HEALTH ADVISORY

Missouri Department of Health and Senior Services

Paula F. Nickelson, Director **8 March 2024**

The Missouri Department of Health & Senior Services (DHSS) uses four types of documents to provide important information to medical and public health professionals, and to other interested persons:

Health Alerts convey information of the highest level of importance which warrants immediate action or attention from Missouri health providers, emergency responders, public health agencies, and/or the public.

Health Advisories provide important information for a specific incident or situation, including that impacting neighboring states; may not require immediate action.

Health Guidances contain comprehensive information pertaining to a particular disease or condition, and include recommendations, guidelines, etc. endorsed by DHSS.

Health Updates provide new or updated information on an incident or situation; can also provide information to update a previously sent Health Alert, Health Advisory, or Health Guidance; unlikely to require immediate action.

Phone: 800-392-0272
Fax: 573-751-6041
Web: health.mo.gov

Acinetobacter baumannii Bacteria with Combined NDM and OXA-23 Antibacterial Resistance Genes in Missouri

Summary

- In recent months, the Missouri Department of Health and Senior Services (MDHSS) has detected an increase in cases of Carbapenem resistant *Acinetobacter baumannii* (CRAB) with the combination of New Delhi metallo beta lactamase (NDM) and oxacillinase 23 genes (OXA-23) within health care facilities in Missouri. Acquisition of such genes by CRAB further increases antibacterial resistance of this bacteria and limits treatment options.
- This health alert provides background and epidemiological information on CRAB harboring NDM and OXA-23 genes and describes recommendations for facilities regarding infection prevention and control, transmission-based precautions, inter-facility communications, screening, laboratory testing, and reporting requirements in order to prevent spread of highly resistant organism among the state's health care facilities.

NDM and OXA-23 CRAB Background

Carbapenem Resistant *Acinetobacter baumannii* (CRAB) was classified as an urgent threat by the Centers for Disease Control and Prevention (CDC) due to enhanced transmissibility and limited treatment options (1). Patients with CRAB infection tend to have longer hospital stays and higher in-hospital mortality compared to those without CRAB infections. In the national retrospective cohort study of veterans with positive CRAB cultures, the 90-day mortality rate was as high as 30.3%. (2)
In another study, blood stream infections caused by multidrug resistant *Acinetobacter baumannii* were associated with high rates of septic shock and mortality among large tertiary-care hospital patients in Italy. (3)
The more common resistance genes in CRAB are OXA-23-like, OXA-24/40-like and OXA-58-like oxacillinases. A small proportion of CRAB possess mobile genes that encode different carbapenemases, such as KPC, IMP, NDM, VIM, and OXA-48-like. According to the CDC Antimicrobial Resistance and Patient Safety Portal, in 2022 there were only 125 detections of NDM gene in 6,131 (2.03%) isolates of *Acinetobacter baumannii* tested by the CDC Antimicrobial Resistance Laboratory Network (ARLN) across the United States (5).

CRAB with dual antibacterial resistance mechanism, where both OXA-23 and NDM genes are present, is very rare, and such combination further amplifies bacterial drug resistance.
Combined NDM and OXA-23 CRAB has previously been seen in the United States during an outbreak of NDM-CRAB in California between May 2020 and April 2021 with 79% of their isolates containing both NDM

and OXA-23 genes. (5) Overall, 85% of the tested isolates were pan-nonsusceptible to tested antimicrobials during that outbreak.

Risk Factors
CRAB mostly affects individuals with underlying conditions, those requiring prolonged or complex medical care, as well as those with indwelling devices and/or chronic wounds. Healthy people without these risk factors, including health care workers and family members, have a low risk for becoming infected with CRAB.

Transmission
CRAB can spread from one patient to another in hospitals, nursing homes, and other health care settings. People can be colonized with CRAB without displaying symptoms but still transmit the infection to other persons without proper infection control practices. It can spread through close contact with affected patients and contaminated surfaces or equipment. CRAB can live on surfaces for several weeks. Contact with these surfaces allows the organism to spread to other people. Once a patient has tested positive for CRAB infection or colonization, they are likely considered colonized for life and infection control measures should be utilized.

