

Guidance: Infection Prevention and Control Measures for Healthcare Workers in All Healthcare Settings

Carbapenem-resistant Gram-negative Bacilli



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Guidance: Infection Prevention and Control Measures for Healthcare Workers in All Healthcare Settings

Carbapenem-resistant Gram-negative Bacilli

The Public Health Agency of Canada (PHAC) has developed this document to provide infection prevention and control guidance to healthcare workers (HCWs) in the management of patients^a colonized or infected with carbapenem-resistant Gram-negative bacilli (CRGNB), including the **New Delhi metallo beta-lactamase (NDM-1)**. The content of this document has been informed by technical advice provided by infection control experts.

The following guidance should be read in conjunction with relevant provincial and territorial legislation, regulations, and policies. This guidance is based on current, available scientific evidence and is subject to review and change as new information becomes available. It is not to be viewed as binding, but indicates the best practices to follow.

Description

Gram-negative bacilli commonly encountered in healthcare settings include species such as *Pseudomonas aeruginosa*, *Acinetobacter* spp. and *Stenotrophomonas maltophilia*, and species belonging to the Enterobacteriaceae family, such as *Escherichia coli*, *Klebsiella pneumoniae*, and *Enterobacter cloacae*.¹ Recent events indicate an increasing occurrence of antimicrobial resistance in Gram-negative bacteria. The carbapenem group of antimicrobials is a safe and generally effective treatment for severe Gram-negative bacterial infections when resistance to other classes of antimicrobials is present. When resistance to carbapenems occurs, there are often few alternative treatments available.²

Carbapenem-resistance in Gram-negative bacteria can occur by a number of different mechanisms. Identifying carbapenem resistance and distinguishing between these different mechanisms of resistance can be challenging for clinical microbiology laboratories. Carbapenem resistance develops as a result of the production of carbapenem-hydrolysing enzymes. These enzymes are usually encoded by genes carried on mobile genetic elements such as plasmids which can rapidly spread amongst related bacterial genera. Some notable examples of recently identified carbapenemases are:

- *Klebsiella pneumoniae* carbapenemase (KPC) which is found mostly in *K. pneumoniae* but also in other Enterobacteriaceae. KPC producing microorganisms have caused major healthcare related outbreaks in Greece, Israel and north eastern USA;³
- The OXA-type resistance genes found in *Acinetobacter* spp.⁴ Carbapenem-resistant *Acinetobacter* has been identified worldwide but is currently rarely seen in Canadian hospitals;
- Metallo- β -lactamases which are mostly found in *P. aeruginosa* and *Acinetobacter* spp., and rarely in other Enterobacteriaceae;⁵ and include the **New Delhi metallo beta-lactamase (NDM-1 enzyme)** found mostly in *Escherichia coli* and *K. pneumoniae*, but also seen in other Enterobacteriaceae. The **New Delhi metallo beta-lactamase (NDM-1 enzyme)** has recently been identified in India and Pakistan and in patients hospitalized in other countries after receiving health care in India and Pakistan.³

^a Patients refer to patients, residents or clients.



Recommended Infection Prevention and Control Measures

The following guidance is based primarily on recommendations in the Public Health Agency of Canada's "*Routine Practices and Additional Precautions for Preventing the Transmission of Infection in Health Care*" guideline.⁶

In addition to Routine Practices, patients colonized or infected with carbapenem-resistant Gram-negative bacilli (CRGNB), including bacteria harbouring the **New Delhi metallo beta-lactamase (NDM-1)**, in healthcare settings should be placed on **Contact Precautions**. This should include patients suspected of harbouring a CRGNB (e.g. based on prolonged contact with a person known to carry CRGNB, or if preliminary laboratory testing suggests possible CRGNB) until etiology is confirmed. Specific attention should be given to laboratory testing/surveillance, screening, hand hygiene, accommodation, personal protective equipment, patient care equipment, environmental cleaning, laundry/waste management, reporting, discontinuing of Contact Precautions, and antimicrobial stewardship.

Note, for asymptomatic patients known or suspected of colonization with CRGNB, Contact Precautions are not recommended for prehospital and home care settings.

1. Laboratory Testing/Active Surveillance

Ensure that the healthcare laboratory is utilizing appropriate laboratory methods for detection of CRGNB, with prompt notification to Infection Prevention and Control Professionals and clinicians,² as well as regional, provincial/territorial public health authorities as required.

