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-June 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 January through June, 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.

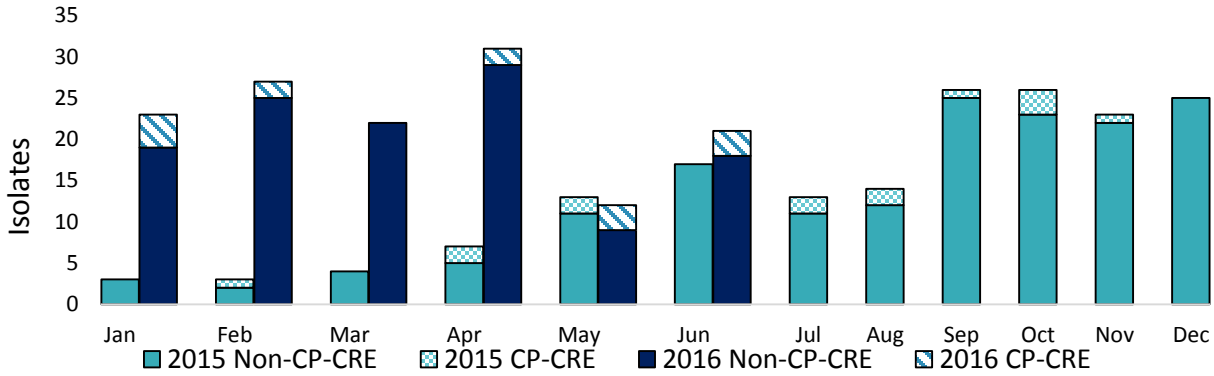
The Washington State Public Health Laboratories (PHL) test CRE isolates for the following carbapenemase genes:

- *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 June 2016, compared to those submitted and tested January through June 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 January through June 2016



- Sixty-four CRE isolates were reported statewide in the second quarter of 2016, and 136 in the first two quarters of 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 64 CRE isolates, 39 (61%) were *Enterobacter* spp., 17 (27%) *E. coli*, 7 (11%) *Klebsiella* spp., and 1 (1%) *Serratia* spp. (Figure 2)
- Of 64 CRE isolates, 8 (12%) isolates from 8 individual patients tested positive for carbapenemase: 2 NDM, 3 KPC, 2 OXA-48 and 1 SME. (Figure 2).
- Zero of 39 (0%) *Enterobacter* isolates was carbapenemase-positive, whereas 4 of 17 (24%) *E. coli*, and 3 of 7 (43%) *Klebsiella* spp. tested positive for carbapenemase.
- A single SME-positive *Serratia* isolate was identified in quarter 2 of 2016. Since we do not routinely solicit carbapenem-resistant (CR) *Serratia*, the proportion of CR-*Serratia* isolates that produce a carbapenemase is not reported.
- Of the 8 individual patients with any carbapenemase-producing organism, only 3 (38%) had recent international healthcare or travel (Table 1).
    - For the 3 KPC carbapenemase cases, the likely source of acquisition was healthcare in Europe (1) and healthcare in the US (2). Both cases likely associated with healthcare in the US had exposures in Washington and out of state.
    - For the 2 NDM cases, healthcare in Asia was the likely source.
    - For the 2 OXA-48 carbapenemase cases, healthcare in Washington State was the likely source.

Table 1. Carbapenemase and likely source

Carbapenemase	Number of cases	Likely Source
KPC	**3**	**Healthcare in Europe (1)** **Healthcare in Texas and Washington (1)** **Healthcare in Oregon and Washington (1)**
NDM	**2**	**Healthcare in Asia**
OXA-48	**2**	**Healthcare in Washington**
SME	**1**	**Unknown**

- Carbapenemases were diagnosed in 7 Washington counties in quarter two 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.