Infection and Colonization
CRAB can cause clinical infection in different parts of the body, such as in the bloodstream, open wounds, and urinary tract infections. The symptoms depend on the location and severity of CRAB infection. Symptoms are usually similar to bacterial infection presentation. There is not a common set of symptoms specific for CRAB infections. People can also get CRAB on their skin and other body sites without getting sick or having an active infection with symptoms. Health care providers may refer to this as 'colonization.' Some colonized persons may eventually develop clinical infection due to CRAB. Those who are colonized can still contaminate surfaces or objects they contact with CRAB, which can then spread it to other patients.

Diagnosis
Health care Providers can diagnose a patient as actively infected or colonized with CRAB in two ways:

- **Colonization screening–** a health care provider collects an axilla/groin swab and/or a rectal swab and sends the swab to a laboratory for testing.
- **Clinical specimen testing–** If a patient is showing symptoms of an infection of an unknown cause, a health care provider may collect a clinical sample, like, blood or urine, and the results may show that the patient has CRAB. Additional testing is done to determine if the carbapenemase genes are present.

Retesting patients infected or colonized with CRAB is not recommended and should not be used to change infection control measures. A negative test after a previous positive does not ensure that the patient no longer has CRAB on their skin or other body sites and will not spread it to others.

Treatment
Treatment is NOT recommended for persons colonized with CRAB, including NDM and OXA-23 positive CRAB. Those persons with clinical infection with CRAB susceptible to polymyxins should be managed in consultation with an infectious disease specialist. Patients with infection due to CRAB resistant to all antibiotics tested, including polymyxins, should be only managed with infectious disease expert consultation since no known effective therapy exists.

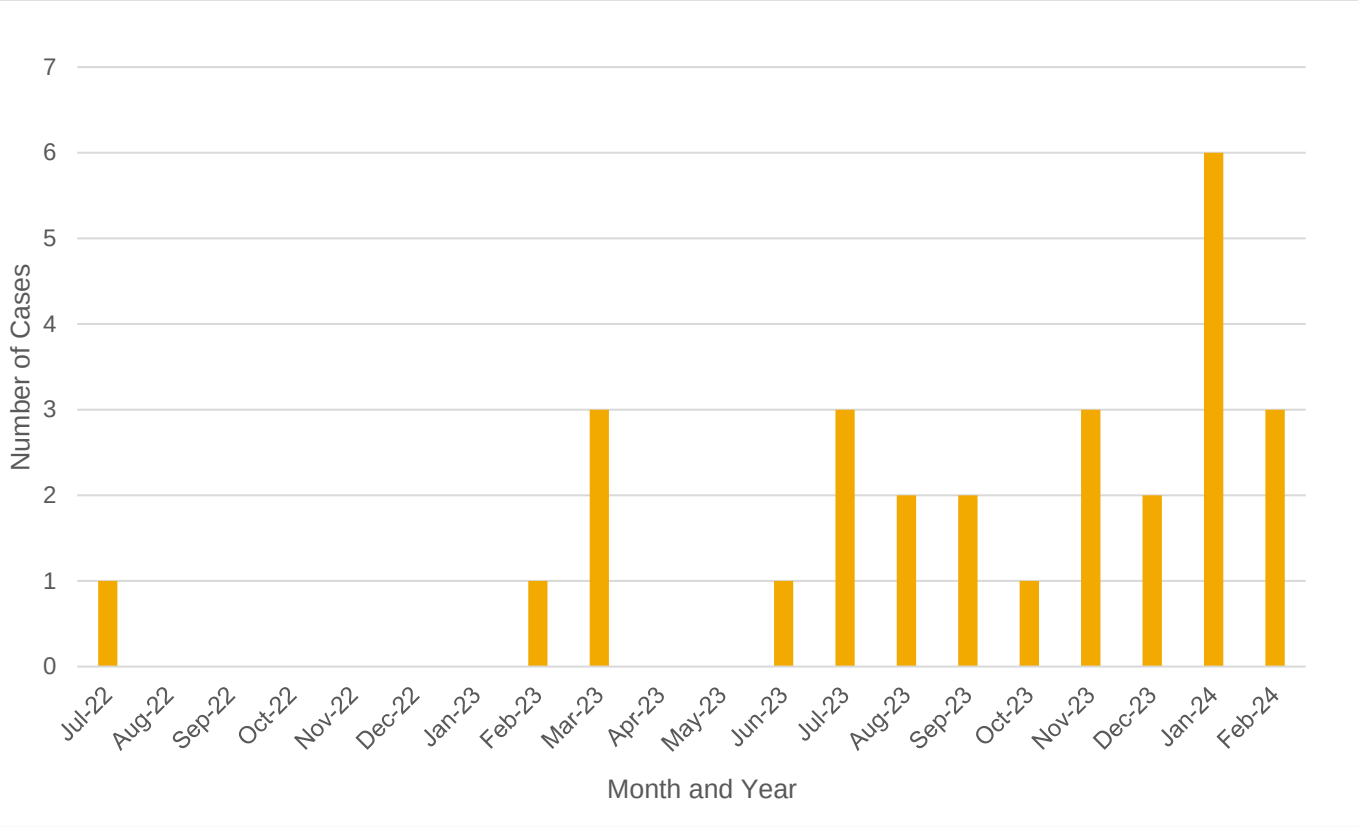
Epidemiology of NDM and OXA-23 CRAB in Missouri
NDM and OXA-23 gene containing CRAB was first seen in Missouri in July 2022. NDM and OXA-23 CRAB infection cases have been detected in a variety of health care facilities including Acute Care Hospitals and Skilled Nursing Facilities. Currently, cases have been identified in at least three regions in Missouri.