If a patient is found to be colonized or infected with CRGNB more than 48 hours after admission, **consider:**

- Clinical screening (i.e. assessing the presence of infection) with laboratory testing of clinically relevant specimens (e.g. urine in the setting of urinary tract infection or presence of an indwelling bladder catheter; wound in the setting of skin and soft tissue infection or open wound) of any roommates the patient had during hospitalization;
- Doing a retrospective (6-12 months)² review of laboratory records to determine whether CRGNB was circulating within the healthcare organization prior to the identification of this patient;
- In the circumstance where 2 or more patients within an organization are found to be infected with or carrying the same strain (species) of CRGNB, after expert consultation (including Infection Prevention and Control Professionals, Clinical Microbiology and Public Health), the organization should strongly consider active surveillance culture laboratory testing of other patients who may have had contact with the index cases;
- There is no indication for surveillance culture testing of healthcare providers, family or visitors, or, in the absence of a major outbreak, for environmental sampling.

2. Screening

There is insufficient evidence to recommend routine screening (including epidemiologic risk screening and active surveillance culture screening) of patients for colonization with CRGNB. Laboratory testing for asymptomatic carriage of CRGNB is not routinely recommended. As for all patients with symptoms of infection, specimens should be sent for culture. There should be a high index of suspicion for the presence of CRGNB in patients at risk for infection with these bacteria, particularly patients transferred from facilities known to have high CRGNB prevalence rates; roommates of CRGNB colonized or infected patients; and patients known to have been previously infected or colonized with a CRGNB.⁷

3. Hand Hygiene



HCWs should perform hand hygiene frequently (as recommended in the PHAC "*Hand Hygiene Practices in Health Care*" guideline⁸ and the healthcare organization's policy) preferably using an alcohol based hand rub (60-90%) or soap and water if hands are visibly soiled.⁸ Alcohol based hand rubs are effective against these Gram-negative bacilli.

4. Accommodations

Patients colonized or infected with CRGNB should be cared for in single rooms, or cohorted with other patients with the same strain of CRGNB, based on roommate suitability. It is recommended that infection control signage be placed on the room^b door indicating Contact Precautions required upon entry to the room.

5. Personal Protective Equipment

Gloves should be worn when entering the room of a patient colonized or infected with a CRGNB. Gowns should be worn if it is anticipated that clothing or forearms will be in direct contact with the patient or with environmental surfaces or objects in the patient care environment. Remove gloves just before leaving the room and discard in a hands-free waste receptacle. Remove the gown just before leaving the room and discard in a hands-free linen or waste receptacle, as appropriate. HCWs should perform hand hygiene after removing gown and gloves and after leaving the room.

6. Patient Care Equipment

All patient care equipment (e.g., thermometers, blood pressure cuff, pulse oximeter, etc.) should be dedicated to the use of one patient and cleaned and disinfected as per Routine Practices before reuse with another patient or use a single use device and discard in a waste receptacle after use.

Toys, electronic games or personal effects should not be shared between patients.

7. Environmental Cleaning

Hospital-grade cleaning and disinfecting agents are sufficient for environmental cleaning in the context of CRGNB colonization or infection. All horizontal and frequently touched surfaces should be cleaned at least twice daily and when soiled. The healthcare organization's terminal cleaning protocol for cleaning of the patient's room following discharge, transfer or discontinuation of Contact Precautions should be followed.

8. Laundry/Waste Management

No special precautions are recommended; Routine Practices should be sufficient.

9. Reporting

Infection Prevention and Control Professionals should be notified, as per the healthcare organization's policy/ regulations.

10. Discontinuing Contact Precautions

Evidence based criteria for discontinuing Contact Precautions for CRGNB in acute care settings have not been developed. Given the likelihood for prolonged gastrointestinal carriage of CRGNB and risk for spread of these microorganisms, organizations should be cautious in discontinuing Contact Precautions. In most cases Contact Precautions should continue for the duration of the hospitalization during which the CRGNB was first isolated. Patients readmitted within 12 months of that hospitalization should be considered probably colonized and managed with Contact Precautions.

^b Patient's room or designated bedspace.



11. Antimicrobial Stewardship

The healthcare organization should have an antimicrobial stewardship program to address the judicious utilization of antibiotics.⁷

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