

Cohorting Guidance for Patients or Residents Infected or Colonized with Multidrug-resistant Organisms

Multidrug-resistant organisms (MDRO) are bacteria or fungi resistant to multiple classes of antimicrobials. When there is more than one patient or resident colonized or infected with MDRO in a facility, cohorting those with the same MDRO into dedicated units or areas of the facility is a strategy that is known to prevent transmission. MDRO targeted for cohorting include *Candida auris* (*C. auris*), carbapenemase-producing organisms (CPO), and other emerging MDRO.¹ CDPH recommends obtaining carbapenemase-testing for all carbapenem-resistant organisms (CRO) to inform cohorting.

MDRO cohorts include patients or residents who are known to be infected or colonized with the same MDRO.² Two types of MDRO cohorts can be implemented in a healthcare facility:

1. **A within-room cohort** is where patients or residents with the same MDRO or carbapenemase (e.g., KPC, NDM) are placed within one room, regardless of specimen source, infection, or colonization status.
2. **A multi-room cohort** is a designated area of the facility that contains multiple within-room cohorts with the same MDRO or carbapenemase; e.g., multiple within-room cohorts are placed together at the end of a hallway, unit, or floor.

¹ Excludes more common MDRO such as vancomycin-resistant Enterococcus (VRE), methicillin-resistant *Staphylococcus aureus* (MRSA), and extended-spectrum β -lactamase (ESBL)-producing organisms.

² MDRO colonization=identification of an MDRO at a body site with no signs or symptoms of infection; MDRO infection=clinical signs and symptoms of disease that are attributable to an MDRO that is isolated from a body fluid associated with the infection and requires targeted antimicrobial therapy to treat the infection, (e.g., respiratory tract culture and pneumonia, blood culture and sepsis, urine and urinary tract infection).

Table 1. Principles of Patient or Resident Cohorting by MDRO Type

Organism	Examples	Cohorting Recommendations
<i>Candida auris</i> (<i>C. auris</i>)	N/A	Always cohort patients or residents with <i>C. auris</i> together with others that have <i>C. auris</i>
Carbapenemase-producing organism (CPO)	Bacteria producing one or more carbapenemases, such as KPC, IMP, VIM, OXA, NDM, ¹ e.g., <ul style="list-style-type: none"> • KPC-<i>Escherichia coli</i> • NDM-<i>Acinetobacter baumannii</i> • VIM-<i>Pseudomonas aeruginosa</i> 	<ol style="list-style-type: none"> 1. Prioritize cohorting by the same carbapenemase(s) and organism combination, e.g., <ul style="list-style-type: none"> • KPC-<i>E. coli</i> with KPC-<i>E. coli</i> • NDM/KPC-<i>E. coli</i> with NDM/KPC-<i>E. coli</i> 2. If not possible, cohort by carbapenemase(s), e.g., <ul style="list-style-type: none"> • KPC with KPC • NDM/OXA-23 with NDM/OXA-23 • Patient or resident with KPC, OXA-48, and NDM carbapenemases with another patient or resident that has KPC, OXA-48, and NDM carbapenemases
Carbapenem-resistant organism (CRO) (not tested for carbapenemases ²)	Carbapenem-resistant <ul style="list-style-type: none"> • Enterobacterales (CRE) • <i>P. aeruginosa</i> (CRPA) • <i>A. baumannii</i> (CRAB) 	Cohort by organism combination, e.g., <ul style="list-style-type: none"> • CRPA with CRPA • Patient or resident with CRE and CRAB with another patient or resident with CRE and CRAB

¹ KPC=*Klebisella pneumoniae* carbapenemase; IMP=imipenemase; VIM=Verona integron-encoded metallo-β-lactamase; OXA=oxacillinase; NDM=New Delhi metallo-β-lactamase

² Routine room placement may be applied for patients or residents with CRO that are known to be tested and negative for carbapenemases. Patients or residents with CRO that were not tested for carbapenemases should be cohorted based on the CRO. Please see [CDPH Algorithm for Prioritizing Carbapenemase Testing](https://www.cdph.ca.gov/Programs/CHCQ/HAI/CDPH%20Document%20Library/CPTestingPrioritizationAlgorithm.pdf) (PDF) (www.cdph.ca.gov/Programs/CHCQ/HAI/CDPH%20Document%20Library/CPTestingPrioritizationAlgorithm.pdf).

