

## Carbapenem-resistant *Enterobacteriaceae* (CRE)

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

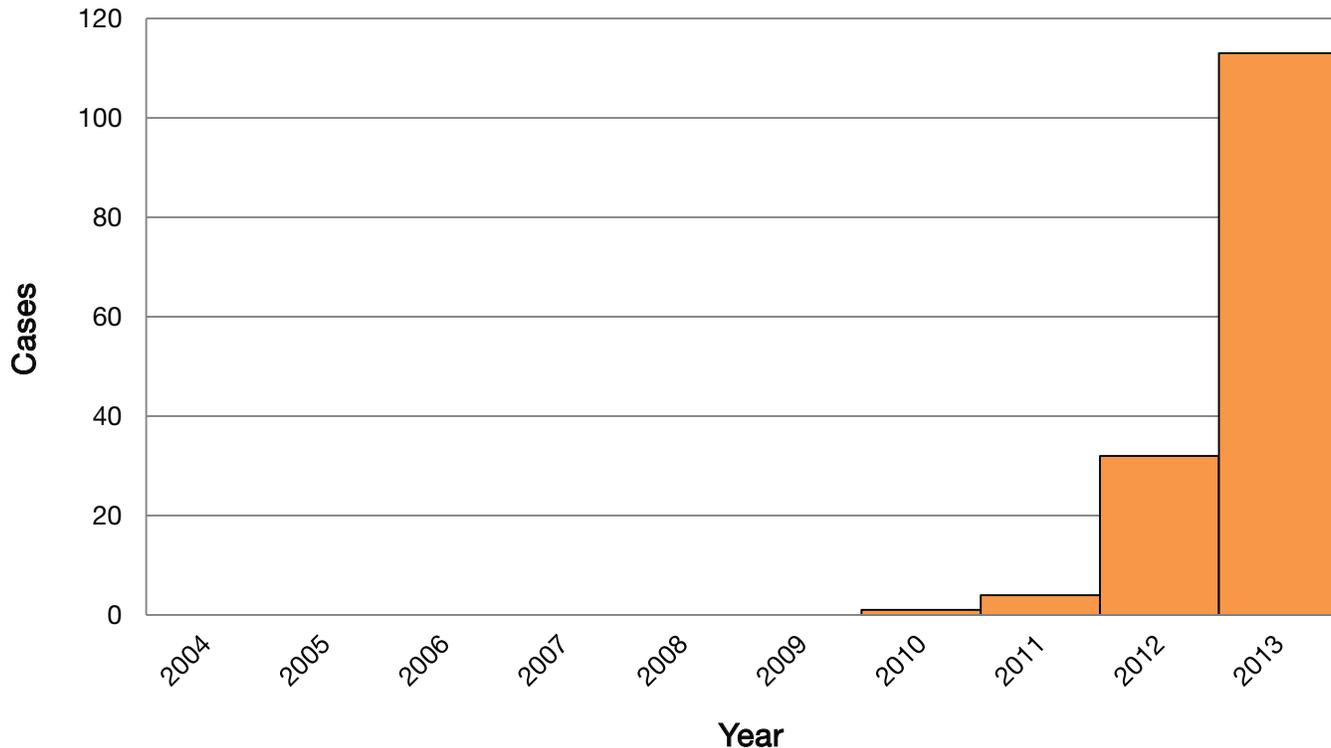
Carbapenems are broad-spectrum antibiotics typically used to treat severe health care-associated infections (HAIs) caused by highly drug-resistant bacteria; currently available carbapenems include imipenem, meropenem, ertapenem, and doripenem. Related to the beta-lactam antibiotics, carbapenems retain antibacterial activity in the presence of most beta-lactamases, including extended-spectrum beta-lactamases (ESBLs), and extended-spectrum cephalosporinases (e.g., AmpC-type beta-lactamases). Loss of susceptibility to carbapenems is a serious problem because few safe treatment alternatives remain against such resistant bacteria.