From the 28 cases reported in Missouri:

- Patient age ranges from 30 to 96 years old with a median age of 64.5 years.
- 74% of patients have been male.

- Clinical isolates were obtained from wounds, urine, sputum, blood, bone, bronchoalveaolar lavage/bronchial washing.
- All patients currently infected with NDM and OXA-23 CRAB resided in a skilled nursing facility or have had hospitalizations within the last 12 months.

Graph 1. Number of NDM and OXA-23 positive *Acinetobacter baumannii* cases by month, Missouri, 2022-2024*



*Feb-24 data is preliminary as of 03/8/2024

Missouri DHSS Recommendations

Infection Prevention and Control

The CDC and the MDHSS recommends health care facilities take the following actions to identify and control further spread:

- Immediately initiate and regularly reinforce appropriate use of transmission-based precautions based on the setting (described below).
- Inform and educate appropriate personnel about the presence of a patient with CRAB and the need for rigorous adherence to infection control practices.
- Ensure strict adherence to hand hygiene and appropriate personal protective equipment (PPE) use. Alcohol-based hand sanitizer is effective against CRAB and is the preferred method for cleaning hands when they are not visibly soiled. Wearing gloves is not a substitute for hand hygiene.
- Perform thorough cleaning and disinfection of the patient care environment and any shared equipment (daily and terminal cleaning) used by patients with CRAB. Use a disinfectant effective against

Acinetobacter baumannii. Some products may have a longer kill time for *Acinetobacter baumannii* please refer to product label or manufacturer.
- If possible, use dedicated medical equipment for patients with confirmed or suspected CRAB.
- Promote antimicrobial stewardship to limit the emergence of CRAB and other multi-drug resistant organisms (MDROs).

