State of Alaska Epidemiology **Bulletin**

Department of Health
Heidi Hedberg, Commissioner
Anne Zink, MD, Chief Medical Officer

3601 C Street, Suite 540
Anchorage, Alaska 99503

Division of Public Health
Christy Lawton, Acting Director

https://health.alaska.gov/dph/Epi
24 Hour Emergency (800) 478-0084
Local (907) 269-8000

Editors:
Joe McLaughlin, MD, MPH
Louisa Castrodale, DVM, MPH

Bulletin No. 4
April 13, 2023

Case Series of Carbapenem-Resistant Organism Infections — Alaska, 2022–2023

Background

Antimicrobial resistance is a problem of growing concern globally. Carbapenemase-producing organisms (CP-CRO) are of particular concern as carbapenem antibiotics are an important second-line drug class and because carbapenemase genes can be transferred between strains and species of bacteria. Risk factors for CROs include history of hospitalization, antibiotic use, and poor functional status. Some patients are asymptomatically colonized with CROs and become a silent reservoir for transmission to others. Additional information about CP-CRO incidence, morbidity, and mortality is available online.[1]

Identification of CRO and CP-CROs is a multistep process. Once a patient is diagnosed with a CP-CRO infection, close contacts should be screened using PCR testing. Carbapenemase production testing can be accessed through the Antimicrobial Resistance Laboratory Network (ARLN) by contacting ASPHL. Isolates must be submitted to the Alaska State Public Health Laboratory (ASPHL). The purpose of this *Bulletin* is to describe six recent CRO cases in Alaska, highlight risk factors for infection, and offer prevention and management resources.

Case1: VIM CRPA Following Medical Tourism

An Alaska resident traveled to Mexico for cosmetic surgery using a medical tourism agency; arrangements were made online. Several months later, the patient presented to an Alaska hospital with a surgical site infection. Wound specimens grew Verona integron-encoded metallo-beta-lactamase (VIM)-producing, carbapenem-resistant, *Pseudomonas aeruginosa* (CRPA). Colonization screening of known contacts was conducted at the hospital; no additional cases were identified. Many medical tourists have been diagnosed with VIM-producing CRPA following cosmetic surgeries in Mexico in recent years.[5] The patient recovered after hospitalization and treatment.

Cases 2, 3, and 4: VIM CRE of Unknown Source

Isolates of VIM CRE (CP-*Enterobacter cloacae*) were identified in two inpatients at an Alaska hospital. VIM CRE is rare in Alaska and nationally. Neither patient had a history of surgery or hospitalization outside Alaska, but both had been hospitalized for an extended time. In accordance with published guidelines,[2] the hospital conducted a series of screening tests on known contacts to the infected patients and on other patients admitted to the same units, identifying one additional case. SOE and CDC conducted an onsite infection control assessment. No clear source of the CP-CRO was identified. Two of the patients recovered; the third expired from unrelated health conditions.

Cases 5 and 6: mCIM+ non-CP-CROs

In unrelated incidents, two patients with unusual CRO phenotypes were identified. The first patient was hospitalized with severe COVID-19 pneumonia and subsequently became infected with several pathogens, including CRPA. The second patient was hospitalized at a different facility due to cancer and chronic wounds that ultimately tested positive for carbapenem-resistant *Enterobacter bugandensis* on culture. The isolates from both patients were negative for common carbapenemase genes on PCR panel, but positive for carbapenemase activity on phenotypic assay (i.e., the modified carbapenem inactivation method, mCIM). These unusual results could indicate the presence of a rare or novel carbapenemase gene and thus warranted additional testing. Advanced testing at the ARLN did not identify any carbapenemase genes; therefore, it is likely these isolates overexpressed a chromosomal resistance gene such as AmpC or accumulated numerous minor resistance mutations over the course of extended treatment with antibiotics. Both patients were able to be discharged and managed as outpatients.

Discussion

We report six recent CP-CRO and CRO infections in Alaska. All patients involved had known risk factors for CRO acquisition, such as extended hospitalization or recent medical tourism surgery in Mexico.[5] Rapid identification and implementation of isolation precautions for patients known or suspected of having a multidrug resistant organism (MDRO) are crucial in preventing their spread. Admission screening for CRO and *Candida auris (*a fungal infection of growing concern) is available through the ARLN to facilitate early recognition.[7]

Strong collaboration is needed between health care personnel, microbiologists, and public health staff for both identifying and responding to MDROs. A swift response to cases, including rapid initiation of contact precautions and colonization screening prevents these organisms from becoming established in health care facilities and causing protracted outbreaks. Antimicrobial stewardship is also an important component of preventing the evolution and spread of MDROs.[2] Recommendations are available for managing MDRO cases in health care facilities.[2]

Recommendations

1. Health care providers should consider the potential for CP-CROs in patients with risk factors and engage early with infection control staff to prevent spread within facilities.
2. Health care providers caring for patients with known or suspected CROs should use appropriate isolation precautions, such as contact precautions. Additional infection control recommendations are available online.[2]
3. When transferring a patient with a CRO 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. Health care facilities should incorporate national MDRO response recommendations into their policies and planning. This includes establishing mechanisms to rapidly identify and isolate cases, notify public health, conduct colonization screenings, and engage with public health infection control assessments.
5. People who are considering traveling abroad to access health care should review CDC's medical tourism recommendations.[6]
6. Patients with a history of CRE or other MDROs or a history of hospitalization outside Alaska, should inform their health care providers at every visit.
7. Cases of CRO should be reported to SOE and isolates should be sent to ASPHL.
8. Call 269-8000 to reach SOE's Healthcare-Associated Infections and Antimicrobial Resistance (HAI/AR) Program for consultation and assistance with healthcare-associated infections and outbreaks.

References

1. CDC. COVID-19: US Impact on Antimicrobial Resistance. 2022. Available at: https://www.cdc.gov/drugresistance/pdf/threats-report/covid19-impact-report-508.pdf
2. CDC. Strategies for Prevention and Response to Novel and Targeted Multidrug-Resistant Organisms (MDROs). 2023. Available at: https://www.cdc.gov/hai/mdro-guides/index.html
3. Alaska Epidemiology *Bulletin*. "Carbapenem-Resistant Enterobacteriaceae — Alaska, 2013–2015". No. 26, October 20, 2016.
4. Alaska Epidemiology *Bulletin*. "First Reported Case of New Delhi Metallo-β-Lactamase (NDM) Producing CRE in Alaska." No. 23, November 18, 2019.
5. Kracalik I, et al. Extensively Drug-Resistant Carbapenemase-Producing *Pseudomonas aeruginosa* and Medical Tourism from the United States to Mexico, 2018-2019. *Emerg Infect Dis* 2022;28(1):51-61.
6. CDC. Medical Tourism: Travel to Another Country for Medical Care. 2023. Available at: https://wwwnc.cdc.gov/travel/page/medical-tourism
7. CDC. Strategies for Prevention and Response to Novel & Targets MDROS. 2023. Available at: https://www.cdc.gov/hai/mdro-guides/index.html

(Contributed by: Anna Frick, MPH, CIC, and Clayton Weingartner, MPH, Section of Epidemiology, with input from hospital infection prevention staff.)