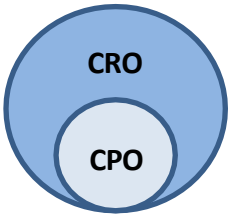
California Department of Public Health

Carbapenemase-Producing Organisms Quicksheet

The CDPH Healthcare-Associated Infections (HAI) Program created the carbapenemase-producing organisms (CPOs) Quicksheet to provide guidance to local health departments (LHDs) responding to CPO cases at **all levels** of local CPO endemicity. This Quicksheet is designed to be used alongside the CDPH Regional CPO Prevention and Response Strategy[1] ("Response Phases" document), which provides additional infection prevention and control (IPC) and screening recommendations that change based on local or regional CPO epidemiology**. Implementing some practices (e.g., cohorting) in this guidance can be challenging or not feasible in some healthcare facilities, but this should not preclude facilities from accepting and caring for patients and residents with CPOs.**

Background and Epidemiology

- Carbapenem-resistant organisms (CROs) are gram-negative bacteria that are resistant to at least one carbapenem antibiotic (e.g., meropenem). CROs include carbapenem-resistant Enterobacterales (CRE), *Pseudomonas aeruginosa* (CRPA), and *Acinetobacter baumannii* (CRAB).
- A ***subset*** of CROs are carbapenemase-producing organisms (CPOs). CPOs make carbapenemase enzymes (e.g., NDM, KPC, OXA, VIM, IMP[2]) which inactivate carbapenem antibiotics. Examples of CPOs that have been identified in California include VIM-CRPA, NDM-CRAB, and KPC-*E. coli*.



- Carbapenemase genes can be transmitted within and between bacterial species on mobile genetic elements, which can increase the spread of antimicrobial resistance.
- CPOs can cause outbreaks in healthcare settings, tend to be more difficult to treat, and have poorer patient outcomes.
- CPOs can spread patient-to-patient via transient contamination of the hands or clothing of healthcare personnel (HCP), or via contaminated equipment or the healthcare environment.
- Risk factors include presence of indwelling medical devices, broad-spectrum antibiotic or antifungal use, and recent international travel or healthcare exposure.
- In California, CPO cases have been increasing since 2019 (Fig. 1). We are also seeing a rise in dual mechanism CPOs, and rarer organism and mechanism CPO combinations (Fig. 2).

Fig. 1. CPO Cases Reported by Organism, 2019–2023

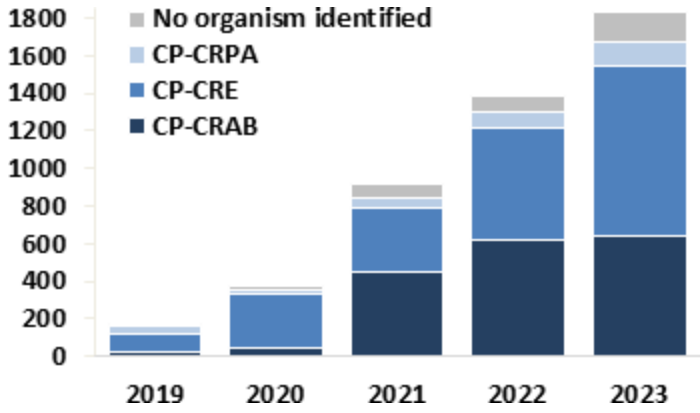
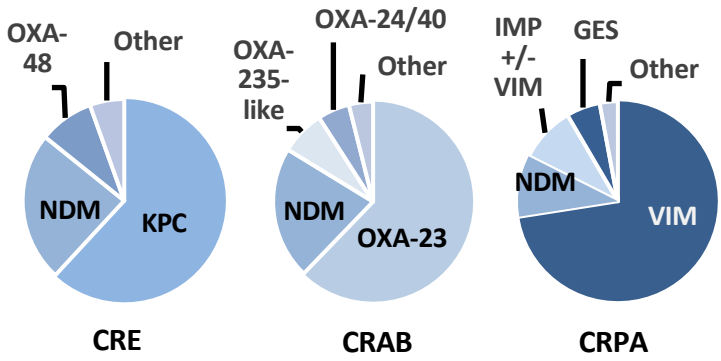


Fig. 2. Carbapenemases Identified in CRE, CRAB and CRPA Isolates, 2019–2023



[1] CDPH CPO Response Phases (PDF) (www.cdph.ca.gov/Programs/CHCQ/HAI/CDPH%20Document%20Library/CPO_Phases.pdf)

[2] GES = Guiana extended-spectrum β-lactamase, KPC = *Klebsiella pneumoniae* carbapenemase, IMP = imipenemase, NDM = New Delhi metallo-β-lactamase (NDM), OXA = oxacillinase, VIM = Verona integron metallo-β-lactamase

For more information or consultation, contact HAIProgram@cdph.ca.gov or call 510-412-6060.

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CRO versus CPO

- If not already completed, CROs should be tested for carbapenemases.[3]
- Some IPC measures are implemented for patients with CROs. However, contact tracing and screening are reserved for confirmed CPO cases and generally not indicated for CRO cases.
- See IPC practice and carbapenemase testing recommendations for CROs in the companion document at the end of the Quicksheet.

CPO Reporting Requirements[4, 5, 6]

- ✓ CPOs are reportable by laboratories.
- ✓ Report unusual infectious disease occurrences and outbreaks to CDPH Licensing & Certification if in a licensed healthcare facility.

