



California Department of Public Health

Carbapenem Resistant Enterobacteriaceae

Quicksheet



A coordinated approach among healthcare facilities and public health is recommended to address carbapenem resistant Enterobacteriaceae (CRE) in California. Local health departments (LHD) should be aware of CRE incidence in healthcare facilities and communities in their regions, understand prevention measures, and provide guidance to healthcare facilities when responding to CRE-related inquiries or events.

Carbapenem Resistant Enterobacteriaceae (CRE)

- CRE are bacteria of the Enterobacteriaceae family (e.g. *Klebsiella pneumoniae*, *E. coli*) that are resistant to the carbapenem class of antibiotics (e.g. meropenem).
- Infections caused by CRE can be very difficult to treat, and mortality rates for invasive (e.g., bloodstream) CRE infections are as high as 50%.
- Risk factors for CRE acquisition include healthcare exposures (including hospitalization outside of the United States), prior current antimicrobial treatment, and presence of indwelling medical devices such as urinary catheters, endotracheal tubes, etc.
- CRE are highly transmissible in healthcare settings. Infected and colonized patients or residents can serve as sources of transmission.

Epidemiologically Important CRE

- CRE that produce carbapenemases (called CP-CRE), including *Klebsiella pneumoniae* carbapenemase (KPC) and New Delhi Metallo- β -Lactamase (NDM), are a public health priority because their resistance can spread rapidly. The increasing prevalence of CRE in the United States is largely attributable to CP-CRE.
- Testing for production of a carbapenemase enzyme to differentiate CP-CRE from non-CP-CRE is encouraged to guide the appropriate infection control and public health response.

CRE in California

- According to a 2012 survey, CRE prevalence in California was relatively low compared with other regions of the United States. Statewide CRE prevalence varied widely by region and type of hospital; the highest CRE prevalence was

observed in southern California hospitals and among long-term acute care (LTAC) hospitals.

CRE Surveillance Definition¹

Any Enterobacteriaceae that is:

- Resistant to a carbapenem antibiotic (using current Clinical and Laboratory Standards Institute breakpoints)
--OR--
- Production of a carbapenemase enzyme by a recognized test (e.g., PCR, modified-Hodge test, Carba-NP)

Note: CRE cases are not currently reportable in California. However, a suspected or confirmed CRE outbreak in a healthcare facility must be reported to local public health and to CDPH Licensing and Certification.

CRE Prevention and Control in Healthcare Facilities²

When responding to inquiries regarding CRE in healthcare facilities, LHD should make recommendations for conducting surveillance, implementing contact precautions, and cohorting patients or residents with CRE.

Surveillance

- Most clinical laboratories have protocols to immediately notify clinicians and infection prevention staff when CRE is identified.
- Healthcare facilities should perform targeted CRE surveillance cultures³ and preemptive contact

¹ [FAQs regarding the CRE definition](http://www.cdc.gov/hai/organisms/cre/definition.html), available at: (<http://www.cdc.gov/hai/organisms/cre/definition.html>)

² [CDC CRE Toolkit](http://www.cdc.gov/hai/pdfs/cre/CRE-guidance-508.pdf), available at: (<http://www.cdc.gov/hai/pdfs/cre/CRE-guidance-508.pdf>)

precautions for patients or residents at risk for CRE, including:

- Patients or residents admitted from LTAC hospitals
- Patients or residents admitted from facilities known to have ongoing CRE transmission or experiencing a CRE outbreak
- Patients or residents epidemiologically linked to a newly identified CRE case
- Patients or residents residing in intensive care units or other care areas identified by periodic point prevalence surveys as having high CRE rates

Contact Precautions

In acute care hospitals and high-acuity post-acute care settings (e.g., ventilator units of skilled nursing facilities), implement contact precautions for patients infected or colonized with CRE.

- Contact precautions consist of gowns and gloves for all patient contact, and contact with environmental surfaces in the patient's room.
- In general, contact precautions should be continued for the duration of hospitalization. Repeated bacterial cultures to demonstrate CRE "clearance" are not generally recommended, because CRE can be shed intermittently and patients may remain colonized for greater than six months.

In lower-acuity long-term care facilities⁴, use of contact precautions for CRE-infected or colonized residents may be modified depending on the clinical and functional status of the resident and his/her risk of serving as a source for transmission.

