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## Objectives

- Review multidrug-resistant organisms (MDROs) and basic elements of infection prevention and control (IPC)
- Define Standard Precautions, Contact Precautions, and Enhanced Barrier Precautions
- Discuss best practices for implementing Enhanced Barrier Precautions (EBP)

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## Threat of Antibiotic Resistance

- 2019 CDC Antibiotic Resistance (AR) Threats in the United States
  - Estimated 2.8 million AR infections each year.
  - At least 35,000 AR deaths each year.
  - Infections from AR organisms are more costly and difficult to treat.



<https://www.cdc.gov/drugresistance/pdf/threats-report/2019-ar-threats-report-508.pdf>

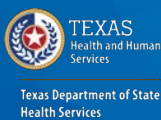
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## Risk Factors for Colonization with MDROs

- Indwelling medical devices (e.g., urinary catheter, PEG tube, tracheostomy/ventilator, central line)
- Presence of wounds or decubitus ulcers
- Antibiotic use in prior 3 months, particularly fluoroquinolones
- Recent hospitalization
- Comorbid medical conditions
- Lower functional status
- Older age

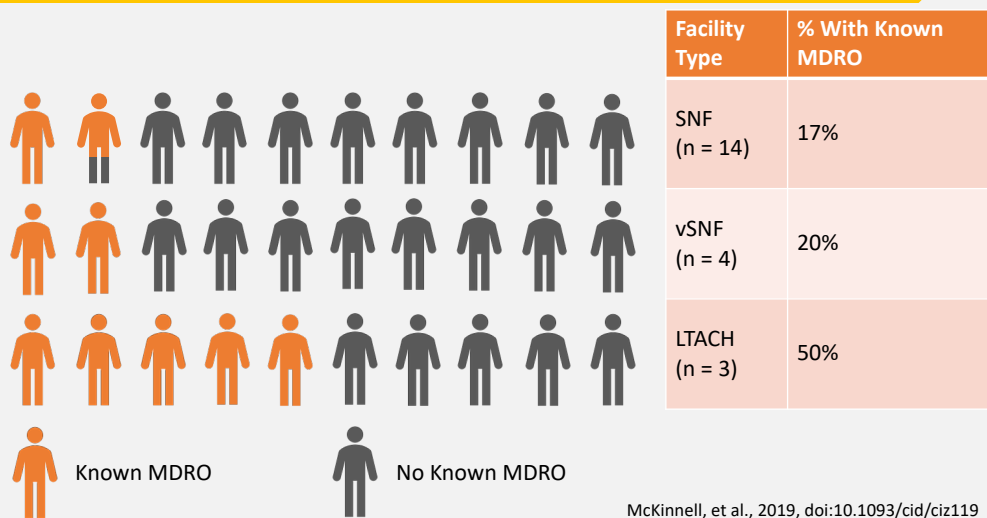
Prolonged length of stay also increases opportunities for transmission