Infections caused by CRE most commonly occur among people with chronic medical conditions, invasive medical devices such as central venous and urinary catheters, frequent or prolonged stays in health care settings, or extended courses of antibiotics. CP-CRE are most concerning and 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.

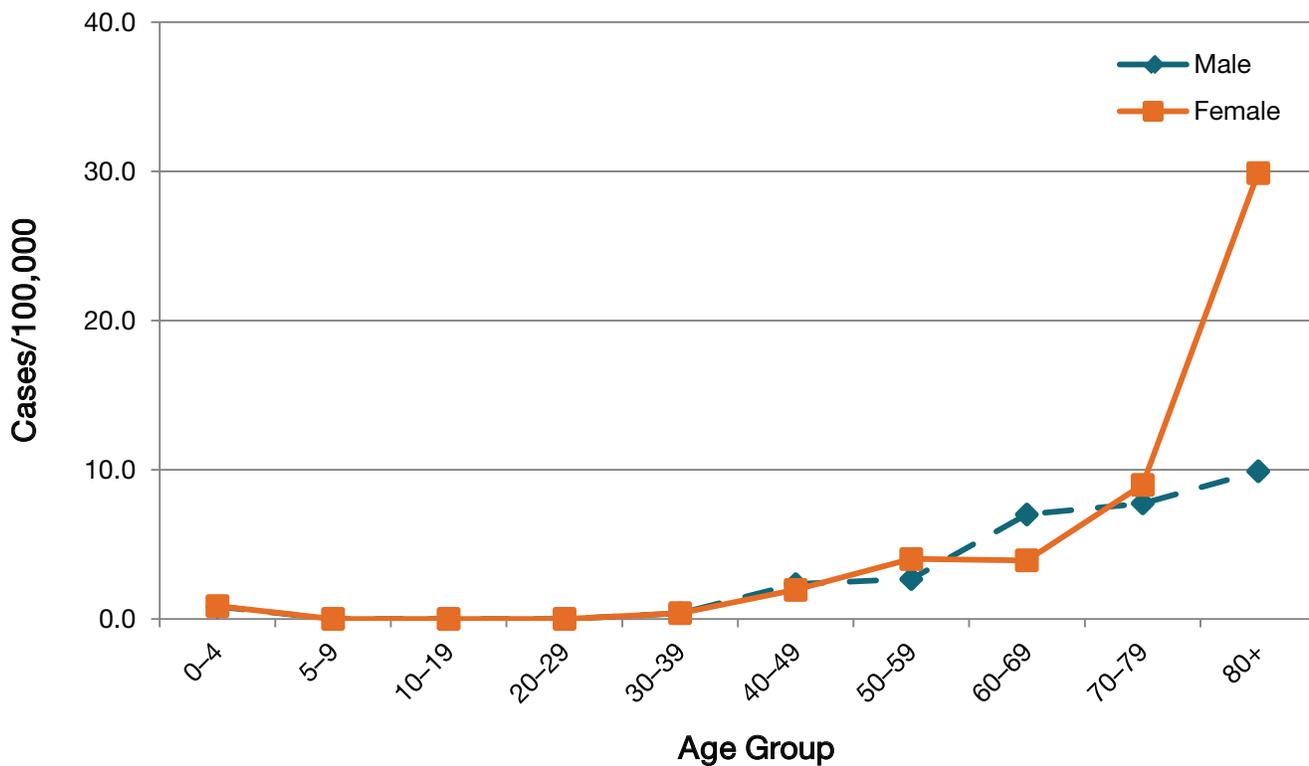
In December 2011, CRE bacterial isolates became reportable statewide. The Oregon State Public Health Laboratory offers specialized testing to determine whether reported CRE are carbapenemase producers and the Oregon Public Health Division's HAI program performs detailed investigation of any reported cases. In 2013, 113 cases of CRE infection or colonization occurred among Oregon residents; the median case age was 69 (range 0–92) years; 68 (60%) were female; 65 (58%) were hospitalized at the time of specimen collection. Urine was the most common source (62%) and *Enterobacter* spp. accounted for 64% of all isolates. In terms of case risk factors for CRE, 52% had surgery and 71% were hospitalized in the previous year. Forty-seven percent had medical devices in place within two days of culture collection and 81% had received antibiotics within 30 days before. Only one case of CP-CRE was identified in 2013, which was an *E. coli* New Delhi Metallo-beta-lactamase (NDM), the first seen in Oregon.