General Patient or Resident Cohorting Principles

- 1. Cohort patients or residents colonized or infected with MDRO for the duration of their admission.** There are no “clearance” recommendations for colonization with these MDRO.
- 2. Consider other communicable disease statuses** (e.g., COVID-19, *Clostridioides difficile*) when cohorting patients or residents.
- 3. When creating MDRO cohorts, prioritize cohorting patients or residents with rare, highly resistant, or multiple carbapenemases or organisms.**
 - This includes patients or residents with *C. auris*; CPO with 2 or more carbapenemases; carbapenemase-producing (CP) *P. aeruginosa* or *A. baumannii*¹; and NDM, VIM, IMP, or OXA-48-like CP Enterobacterales.
- 4. Dedicate direct care healthcare personnel (HCP) (e.g., nursing) to provide care only for patients or residents in an MDRO cohort during a specific shift.**
 - This does not imply one-to-one staffing or primary nursing.
 - Ensure dedicated HCP do not have responsibility to care for non-MDRO individuals.
 - HCP who cannot be dedicated to patients or residents in an MDRO cohort (e.g., respiratory therapist) should care for patients or residents without MDRO before those with MDRO, whenever feasible.
- 5. Dedicate medical equipment (e.g., pulse oximeter) to an MDRO cohort.**
 - For medical equipment that cannot be dedicated (e.g., large physical therapy equipment), consider scheduling patients with MDRO to receive their treatment at the end of the day.
 - Thoroughly clean and disinfect shared medical equipment after each use with a hospital-grade disinfectant effective against the pathogen of concern (e.g., [List P](http://www.epa.gov/pesticide-registration/list-p-antimicrobial-products-registered-epa-claims-against-candida-auris) (www.epa.gov/pesticide-registration/list-p-antimicrobial-products-registered-epa-claims-against-candida-auris) for *C. auris*)).
- 6. Avoid excessive patient or resident movement as this can lead to additional transmission.**
 - Wait for all pending test or colonization screening results before moving patients or residents into a cohort in a facility.
- 7. HCP should treat each bed space in a multi-occupancy room as a separate room.**
 - Change personal protective equipment (PPE) and perform hand hygiene between each patient or resident.
- 8. When cohorting patients or residents in a 3+ bed room, choose rooms that can support greater physical separation, when possible.**
 - Provide 3-6 feet separation with a privacy curtain between beds.

¹ Excluding OXA-23 or other more commonly identified (e.g., OXA-24/40, -58, -235, or -237) CP *A. baumannii*.

9. **Create a multi-room cohort if there are multiple patients or residents with MDRO or rooms with patients or residents with MDRO in the facility.**
 - Locate the multi-room cohort in an area that is physically separated and as distant as possible from other rooms (e.g., at the end of the hallway).
 - Avoid use of plastic barriers (including at the entrance to patient rooms) as these can become contaminated and a source of transmission.
10. **Engage frontline staff in MDRO prevention strategies.**
 - Share data from routine adherence monitoring and point prevalence surveys (PPS).
 - Show trends over time so that frontline staff may see the results of their efforts or areas needing improvement.
11. For **cohorting guidance specific to skilled nursing facilities (SNF)**, see [MDRO Cohorting Guide for SNF](https://www.cdph.ca.gov/Programs/CHCQ/HAI/CDPH%20Document%20Library/MDROcohortingSNF.pdf) (PDF)
(www.cdph.ca.gov/Programs/CHCQ/HAI/CDPH%20Document%20Library/MDROcohortingSNF.pdf).
12. Patient or resident cohorting can be a complicated and challenging process. **Please contact the CDPH HAI Program at HAIProgram@cdph.ca.gov** for additional guidance.

Frequently Asked Questions

Q: How long do we keep patients or residents with MDRO cohorted?

A: Patients or residents with these MDRO can remain colonized for months or even years; therefore, we recommend keeping them cohorted for the duration of their admission.

Q: What if a patient or resident with an MDRO doesn't have a "match" (by carbapenemase, organism, or gender) to room with?

A: If there is not another patient or resident of the same gender, and carbapenemase/organism combination to cohort with, prioritize:

- Placing patients or residents with the greatest number of carbapenemase/organism combinations (e.g., patient with VIM-*P. aeruginosa*, NDM-*E. coli*, and *C. auris*) in a single-occupancy room.
- Cohorting with another patient or resident who has the fewest risk factors for MDRO acquisition (i.e., indwelling devices, unhealed wounds, requiring total assistance for activities of daily living).
- Placing patients or residents with the rarest, most highly resistant or greatest number of carbapenemase/organism combinations against the back wall, ideally in a 3-bed room with the middle bed unoccupied (e.g., patient with VIM, NDM, and *C. auris* against back wall and patient with VIM only in bed closest to door).

Q: There are too many patients or residents with different MDRO combinations to be able to cohort all of them. What do I do?

A: Prioritize cohorting patients or residents with rare, highly resistant, or multiple carbapenemases or organisms. This includes patients or residents with *C. auris*; CPO with 2 or more carbapenemases; CP *P. aeruginosa* or *A. baumannii*¹; NDM, VIM, IMP, or OXA-48-like CP Enterobacterales.

Q: What if a patient or resident has *C. auris* and a CPO?

