State of Alaska Epidemiology Bulletin

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First Reported Case of New Delhi Metallo-β-Lactamase (NDM) Producing CRE in Alaska

Background

Antibiotic resistance is a major public health challenge globally. Every year in the U.S., at least 2.8 million people become infected with and at least 35,000 people die from an antibiotic-resistant infection.[1] Carbapenem-resistant Enterobacteriaceae (CRE) is a family of gram-negative bacteria that are resistant to most antibiotics, including carbapenems. Resistance to carbapenems can be conferred by several mechanisms (e.g., production of plasmid-encoded carbapenemase enzymes that inactivate carbapenems). Carbapenemase-producing CRE (CP-CRE) can spread rapidly, transfer resistance genes to other bacteria, and cause infections that are associated with high mortality rates.[1] Risk factors for acquisition of CRE include exposure to healthcare, exposure to antibiotics, and poor functional status. Among hundreds of carbapenemase types, the most common type found in the United States is KPC (*Klebsiella pneumoniae* carbapenemase); elsewhere, other types are more common.[2]

Routine bacterial identification and susceptibility tests usually determine whether or not the organism is CRE. Additional tests are needed to assess for carbapenemase production, including phenotypic tests such as the mCIM or genetic tests such as polymerase chain reaction (PCR). Once a case of CRE is identified, contacts can be screened with PCR testing. The mCIM and PCR tests can be accessed through the Antimicrobial Resistance Lab Network (ARLN) by contacting the Alaska State Public Health Laboratory (ASPHL).

CRE has been reportable to the Alaska Section of Epidemiology (SOE) since 2013; reports of CP-CRE are infrequent.[3] All previously identified cases of CP-CRE in Alaska have been KPC-producing. This *Bulletin* describes the first known case of NDM (New Delhi Metallo-β-Lactamase) CP-CRE in Alaska.

Case Report

On July 24, 2019, SOE received notification of a carbapenem-resistant *Klebsiella pneumoniae* isolate from an Alaska hospital. The isolate had been sent to ASPHL and was tested using the GeneXpert® Carba-R Assay carbapenemase PCR panel, which identified the presence of the NDM carbapenemase. The patient was an adult who underwent major surgery in Europe for an injury sustained while on vacation. After several weeks of hospitalization, the patient elected to return home to Alaska to receive additional care, and initially checked into the Hospital A emergency department. The patient presented with GI bleeding, bed sores, atrial flutter, and ongoing complications from the surgery. The past medical history was also significant for a renal transplant more than 10 years earlier. Hospital A determined that the patient needed specialist attention, and transferred the patient to Hospital B the next day; the patient was not on contact precautions while at Hospital A. At Hospital B, the patient developed a drug-resistant *E. coli* urinary tract infection within a week of admission and was placed on contact precautions. The patient underwent multiple procedures and was hospitalized for over a month when CRE was isolated from a urine culture (ordered due to urine discoloration). The patient was not experiencing symptoms of CRE infection at the time of diagnosis.

Public Health Investigation

SOE staff immediately notified the infection prevention teams at both hospitals. A Tier 2 MDRO (Multidrug-Resistant Organism) Containment procedure was followed.[4] This approach involves evaluation of infection prevention around the patient and screening of those potentially exposed based on risk of acquisition. The infection preventionist (IP) at Hospital B determined that the patient was in a single room or on contact precautions for the duration of their stay and was confident that adherence to precautions was high among hospital staff; therefore, an onsite assessment was not performed. Because the patient had no roommates at Hospital B and had been on appropriate precautions, contact screening was not warranted.

The IP and laboratory staff at Hospital A reviewed all *K. pneumoniae* isolates since the time of the patient's stay, confirming that none were carbapenem-resistant. Moreover, the risk of transmission to other patients was determined to be very low given the patient's likely status as being colonized rather than infected and the one-day stay in a single-occupancy room; therefore, an onsite assessment was not performed. Due to the patient's medical history and recent hospitalization outside the U.S., the patient was determined to also be at risk for *Candida auris* colonization.[6] Therefore, the patient was screened for *C. auris* by the ARLN; the test result was negative.

Discussion

We report the first identified case of NDM-producing CRE in Alaska. The patient had risk factors for CRE acquisition, including recent prolonged hospitalization outside the U.S. and exposure to antimicrobials. Admission screening for CRE and *C. auris* would have been justified in this case, and may have helped to better ensure appropriate infection control practices at both facilities and during patient transfer.

Alaska's CP-CRE infection rate is low. Rapid identification of cases, strict adherence to national infection control practices, and good antibiotic stewardship are critical to keep the rate low. SOE's Healthcare-Associated Infections (HAI) Program is available for consultation and assistance with healthcare-associated infections and outbreaks.

Recommendations

1. Healthcare providers should follow CDC's screening recommendations for persons at risk for CRE and *C. auris*.[5,6] For patients who have had an overnight stay in a healthcare facility outside the U.S. in the prior 6 months, admission screening for *C. auris* is available free of charge through the ARLN; contact the HAI Program for approval at 269-8000.
2. Healthcare providers caring for patients with known or suspected CRE should use appropriate isolation precautions, such as contact precautions. Additional infection control recommendations are available online.[5]
3. When transferring a patient with CRE, or any patient on isolation precautions, facilities should clearly communicate the patient's isolation status to the receiving facility, such as by calling the IP and by using a standard transfer form.
4. Patients with a history of CRE or other MDROs, or a history of hospitalization outside Alaska, should be advised to inform their healthcare providers at every visit.
5. Cases of CRE should be reported to SOE and isolates should be sent to ASPHL.

References

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