Wisconsin Department of Health Services
Division of Public Health
P-02187 (07/2024)

Communicable Disease Case Reporting and Investigation Protocol

CARBAPENEMASE-PRODUCING ORGANISMS

I. IDENTIFICATION AND DEFINITION OF CASES

A. **Clinical Description:** Carbapenemase-producing organisms (CPOs) are an emerging and epidemiologically important public health threat. Infections with CPOs are difficult to treat and are associated with high mortality rates. Carbapenem antibiotics (doripenem, ertapenem, imipenem, and meropenem) are often used as the last line of treatment for infections caused by highly resistant gram-negative bacteria, including *Acinetobacter baumannii, Pseudomonas aeruginosa*, and many species from the order Enterobacterales. CPOs can contain mobile antibiotic-resistant elements that facilitate transmission of resistance to other gram-negative bacteria. Early detection and aggressive implementation of infection prevention and control strategies are necessary to prevent further spread of CPOs, especially novel CPOs.

B. **Laboratory Criteria:** Any bacterial isolate of *Acinetobacter baumannii, Pseudomonas aeruginosa*, or any species from the order Enterobacterales (for example: *Klebsiella* spp., *Enterobacter* spp., *E. coli*, etc.) that tests positive or indeterminate for carbapenemase production by a phenotypic method, or positive for a carbapenemase resistance mechanism by molecular testing methods.

- Confirmatory laboratory evidence:
  - Positive phenotypic test result for carbapenemase production, OR
  - Positive test result detecting a carbapenemase gene (with or without organism identification)
- Examples of phenotypic methods for the detection of carbapenemase production:
  - Carba NP positive
  - Metallo-β-lactamase testing (for example, E-test) positive
  - Modified Carbapenem Inactivation Method (mCIM) positive
  - Carbapenem Inactivation Method (CIM) positive
- Examples of methods for the detection of carbapenemase resistance mechanisms:
  - Commercial or validated laboratory-developed PCR for KPC, NDM, OXA, IMP, VIM or other carbapenemase
  - Xpert® Carba-R (KPC, NDM, OXA-48, VIM, or IMP)
  - NG-Test Carba-5 (KPC, NDM, OXA-48, VIM, or IMP) immunoassay
  - Next Generation or other sequencing methods
- Specimen classification:
  - A **clinical specimen** is collected for the purpose of diagnosing disease in the normal course of care. It may be collected from any body site.
  - A **screening specimen** is collected from an individual without clinically compatible illness for the purpose of detection of colonization with the organisms. Common screening specimen sites are skin (for example, axilla, groin), rectal, nares, or other external body sites.

C. **Wisconsin Surveillance Case Definition:**

- Carbapenemase-Producing Organism, clinical
  - Confirmed: A clinical specimen with confirmatory laboratory evidence of a CPO.
  - Suspect: A clinical specimen that was resistant to carbapenem antibiotics but not tested for carbapenemase production.
- Carbapenemase-Producing Organism, screening
  - Confirmed: A screening specimen with confirmatory laboratory evidence of a CPO.

D. **Criteria to Distinguish a New Case:**

A case should be counted as new if any of the following conditions are met:

- The patient tests positive for a different carbapenemase resistance mechanism (KPC, NDM, VIM, IMP, OXA) than previously identified.
- The patient tests positive for a different carbapenemase/organism combination (KPC-*E. coli* and KPC-*Klebsiella pneumoniae*.)

- The isolate is from a clinical case where the previous isolate was from screening (for example, a patient with positive axilla/groin screening swab who later develops a wound infection). The opposite, a screening positive in a patient with a previous clinical case, would not be considered a new case.

II. REPORTING

A. **Wisconsin Disease Surveillance Category II – Methods for Reporting:** This disease shall be reported to the patient's local health officer or to the local health officer's designee within 72 hours of recognition of a case or suspected case, per Wis. Admin. Code § DHS 145.04 (3) (b). Report electronically through the Wisconsin Electronic Disease Surveillance System (WEDSS), or mail or fax a completed Acute and Communicable Disease Case Report (F-44151) to the address on the form.