CPO Containment Recommendations

1. Surveillance

a. Identification of CPOs from Clinical Isolates

- Clinical labs perform carbapenemase testing on confirmed CRE, CRPA (additionally non-susceptible to cefepime or ceftazidime, or resistant to ceftolozane/tazobactam), and CRAB isolates.[3]
- Carbapenemase testing is available at some local public health labs and the CDPH Microbial Diseases Laboratory (MDL).[7]
- Clinical labs immediately notify clinicians and infection prevention staff whenever a CPO is identified.

b. Enhanced Detection among High-Risk Populations

- For the following patients at risk of CPO acquisition, healthcare facilities screen for CPOs and place on empiric Contact Precautions, or implement Enhanced Barrier Precautions (EBP)[8] empirically in SNFs with no outbreak, pending the test result[9]:
  - patients admitted **to** any long-term acute care hospital (LTACH) or ventilator-equipped skilled nursing facility (vSNF) ventilator unit
  - patients admitted **from** any LTACH, vSNF ventilator unit, or other facility with known CPO outbreak.
    - In short-stay acute care hospitals, alternatively or additionally consider screening patients admitted to high-risk units (e.g., ICU).
  - high-risk contacts of a confirmed CPO case, including roommates, those who shared a bathroom, those who occupy the same bedspace immediately after the index patient.[10]
    - Consider patients in the same unit or facility based on LHD phase[1] and facility type.
  - Consider screening patients not included above with other known risk factors such as patients:
    - with indwelling devices, particularly those who are mechanically ventilated or trached;
    - colonized or infected with *Candida auris*, especially those requiring high-level care (e.g., indwelling medical devices, mechanical ventilation); and
    - with healthcare exposure outside of California in the past 12 months (i.e., in other states or countries).
- See Response Phases guidance for additional screening considerations.[1]

2. Investigation

- Investigate all clusters and uncommon CPOs. LHD staff may provide specific recommendations for

[3] CDPH Prioritizing Carbapenemase Testing Algorithm (PDF) (www.cdph.ca.gov/Programs/CHCQ/HAI/CDPH%20Document%20Library/CPTestingPrioritizationAlgorithm.pdf)
[4] CDPH CPO Reporting FAQ (PDF) (www.cdph.ca.gov/Programs/CHCQ/HAI/CDPH%20Document%20Library/CPOReportingFAQ.pdf)
[5] CDPH Reportable Diseases and Conditions (www.cdph.ca.gov/Programs/CID/DCDC/Pages/Reportable-Disease-and-Conditions.aspx)
[6] CDPH All Facilities Letter 23-08 (www.cdph.ca.gov/Programs/CHCQ/LCP/Pages/AFL-23-08.aspx)
[7] CDPH MDL Carbapenemase Testing FAQ (www.cdph.ca.gov/Programs/CID/DCDC/Pages/MDL-Expanded-Carbapenemase-Testing-Services-FAQs.aspx)
[8] CDC Enhanced Barrier Precautions (www.cdc.gov/long-term-care-facilities/hcp/prevent-mdro/PPE.html)
[9] CDC Preventing MDROs: FAQs (www.cdc.gov/healthcare-associated-infections/php/preventing-mdros/preventing-mdros-faqs.html)
[10] CDPH Screening Decision Tree (PDF) (www.cdph.ca.gov/Programs/CHCQ/HAI/CDPH%20Document%20Library/Tier2_Pathogen_Screening_Decision_Tree.pdf)

individual case investigation and notification based on local epidemiology.[1]

3. Initial Response and Recommendations

- LHD ensures the following information is complete in the case report:
  - Patient name, date of birth, race, ethnicity, gender, collection facility, collection facility type, date of collection, specimen source
- Phase 1 and 2 LHDs[1] collect additional epidemiological information for all healthcare exposures from at least 30 days prior to specimen collection (using CalREDIE or line list as relevant):
  - Dates of admission, discharge, initiation of Contact Precautions or EBP (if SNF)
  - Previous, subsequent healthcare exposure
  - Locations (e.g., units, rooms)
  - Additionally collect information about healthcare exposures outside California or the U.S. in the previous 12 months
- In hospitals, implement Contact Precautions and place the patient in a single-bed room. In SNFs, implement EBP if no outbreak; if no single-bed room is available, cohort with another resident colonized with the same CPO, whenever possible.[11]
- Inform receiving facilities of patient's CPO status at time of transfer (see section 5).

4. Additional IPC Recommendations

Room Placement Considerations

- Facilities with multiple patients with CPO(s) may create cohorts within rooms or in the same geographic area of the facility. Factor in other communicable disease status (e.g., *C. auris*) when creating cohorts, whenever possible.[11]
- In multi-bed rooms, treat each bed space as a separate room, even when patients are cohorted. HCP must change gown and gloves and perform hand hygiene between contact with patients in the same room.

Hand Hygiene

- Follow and audit hand hygiene practices, including the use of alcohol-based hand sanitizer as the preferred method for cleaning hands if not visibly soiled; if visibly soiled, wash with soap and water.

Transmission-based Precautions

- Contact Precautions consist of HCP use of gowns and gloves upon entry to the patient room; patients may only leave room when medically necessary.
- Continue Contact Precautions for the duration of admission in hospitals, including LTACHs.
- In SNFs, implement Contact Precautions during a CPO outbreak until containment can be demonstrated; in the absence of an outbreak, implement EBP consisting of gown and glove use during high-contact care activities. Residents may leave their room if they can be maintained in hygienic condition and don clean clothing.[12]
- Do not perform repeated cultures or screening to demonstrate CPO "clearance" for purposes of discontinuing Transmission-based Precautions, as patients may remain colonized for many months or years, possibly indefinitely.[9]

Dedicated Equipment and Staff

- Dedicate patient care equipment as much as possible to patients with CPOs, and consider using single-use, disposable devices.
- In facilities with CPO cohorts, dedicate primary HCP (e.g., nursing) to care only for patients with CPOs, whenever feasible.
- Consider providing physical therapy or other ancillary care for patients with CPOs in their room or scheduling at the end of the day.

Environmental Cleaning and Disinfection

- Conduct and audit daily and terminal cleaning and disinfection of patient care environment including high-touch surfaces, and non-dedicated equipment after use, with an EPA-registered hospital-grade disinfectant effective against gram-negative bacteria. See Response Phases guidance for phase-specific disinfectant use recommendations.[1]
- During an outbreak or when transmission is difficult to control, consider double terminal cleaning in rooms with patients with CPOs or on

[11] CDPH Cohorting Guidance (PDF) (www.cdph.ca.gov/Programs/CHCQ/HAI/CDPH%20Document%20Library/MDROCohorting.pdf)

[12] CDPH EBP: Additional Considerations for CA SNFs (PDF) (www.cdph.ca.gov/Programs/CHCQ/HAI/CDPH%20Document%20Library/EBP_AdditionalConsiderationsForCA_SNF.pdf)

affected units, i.e., perform two rounds of terminal cleaning and disinfection, with a fluorescent marker audit after each.

