ml for Meropenem
    - $\geq 4$ mcg/ml Imipenem
    - $\geq 4$ mcg/ml Doripenem
    - $\geq 2$ 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
• BOL report is negative for phenotypic and molecular tests
• All carbapenems are susceptible (MICs don’t match case definition)
• Not *Enterobactericeae*

CSTE Case definition
CP-CRE Cases Reported to MDSS
Jan – Dec 2018

217, 58%
159, 42%

Confirmed  Suspect
## CP-CRE Cases by Organism

**Jan – Dec 2018**

<table>
<thead>
<tr>
<th>Organism</th>
<th>CP-CRE Cases</th>
<th></th>
<th></th>
<th></th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Confirmed</td>
<td>Suspect</td>
<td>Total</td>
<td></td>
</tr>
<tr>
<td></td>
<td>n=159</td>
<td>n=217</td>
<td>n=376</td>
<td></td>
</tr>
<tr>
<td>Klebsiella spp.</td>
<td>110 (69%)</td>
<td>89 (41%)</td>
<td>199 (53%)</td>
<td></td>
</tr>
<tr>
<td>Klebsiella pneumoniae</td>
<td>102</td>
<td>68</td>
<td>170</td>
<td></td>
</tr>
<tr>
<td>Klebsiella aerogenes</td>
<td>4</td>
<td>14</td>
<td>18</td>
<td></td>
</tr>
<tr>
<td>Klebsiella oxytoca</td>
<td>3</td>
<td>7</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Klebsiella variicola</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Escherichia coli</td>
<td>23 (14%)</td>
<td>69 (32%)</td>
<td>92 (42%)</td>
<td></td>
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<tr>
<td>Enterobacter spp.</td>
<td>26 (16%)</td>
<td>36 (17%)</td>
<td>85 (23%)</td>
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<td>Enterobacter cloacae</td>
<td>26</td>
<td>57</td>
<td>83</td>
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<td>Enterobacter asburiae</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td></td>
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<tr>
<td>Enterobacter hormaechei</td>
<td>0</td>
<td>1</td>
<td>1</td>
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</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

- 1-25 cases
- 26-50 cases
- 51-79 cases

Confirmed CP-CRE only

- 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 by Year

- **NDM-1**
- **OXA-48**
- **VIM**
- **IMP**
- **mcr-1**
- **NDM-1 & OXA-48**

<table>
<thead>
<tr>
<th>Year</th>
<th>NDM-1</th>
<th>OXA-48</th>
<th>VIM</th>
<th>IMP</th>
<th>mcr-1</th>
<th>NDM-1 &amp; OXA-48</th>
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<td>2014</td>
<td>5</td>
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<td>2019</td>
<td></td>
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</table>
Novel Resistance Case Demographics

Median Age, 62 yrs
(range 5 – 87 yrs)

Male, 32 (52%)

Comorbid conditions
- Cardiovascular disease – 39%
- 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
- 51% 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
There's a fungus among us.
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 presents new challenges

1. Often misidentified
Candida auris presents new challenges

1. Often misidentified
2. Resistant to antifungal drugs

Polyenes
- 30% resistant

Azoles
- 90% resistant

Echinocandins
- 3% resistant
*Candida auris* presents new challenges

1. Often misidentified
2. Resistant to antifungal drugs
3. Causes invasive infections with high mortality
Colonization poses a risk for:
• Invasive infection
• Transmission to others
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

Madder et al (U.K.), bioRxiv 2017
Armstrong et al, unpublished

https://5.imimg.com
*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!*
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.
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

**Resistance**
- CRE
- CRPA
- Pan-resistant organisms
- *Candida auris*

**Detection**
- INFECTIONS
- ASYMPTOMATIC COLONIZATION

**Transmission**

**Spread**
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]).

• The important thing to note is Candida auris is bad. This is not your average yeast. This will require extensive investigation. https://www.cdc.gov/fungal/candida-auris/tracking-c-auris.html
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

[https://www.cdc.gov/hai/outbreaks/mdro/index.html](https://www.cdc.gov/hai/outbreaks/mdro/index.html)
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

- Organism identification
- Confirmatory AST
- Phenotypic screening for carbapenemase production
- Molecular detection of mechanism

State/Local PHL

- Healthcare-associated infections
  - Confirmatory testing: full directory
  - Colonization screening
  - Targeted surveillance for emerging AR threats

CRE and CRPA

- Confirmatory testing
- Whole Genome Sequencing
- Applied research

Regional lab

CDC
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

- Detection
- Infection Control
- Contact Screening
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

**DETECTION**

Onsite assessment using standardized tools

**INFECTION CONTROL**

HAI programs = response capacity in every state

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

DETECTION

INFECTION CONTROL

CONTACT SCREENING

Available through ARLN for carbapenemase-producing organisms
Containment Strategy
Systematic public health response to slow the spread of emerging AR

**DETECTION**
Single case of emerging resistance

**INFECTION CONTROL**
Onsite assessment using standardized tools
HAI programs = response capacity in every state

**CONTACT SCREENING**
Available through ARLN for carbapenemase-producing organisms

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

Report facility findings back to facility leadership

Aggregate findings

Strengths
Areas for opportunity
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

- Antimicrobial Stewardship: 95%
- Environmental Cleaning: 93%
- Surveillance & Disease Reporting: 83%
- PPE: 80%
- Hand Hygiene: 71%
- Injection Safety & POC Testing: 63%
- Respiratory Hygiene & Cough Etiquette: 59%
- Infection Control & Infrastructure: 49%
- Healthcare Personnel & Resident Safety: 49%
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 (41%) 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
Recommendations

• 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 and Precautions
- Meticulous environmental disinfection
Hand Hygiene
CLEAN HANDS SAVE LIVES
Protected patients, protect yourself

Alcohol-rub or wash before and after EVERY contact.

