

Carbapenem-resistant Enterobacteriaceae (CRE)

The Enterobacteriaceae are a large family of Gram-negative bacilli, living in the human gastrointestinal tract. Commonly encountered species include *Escherichia coli*, *Klebsiella* spp., and *Enterobacter* spp. Carbapenem-resistant Enterobacteriaceae (CRE) are Enterobacteriaceae resistant to carbapenem antibiotics. They are broadly categorized based on the mechanism of their resistance as carbapenemase producers (CP-CRE) and non-carbapenemase producers.

Carbapenems are broad-spectrum antibiotics typically used to treat severe hospital-associated infections (HAIs) caused by highly drug resistant bacteria; currently available carbapenems include imipenem, meropenem, ertapenem, and doripenem. Although related to the β -lactam antibiotics, carbapenems retain antibacterial activity in the presence of most β -lactamases, including extended-spectrum β -lactamases (ESBLs) and extended-spectrum cephalosporinases (e.g., AmpC-type β -lactamases). Loss of susceptibility to carbapenems is a serious problem because few safe treatment alternatives remain against such resistant bacteria. Infections caused by CRE occur most commonly among people with chronic medical conditions, invasive medical devices such as central venous and urinary catheters, frequent or prolonged stays in healthcare settings, or extended courses of antibiotics. CRE have spread rapidly across the nation and around the globe, perhaps because carbapenemases can be encoded on plasmids that are easily transferred within and among bacterial species.

CRE have been rare in Oregon and we'd like to keep it that way. In December 2011, CRE bacterial isolates became reportable statewide. The Oregon State Public Health Laboratory offers additional specialized testing to determine whether reported CRE are carbapenemase producers while the Oregon Public Health Division's HAI program performs detailed investigation of any reported cases. In 2012 thirty-two cases of CRE infection or colonization occurred among Oregon residents; the median case age was 62 (range, 7–94) years; 23 (72%) were female; Twenty (62%) were hospitalized. *Enterobacter* spp. accounted for 72% of the isolates. Only 2 cases of carbapenemase-producing *Klebsiella pneumoniae* were identified in 2012, both cases had received recent medical care outside of Oregon in areas where CP-CRE is endemic; neither died.

Unlike much of the rest of the country, we have no indication that CP-CRE is spreading in Oregon. This provides an opportunity to prevent the spread through enhanced surveillance and prevention efforts. In that vein, we have instituted the drug-resistant organism prevention coordinated regional epidemiology network (DROP-CRE), a statewide network to rapidly detect, respond to, and prevent CRE. For more information, including our CRE toolkit, please see <http://public.health.oregon.gov/DiseasesConditions/DiseasesAZ/Pages/disease.aspx?did=108>.

Prevention

Think “NICE” if you encounter CRE:

- **Notify** the county health department, pertinent clinical groups, and your antibiotic stewardship program that CRE has been spotted.
- **Intervene** in all cases with core infection control activities: hand hygiene, contact precautions, private rooms, and optimized environmental cleaning. Reduce unnecessary antibiotics and use of invasive devices. Additionally, for CP-CRE, screen patient contacts, and cohort staff and patients.
- **Communicate** CRE infection or colonization status to the receiving facility upon patient transfer.
- **Educate** patients, staff, and visitors about CRE.