Mody et al., 2007; Cassone and Mody, 2015

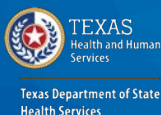


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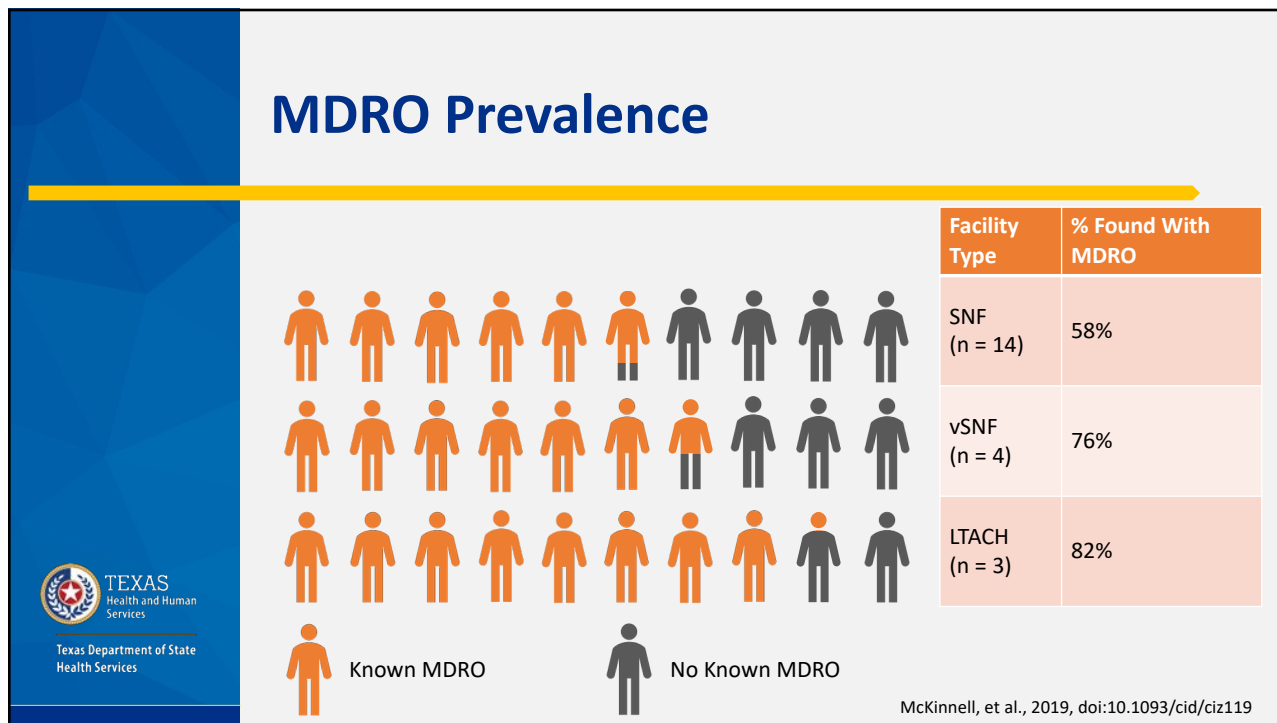
## MDRO Prevalence



McKinnell, et al., 2019, doi:10.1093/cid/ciz119



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## Challenges with MDRO Detection

- Clinical cultures underestimate true prevalence of MDROs.
- Most facilities are not performing active surveillance culturing to identify asymptomatic, colonized residents.
- Inadequate communication of MDRO status during transfers.

Number of infections  
←

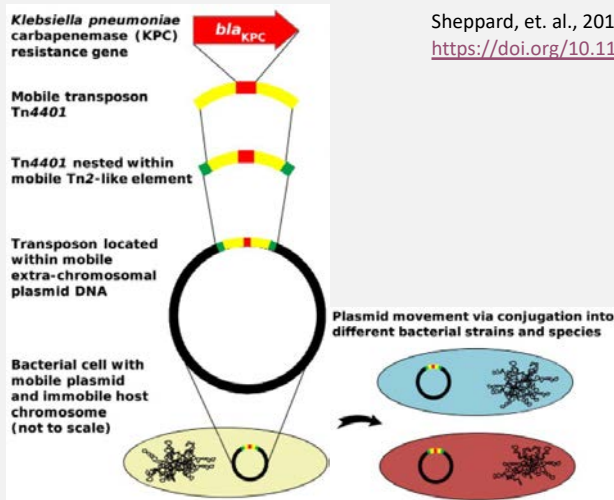
Asymptomatic carriage  
←

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## Carbapenemase-Producing Organisms (CPOs)

- CPOs are a group of bacteria that are resistant to carbapenem antibiotics.
  - CPOs produce enzymes (carbapenemases) that break down carbapenems
- Carbapenemase-producing genes can be easily be transmitted.
- CPOs are emerging throughout the United States and the world.

