SOUTH DAKOTA DEPARTMENT OF HEALTH
Every South Dakotan Healthy and Strong

Carbapenemase-Producing Organisms (CPO), Carbapenem-Resistant Enterobacterales (CRE) and other Carbapenem-Resistant Organisms (CRO)

WHEN DEALING WITH MULTI-DRUG-RESISTANT ORGANISMS OF CONCERN, IT IS IMPORTANT FOR HEALTHCARE FACILITIES TO QUICKLY IDENTIFY, ISOLATE AND INFORM TO PREVENT FURTHER SPREAD. THE INFORMATION PROVIDED IS AIMED AT GIVING RESOURCES AND A BRIEF INTRODUCTION TO CPO/CRE/CROS.

IDENTIFY

In January 2024, South Dakota Department of Health officially changed the surveillance case definition to Carbapenemase producing organism (CPO) from Carbapenem-resistant enterobacterales (CRE).[1] Surveillance case definitions enable public health officials to classify and count cases consistently across reporting jurisdictions. Clinical diagnosis and infection prevention standards remain the same despite the case definition name.

CPO, CRE, and CRO are significant public health concerns and contribute to the growing problem of antibiotic resistance. The Enterobacterales constitute a large order of Gram-negative bacilli, many of which are normal inhabitants of the intestinal tract in humans, other mammals, and birds. Enterobacterales most encountered in healthcare settings include the genera *Citrobacter*, *Enterobacter, Escherichia, Klebsiella, Morganella, Proteus, Providencia, and Serratia.* Other frequently encountered carbapenem-resistant Gram-negative organisms (not in the order, Enterobacterales) include *Acinetobacter* and *Pseudomonas*. They are common inhabitants of soil and water and may colonize human skin (both), intestines (*Pseudomonas*), and other body sites.

Carbapenem antibiotics (ertapenem, imipenem, meropenem and doripenem) are broad spectrum (active against many different groups of bacteria) and usually reserved for severe life-threatening infections. Certain Gram-negative bacilli, including the Enterobacterales, *Pseudomonas,* and *Acinetobacter*, have developed carbapenem resistance which limits options for treating infections due to these organisms. The mechanism of resistance can be varied; most concerning are carbapenemases, enzymes produced by bacteria that directly inactivate carbapenems. Carbapenemase genes can be transmitted on plasmids. This "horizontal inheritance" is primarily responsible for the worldwide spread of carbapenemase producing organisms (CPO).[2,4]

Illness and Treatment

Healthy people usually do not get infections due to CPO/CRE/CROs. These bacteria can colonize body sites and cause no symptoms. CPO/CRE/CROs infections occur most commonly in patients who have long term hospitalizations, invasive medical devices (e.g., ventilators, bladder catheters, or intravenous catheters), or have international healthcare. Few antibiotics are effective against CPOs. Infectious Disease consultation should be considered for guidance on treating infections. Decolonization should not be attempted except in extremely rare situations.[2,3,4]

Sources

In the US, the most common sources for colonization or infection with CPO/CRE/CROs are from health care worker's hands and other contaminated objects in the healthcare environment.[3,4]

Reviewed January 2025

Additional Risks

The outcomes from infections due to resistant bacteria are generally worse than from infections due to antibiotic sensitive bacteria. For CRE, the mortality rate associated with blood stream infections has been reported to be 50%.[4]

Prevention

The best way to prevent colonization and infections with CPO/CRE/CROs is through implementation of appropriate infection control precautions in healthcare settings. Including hand washing; placing patients infected with CPO/CRE/CROs on transmission-based precautions; minimizing the use of invasive devices; and using antibiotics only when necessary and for the minimum time.[3,4]

ISOLATE

CPO/CRE/CRO infections are difficult to treat. These bacteria an cause outbreaks in healthcare settings and are threats to patient safety. As patients move through the healthcare system, CPO in one facility can lead to CPO in other facilities.[3,4,5,6]

- Ensure CPO/CRE/CROs patients are placed on contact precautions in isolation.
- If possible, place patient in a private or individual room. Otherwise, you may need to consider co-horting patients.