B. **Responsibility for Reporting**: According to Wis. Admin. Code § DHS 145.04(1), persons licensed under Wis. Stat. ch. 441 or 448, laboratories, health care facilities, teachers, principals, or nurses serving a school or day care center, and any person who knows or suspects that a person has a communicable disease identified in Appendix A.

C. **Clinical Criteria for Reporting**: None.

D. **Laboratory Criteria for Reporting:** Laboratory evidence of infection or colonization by culture or non-culture-based methods that meet the laboratory criteria. All positive results shall be reported, and all positive isolates shall be forwarded to the Wisconsin State Laboratory of Hygiene (WSLH).

III. CASE INVESTIGATION

A. **Responsibility for case investigation**: It is the responsibility of the local or Tribal health department (LTHD) to investigate or arrange for investigation of probable or confirmed cases as soon as is reasonably possible. A case investigation may include information collected by phone, in person, in writing, or through review of medical records or communicable disease report forms, as necessary and appropriate. The Wisconsin Healthcare-Associated Infections (HAI) Prevention Program within the Division of Public Health is available to assist or lead these investigations and support LTHDs and facilities through the case identification as well as ongoing response.

B. **Required Documentation:**
Complete the WEDSS disease incident investigation report, including appropriate disease-specific tabs. Upon completion of investigation, set WEDSS disease incident process status to "Sent to State."

C. **Additional Investigation Responsibilities:** Some facilities that report a CPO will be eligible for fee-exempt colonization testing of patients or residents. This will be at the discretion of the Wisconsin Healthcare-Associated Infections (HAI) Prevention Program.

IV. PUBLIC HEALTH INTERVENTIONS AND PREVENTION MEASURES

A. In accordance with Wis. Admin. Code § DHS 145.05, local public health agencies should follow the methods of control recommended in the current editions of *Control of Communicable Diseases Manual*, edited by David L. Heymann, published by the American Public Health Association, and the American Academy of Pediatrics' *Red Book: Report of the Committee on Infectious Diseases*, unless otherwise specified by the state epidemiologist.

B. Information on case and contact management can be found on the Wisconsin Department of Health Services Healthcare-Associated Infections Prevention Program Reportable MDROs website: https://www.dhs.wisconsin.gov/hai/reportable-mdro.htm.

C. Additional information on *Acinetobacter* in health care settings can be found at the CDC's website: https://www.cdc.gov/acinetobacter/about/.

D. Additional information on *Pseudomonas aeruginosa* in health care settings can be found at the CDC's website: https://www.cdc.gov/pseudomonas-aeruginosa/about/.

E. Additional information on CRE in health care settings can be found at the CDC's website: https://www.cdc.gov/cre/hcp/infection-control/.

V. CONTACTS FOR CONSULTATION

A. Local health departments and tribal health agencies: https://www.dhs.wisconsin.gov/lh-depts/index.htm

B. Bureau of Communicable Diseases, Wisconsin HAI Prevention Program: dhswihaipreventionprogram@wi.gov, 608-267-7711

C. Wisconsin State Laboratory of Hygiene: 1-800-862-1013; after hours emergency number: 608-263-3280

VI. RELATED REFERENCES

A. Heymann DL, ed. Infection Prevention and Control. In: Control of Communicable Diseases Manual. 20th ed. Washington, DC: American Public Health Association, 2015: A28-36.

B. Pickering LK, ed. Infection Control and Prevention for Hospitalized Children. In: Red Book: 2015 Report of the Committee on Infectious Diseases. 30th ed. Elk Grove Village, IL: American Academy of Pediatrics, 2015: 161-176.

C. Centers for Disease Control and Prevention. Facility Guidance for Control of Carbapenem-resistant *Enterobacteriaceae* (CRE) – November 2015 Update CRE Toolkit. Retrieved from https://www.cdc.gov/infection-control/media/pdfs/Guidelines-CRE-Guidance-508.pdf

D. Wisconsin Department of Health Services, Division of Public Health. Antibiotic Resistance: https://www.dhs.wisconsin.gov/disease/aro.htm

E. Wisconsin Department of Health Services, Division of Public Health. Multidrug-Resistant Organism (MDRO) Reportables: https://www.dhs.wisconsin.gov/hai/reportable-mdro.htm.