Adherence Monitoring and Feedback

- Conduct regular adherence monitoring to evaluate implementation of IPC measures using standardized tools and provide feedback to HCP and facility leadership.[13]
- During an outbreak, increase the frequency of adherence monitoring and feedback (e.g., weekly).

Onsite IPC Assessment

- LHDs can recommend an onsite IPC assessment in response to a CPO case or outbreak; CDPH HAI Program may be consulted as needed.

5. Communication and Follow-up

- When transferring patients with CPOs to another healthcare facility, communicate the patients' CPO status to the receiving facility at time of transfer.[14]
- When receiving transferred patients, facilities should actively seek information on multidrug-resistant organism status.
- Facilities with CPO outbreaks must inform facilities to which they transfer patients. Receiving facilities should screen such patients for the CPO(s) and place them on empiric Contact Precautions or implement EBP empirically in SNFs pending the test result.
- If a patient tests positive for a CPO on admission, notify transferring facility of the CPO status. The transferring facility should also conduct a contact investigation or point prevalence survey (PPS).
- LHDs may request to be notified when healthcare facilities transfer patients with CPOs.
- Flag the medical record of patients with CPOs to ensure IPC measures are implemented upon readmission. Do not rescreen patients who have previously tested positive for a CPO(s) unless they are at risk for a different CPO (e.g., patient has NDM-CRAB but was exposed to VIM-CRPA).
- Provide education materials to patients, their families, and HCP as needed.[15]
  - A template letter is available that healthcare facilities can provide to patients when they discharge home.

6. Considerations for Other Healthcare Settings (e.g., dialysis, outpatient, home health)[16]

- IPC practices for CPOs are similar across other healthcare settings. Ensure:
  - hand hygiene before and after entering the patient's room and providing care.
  - implementation of Contact Precautions, or EBP for inpatient settings.
  - scheduling the patient to receive care at the end of the day, whenever possible.
  - environmental cleaning and disinfection of the patient's care environment and any reusable medical equipment with a disinfectant effective against the CPO. See Response Phases guidance for phase-specific disinfectant use recommendations.[1]
  - the patient's CPO status is communicated if the patient needs to be transferred to a healthcare facility.
- Healthcare settings within correctional facilities should generally follow the recommended IPC practices for the type of healthcare provided. Specific IPC measures are generally not indicated for non-healthcare settings in correctional facilities.
- LHDs can consider adapting many of these practices to non-healthcare congregate residential settings (e.g., implementation of EBP in assisted living facilities, group or board and care homes).
- In any of these settings, screening contacts may be indicated in certain circumstances.
- LHD may consult with HAI Program for additional guidance.

[13] CDPH Adherence Monitoring (www.cdph.ca.gov/Programs/CHCQ/HAI/Pages/MonitoringAdherenceToHCPracticesThatPreventInfection.aspx)

[14] CDPH Interfacility Transfer Communications (www.cdph.ca.gov/Programs/CHCQ/HAI/Pages/InterfacilityCommunication.aspx)

[15] CDPH CPO for Patients and their Families (www.cdph.ca.gov/Programs/CHCQ/HAI/Pages/CPO_InfoForPatientsAndFamilies.aspx)

[16] CDC IPC for *C. auris* provides IPC guidance for *C. auris* that can also apply to CPOs (www.cdc.gov/candida-auris/hcp/infection-control/index.html)

Guidance for Local Health Department Follow-up on Carbapenem-Resistant Organism (CRO) Isolates

As CRO and carbapenemase-producing organism (CPO) cases continue to increase in California, CDPH recommends prioritizing public health action that will have the greatest impact at reducing the spread of the most concerning antimicrobial-resistant pathogens. This includes focusing containment and response efforts on confirmed CPO cases; however, there are still infection prevention and control (IPC) and carbapenemase testing considerations for patients identified with CROs.

A. CROs that *HAVE NOT* been tested for carbapenemases

1. When resources allow and if the CRO isolate is still available, perform or access carbapenemase testing based on the CDPH carbapenemase testing prioritization algorithm.[17]
   - CRO isolates can be tested at clinical or reference laboratories[18]; they can also be forwarded for carbapenemase testing at some local public health laboratories[19] or the CDPH Microbial Diseases Laboratory (MDL).[20]
   - Depending on the carbapenemase test result, manage according to section B1 or B2 below.
2. If the CRO isolate is not available, consider all carbapenem-resistant *Acinetobacter baumannii* (CRAB) to be carbapenemase-producing. For non-tested carbapenem-resistant Enterobacterales (CRE) and *Pseudomonas aeruginosa* (CRPA), consider reculturing and accessing carbapenemase testing for patients or residents with ongoing or anticipated stays in a healthcare facility and based on known epidemiological risk factors including prior exposure to a CPO outbreak facility, being a close contact of a known CPO-positive patient, receipt of healthcare outside the US in the past 12 months, or having a highly resistant isolate.
   - If the patient has no known risk factors, manage non-tested CRE and CRPA like a CRO case confirmed negative for carbapenemases (see B1).
3. Communicate the patient's CRO status if the patient is going to be transferred to another healthcare facility.

B. CROs that *HAVE* been tested for carbapenemases

1. CRO **confirmed negative** for carbapenemases
   - Manage as determined by facility-specific policy or local health department guidance.
   - In SNFs, implement Enhanced Barrier Precautions (EBP) based on presence of indwelling devices or unhealed wounds.[21]
2. CRO **confirmed positive** for carbapenemases (i.e., CPO)
   - Implement Contact Precautions in hospitals or EBP in SNFs.
   - See Quicksheet for reporting (page 2), surveillance (page 2, section 1), and IPC (pages 3-4, sections 3-6) recommendations.
3. Communicate the patient's CRO or CPO status if the patient is going to be transferred to another healthcare facility.