For long-term care facilities, enhanced barrier precautions should be considered for this patient:

1. Enhanced Barrier Precautions (EBP) are an infection control intervention designed to reduce transmission of resistant organisms that employ targeted gown and glove use during high contact resident care activities.[6]
2. EBP may be indicated (when Contact Precautions do not otherwise apply) for residents with any of the following:
    1. Wounds or indwelling medical devices, regardless of MDRO colonization status
    2. Infection or colonization with an MDRO.

When can Contact Precautions be discontinued for patients colonized or infected with CPO/CRE/CRO?

There is currently not enough evidence to support discontinuing isolation for patients with CPO/CRE/CROs. That's why enhanced barrier precautions are advised in long-term care facilities. Colonization can last for months, and a single negative culture shouldn't be used to end contact precautions, as patients can test positive intermittently.[4,6]

Patients can leave their room for activities once their active infection is resolved but should be as clean as possible when doing so. They should be wearing clean clothes, use a clean wheelchair if needed, and always washing hands or using hand sanitizer before leaving their room and after toileting. Proper hand hygiene is critical in preventing transmission. See enhanced barrier precautions above for more details.

Cleaning

Antibiotic resistance doesn't mean that bacteria can resist hospital disinfectants. So, even though CPO/CRE/CROs are difficult to treat with antibiotics, it's not any harder to clean or disinfect than non-CPO/CRE/CROs. Unlike other organisms, like Clostridium difficile, which can form tough spores, CPO/CRE/CROs don't have that outer protection, making it easier to kill or remove from a patient's environment.[7]

Follow the manufacturers' instructions for use to ensure proper disinfection time. Refer to the EPA's list of disinfectants for more information[7].

Reviewed January 2025

Clean and Disinfect the Patient Environment and Medical Equipment

- Follow your facility's cleaning and disinfection protocols.
- Ensure high-touch surfaces (e.g., bed rails, light switches, call buttons) are cleaned frequently.
- Dedicate non-critical medical equipment (e.g., stethoscopes, blood pressure cuffs) to CPO/CRE/CRO patients whenever possible and always clean and disinfect between patients.
- Ensure shared medical equipment (e.g., portable X-ray machine) is cleaned and disinfected between each patient.[4,9]

Prevent Transmission from Sinks, Toilets, and Other Wastewater Plumbing

CPO/CRE/CROs can contaminate wastewater plumbing, especially sink drains, toilets, and hoppers. Splashes from these sources are associated with outbreaks of carbapenemase-producing organisms.[8,9]

- Clean and disinfect countertops, handles, faucets, and sink basins at least daily.
- Keep patient care items at least three feet away from sinks, toilets, and hoppers.
- Do not discard patient waste in sinks.
- Avoid discarding beverages or other sources of nutrients in sinks or toilets.

Laundry and Disposal of Personal Protective Equipment (PPE)

Although contaminated textiles and fabrics in health-care facilities can be a source of a substantial number of pathogenic microorganisms, reports of healthcare associated diseases linked to contaminated fabrics are so few that the overall risk of disease transmission during the laundry process is likely negligible. When the incidence of such events are evaluated in the context of the volume of items laundered in health-care settings (estimated to be 5 billion pounds annually in the United States), **existing control measures (e.g., standard precautions) are effective in reducing the risk of disease transmission to patients and staff.** Therefore, use of current control measures should be continued to minimize the contribution of contaminated laundry to the incidence of healthcare associated infections.