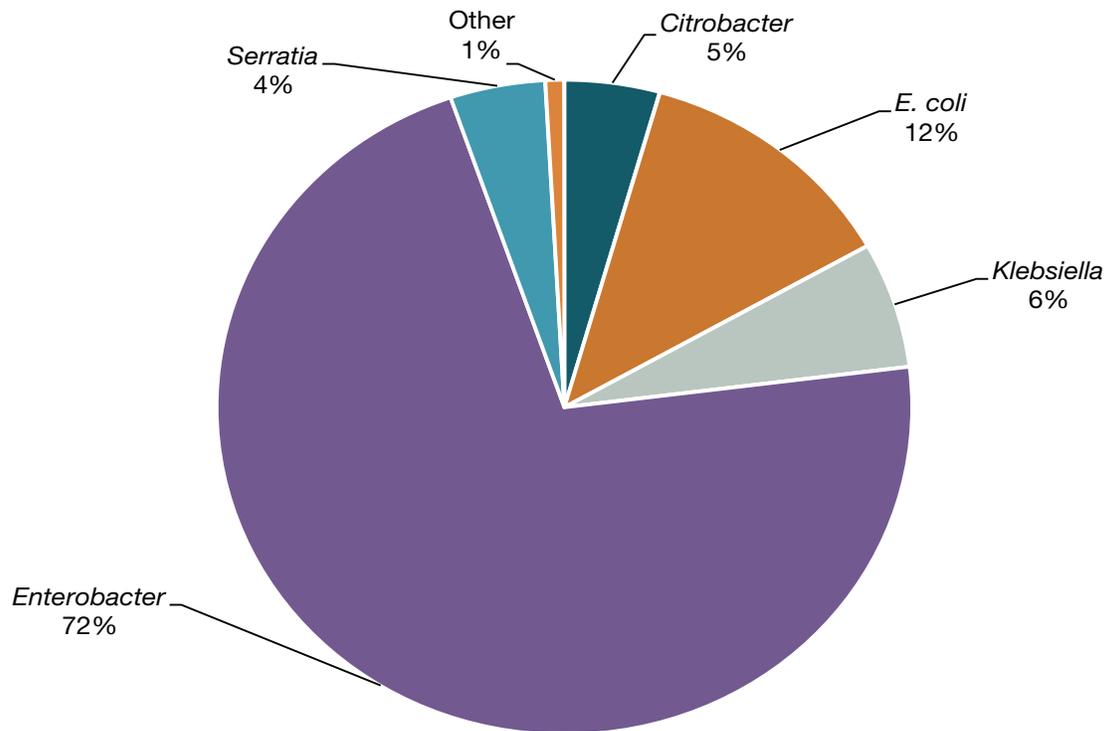
Unlike much of the rest of the county, we have no indication that CP-CRE are spreading in Oregon. We have instituted enhanced surveillance and prevention efforts and established the Drug-Resistant Organism Prevention Coordinated Regional Epidemiology Network (DROPCRE), a statewide network to rapidly detect, respond to and prevent CRE. At the end of 2013, the surveillance definition for CRE in Oregon was changed. Next year's definition will be more specific for detection of CP-CRE.

Carbapenem-resistant *Enterobacteriaceae* by year: Oregon, 2004–2013



Incidence of Carbapenem-resistant *Enterobacteriaceae* by age and sex: Oregon, 2013



Carbapenem-resistant *Enterobacteriaceae* by species: Oregon, 2013

### 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.

For more information, including our CRE toolkit, please see <http://public.health.oregon.gov/DiseasesConditions/DiseasesAZ/Pages/disease.aspx?did=108>.