Transmission-Based Precautions

Health care facilities should not decline admission based on colonization or presence of MDRO infection including CRAB.
All patients with CRAB infection or colonization should be placed on the appropriate transmission-based precautions based on the setting:
- **Acute care hospitals, post-acute care facilities (including long-term acute care hospitals)** should place patients with CRAB on contact precautions.
- **Skilled Nursing Facilities** should place patients on Enhanced Barrier Precautions (when contact precautions do not otherwise apply). More information on enhanced barrier precautions can be found here: https://www.cdc.gov/hai/containment/PPE-Nursing-Homes.html
    - **Skilled nursing facilities with ventilator units,** should initially place patients on contact precautions. Patients may be able to be moved to Enhanced Barrier Precautions.
- **Dialysis clinics and providers** should care for patients with CRAB by having health care personnel wear disposable gowns and gloves during patient care or when touching items at the dialysis station. Gowns and gloves should be removed and disposed of carefully, and hand hygiene should be performed when leaving the patient's station. Minimize exposure to other patients by placing the patient away from others or seeing the patient at the end of day.
- **Outpatient Settings** should care for patients with CRAB by having health care personnel wear disposable gown and gloves if extensive patient contact is anticipated or contact with infected areas is planned (e.g., debridement or dressing of colonized or infected wound). Gowns and gloves should be removed and disposed of appropriately, and hand hygiene should be performed when leaving the patient's room.
- **Home Health care settings** should care for patients with CRAB by having health care personnel wear disposable gown and gloves when entering the area of the home where patient care is provided. Gowns and gloves should be removed and disposed of appropriately. Hand hygiene should be performed when leaving the patient care area. Minimize exposure to other patients by seeing the patient at the end of day.

Place all patients with confirmed or suspected CRAB infection or colonization in a private room. If a private room is not available:
- Patients infected or colonized with CRAB and/or other MDROs should be placed in rooms with patients colonized with the same organism(s). CDC does not recommend placing patients with CRAB in rooms with patients who have other types of MDROs.
- Avoid placing CRAB patients with patients who have indwelling devices (e.g., central venous catheter, tracheostomy tubes and mechanical ventilators), serious underlying medical conditions, or are otherwise immunocompromised.

MDHSS does not currently recommend the discontinuation of precautions for a patient or resident with a current, or history of, CRAB colonization or infection.

Interfacility Communication
Robust communication at the time of transfer ensures the continuation of infection prevention and control measures during transitions of care. This can be accomplished via verbal report at the time of transfer, in the discharge summary, or with an interfacility transfer tool.
- Upon admission, ask about a patient's CRAB and other MDRO status, if not included in the accompanying medical records.

- Upon admission, assess CRAB and other MDRO status for all patients by reviewing medical records and utilizing EHR or HL7, especially for patients being admitted from long term acute care hospitals or from ventilator units.
- Upon discharge, communicate a patient's CRAB and other MDRO status, including for any patients screened for an MDRO, but for whom laboratory results are not available at the time of transfer, to any receiving health care facility prior to transfer.
    - This should be done by including a written notification of the infection or colonization to the receiving facility in transfer documents. The referring facility should ensure that the documentation is readily accessible to all parties involved in patient transfer (for example, referring facility, medical transport, emergency department, receiving facility). CDC has a sample Interfacility Transfer Form that facilities can use.

Containment Response
A single case of CRAB (active infection or colonization) requires a robust containment response. Be aware that as part of the current investigation the MDHSS Healthcare Associated Infections/Antimicrobial Resistance (HAI/AR) Program may be conducting outreach to health care facilities and clinical laboratories with epidemiologic links to case patients or health care facilities with cases of CRAB infection.

Colonization Screening[1]
MDHSS recommends screening patients for carbapenemase producing CRAB who meet any of the following criteria:

- Patients presenting from long-term acute care facilities, skilled nursing facilities, or rehabilitation facilities, within the past 12 months, and have history of:
    - Multi-drug resistant organisms (MDROs)
    - Mechanical ventilation or tracheostomy
    - Chronic or unhealing wounds
- Patients hospitalized outside of the United States within the preceding 12 months

Testing of the environment or equipment for *Acinetobacter baumannii* is not routinely recommended. Likewise, testing of health care workers or family members who care for patients with CRAB (or an exposure to CRAB) is not routinely recommended.

