Welcome to the Healthcare Associated Infections Antimicrobial Resistance Webinar Series
Webinar overview

- Schedule – bi-monthly
- Intended audience – LTCF infection preventionists
- Upcoming topics:
  - The Three Rs – September 28th, 2021
  - Candida auris – November 30th, 2021
  - MDROs – January 25th, 2022

Please visit the HAI-AR Webinar Series Webpage for LTCF Infection Preventionists by clicking here!
2022 schedule

• MDROs – Jan. 25
• Tuberculosis – March 29
• Legionella – May 31
• Group A *Streptococcus* (GAS) – July 26
• Project Firstline – Sept. 27
• Wound Care – Nov. 29

Please visit the HAI-AR Webinar Series Webpage for LTCF Infection Preventionists by clicking here!
MULTIDRUG RESISTANT ORGANISMS

Hannah Gallion

January 25, 2022
OUR MISSION:
To promote, protect, and improve the health and safety of all Hoosiers.

OUR VISION:
Every Hoosier reaches optimal health regardless of where they live, learn, work, or play.
Overview

- Definitions
- Antibiotic resistance
  - Spread
  - Mechanisms of action
  - Stewardship
- Antibiotic Resistant Organisms
  - AR threats
  - Carbapenem resistant organisms (CRO)
- Infection Control and Prevention
Definitions

• **Multidrug-resistant organism** (MDRO) - an organism that is resistant to one or more agent in at least three classes of antibiotics, or that exhibits a classification of resistance that is of epidemiological concern (e.g. MRSA, VRE, ESBL, CRE)

• **Carbapenem** - class of antibiotics (often thought of as the last line antibiotics)

• **Carbapenemase** - enzyme produced by bacteria that breaks down most antibiotics, including carbapenem antibiotics
Antibiotic resistance

**Intrinsic resistance**
- The organism is naturally resistant to the antibiotic mechanism of action
  - Example: Porins in the cell wall are naturally too small to allow passage of the antibiotic.

**Acquired resistance**
- Vertical gene transfer
  - Example: Porin size
- Horizontal gene transfer
  - Example: Carbapenemase
Antibiotic resistance: How it happens

1. Lots of germs. A few are drug resistant.
2. Antibiotics kill bacteria causing the illness, as well as good bacteria protecting the body from infection.
3. The drug-resistant bacteria are now allowed to grow and take over.
4. Some bacteria give their drug-resistance to other bacteria, causing more problems.

Source: https://www.cdc.gov/narms/faq.html
AR mechanisms
How antibiotic resistance spreads

Source: https://www.cdc.gov/narms/faq.html
Antibiotic stewardship

• Antibiotic stewardship is a set of commitments and activities designed to improve the treatment of infections and reducing the negative health impacts of antibiotic use.

• The CDC has issued “core elements” of antibiotic stewardship for:
  • Hospitals
  • Long-term care
  • Outpatient
Antibiotic-resistant organisms
AR threats

- Vancomycin-resistant Enterococcus (VRE)
- Vancomycin-resistant *Staphylococcus aureus* (VRSA)
- *Clostridioides difficile*
- Emerging resistance
- Carbapenem-resistant *Enterobacterales* (CRE)
- Carbapenemase-producing organisms (CPO)
VRE

• Enterococci are bacteria normally found in human intestines
• Most VRE infections are healthcare-associated
• VRE is spread from person to person
• VRE can also be transmitted through the environment via contaminated surfaces or equipment

Image source: https://www.cdc.gov/hai/organisms/vre/vre.html
VRSA

- Uncommon, but problematic
  - 15 infections reported in the US
- All identified have the vanA gene, which is commonly found in VRE
- Risk factors
  - Underlying health conditions
  - Catheter use
  - History of MRSA infections
  - Recent exposure to antibiotics

C. diff

• *C. difficile* infections (CDI) most often occur in older adults who have had recent exposure to antibiotics

• *C. difficile*, to date, has not been found to be resistant to any antibiotics of clinical relevance

• Residents diagnosed with a CDI should be placed on contact precautions
Emerging resistance

• Carbapenem-resistant *Psuedomonas aeruginosa* (CRPA)

• Carbapenem-resistant *Acinetobacter baumannii* (CRAB)
• *Pseudomonas* is commonly found in the soil and water.
• *Pseudomonas aeruginosa* can cause infections in the blood, lungs, or other parts of the body after surgery.