[17] CDPH Prioritizing Carbapenemase Testing Algorithm (PDF) (www.cdph.ca.gov/Programs/CHCQ/HAI/CDPH%20Document%20Library/CPTestingPrioritizationAlgorithm.pdf)
[18] LACDPH List of Carbapenemase Testing Resources (PDF) (publichealth.lacounty.gov/acd/docs/LaboratorieswithCPOScreening.pdf)
[19] California Public Health Laboratories (www.caphld.org/network-laboratories)
[20] CDPH MDL Carbapenemase Testing FAQ (www.cdph.ca.gov/Programs/CID/DCDC/Pages/MDL-Expanded-Carbapenemase-Testing- Services-FAQs.aspx)
[21] CDC Enhanced Barrier Precautions (www.cdc.gov/long-term-care-facilities/hcp/prevent-mdro/PPE.html)

California Department of Public Health (CDPH) Regional Carbapenemase-Producing Organism (CPO) Prevention and Response Strategy

Introduction

Local health jurisdictions (LHJs) can use the Regional Carbapenemase-Producing Organism (CPO) Prevention and Response Strategy ("Response Phases") document to guide prevention, response, and mitigation activities, and recommendations that depend on local or regional CPO epidemiology. The "Response Phases" document is designed to complement the CPO Quicksheet[22] which provides response recommendations for all levels of CPO endemicity. The CPO Response Phases largely correspond to the Antimicrobial-resistant (AR) Pathogen Tiers (see Table 1). If an LHJ is responding to a healthcare facility with CPOs included in multiple tiers (e.g., KPC-*Klebsiella pneumoniae* in Tier 3 and NDM-*E. coli* in Tier 2), follow recommendations for the phase corresponding to the less endemic tier (e.g., Phase 2 for NDM-*E. coli*). The recommendations described in this document are the minimum set of prevention and response activities and do not preclude LHJs from providing more stringent recommendations to their healthcare facilities.

Definitions

Screening refers to the collection of rectal or other swabs to test for colonization in individuals exposed to or at risk of acquiring CPOs.

Individuals at high risk of CPO acquisition include those:

- who are close healthcare contacts of a confirmed CPO case, including roommates, those who shared a bathroom, those who occupy the same bedspace immediately after the index patient, and patients or residents on the same unit or in the same facility;
- mechanically ventilated or trached admitted to long-term acute care hospitals (LTACHs) or ventilator (subacute) units of skilled nursing facilities (vSNFs);
- admitted from facilities with known CPO transmission;
- colonized or infected with *Candida auris*, especially those requiring high-level care (e.g., indwelling medical devices, mechanical ventilation); and
- with international healthcare exposure in the last 12 months, especially those colonized or infected with *C. auris*.

Facilities at high risk of CPO introduction and spread include:

- LTACHs
- vSNFs (particularly ventilator units)
- Acute care hospital (ACH) high-acuity units, e.g., intensive care, step-down, burn, and oncology units

Table 1. Response Phase Crosswalk with AR Pathogen Tiers[23]

The CDPH AR Pathogen Containment Plan Tiers were designed to help LHJs prioritize which AR pathogens are most critical for public health follow-up. These tiers can be locally adapted to fit each LHJ's needs and are generally aligned with a Response Phase.

Phase and Description	Pathogen Tier	Tier Description	Tier Pathogens*	Description
Phase 1: Prevention	All Tiers	All tiered AR pathogens	All AR pathogens listed below	Support enhanced detection, infection prevention and control (IPC) practices, and antimicrobial stewardship.
Phase 2: Aggressive Containment and Prevention	Tiers 1-2	**Tier 1:** Pathogens, resistance mechanisms never or very rarely detected in California	• Novel organism or resistance mechanism	Carry out response-driven screening, improvements in IPC practices, and additional laboratory surveillance.
		Tier 2: Pathogens, resistance mechanisms not commonly detected in California	• *Candida auris* • Non-KPC-producing Enterobacterales† • Uncommon carbapenemase-producing *Acinetobacter* spp.‡ • Carbapenemase-producing *Pseudomonas* spp.§	
Phase 3: Mitigation	Tier 3	**Tier 3:** Pathogens, resistance mechanisms regularly detected in California but not endemic	• KPC-producing Enterobacterales** • OXA-23-like-, OXA-24/40-like-, OXA-58-like-, OXA-235-like-producing *Acinetobacter* spp.	Transition to routine, less frequent screening and facility-based follow-up including strengthening IPC practices.
Phase 4: Maintenance	Tier 4	**Tier 4:** Pathogens, resistance mechanisms endemic in California	None of the AR pathogens in this framework is endemic statewide. However, levels of endemicity vary regionally. Some Tier 2 and 3 pathogens may be considered Tier 4 pathogens in some LHJs.	Continue decreasing frequency of screening, intensifying focus on preventing adverse clinical outcomes, and optimizing IPC practices.

* Tiers do not include methicillin-resistant *Staphylococcus aureus* (MRSA), vancomycin resistant *Enterococcus* (VRE), extended-spectrum beta-lactamase-producing Enterobacterales (ESBL), and other common AR pathogens.

† Includes imipenemase (IMP)-, New Delhi metallo-beta-lactamase (NDM)-, oxacillinase (OXA)-48-like-, and Verona-integron-encoded metallo-beta-lactamase (VIM)-producing Enterobacterales

‡ Includes *Klebsiella pneumoniae* carbapenemase (KPC)-, IMP-, NDM-, OXA-48-like-, VIM-producing *Acinetobacter* spp.

§ Includes KPC-, IMP-, NDM-, OXA-48-like, VIM-, and some Guiana extended-spectrum beta-lactamase (GES)-producing *Pseudomonas* spp.

** KPC identified from a rectal swab without an organism recovered is assumed to be KPC-Enterobacterales unless other laboratory or epidemiological evidence suggests otherwise.