Clinical Laboratories
The Missouri State Public Health Laboratory (MSPHL) continues to request clinical laboratories submit CRAB isolates from residents receiving health care in Missouri as outlined below:

- Carbapenem-Resistant *Acinetobacter baumannii* (CRAB) that are resistant to imipenem, meropenem, or doripenem using current CLSI breakpoints (i.e., minimum inhibitory concentrations of >8 mcg/ml)
    - Please send pure isolates only AND a copy of your clinical laboratories AST results so that we may ensure suitable criteria.

MSPHL, as part of a national surveillance program, can provide testing for carbapenemase genes. MSPHL methods for testing include: mCIM, and PCR markers (KPC, NDM, VIM, OXA-48-like, IMP, OXA-23-like, OXA-24-like, and OXA-58-like genes).

Reporting
Health care facilities, providers, and laboratories with suspected or confirmed cases of CRAB (active infection or colonization), should report them to the MDHSS HAI/AR Program at 573-751-6113 or the MDHSS Emergency Response Center (ERC) at 800-392-0272. Carbapenemase producing organisms including *Acinetobacter*

[1] Colonization testing (screening) for *C. auris* and carbapenem-resistant bacteria, including *Acinetobacter baumannii* is available at no cost through the CDC Antimicrobial Resistance Laboratory Network. These services can be accessed in consultation with the MO DHSS by contacting the Healthcare Associated Infections/Antimicrobial Resistance (HAI/AR) Program.

baumannii is implicitly reportable in Missouri as an emerging or unusual disease per State of Missouri regulations, 19 CSR 20-20.020, *Reporting Infectious, Contagious, Communicable, or Dangerous Diseases*). Carpabenemase producing organisms are nationally notifiable as of 2023.

Please contact the MDHSS HAI/AR Program for:

- Patients newly colonized or infected with CRAB (immediately notifiable)
- Guidance on CRAB screening of roommates or other close contacts
- Guidance on patient cohorting (i.e., grouping patients infected with the same infectious agents together to confine their care to one area and prevent contact with susceptible patients)
- Guidance on infection control interventions
- HAI Surveillance including reporting, specimen collection, and specimen submission to the MSPHL.

The MDHSS HAI/AR Program can be contacted at the following 573-751-6113 or the MDHSS Emergency Response Center (ERC) at 800-392-0272. Email address: info@health.mo.gov

References

1. CDC. (2019). Carbapenem Resistant Acinetobacter https://www.cdc.gov/drugresistance/pdf/threats-report/acinetobacter-508.pdf
2. Vivo et al. BMC Infectious Diseases (2022) 22:491 https://doi.org/10.1186/s12879-022-07436-w)
3. Russo A, et al. Bloodstream infections caused by carbapenem-resistant Acinetobacter baumannii: Clinical features, therapy and outcome from a multicenter study. J Infect. 2019 Aug;79(2):130-138. doi: 10.1016/j.jinf.2019.05.017.)
4. CDC. (2023, June) Carbapenem-Resistant Acinetobacter baumannii, Antimicrobial Resistance & Patient Safety Portal
5. California Department of Health.(2021, February) Regional Outbreak of Highly Drug-resistant Carbapenemase-producing Acinetobacter baumannii https://www.cdph.ca.gov/Programs/CHCQ/HAI/CDPH%20Document%20Library/CAHAN_NDM_OXA23_CRAB_May2021.pdf

Target Audience

Local Health Departments, Infectious Disease Physicians, Hospital Emergency Departments, Infection Control Preventionists, Health Care Providers, Long Term Care Facilities, Dialysis Clinics, and Laboratories

Author

MDHSS Healthcare Associated Infections/Antimicrobial Resistance Program, the State Epidemiologist, and Division of Community and Public Health.

This information is current as of March 5, 2024 but may be modified in the future. We may continue to post updated information regarding the most common questions about this subject.