Image source: https://www.cdc.gov/hai/organisms/pseudomonas.html
CRPA can spread person-to-person via:
- Contaminated hands
- Contaminated equipment
- Contaminated surfaces

Risk factors:
- Ventilator-dependent
- Invasive devices such as catheters
- Wounds from burns or surgery
• *Acinetobacter* is commonly found in soil and water.

• *Acinetobacter baumanii* can cause infections in the blood, urinary tract, lungs, and in wounds.

• Can colonize a resident without causing infections

Image source: https://www.cdc.gov/hai/organisms/acinetobacter.html
CRAB

CRAB can be spread person-to-person via
• Hands of care-givers or family
• Contaminated surfaces
• Shared equipment

Risk factors:
• Recent healthcare exposure (particularly ICU stays)
• Ventilator-dependent
• Invasive devices such as catheters
• Open wounds
CRE

**Definition:** Any *Enterobacterales* that are not susceptible (i.e. intermediate or resistant) to a carbapenem antibiotic

- *Enterobacterales* can be resistant to carbapenems through several resistance mechanisms
- Carbapenemase production is currently the most concerning

Image source: https://www.cdc.gov/hai/organisms/cre/cre-patients.html
CRE

**Risk factors:**

- Recent healthcare exposure
- ACH, LTC, LTACH
- Recent medical procedures
- Recent invasive device use
  - Mechanical ventilator, PICC line, Foley catheter
- Recent antibiotic use
- Prior history of MDRO colonization or infection
Carbapenemase-producing CRE (CP-CRE)

Definition:

_Enterobacterales_ that are not susceptible (i.e. intermediate or resistant) to at least one carbapenem antibiotics AND one of the following:

- Positive for carbapenemase production by a phenotypic test
- Not susceptible to at least three carbapenem antibiotics
- OR:
  - Positive for a carbapenemase gene marker (KPC, NDM, VIM, OXA, IMP)
2021 Indiana CP-CRE cases

2021 CP-CRE Cases by Mechanism

- IMP: 81%
- KPC: 7%
- NDM: 5%
- OXA-48: 2%
- VIM: 2%
- Novel/Unknown: 2%

Data collected by the Indiana Department of Health
2021 Indiana CP-CRE cases by district

District 1: 76
District 2: 9
District 3: 14
District 4: <5
District 5: 43
District 6: 19
District 7: 7
District 8: <5
District 9: 6
District 10: <5

Data collected by the Indiana Department of Health
Carbapenemase-producing organisms

**Pseudomonas aeruginosa**
- Carbapenem Resistant *Pseudomonas aeruginosa* (CRPA)
- Carbapenemase Producing-CRPA (CP-CRPA)

**Acinetobacter baumannii**
- Carbapenem Resistant *Acinetobacter baumannii* (CRAB)
- Carbapenemase Producing-CRAB (CP-CRAB)

*Proportions not to scale*
Facility level prevention strategies

- Hand hygiene ★
- Contact precautions ★
- Healthcare personnel education
- Smart use of invasive devices
- Laboratory notification
- Inter-facility communication ★
- Antibiotic stewardship
- Environmental cleaning
- Resident and staff cohorting ★
- Screening contacts of CRE residents ★
- Active surveillance testing ★
- Chlorhexidine bathing
Hand hygiene

When caring for residents with MDROs, healthcare personnel should follow standard hand hygiene practices.

Wearing gloves is **NOT** a substitute for hand hygiene.

**Alcohol-based hand sanitizer (ABHR) is effective against most MDROs, including Candida auris** and is the preferred method for cleaning hands when they are not visibly soiled.