All Phases and Facilities

1. See CPO Quicksheet for response recommendations across all phases and facilities.[22]
2. All confirmed CPO cases are laboratory reportable.[24]
3. Ensure laboratories can perform or access carbapenemase testing for clinical isolates and healthcare facilities have access to routine CPO screening resources.[25] The state[26] and some local public health[27] laboratories have carbapenemase testing resources.
4. Promote antimicrobial stewardship (AS) in all healthcare facilities.
    - Ensure appropriate use of broad-spectrum antibiotics and antifungals; e.g., do not treat organisms isolated from non-sterile sites without evidence of infection.
    - Engage facility leadership on implementation of core elements, including:
        - who is responsible for AS in the facility;
        - how the facility is tracking or monitoring antimicrobial use, and for which antimicrobials; and
        - whether the facility has a process for reassessing the indication and duration for antimicrobial prescriptions.
    - Encourage participation in CDPH AS initiatives,[28] including the AS Program Honor Roll and multidrug-resistant organism (MDRO) prevention collaboratives.[29]
5. Ensure facility-wide implementation of Enhanced Barrier Precautions (EBP) in SNFs. CPOs are included in the CDC list of targeted MDROs for which EBP are indicated, in addition to indwelling devices and unhealed wounds.[30] In units where CPO transmission has been identified, recommend placing residents known to be CPO-positive on Contact Precautions until containment can be demonstrated; refer to EBP: Additional Considerations for California SNFs for guidance on transitioning from Contact Precautions to EBP.[31] LHJs may adapt EBP principles in non-healthcare congregate residential settings (e.g., assisted living facilities, group home, board and care) for known CPO-positive individuals.
6. Refer to the *C. auris* Response Phases document for recommendations on disinfectant use by healthcare facilities corresponding to their *C. auris* phase (for a summary, see Table 2). As a reminder, List P disinfectants[32] are effective against *C. auris* as well as other MDROs including CPOs.

Table 2. Recommendations for List P Disinfectant[32] Use by Healthcare Facility Type and Response Phase

This table summarizes recommendations for use of a List P disinfectant (List K disinfectant or bleach, if not accessible) in healthcare settings depending on the *C. auris* Response Phase a healthcare facility or LHJ is experiencing. In general, as *C. auris* endemicity increases, the recommendations for use of a List P disinfectant become stronger both within a healthcare facility and across facility types. In facilities or units where a List P disinfectant is not indicated, ensure the use of an Environmental Protection Agency (EPA)-registered hospital-grade disinfectant according to label instructions for facility-wide daily and terminal cleaning and disinfection. As a reminder, List P disinfectants are effective against *C. auris* as well as other MDROs including CPOs.

<table>
<tr><th></th><th>ACH</th><th>LTACH</th><th>SNF</th><th>vSNF</th></tr>
<tr><td>Phase 1: No C. auris cases</td><td>Per routine facility protocol</td><td rowspan="4">Facility-wide</td><td>Per routine facility protocol</td><td>Use List P disinfectant in vent unit. Consider using List P disinfectant facility-wide.</td></tr>
<tr><td>Phase 2: Newly identified C. auris cases</td><td>In affected unit(s) (with cases or where transmission is suspected)</td><td>For a single C. auris case: in affected resident’s room

When C. auris transmission is suspected or confirmed: in affected unit(s)</td><td rowspan="3">Facility-wide</td></tr>
<tr><td>Phase 3: Ongoing local transmission</td><td>In affected and high-acuity* units. Consider using List P disinfectant facility-wide.</td><td>In affected unit(s)</td></tr>
<tr><td>Phase 4: Ongoing regional transmission</td><td>Facility-wide</td><td>Facility-wide</td></tr>
</table>

* Including, but not limited to, intensive care, step-down, burn, and oncology units.

Phase 1. No CPO cases in LHJ: Prevention

1. Engage LTACHs to:
   a. conduct proactive initial and follow-up onsite infection prevention and control (IPC) assessments, education, and outreach in coordination with the HAI Program;
   b. conduct proactive baseline point prevalence survey (PPS) and consider 3-6 monthly proactive PPS;
   c. conduct admission screening; and
   d. ensure clinical lab obtains carbapenemase testing per the CDPH carbapenemase testing algorithm,[33] or reaches out to public health for additional testing resources.[26,27]
2. Engage vSNFs to:
   a. conduct proactive initial and follow-up onsite IPC assessments, education, and outreach in coordination with the HAI Program;
   b. conduct proactive baseline PPS in vent unit and consider 6-12 monthly proactive PPS;
   c. consider screening testing in addition to ensuring EBP are implemented for residents admitted to the vent unit from LTACHs or other facilities with known CPO transmission; and
   d. consider obtaining carbapenemase testing per the CDPH carbapenemase testing algorithm.[33]
3. Engage SNFs to consider obtaining carbapenemase testing per the CDPH carbapenemase testing algorithm.[33]
4. Engage ACHs to:
   a. ensure clinical lab obtains carbapenemase testing per the CDPH carbapenemase testing algorithm[33] or reaches out to public health for additional testing resources[26,27]; and
   b. consider screening testing and placing on empiric Contact Precautions (see CDC guidance for additional recommendations[34]) patients admitted to high-risk units, or with indwelling devices or mechanically ventilated from SNFs, in addition to high-risk patients.
5. Engage all ACHs, SNFs, LTACHs in routine (e.g., monthly) calls.
   a. Conduct education and outreach (may coordinate with HAI Program).
   b. Promote interfacility communication.
   c. Pair ACH infection preventionist (IP) (mentors) with SNF IPs in patient referral networks.
   d. Encourage participation in CDPH MDRO prevention collaborative(s) as relevant.[29]
6. Follow up on all discharges from known outbreak facilities (intra- and inter-LHJ).
   a. Screen and place on empiric Contact Precautions, or implement EBP empirically in SNFs in coordination with the HAI Program.
7. Consider combining CPO and ***C. auris*** **prevention activities**[35] when feasible, including recommendations to:
   a. in LTACHs, conduct admission screening and proactive baseline and follow-up *C. auris* PPS facility-wide;
   b. in vSNF vent units, conduct proactive baseline and follow-up *C. auris* PPS; and
   c. in ACHs, conduct *C. auris* screening testing for patients admitted to high-risk units or with indwelling devices or mechanically ventilated from SNFs, in addition to high-risk

patients. See CDC guidance for additional recommendations on use of empiric Contact Precautions.[34]

Phase 2. Newly identified case(s) in LHJ: Aggressive Containment + Prevention

For Phase 2 responses, an outbreak is defined as:

