Quarterly Update on Carbapenem-Resistant Enterobacteriaceae and Other Carbapenemase-Producing Organisms for Washington State

Isolates reported to the Department of Health and tested at the
Public Health Laboratories, by date of collection, January-December 2016

Washington State Department of Health has performed surveillance and testing for CRE since October 2012. This update summarizes reports of carbapenem-resistant Enterobacteriaceae (CRE) isolates and other carbapenemase-producing organisms (CPO) collected from October through December, 2016. We include all CRE isolates diagnosed in-state and isolates from Washington residents diagnosed out-of-state and reported to the department. Isolates were included if they were the first unique genus/species/carbapenemase profile reported from an individual patient since surveillance began in 2012. If an isolate produced more than one carbapenemase, it was counted once for each novel carbapenemase.

The CRE case definition since May 2015, is:
E. coli, Klebsiella spp., and *Enterobacter* spp. resistant to any carbapenem (according to Clinical Laboratory Standards Institute breakpoints: minimum inhibitory concentrations of ≥4 mcg/ml for meropenem, imipenem, and doripenem or ≥ 2 mcg/ml for ertapenem).

See the 2010-2015 CRE Surveillance Summary (http://www.doh.wa.gov/portals/1/Documents/Pubs/420-163-CRE-Summary2015.pdf) for details about the case definitions prior to May 2015.

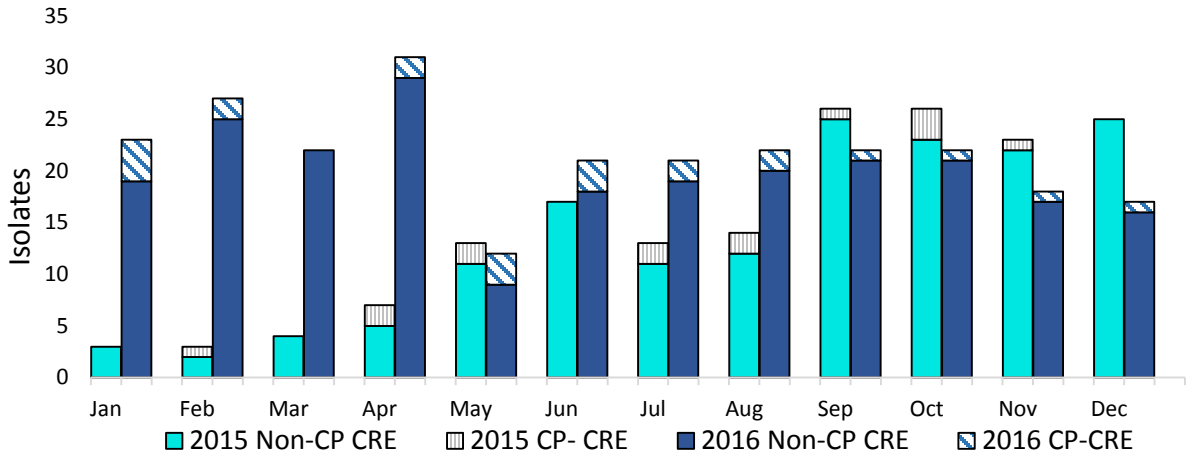
The Washington State Public Health Laboratories (PHL) test CRE isolates for the following carbapenemase genes:

- *Klebsiella pneumoniae* carbapenemase (KPC)
- New Delhi metallo-β-lactamase (NDM)
- Oxacillin-hydrolyzing β-lactamase-48 (OXA-48)
- Verona integron-encoded metallo-β-lactamase (VIM)
- Imipenem-hydrolyzing β-lactamase (IMP)

In addition, PHL tests other Gram-negative organisms (such as other Enterobacteriaceae, and *Pseudomonas* spp. and *Acinetobacter* spp.) suspicious for carbapenemase on special request.

The bar graph shows CRE and carbapenemase-producing Enterobacteriaceae isolates collected January through December 2016, compared to those submitted and tested in 2015 (Figure 1). The new case definition was implemented in May 2015 which may explain some of the difference between total case counts in 2015 and 2016.