**Soap and water should be used for C. diff** and when hands are visibly soiled.
Contact precautions

When to use:

- All residents infected or colonized with a novel or targeted MDRO

*See Appendix A – Type and duration of Precautions Recommended for Selected Infections and Conditions of the CDC Guideline for Isolation Precautions

What to use:

- Gloves
- Gown
- Dedicated or disposable equipment (Clean and disinfect reusable equipment before use on another person.)
Inter-facility communication

## Inter-Facility Infection Control Transfer Form

This form must be filled out for transfer to accepting facility with information communicated prior to or with transfer. Please attach copies of latest culture reports if available.

### Sending Healthcare Facility:

<table>
<thead>
<tr>
<th>Patient/Resident Last Name</th>
<th>First Name</th>
<th>Date of Birth</th>
<th>Medical Record Number</th>
</tr>
</thead>
</table>

### Name/Address of Sending Facility

<table>
<thead>
<tr>
<th>Sending Unit</th>
<th>Sending Facility Phone</th>
</tr>
</thead>
</table>

### Sending Facility Contacts

<table>
<thead>
<tr>
<th>Contact Name</th>
<th>Phone</th>
<th>E-mail</th>
</tr>
</thead>
</table>

### Inter-Facility Infection Control Transfer Form

**Does the person currently have any of the following?**

- [ ] Cough or requires suctioning
- [ ] Diarrhea
- [ ] Vomiting
- [ ] Incontinence of urine or stool
- [ ] Open wounds or sores requiring dressing change
- [ ] Central line/IV/PC/Approx. date inserted:
- [ ] Drainage (source):

**Is the person currently in Transmission-Based Precaution?**

- [ ] No
- [ ] Yes

*Specify type of precaution (check all that apply):*  
- [ ] Contact
- [ ] Droplet
- [ ] Airborne
- [ ] Other:

*Reason for Precautions:

<table>
<thead>
<tr>
<th>Vaccine</th>
<th>Date administered (if known)</th>
<th>Lot and Brand (if known)</th>
<th>Year administered at exact date known (if known)</th>
<th>Does the person self-report receiving vaccine?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Influenza (seasonal)</td>
<td>[ ] Yes [ ] No</td>
<td>[ ] Yes [ ] No</td>
<td>[ ] Yes [ ] No</td>
<td>[ ] Yes [ ] No</td>
</tr>
<tr>
<td>Pneumococcal (PPSV23)</td>
<td>[ ] Yes [ ] No</td>
<td>[ ] Yes [ ] No</td>
<td>[ ] Yes [ ] No</td>
<td>[ ] Yes [ ] No</td>
</tr>
<tr>
<td>Pneumococcal (PCV13)</td>
<td>[ ] Yes [ ] No</td>
<td>[ ] Yes [ ] No</td>
<td>[ ] Yes [ ] No</td>
<td>[ ] Yes [ ] No</td>
</tr>
<tr>
<td>COVID-19</td>
<td>[ ] Yes [ ] No</td>
<td>[ ] Yes [ ] No</td>
<td>[ ] Yes [ ] No</td>
<td>[ ] Yes [ ] No</td>
</tr>
</tbody>
</table>

*Other: [ ] Yes [ ] No

**Notes to patient or patient's parent concerning transmitting facility:**

- [ ] Required PPE

**Name of staff completing form (print):**

**Signature:**

**If information communicated prior to transfer:**

**Name of individual at receiving facility:**

**Phone of individual at receiving facility:**

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Promote, protect, and improve the health and safety of all humans.
Resident and staff cohorting

- Residents on contact precautions should be placed in a single room whenever possible.
- When single rooms are not available, people with the same MDROs may be housed together in the same room.
- If multiple residents with an MDRO are present, consider cohorting to one wing or unit.
- Consider cohorting healthcare personnel who provide the most regular care to these residents during a shift.
Screening for CP-CRE

Recommended for:

• Roommates of those with a positive CP-CRE test
• Units when a CP-CRE resident was not under contact precautions
Screening process

- Work with IDOH to determine who will be screened and when:
  - Testing laboratories have limited capacity and stick to a strict schedule
- IDOH will order kits from the AR Lab Network (ARLN) Wisconsin
- Kits can be shipped to either IDOH directly or to the facility where screening is to occur
Questions?

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