A: Depending on the facility, they may create cohorts within cohorts. For example, if there is an existing cohort of patients or residents with *C. auris* (see Fig. 1 in orange), they may create cohorts of patients or residents with matching CPO or carbapenemase (e.g., KPC with KPC) within the *C. auris* cohort (see Fig. 1 in orange and blue); otherwise, cohort patients or residents with the same MDRO combinations together (e.g., *C. auris* and NDM with *C. auris* and NDM, *C. auris* and VIM with *C. auris* and VIM).

Q: We have a limited number of single-bed rooms. Who should we prioritize to place in them?

A: When single-bed rooms are limited, prioritize patients or residents with:

- the greatest number of carbapenemase/organism combinations (e.g., VIM and NDM and *C. auris*)
- the rarest or most resistant organism in your region or facility. This might include:

¹ Excluding OXA-23 or other more commonly identified (e.g., OXA-24/40, -58, -235, or -237) CP *A. baumannii*.

- *C. auris* in facilities with 1 or 2 patients with *C. auris*
- KPC, NDM, VIM, IMP, OXA-48-like CP *P. aeruginosa* or *A. baumannii*
- NDM, VIM, IMP, OXA-48-like CP Enterobacterales

Q: What should I do if I have patients or residents with the same carbapenemase but different organisms, e.g., NDM-*A. baumannii* and NDM-*E. coli*?

A: If possible, cohort these patients or residents separately; however, if not possible, because patients or residents have the same carbapenemase, you may cohort them together.

Q: What if our facility can create within-room cohorts by MDRO, but patients or residents with different MDRO or no MDRO still have to share a bathroom?

A: If patients or residents with different MDRO status must share a bathroom, place disinfecting wipes in the room and bathroom to be used before and after every bathroom use.

Example Figures

Figure 1. Cohort within a cohort

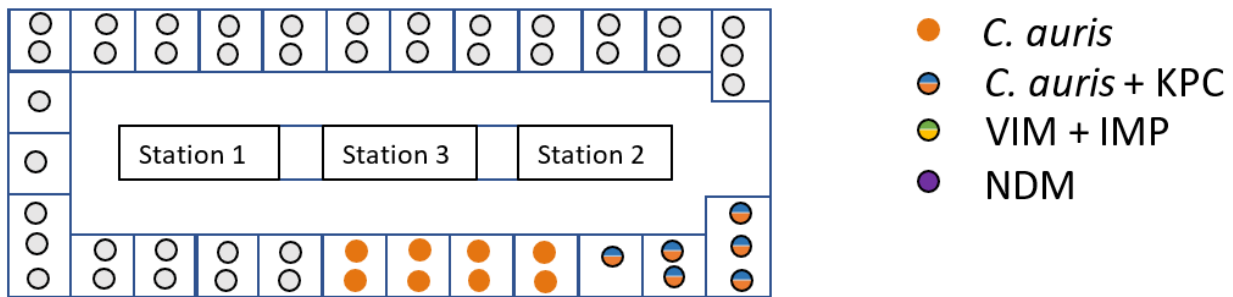
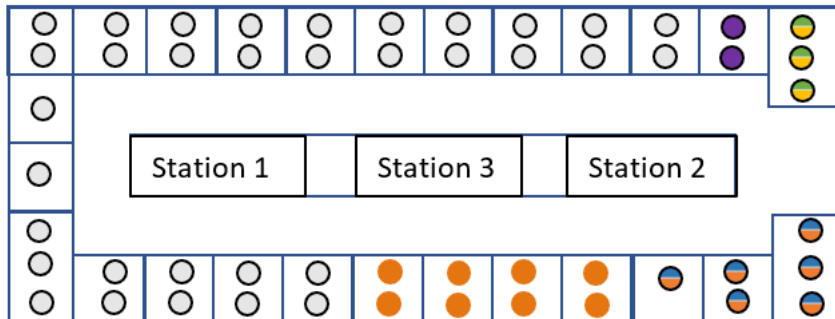


Figure 2. Cohort by carbapenemase/organism combination



Resources

- [CDPH Enhanced Standard Precautions Webpage](http://www.cdph.ca.gov/Programs/CHCQ/HAI/Pages/ESP.aspx) (www.cdph.ca.gov/Programs/CHCQ/HAI/Pages/ESP.aspx)
- [CDPH Carbapenem-resistant and Carbapenemase-producing Organisms Webpage](http://www.cdph.ca.gov/Programs/CHCQ/HAI/Pages/CRE_InfectionPreventionStrategies.aspx) (www.cdph.ca.gov/Programs/CHCQ/HAI/Pages/CRE_InfectionPreventionStrategies.aspx)
- [CDPH C. auris Webpage](http://www.cdph.ca.gov/Programs/CHCQ/HAI/Pages/Candida-auris.aspx) (www.cdph.ca.gov/Programs/CHCQ/HAI/Pages/Candida-auris.aspx)