1. 1+ newly-identified case during PPS in response to a known case **OR**
2. 2+ cases identified within 4 weeks of each other in the same unit or epidemiologically linked*

A. Single case investigation

1. If the LHJ is responding to a single CPO case (see screening decision tree on page 13):
   a. In LTACHs and vSNFs
      i. Conduct a PPS facility-wide in LTACHs or in vSNF vent units.
         - If initial PPS is negative, repeat PPS after two weeks. If the second PPS is negative, continue preventive PPS in vSNFs (6-monthly) and LTACHs (3-monthly).
         - If initial or repeat PPS is positive, see section B below.
   b. In ACHs and SNFs
      i. Screen high-risk healthcare contacts, regardless of whether the index patient was being managed with Contact Precautions, or EBP in SNFs or vSNFs.
      ii. In high-risk ACH units consider conducting a PPS.
         - If initial PPS is negative, discontinue PPS.
         - If initial PPS is positive, see section B below.
   c. If additional CPO screening or clinical cases are identified, see section B below.
2. Conduct initial IPC assessment, education, and outreach; coordinate with HAI Program as relevant.
3. Conduct retrospective and prospective lab surveillance.
   a. Conduct microbiologic record review to identify any CPO cases that might have been unrecognized during the past 3 months.
   b. For ACHs and LTACHs, continue to perform or access carbapenemase testing on all CROs per CDPH carbapenemase testing algorithm.[33]
   c. For SNFs and vSNFs, perform or access carbapenemase testing on all CROs for at least 3 months after the initial positive CPO case was identified per CDPH carbapenemase testing algorithm.[33]

B. Two or more cases or transmission is suspected

1. If transmission is suspected or ongoing in a healthcare facility (see screening decision tree on page 13):

* Epidemiologically linked includes having previous admission at the same healthcare facility (in last year), **OR** common primary or consultative service, healthcare personnel, bathroom, procedure, or device. This outbreak facility definition excludes 2+ cases tested within 24 hours from time of admission, and not epi-linked to any other cases at the facility.

a. Conduct a PPS. If LTACH, conduct PPS facility-wide; if vSNF, in vent unit; if ACH or SNF, in affected unit(s).
b. Once the healthcare facility has 2 consecutively negative PPS at 2-week intervals **AND** no new clinical cases during the PPS screening window:
    i. In ACHs and SNFs, discontinue biweekly PPS.
    ii. In LTACHs and vSNFs, reduce PPS frequency to monthly for 3 months; if negative, move to 3-monthly if LTACH, and 6-monthly if vSNF.
    iii. If low-level transmission continues in LTACH or vSNF, see **Phase 3.**

2. For patients or residents discharged prior to PPS, at the receiving facility, implement empiric Contact Precautions, or implement EBP empirically in SNFs or vSNFs for transfers with unknown or negative CPO status, including communication to outside LHJ.
    a. Refer to Phase 2 screening decision tree (on page 13) for discharge screening and tracking considerations.
3. Continue follow-up IPC assessments at outbreak facility and retrospective and prospective surveillance (see A3 above).
4. Consider disseminating weekly outbreak facility list to all healthcare facility IPs intra-jurisdictionally, and inter-jurisdictionally as applicable.
5. Facilities may alert LHJ when transferring patients with CPO.
    a. If resources allow, LHJ may follow up on positive CPO transfer patients to ensure implementation of appropriate Transmission-based Precautions and IPC measures.

C. Ongoing prevention activities

1. Engage high-risk facilities without cases, if not already done.
    a. Prioritize LTACHs, and vSNFs by interconnectedness to CPO outbreak facilities (HAI Program can support identification).
        i. Conduct proactive PPS facility-wide in LTACHs and vent unit in vSNFs. If PPS negative, consider 3-6 monthly proactive PPS in LTACHs, 6-12 monthly proactive PPS in vSNF vent units.
        ii. Conduct proactive onsite IPC assessments, education, and outreach in coordination with the HAI Program.
    b. Identify other facilities (ACHs, SNFs) with highest volume of patient sharing with facilities with cases.
        i. Encourage SNFs to access carbapenemase testing.
        ii. Encourage ACHs to implement admission screening, in addition to accessing carbapenemase testing.
        iii. Prepare SNFs to identify and care for CPO-exposed or -positive individuals.
    c. Continue to encourage vSNFs to consider obtaining carbapenemase testing for all CRO isolates per the CDPH carbapenemase testing algorithm.[33]

Screening Decision Tree for Local Health Departments (LHDs) Conducting Phase 2 Responses[a]

New Tier 2 pathogen[b] case identified

Transmission suspected or ongoing in the healthcare facility, regardless of facility type
OR
Patient or resident admitted to long-term acute care hospital (LTACH) or ventilator unit in skilled nursing facility (vSNF)

NO

(No transmission suspected, and patient or resident admitted to an acute care hospital (ACH) or skilled nursing facility (SNF))[c]

For all ACH units and SNFs,[c] screen high-risk contacts.[d]

If **high-risk contacts were discharged to another healthcare facility,** screen there.

- Consider notifying the patient or resident, and flagging their chart for screening and empiric Contact Precautions or implementation of Enhanced Barrier Precautions (EBP) empirically if SNF upon readmission within 6 months.

In **ACH units with increased risk of transmission** (e.g., ICU, burn, oncology), consider broader screening such as point prevalence survey (PPS).[e]

YES

Conduct or continue PPS in the affected unit(s)

- If LTACH, conduct PPS facility-wide; if vSNF, PPS in vent unit; if ACH or SNF, PPS in the affected unit(s).
- Continue PPS every 2 weeks until 2 consecutive rounds are negative and no new clinical cases. After this:
  - For ACH and SNF, discontinue biweekly PPS.
  - For LTACH and vSNF, reduce PPS frequency to monthly for 3 months; if negative, move to quarterly PPS if LTACH, and biannual if vSNF.

For patients or residents discharged prior to PPS:

- For ***all*** **patients in LTACH and residents on affected vSNF unit/other geographic location**, and ***only*** **high-risk contacts in ACH and SNF**, if discharged before PPS, flag the chart for screening, and empiric Contact Precautions or implementation of EBP empirically if SNF/vSNF upon readmission within 6 months. If discharged to another healthcare facility, screen there.