## Carbapenemase-Producing Organisms (CPOs)



## Carbapenemase-Producing Organisms (CPOs)

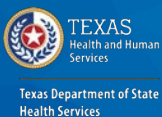
- Bacteria can carry multiple resistance mechanisms
- Examples of Carbapenemase-producing genes
  - **KPC** – *Klebsiella pneumoniae* carbapenemase
  - **NDM** – New Delhi Metallo- $\beta$ -lactamase
  - **VIM** – Verona Integron-encoded Metallo- $\beta$ -lactamase
  - **IMP** – Imipenemase Metallo- $\beta$ -lactamase
  - **OXA-48** – Oxacillinase
- These genes have been reported in Enterobacterales, *Pseudomonas aeruginosa* and *Acinetobacter baumannii*



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## *Candida auris* (*C. auris*)

- First identified in 2009 in Asia.
- *C. auris* is a concerning because:
  - Often multidrug-resistant, with some strains resistant to all three available classes of antifungals.
  - Can cause outbreaks in healthcare facilities.
  - Some common healthcare disinfectants are not effective against the organism.
  - Can colonize patient's skin leading to unknown spread.



<https://www.cdc.gov/drugresistance/pdf/threats-report/candida-auris-508.pdf>

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**DRUG-RESISTANT  
CANDIDA AURIS**

THREAT LEVEL **URGENT**

**323**  
Clinical cases  
in 2018

**90%** Isolates resistant to at  
least **one** antifungal

**30%** Isolates resistant to at  
least **two** antifungals

*Candida auris* (*C. auris*) is an emerging multidrug-resistant yeast (a type of fungus). It can cause severe infections and spreads easily between hospitalized patients and nursing home residents.

<https://www.cdc.gov/drugresistance/pdf/threats-report/candida-auris-508.pdf>

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## Texas *Candida auris* Case Counts by Specimen Collection Date

2017	2018	2019	2020 <sup>+</sup>	2021 <sup>*</sup>
1	2	7	3	261

<sup>+</sup> One specimen collected in 2020 but reported in 2021

<sup>\*</sup> Provisional data

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Health care facilities, health departments, and CDC are ON ALERT for antibiotic resistance.

**THE CONTAINMENT STRATEGY**

RAPID IDENTIFICATION

INFECTION CONTROL ASSESSMENTS

COLONIZATION SCREENINGS

COORDINATED RESPONSE BETWEEN FACILITIES

CONTINUED ASSESSMENT & SCREENINGS

Public health teams nationwide can launch early, aggressive responses to contain spread and protect people—at the first sign of antibiotic resistance, every time.

Find guidance, lab protocols, and more resources: [www.cdc.gov/HAI/Outbreaks/MDRO](http://www.cdc.gov/HAI/Outbreaks/MDRO)

<https://www.cdc.gov/hai/containment/index.html>

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## Containment Response Tiers

A tiered response helps health departments launch effective and tailored responses when a threat has been identified.

- **Tier 1** – Organisms that have no treatment options or have never or rarely been detected in the US
- **Tier 2** – Organisms not commonly detected in a geographic area
- **Tier 3** – Organisms that are known threats in a geographic area but are not endemic

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## Pause for a Poll









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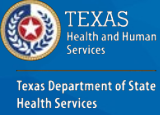
## Implementing Precautions in the LTC Setting



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## Standard Precautions

		
Personal Protective Equipment (PPE)	Hand Hygiene	Respiratory Hygiene
		
Injection and Medication Safety	Cleaning & Disinfection	Disinfecting shared equipment





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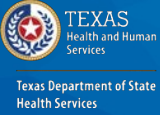
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### INSIDE INFECTION CONTROL