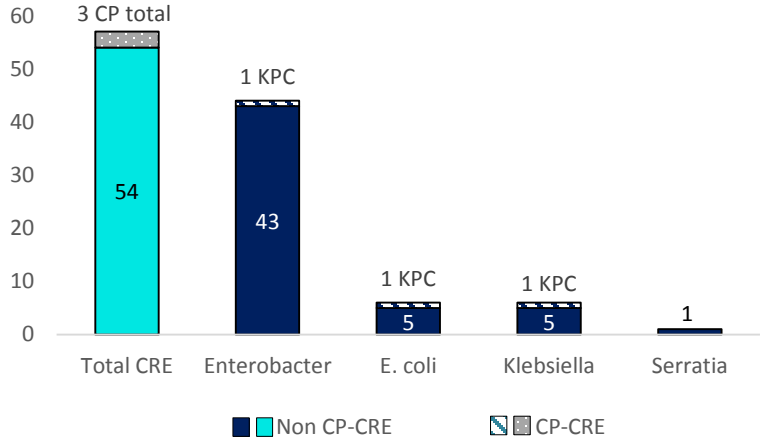
Figure 1. Carbapenem-Resistant Enterobacteriaceae Isolates, Washington, 2015 and 2016



Quarter 4

- Fifty-seven CRE isolates were reported statewide in the fourth quarter of 2016, and a total of 258 isolates in 2016. The contrasting color at the top of each bar represents the number of CRE isolates that were confirmed by PCR testing to carry a carbapenemase gene (Figure 1).
- Of 57 CRE isolates, 44 (77%) were *Enterobacter* spp., 6 (10.5%) *E. coli*, 6 (10.5%) *Klebsiella* spp., and 1 (2%) *Serratia* spp. (Figure 2)
- Of 57 CRE isolates, 3 (5 %) isolates from 3 individual patients tested positive for carbapenemase: all 3 were KPC. (Figure 2)
- One of six (17%) *Klebsiella* isolates was carbapenemase-positive, whereas 1 of 44 (2%) *Enterobacter* isolates, and 1 of 6 (17%) *E. coli* isolates tested positive for carbapenemase. (Figure 2)

Figure 2. Submitted CRE isolates by genus and carbapenemases, Washington, October through December 2016



- One *Serratia* isolate was submitted during the fourth quarter of 2016. This isolate was negative for the five common carbapenemase genes tested at PHL, and was not submitted to CDC as the sensitivity pattern suggests it is unlikely to carry the SME gene. Since we do not routinely solicit carbapenem-resistant (CR) *Serratia*, the proportion of CR-*Serratia* isolates that produce a carbapenemase is not reported. The SME gene is chromosomally encoded and is not as easily transmissible as plasmid mediated carbapenemase genes.

- Of the three patients with KPC identified in quarter four, no patients had known history of international travel, but all had prior healthcare exposures in Washington, suggesting that KPC is circulating in Washington state. Case investigations did not identify the source of transmission.
- Carbapenemases were diagnosed in three Washington counties in quarter four of 2016 (Figure 3). We offer this breakdown of cases by county to inform local health, facilities and providers of recent carbapenemase activity in their region. The quarter four map is shown in Figure 3 below.

Figure 3. Number of Patients with Carbapenemase-producing Organism(s) Reported in Washington, by Location of Residence, October through December 2016 (Quarter Four)

Table 1. Carbapenemases Identified and Likely Source, Washington State, Quarter 4

Carbapenemase	Number of cases	Likely Source
KPC	3	Healthcare in Washington

The Public Health Laboratories accepts and tests other carbapenem-resistant Gram negative organisms, such as other genera in the family Enterobacteriaceae, upon request, or if specialized screening tests (e.g.; RAPIDEC® Carba-NP or Rosco Diagnostica Neo-Sensitabs) indicate suspicion for carbapenemase production.

Since our surveillance has identified several carbapenemases in *Pseudomonas* and *Acinetobacter* isolates, we have established voluntary surveillance for carbapenem-resistant *Pseudomonas* and *Acinetobacter* species beginning January 2017 through sentinel labs. Please consider submitting carbapenem-resistant *Pseudomonas* (non-mucoid from non-cystic fibrosis patients, minimum inhibitory concentration ≥8 µg/mL or Kirby-Bauer zone of inhibition diameter ≤15 mm for any carbapenem) or *Acinetobacter* (minimum inhibitory concentration ≥8 µg/mL for any carbapenem or Kirby-Bauer zone of inhibition diameter ≤14 mm for doripenem and meropenem or ≤18 mm for imipenem) isolates to PHL for carbapenemase testing.

Please contact Kelly Kauber at 206-418-5500 or kelly.kauber@doh.wa.gov for any questions or comments about this report, or for information on becoming a sentinel lab.