Improper disposal of personal protective equipment (PPE) is a common issue. Generally, PPE can go into regular trash unless it is heavily contaminated with something like uncontained, pourable urine. In such cases, it should be handled like a biohazard. PPE should be bagged at the point of use and placed in the regular trash. The CDC's isolation guidelines, found on page 64, provide further information on handling laundry and equipment in isolation rooms.[5] Proper doffing of PPE to reduce risk of contamination should be encouraged, along with practicing hand hygiene. Disposing items like briefs or undergarments can be placed in the regular trash in the room, ideally double-bagged to reduce the chance of leaks.[5]

INFORM

It is crucial to inform other healthcare facilities of a patient's history of a CPO/CRE/CRO. This allows others to proactively place them on contact precautions and isolation procedures on arrival. Please use the interfacility transfer form to help communicate with transfers.[11]

Provide timely education to your staff about the importance of hand hygiene and other infection control practices. Reach out to South Dakota Department of Health, Healthcare Associated Infections/Antibiotic Resistance department for educational resources and support.

Finally, stay up-to-date and informed on current healthcare associated infections, epidemiological concerns and other news. Sign up for the SD DOH HAI/AR listserv.

Reviewed January 2025

Contact Us: Healthcare Association Infections/Antibiotic Resistance Department

DOH.info@state.sd.us

605-773-3361

Cheri Fast, HAI/AR Coordinator: Cheri.fast@state.sd.us

Molly Hausmann, Disease Intervention Specialist: Molly.hausmann@state.sd.us

Leah Bomesberger, Infection Preventionist: Leah.bomesberger@state.sd.us

References

1. Carbapenemase-Producing Organism (CPO) 2023 Case Definition:

https://ndc.services.cdc.gov/case-definitions/carbapenemase-producing-organisms-cpo-2023/

2. Carbapenem-resistant Enterobacteriaceae (CRE) and other Carbapenem-Resistant Organisms:

https://doh.wa.gov/public-health-provider-resources/notifiable-conditions/carbapenemresistant-enterobacterales

3. Carbapenem-resistant Enterobacterales (CRE) Infection Control:

https://www.cdc.gov/cre/hcp/infection-control/index.html

4. Facility guidance for Control of Carbapenem-resistant Enterobacteriaceae (CRE):

https://www.cdc.gov/infection-control/media/pdfs/Guidelines-CRE-Guidance-508.pdf

5. 2007 Guideline for Isolation Precautions: Preventing Transmission of Infectious Agents in Healthcare Settings:

https://www.cdc.gov/infection-control/media/pdfs/Guideline-Isolation-H.pdf

6. Implementation of Personal Protective Equipment (PPE) Use in Nursing Homes to Prevent Spread of Multidrug-resistant Organisms (MDROs):https://www.cdc.gov/long-term-care-facilities/hcp/prevent-mdro/PPE.html

7. EPA Registered Disinfectants: https://www.epa.gov/pesticide-registration/selected-epa-registered-disinfectants

8. Aranega-Bou, P.Aiken, Zoie et al. Carbapenem-resistant Enterobacteriaceae dispersal from sinks is linked to drain position and drainage rates in a laboratory model system Journal of Hospital Infection, Volume 102, Issue 1, 63 – 69

9. CRE-Carbapenem-resistant Enterobacterales Handout: https://www.cdc.gov/healthcare-associated-infections/media/pdfs/CRE-handout-V7-508.pdf

10. Linen and Laundry Management: https://www.cdc.gov/infection-control/hcp/environmental-control/laundry-bedding.html

11. CDC Sample Inter Facility Infection Control Transfer Form: https://www.cdc.gov/healthcare-associated-infections/media/pdfs/Interfacility-IC-Transfer-Form-508.pdf

This publication was supported by the Centers for Disease Control and Prevention (CDC) of the U.S. Department of Health and Human Services (HHS) as part of a financial assistance award totaling $1,777,753 with 100 percent funded by CDC/HHS. The contents are those of the author(s) and do not necessarily represent the official views of, nor an endorsement, by CDC/HHS, or the U.S. Government.

Reviewed January 2025