## WHAT IS PERSONAL PROTECTIVE EQUIPMENT (PPE)?

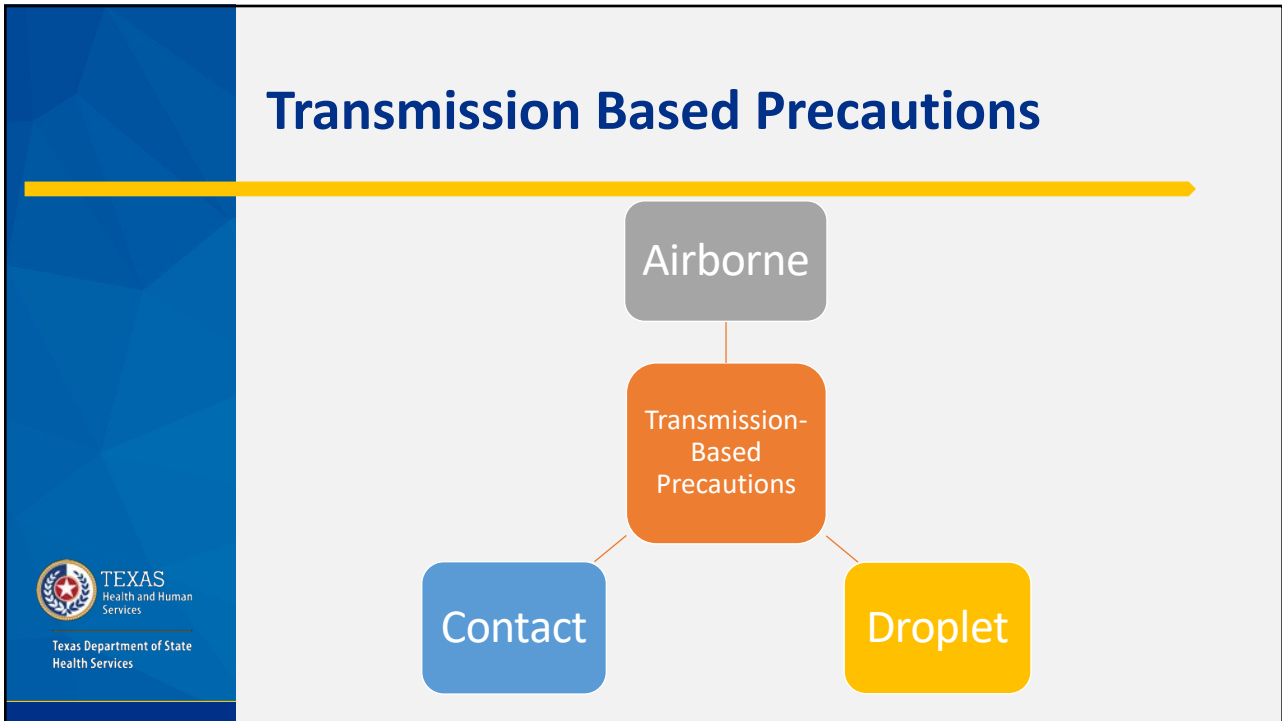
**EPISODE 9**





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**STOP CONTACT PRECAUTIONS STOP**  
**EVERYONE MUST:**

- Clean their hands, including before entering and when leaving the room.

**PROVIDERS AND STAFF MUST ALSO:**

- Put on gloves before room entry. Discard gloves before room exit.
- Put on gown before room entry. Discard gown before room exit.  
**Do not wear the same gown and gloves for the care of more than one person.**
- Use dedicated or disposable equipment. Clean and disinfect reusable equipment before use on another person.