Notes

- **High-risk contact** is defined as a roommate (including patients in the same open bay unit); patient/resident who shared a bathroom with the index patient/resident; or patient/resident occupying the same bed space immediately following the index patient/resident.[f]
- LHD can **consider screening additional contacts who do not meet high-risk criteria**. Prioritize contacts discharged to higher acuity settings (e.g., LTACH, vSNF vent unit, ACH).[g]
- If a contact (high-risk or otherwise) is **discharged home**, screening at home is not recommended.
- In some situations, broader screening may not be indicated.[h]

Screening Decision Tree Definitions and Considerations

[a] Please see *Candida auris* (PDF) (www.cdph.ca.gov/Programs/CHCQ/HAI/CDPH%20Document%20Library/Cauris_Phases.pdf) or Carbapenemase-producing Organism (PDF) (www.cdph.ca.gov/Programs/CHCQ/HAI/CDPH%20Document%20Library/CPO_Phases.pdf) Prevention and Response Strategy document to identify your LHD's phase for relevant Tier 2 antimicrobial-resistant (AR) pathogen prevention and response activities.

[b] Tier 2 AR pathogens (PDF) (www.cdph.ca.gov/Programs/CHCQ/HAI/CDPH%20Document%20Library/ARPathogenTiers.pdf) are those not commonly detected in California (although epidemiology can vary by region within California), for example: *Candida auris,* non-KPC-producing Enterobacterales, carbapenemase-producing *Pseudomonas* species (spp.) and *Acinetobacter* spp. (excluding OXA-23-, OXA-24/40-, and OXA-58-like carbapenemases).

[c] In addition to ACHs and SNFs, this could apply to other congregate care settings including but not limited to assisted living facilities, group homes, and board & care facilities, prioritizing residents with risk factors for AR pathogen acquisition or transmission (e.g., presence of indwelling device or unhealed wound, total dependence on others for assistance with activities of daily living, or frequent healthcare exposure).

[d] High-risk contacts should be screened regardless of whether the index patient or resident was being managed with Contact Precautions, or Enhanced Barrier Precautions in SNFs and regardless of the amount of time they overlapped with the index patient or resident.

[e] LHD can consider PPS in ACH units with increased risk of transmission in situations including, but not limited to, healthcare settings with high-acuity patients with longer lengths of stay (e.g., 1 week); or if it will take time to identify high-risk contacts or if most high-risk contacts have been discharged from a unit/healthcare facility. This generally excludes the emergency department.

[f] The highest yield is likely to be the patient exposed to Tier 2 pathogen contamination following a single terminal cleaning. Subsequent patients occupying the same bed space, including current occupant(s) may be considered for screening if feasible.

[g] Considerations for pursuing screening of additional contacts who do not meet high-risk criteria can include, but are not limited to, contacts who shared a common primary or consultative service, healthcare personnel, procedure, or device; or contacts who have risk factors for AR pathogen acquisition (e.g., presence of indwelling device or unhealed wound, total dependence on others for assistance with activities of daily living receive high-level care).

[h] In some situations, broader screening may not be recommended by public health. For example, if the index patient's length of stay was very short (e.g., <24 hours), screening may not be indicated. During a response to a single case in an ACH unit with a short average length of stay where patients are ambulatory and not mechanically ventilated, broader screening could be limited to situations where the index patient is currently admitted or recently discharged (<7 days prior). See CDC Containment Strategy (www.cdc.gov/hai/mdro-guides/containment-strategy.html).

Phase 3. Ongoing transmission in at least one high-risk facility for > 6 months in LHJ: Mitigation

1. Routine PPS
    a. In LTACHs, continue monthly PPS; if <2 cases per PPS for 3 consecutive months, decrease to 3-monthly PPS.
    b. In vSNFs, continue monthly PPS; if <2 cases per PPS for 3 consecutive months, decrease to 3-6 monthly PPS depending on CPO-positive resident burden.
2. Admission screening
    a. In LTACHs, continue admission screening and empiric Contact Precautions.
    b. In vSNF vent units, consider admission screening and rescreen residents if readmitted after >24 hours hospital admission; ensure implementation of EBP facility-wide.
    c. In ACHs, consider admission screening for high-risk patients, if not already done.
3. Transition from LHJ- to facility-led discharge screening and notification for CPO-exposed and -positive individuals; LHJ continues notifying outside LHJ(s) of interjurisdictional transfer cases.
4. Ensure ACHs, LTACHs, and vSNFs obtain carbapenemase testing for all CRO isolates per the CDPH carbapenemase testing algorithm[33]; SNFs consider obtaining this testing especially in facilities with known prior CPO outbreaks or that regularly share patients with facilities with known CPO outbreaks.
5. Implement **Phase 2** activities if:
    a. case(s) of new Tier 2 carbapenemase-producing organism-mechanism combination identified in previously naïve facility; or
    b. new outbreak (higher-than-expected number of cases) in a non-naïve facility.
6. Engage facilities to mitigate morbidity and mortality from invasive CPO infection (particularly bloodstream).
    a. Prioritize individuals with lines, tubes, or drains, particularly central venous catheters (CVC).
        i. Focus on appropriate use and care of medical devices, especially CVC insertion and maintenance practices.
        ii. Incorporate central line-associated bloodstream infection (CLABSI) prevention and guidance[36] in LTACHs and vSNF vent units during public health onsite IPC assessments.
    b. There are no specific recommendations for CPO decolonization.

Phase 4. Ongoing transmission in at least one high-risk facility for >1 year in LHJ, and some surrounding LHJs with highly-connected patient sharing networks: Maintenance

Considerations for LTACHs

In individual LTACHs where CPOs have become endemic despite 1+ year of public health support to mitigate transmission, LHJ can consider shifting prioritization to intensified efforts at preventing adverse clinical outcomes. This shift would occur with continued broad IPC measures but reduced emphasis on PPS. Specifically, these LTACHs should:

1. Intensify measures to prevent invasive CPO infections (e.g., implementing adherence monitoring of central line insertion and maintenance practices to prevent CLABSI).
2. Identify and respond to clusters of invasive CPO disease (e.g., by conducting a PPS).
3. Reinforce broad IPC measures including adherence monitoring and feedback of hand hygiene and personal protective equipment (PPE) practices, and environmental cleaning and disinfection.
4. Continue to do admission screening + empiric Contact Precautions for all new and re-admissions to the LTACH.