CDC
Patient Safety

www.cdc.gov/handhygiene
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

Ashraf MS et al. ICHE 2010; 31(7):758-762
Efficacy of Hand Hygiene Preparations in Killing Bacteria

Ability of Hand Hygiene Agents to Reduce Bacteria on Hands

The Truth about HH

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

"consistent with accepted standards of practice such as the use of ABHR instead of soap and water in all clinical situations except when hands are visibly soiled (e.g., blood, body fluids), or after caring for a resident with known or suspected C. difficile or norovirus infection during an outbreak, or if infection rates of C. difficile are high…"

Literature:
ABHR is a faster, more convenient, less drying method of HH for HCWs in a LTCF AND it **improved compliance**. ABHR was more efficacious than soap and water in removing pathogens already present on HCW hands.

Mody L. et al. ICHE 2003; 24(3):165-171

§483.80 Infection Control
Personal Protective Equipment & Precautions
Routes of Transmission of Infectious Pathogens

**Direct and Indirect Contact Transmission**
- Hepatitis B
- C.diff

**Droplet Transmission**
- Influenza virus
- Group A Streptococcus

**Airborne Transmission**
- Mycobacterium TB
- Measles
- Chicken Pox virus
Standard Precautions

- Group of infection prevention practices

<table>
<thead>
<tr>
<th>Hand Hygiene</th>
<th>Respiratory hygiene and cough etiquette</th>
</tr>
</thead>
<tbody>
<tr>
<td>Personal Protective Equipment</td>
<td>Environmental cleaning and disinfection</td>
</tr>
<tr>
<td>Safe injection practices</td>
<td>Reprocessing of reusable medical equipment</td>
</tr>
</tbody>
</table>

- 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

<table>
<thead>
<tr>
<th>Standard Precautions</th>
<th>Transmission-Based Precautions</th>
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</thead>
<tbody>
<tr>
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</table>


Transmission-Based Precautions

Contact Precautions

Droplet Precautions

Airborne Precautions

N95
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
### Standard & Transmission-Based Precautions

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#### Enhanced Barrier Precautions

- Contact Precautions
- Droplet Precautions
- Airborne Precautions

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Enhanced Barrier Precautions

- The use 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

Roghmann et al. Infect Control Hosp Epidemiol. 2015 September; 36(9): 1050-1057
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.
<table>
<thead>
<tr>
<th>Applies to:</th>
<th>PPE used for these situations:</th>
<th>Required PPE</th>
<th>Room restriction</th>
</tr>
</thead>
</table>
| **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 | 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 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. |
Cleaning & Disinfection
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>
<thead>
<tr>
<th>IX. Environmental Cleaning</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Elements to be assessed</th>
<th>Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. The facility has written cleaning/disinfection policies which include routine and terminal cleaning and disinfection of resident rooms.</td>
<td>☒ Yes ☐ No</td>
</tr>
</tbody>
</table>
Case Example: ICAR Results

- Trained, experienced IP
- ABHR and gloves available immediately inside of every resident room
- Early stages of starting an auditing & feedback program for hand hygiene and environmental services

- Limited access to gowns
- Confusion over responsibility for cleaning shared equipment
- Limited access to cleaning & disinfectant wipes
Acinetobacter

Candida auris
**Transitions of Care**

**INFECTION CONTROL TRANSFER FORM**
*(Discharging Facility to complete form and communicate information to Receiving Facility)*

<table>
<thead>
<tr>
<th>Demographics</th>
<th></th>
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</thead>
<tbody>
<tr>
<td>Last Name</td>
<td></td>
</tr>
<tr>
<td>Date of Discharge</td>
<td></td>
</tr>
<tr>
<td>Sending Facility Name:</td>
<td></td>
</tr>
<tr>
<td>Contact Name:</td>
<td></td>
</tr>
<tr>
<td>Contact Phone:</td>
<td></td>
</tr>
<tr>
<td>Receiving Facility Name:</td>
<td></td>
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</tbody>
</table>

**Precautions**

- Currently in Isolation Precautions? [ ] Yes [ ] No
- If Yes check: [ ] Contact [ ] Droplet [ ] Airborne [ ] Other: ________________

**Did or does have (send documentation):**

<table>
<thead>
<tr>
<th>Multiple Drug Resistant Organism (MDRO):</th>
<th>Current Infection, History, or Ruling Out*</th>
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<tbody>
<tr>
<td>MRSA</td>
<td>[ ] Yes</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

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**
- **Find your state HAI Coordinator and AR expert**
  - https://www.cdc.gov/hai/state-based/index.html
For more information, contact CDC
1-800-CDC-INFO (232-4636)

The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.
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