PHOTO: GETTY IMAGES

U.S. Department of Health and Human Services  
Centers for Disease Control and Prevention

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## Contact Precautions

- Contact Precautions require:
  - Gown and gloves for every entry
  - Dedicated equipment
  - Private rooms or cohorting
  - Room restriction
- Removal: organism-dependent



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## Evolution of Enhanced Barrier Precautions

- “Transmission-Based Precautions are used when a resident develops a transmissible infection”
  - **Colonization ≠ Infection**
- “Facility personnel should wear appropriate PPE”
  - **Duration of MDRO colonization can be prolonged (>6 months or even indeterminate)**
- “Once the infection is resolved, the resident remains at risk for transmitting the MDRO even when not actively infected”
  - **Resident remains at risk for transmitting the MDRO even when not actively infected**

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## Need for a New Approach in LTC

Back to the drawing board to clarify

- How and when to use PPE
- What room restrictions are needed to prevent transmission
- How can we manage the prolonged colonization and prevent “silent spread” of MDROs
- Which nursing home residents are considered “at-risk” for MDRO transmission
  - And how to approach their care



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## PPE to Prevent Spread of MDROs

CDC Centers for Disease Control and Prevention  
CDC 24/7: Saving Lives. Protecting People™

Search

Healthcare-associated Infections

CDC > Healthcare-associated Infections (HAI) > Containment Strategy

Healthcare-associated Infections (HAI)

- HAI Data +
- Types of Infections +
- Diseases and Organisms +
- Preventing HAIs +
- Containment Strategy** -
- What Can Be Done
- Guidelines
- Case Studies
- PPE in Nursing Homes -

Frequently Asked Questions (FAQs)

### Implementation of Personal Protective Equipment (PPE) in Nursing Homes to Prevent Spread of Novel or Targeted Multidrug-resistant Organisms (MDROs)

Note: This Interim Guidance was updated on 07/26/2019 to clarify its current intended use as part of a Containment Response<sup>1</sup>. Future updates are anticipated to address potential for application of this approach outside of a Containment Response.

Print version: [Implementation of PPE in Nursing Homes to Prevent Spread of MDROs](#) (PDF - 6 pages)

Implementation of Contact Precautions, as described in the CDC Guideline for

Enhanced Barrier Precautions

On This Page

- Description of Existing Precautions
- Description of New Precautions
- Summary of PPE Use and Room Restriction
- Implementation
- References

<https://www.cdc.gov/hai/containment/PPE-Nursing-Homes.html>

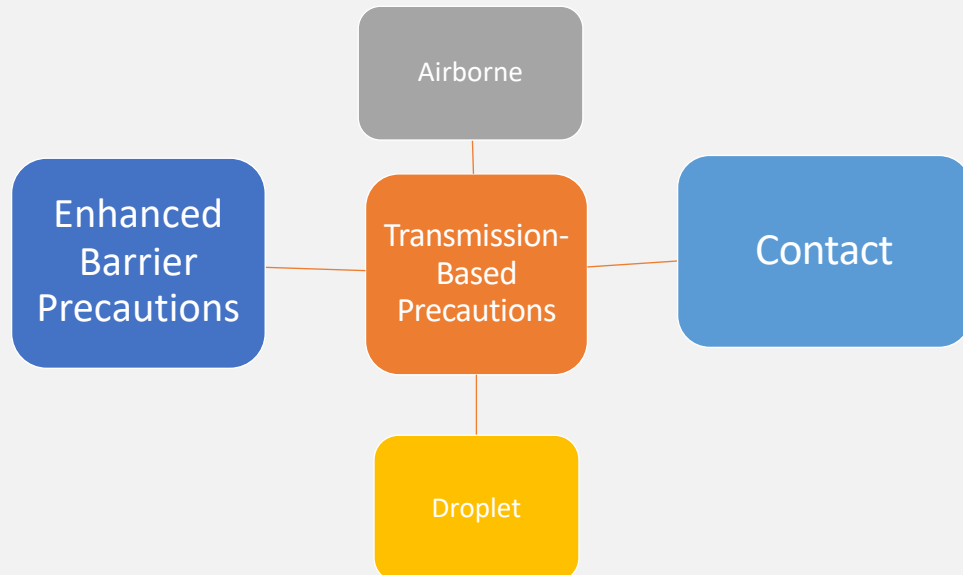
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## Pause for a Poll