Considerations for ACHs, vSNFs, and SNFs

Continue efforts to prevent introduction and contain spread of CPOs in other facilities including those in the same patient sharing network of endemic LTACHs.

1. Facilities perform screening testing in response to an increase in cases until 2 consecutive PPS at least 2 weeks apart result in ≤2 cases or the facility's baseline PPS percent positivity.
   a. Once achieved in vSNFs, reduce PPS frequency to monthly for 3 months; if vSNF continues to maintain ≤2 cases or baseline PPS percent positivity, move to 6-monthly.
2. Perform admission screening + EBP (if SNF or vSNF) or Standard Precautions (if ACH)[*]:
   a. in vSNF vent units, of all new and re-admissions (after >24 hours hospital admission);
   b. in ACHs, of high-risk new and re-admissions; and
   c. in SNFs, of high-risk residents as resources allow.

Considerations for all healthcare facilities

1. Ensure all facilities obtain carbapenemase testing for all CRO isolates per the CDPH carbapenemase testing algorithm,[33] if not already done.
2. Facilities are responsible for knowing baseline CPO prevalence or incidence, conducting ongoing surveillance of clinical isolates, investigating and reporting to public health when a new outbreak is identified, and conducting screening including PPS. Examples of new outbreaks can include:
   a. evidence of CPO transmission in a previously naïve facility;
   b. cluster of cases in a distinct patient or resident population or unit;
   c. increase of cases above baseline occurring in a non-naïve facility; and
   d. increase in clinical cases (e.g., bloodstream) detected within a facility.
3. For facilities identifying single CPO cases in the absence of ongoing transmission, screen high-risk healthcare contacts.
   a. Consider broader screening if there is evidence of a new outbreak (see 2a.-d. above).
4. Public health may provide assistance depending on size and scope of the outbreak, as resources allow.
5. LHJ may conduct or recommend routine IPC assessments or PPS.
6. Facilities are responsible for all interfacility communication.
7. LHJ supports strong IPC and AS practices in all facilities and continues engaging facilities to mitigate morbidity and mortality from invasive CPO infection (particularly bloodstream).

[*] Implement Contact Precautions if there is suspected or confirmed transmission in the unit or facility.

REFERENCES

22. CDPH CPO Quicksheet (PDF) (www.cdph.ca.gov/Programs/CHCQ/HAI/CDPH%20Document%20Library/CPOQuicksheet.pdf)
23. CDPH AR Pathogen Containment Plan Tiers (PDF) (www.cdph.ca.gov/Programs/CHCQ/HAI/CDPH%20Document%20Library/ARPathogenTiers.pdf)
24. CDPH CPO Reporting FAQ (PDF) (www.cdph.ca.gov/Programs/CHCQ/HAI/CDPH%20Document%20Library/CPOReportingFAQ.pdf)
25. LACDPH List of Laboratories with CPO Testing Capacity (PDF) (publichealth.lacounty.gov/acd/docs/LaboratorieswithCPOScreening.pdf)
26. CDPH Microbial Diseases Laboratory Submission Instructions and Forms (www.cdph.ca.gov/Programs/cls/idld/mdl/Pages/MDLSubmissionInstructionsandForms.aspx)
27. California Public Health Laboratories (www.caphld.org/network-laboratories)
28. CDPH AS website (www.cdph.ca.gov/Programs/CHCQ/HAI/Pages/AntimicrobialStewardshipLandingPage.aspx)
29. CDPH MDRO Prevention Collaboratives website (www.cdph.ca.gov/Programs/CHCQ/HAI/Pages/Regional_AR_Collaboratives.aspx)
30. CDC Enhanced Barrier Precautions (EBP) website (www.cdc.gov/long-term-care-facilities/hcp/prevent-mdro/PPE.html)
31. CDPH EBP: Additional Considerations for California SNFs (PDF) (www.cdph.ca.gov/Programs/CHCQ/HAI/CDPH%20Document%20Library/EBP_AdditionalConsiderationsForCA_SNF.pdf)
32. EPA List P Agents with Claims against *C. auris* (www.epa.gov/pesticide-registration/list-p-antimicrobial-products-registered-epa-claims-against-candida-auris)
33. CDPH Carbapenemase Testing Algorithm (PDF) (www.cdph.ca.gov/Programs/CHCQ/HAI/CDPH%20Document%20Library/CPTestingPrioritizationAlgorithm.pdf)
34. CDC Preventing MDROs: FAQs (www.cdc.gov/healthcare-associated-infections/php/preventing-mdros/preventing-mdros-faqs.html)
35. CDPH *C. auris* website (www.cdph.ca.gov/Programs/CHCQ/HAI/Pages/Candida-auris.aspx)
36. Society for Healthcare Epidemiology of America (SHEA) Strategies to Prevent CLABSI in Acute Care Hospitals: 2022 Update (www.cambridge.org/core/journals/infection-control-and-hospital-epidemiology/article/strategies-to-prevent-central-lineassociated-bloodstream-infections-in-acutecare-hospitals-2022-update/01DC7C8BBEA1F496BC20C6E0EF634E3D)

ADDITIONAL RESOURCES

- CDPH Carbapenem-resistant and Carbapenemase-producing Organisms website (www.cdph.ca.gov/Programs/CHCQ/HAI/Pages/CRE_InfectionPreventionStrategies.aspx)
- CDPH CPO Screening Decision Tree (PDF) (www.cdph.ca.gov/Programs/CHCQ/HAI/CDPH%20Document%20Library/Tier2_Pathogen_Screening_Decision_Tree.pdf)
- CDC MDRO Containment Guidelines (www.cdc.gov/healthcare-associated-infections/php/preventing-mdros/mdro-containment-strategy.html)