Figure 2. Submitted CRE isolates by genus and carbapenemases, Washington, April through June 2016

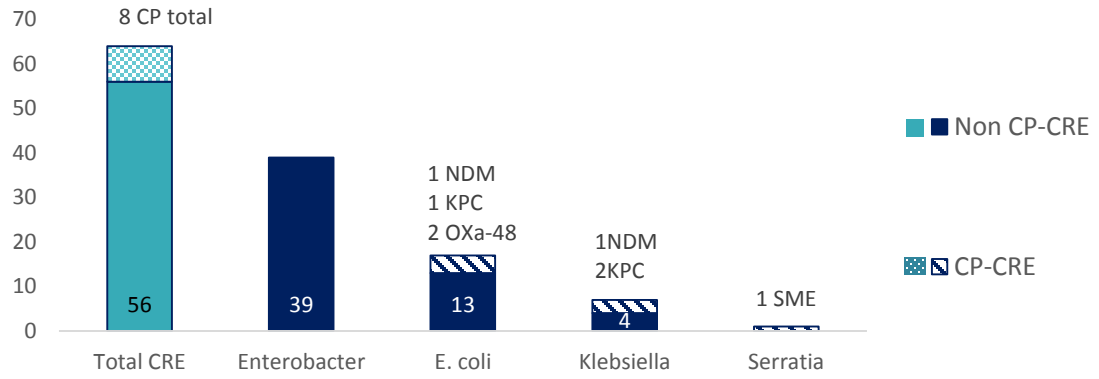
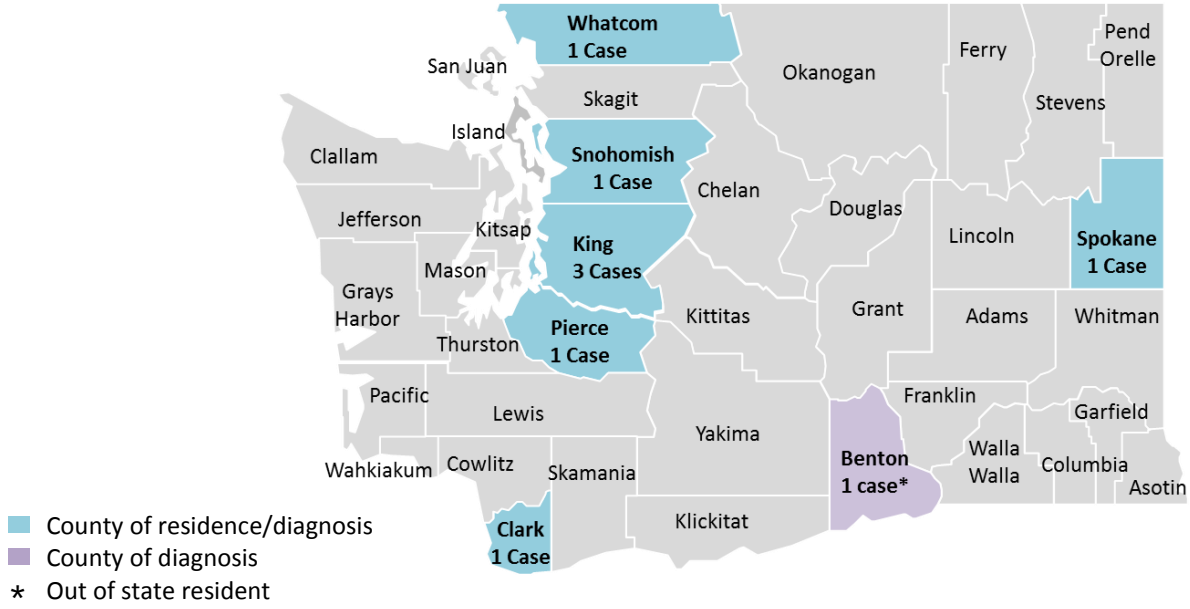


Figure 3. Number of Patients with Carbapenemase-producing Organism(s) Reported in Washington, by Location of Residence, April through June 2016 (Quarter Two)



The Public Health Laboratories accepts and tests other carbapenem-resistant Gram negative organisms, such as other genera in the family Enterobacteriaceae, as well as *Acinetobacter* and *Pseudomonas* species, 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 recently identified several carbapenemases in *Pseudomonas* isolates, we plan to adopt voluntary surveillance for carbapenem-resistant *Pseudomonas* and *Acinetobacter spp*. Please consider submitting any carbapenem-resistant *Pseudomonas* or *Acinetobacter* isolates to PHL for carbapenemase testing.

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