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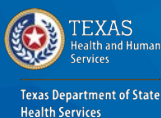
## Enhanced Barrier Precautions



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## Purpose

- Guidance on PPE use and room restrictions
- For **nursing homes** and **skilled nursing facilities**
- To prevent transmission including:
  - Pan-resistant organisms
  - Carbapenemase-producing Enterobacterales
  - Carbapenemase-producing *Pseudomonas* spp.
  - Carbapenemase-producing *Acinetobacter baumannii*, and
  - *Candida auris*



<https://www.cdc.gov/hai/containment/PPE-Nursing-Homes.html>

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## Enhanced Barrier Precautions

Gown and gloves during  
high-contact resident care activities  
with increased risk of MDRO transfer

Can apply to residents:

- Infected
- Colonized
- At-risk of acquiring



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<https://www.cdc.gov/hai/containment/PPE-Nursing-Homes.html>

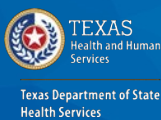
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## Adjunct to Existing Guidelines

Supplements:

- CDC Guideline for Isolation Precautions for Patients with Infectious Diseases  
<https://www.cdc.gov/infectioncontrol/guidelines-isolation-guidelines-H.pdf>
  - Guideline for the Control of Multidrug-Resistant Organisms (MDROs) in Long-Term Care Settings (2006)  
<https://www.cdc.gov/infectioncontrol/pdf/guidelines/mdro-guidelines.pdf>
- <https://www.cdc.gov/hai/containment/PPE-Nursing-Homes.html>

Does not replace the use of these guidelines



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Precautions	Applies to:
Contact	<p><b>All residents infected or colonized</b> with a novel or targeted MDRO in any of the following situations:</p> <ul style="list-style-type: none"> <li>• Acute diarrhea, draining wounds or other sites of secretions or excretions unable to be covered or contained</li> <li>• On unit or facility where ongoing transmission is documented or suspected</li> <li>• Infections and other conditions where Contact Precautions is recommended</li> </ul>
Enhanced Barrier	<p><b>All residents with</b> any of the following:</p> <ul style="list-style-type: none"> <li>• Infection or colonization with a novel or targeted MDRO when Contact Precautions do not apply</li> <li>• Wounds or indwelling medical devices regardless of MDRO colonization status who reside on a unit or wing where a resident known to be infected or colonized resides</li> </ul> <p>Facilities may consider applying Enhanced Barrier Precautions to residents infected or colonized with other epidemiologically-important MDROs based on facility policy.</p>

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Precautions	PPE used for these situations:
Contact	<b>Any room entry</b>
Enhanced Barrier	<b>During high-contact resident care activities:</b> <ul style="list-style-type: none"> <li>• Dressing</li> <li>• Bathing/showering</li> <li>• Transferring</li> <li>• Providing hygiene</li> <li>• Changing linens</li> <li>• Changing briefs or assisting with toileting</li> <li>• Device care or use: central line, urinary catheter, feeding tube, tracheostomy/ ventilator</li> <li>• Wound care: any skin opening requiring a dressing</li> </ul>

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Precautions	Required PPE	Room Restriction
Contact	<b>Gloves and gown</b> <ul style="list-style-type: none"> <li>• Don before room entry, doff before room exit; change before caring for another resident</li> <li>• Face protection may also be needed if performing activity with risk of splash or spray</li> </ul>	Yes, except for medically necessary care
Enhanced Barrier	<b>Gloves and gown prior to the high-contact care activity</b> <ul style="list-style-type: none"> <li>• Change PPE before caring for another resident</li> <li>• Face protection may also be needed if performing activity with risk of splash or spray</li> </ul>	None

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## EBP – not recommended for:

- Any facility other than a nursing home or skilled nursing facility
- Residents with acute diarrhea, uncontained secretions or excretions
- Residents with conditions where contact precautions should be used (ex: C. diff, scabies, norovirus, C. auris)
- Facilities with a current outbreak or cluster of any MDRO

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## Implementation

- Clear signage
- List high-contact resident care activities
- Make PPE available
  - outside of the resident room



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## Implementation

- Alcohol-based hand rub in every room
- Accessible trash can
- Audit compliance
- Educate
  - Staff
  - Residents
  - Visitors



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## Implementation

- For all residents in an area that house a colonized/infected resident.
- EBP is for the entire stay while resident that is under Contact Precautions is in house.
- Residents on the unit or wing may be transitioned to Standard Precautions when their wound heals or the device is removed.

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## Implementation

- A negative retest or screen  $\neq$  removal of EBP
  - EBP stays for the **duration of their stay in healthcare facilities**

Why not?

- MDRO colonization is prolonged
- False negatives
- CDC does not recommend routine retesting of residents with a history of colonization or infection with a targeted MDRO.



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## Public Health

As public health provides the notices for the novel or targeted MDROs, they will be advising the facility on this approach.



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## Public Health

Times that public health may not be involved:

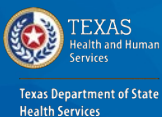
- Some nursing homes may elect to implement EBP more broadly regardless of presence of an MDRO in their facility.
- Facilities may adopt EBP to other epidemiologically-important MDROs.



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## In Summary

- Intended for use only in a nursing facility
- Does not replace use of Standard or Contact Precautions
- Goes beyond applying precautions to the known colonized/infected residents
- Does not restrict the resident movement/ participation within the facility
- EBP Updates are coming



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# Thank you!

**Enhanced Barrier Precautions in the LTC Setting**

**MDROTexas@dshs.Texas.gov**

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## How did CDC choose the high-contact resident care activities described in the guidance?

The high-contact resident care activities described in the guidance were chosen based on hundreds of observations of care in nursing homes that evaluated the potential for antibiotic resistant bacteria to contaminate the hands and clothing of healthcare personnel. **Those activities that demonstrated the highest risk for transfer to hands and clothing were included in the CDC guidance.**



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<https://www.cdc.gov/hai/containment/faqs.html>

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## Why did CDC expand Enhanced Barrier Precautions to include residents with wounds or indwelling medical devices, regardless of MDRO status?

Indwelling medical devices and wounds are risk factors that place residents at risk for colonization with an MDRO. Once colonized, these residents can serve as sources of transmission within the facility.



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<https://www.cdc.gov/hai/containment/faqs.html>

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## Are Enhanced Barrier Precautions recommended for methicillin-resistant *Staphylococcus aureus* (MRSA)?

Currently the CDC guidance on the use of Enhanced Barrier Precautions is focused on preventing the spread of novel or targeted MDROS, defined as

- pan-resistant organisms
- *Candida auris* and
- carbapenemase-producing organisms (Enterobacterales, *Pseudomonas* spp and *Acinetobacter baumannii*).



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<https://www.cdc.gov/hai/containment/faqs.html>

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## How long should a resident remain on Enhanced Barrier Precautions?

Enhanced Barrier Precautions are intended to be used for the duration of a resident's stay in a facility. Public health should be consulted to discuss on a case-by-case basis.



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<https://www.cdc.gov/hai/containment/faqs.html>

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**My nursing home is receiving a resident known to be colonized with a novel or targeted pathogen from an acute care hospital. The resident was on Contact Precautions in the hospital. Do we need to continue Contact Precautions in our facility or may we use Enhanced Barrier Precautions?**

The resident should be maintained on Contact Precautions if he or she has acute diarrhea, draining wounds or other sites of secretions or excretions that are unable to be covered or contained or the facility is currently in the midst of an outbreak. Otherwise, Enhanced Barrier Precautions would be appropriate for the management of this resident.



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<https://www.cdc.gov/hai/containment/faqs.html>

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