- CRE colonized or infected residents who are at high risk for CRE transmission should be placed in

³ CDC's [CRE Surveillance Culture Protocol](http://www.cdc.gov/hai/pdfs/labSettings/Klebsiella_or_Ecoli.pdf), available at: (http://www.cdc.gov/hai/pdfs/labSettings/Klebsiella_or_Ecoli.pdf)

⁴ [Recommendations for Infection Control for Residents with CRE in Long-Term Care Facilities](https://www.cdph.ca.gov/Programs/CID/DCDC/CDPH%20Document%20Library/CareofCREinLongTermCareFacilities.pdf) are available at:

(https://www.cdph.ca.gov/Programs/CID/DCDC/CDPH%20Document%20Library/CareofCREinLongTermCareFacilities.pdf)

contact precautions. Examples of higher risk residents include those who:

- Are receiving post-acute care following a recent hospitalization
 - Are totally dependent on assistance for activities of daily living
 - Are ventilator-dependent
 - Are incontinent of stool or urine and stool or urine cannot be reliably contained
 - Have a wound with drainage that is difficult to control
 - Are cognitively unable to maintain personal hygiene
- Contact precautions may not be necessary for lower risk CRE colonized or infected residents of lower-acuity long-term care facilities who:
 - Are continent of stool and urine;
 - Are less dependent on staff for activities of daily living;
 - Are cognitively able to follow instructions to perform hand hygiene; and
 - Do not have draining wounds.
 - Lower risk residents need not be restricted from common gatherings in the facility.
 - In situations where contact precautions have been relaxed, healthcare providers should strictly adhere to standard precautions. Standard precautions include use of gloves and/or gowns when contact with colonized/infected sites or body fluids is possible, such as during assistance with bathing or toileting, performing wound care or dressing changes, or manipulating devices.
 - The determination to discontinue contact precautions in lower acuity long term care facilities should be made on a case-by-case basis, depending on the clinical and functional status of the resident, i.e., when the resident's secretions or drainage can be contained, and how dependent the resident is on staff for assistance with activities of daily living.
 - Repeated bacterial cultures to demonstrate CRE "clearance" are not generally recommended to discontinue contact precautions.

Cohorting

If multiple CRE-infected or colonized patients or residents are present, facilities should cohort individuals with CRE in a single area and use dedicated healthcare staff (i.e., without responsibility for care of non-CRE patients) to care for them. If carbapenemase testing is performed, cohorting may be limited to patients or residents with CP-CRE.

Interfacility Communication

- When transferring a CRE-infected or colonized patient or resident to another healthcare facility, the transferring facility must communicate the individual's CRE status to the receiving facility ahead of time.⁵
- Facilities with ongoing CRE outbreaks should inform facilities to which they transport or transfer patients or residents about the presence of CRE in their population. Receiving facilities may screen such patients for CRE and place them in pre-emptive contact precautions pending the culture result.

Response to Reports of CRE Cases

In a facility or region where CRE is relatively uncommon, a single case of CP-CRE may constitute an unusual occurrence and warrant an epidemiologic investigation to assess for transmission to other patients or residents. When responding to reports of newly identified CRE cases or clusters in healthcare facilities, LHD should:

- Develop and summarize patient or resident information in a line list format. Relevant information to be collected includes:
 - admission source
 - date of admission
 - locations (e.g., wards, units, wings)
 - indwelling device(s)/procedure(s)
 - specimen collection date(s), source(s) and results.

- Recommend CRE screening of patient or resident contacts, including roommates, individuals residing on the same ward/unit, and/or cared for by common healthcare personnel.
- Request that the clinical lab retain all CRE isolates for potential carbapenemase testing and/or to evaluate relatedness of isolates.

CRE outbreaks must be reported to the local health department. Outbreaks in licensed healthcare facilities should also be reported to CDPH Licensing and Certification District Office.⁶

⁵ An [Infection Control Transfer Form](https://www.cdph.ca.gov/Programs/CHCQ/HAI/CDPH%20Document%20Library/Interfacility%20Transfer%20Form%20061417.pdf), available at: (https://www.cdph.ca.gov/Programs/CHCQ/HAI/CDPH%20Document%20Library/Interfacility%20Transfer%20Form%20061417.pdf)

⁶ [Licensing and Certification District Offices Directory](https://www.cdph.ca.gov/Programs/CHCQ/LCP/Pages/DistrictOffices.aspx), available at: (https://www.cdph.ca.gov/Programs/CHCQ/LCP/Pages/DistrictOffices.aspx)