

# Information for clinicians

## Carbapenem Resistant Enterobacteriaceae (CRE)

Carbapenems are a group of penicillin-related (broad spectrum beta-lactam) antibiotics that are effective against most Gram negative infections.<sup>a</sup> They are the last line of treatment for serious infections caused by multi-resistant *E. coli*, *Klebsiella* species and other Enterobacteriaceae.

Gram-negative bacteria that are resistant to most types of antibiotics, including carbapenems, are now emerging. This group of bacteria are known as Carbapenem Resistant Enterobacteriaceae (CRE).

CRE are resistant to all beta-lactam antibiotics, including penicillins, cephalosporins and carbapenems. They are usually also resistant to most aminoglycosides and fluoroquinolones.

CRE increase the risk of potentially untreatable infections in patients following invasive procedures or other hospital care. CRE infections are associated with a much higher mortality than infections with otherwise similar non-CRE bacteria.<sup>1</sup>

The duration of CRE carriage is variable and may be prolonged past 6 months in around 20% of people.

### CRE in Australia: Who is at risk ?

Australia has not seen a significant number of CRE cases to date, due in part to our geographic isolation. However, the risk of CRE spreading to Australia is significant enough that it is recognised as an emerging public health issue.

International travel to affected areas (such as Greece, India and South-East Asia) creates an increased risk of spread of CRE to Australia. Exposure to healthcare services or residential care in these areas is a particularly significant risk factor for CRE colonisation.

Carbapenem antibiotics include: Meropenem, Imipenem, Ertapenem

Travellers to CRE endemic regions may acquire CRE or other resistant bacteria from food, water or environmental sources and, as a result, extra care should be taken by travellers.

<sup>a</sup> The most common and important gram negative pathogens are the enterobacteriaceae, represented particularly by *Escherichia coli* and *Klebsiella/Enterobacter* spp.

CRE are more likely to affect patients who have:

- poor functional status
- prolonged hospital stay
- had a hospital stay within the previous 12 months
- had multiple exposures to different antibiotic agents
- diabetes mellitus
- had mechanical ventilation
- been admitted to an intensive care unit
- indwelling medical devices, such as a central venous catheter, urinary catheter, biliary catheter or wound drainage
- had an organ or stem-cell transplant
- been a resident in an aged care facility
- travelled to areas where CRE is endemic

### Controlling CRE in healthcare

Early detection of CRE through targeted patient screening is essential to enable containment.

Infection control and antimicrobial stewardship measures are of proven value for limiting the spread and impact of CRE in healthcare settings.

The use of standard and contact precautions reduces the risk of transmission between patients.<sup>2</sup>

“ Multiple screens performed over a period of time are likely to improve screening sensitivity.<sup>3</sup> ”

## How should CRE patients be managed?

**Standard precautions** include hand hygiene, use of personal protective equipment, effective cleaning of all equipment and the healthcare environment.<sup>2</sup>

**Contact precautions** include; isolation in a single room, use of personal protective equipment (gloves and gowns), dedicating equipment to patients where possible and enhanced cleaning and disinfection in selected instances.<sup>2</sup>

Contact precautions should be used in the following circumstances:<sup>3</sup>

- when patients are identified as being at high risk of colonisation with CRE
- whilst waiting for the results of screening swabs
- when patients are known to be colonised with CRE.

If there are insufficient single rooms available, patient placement should be discussed with the Infection Control Service.

## Antimicrobial stewardship

Antimicrobial stewardship measures aim to minimise overall antimicrobial use and optimise use of key Gram-negative antibiotics. These measures are critically important to reduce the emergence and spread of antibiotic resistant pathogens like CRE.

Clinicians should follow best practice prescribing principles for antibiotic prescription – **MINDME**<sup>4</sup>

**M**icrobiology guides therapy wherever possible

**I**ndications should be evidence based

**N**arrowest spectrum required

**D**osage appropriate to the site and type of infection

**M**inimise duration of therapy

**E**nsure monotherapy in most cases

It is essential that clinical practice ensures that use of antibiotics is consistent with *Therapeutic Guidelines: Antibiotic*,<sup>5</sup> taking into consideration local susceptibility information.

Health care organisations should monitor the use of antibiotics and aim to reduce overall use of cephalosporins, carbapenems and quinolone classes in ICU and non-ICU settings.

## Antibiotic prescribers should also:

- Avoid the empirical use of broad spectrum beta-lactam antibiotics including third and fourth generation cephalosporins and carbapenems in respiratory tract infection, surgical prophylaxis and urinary tract infection.
- Avoid the empirical use of quinolone antibiotics in community-acquired pneumonia, skin/soft tissue infection, surgical prophylaxis and urinary tract infection.

## Screening for CRE

Recommended screening specimens include rectal or perianal swabs, or faeces. Screening open wounds, or urine from indwelling urinary catheters should also be considered for CRE screening.

False negative results from CRE screening tests may occur early after acquisition of the CRE, in the presence of certain antimicrobial agents and when the organism is present in low numbers.

Multiple screens performed over a period of time are likely to improve screening sensitivity. No consensus recommendation can be made about the optimal timing and frequency of screening.<sup>3</sup>

Contact precautions should be used for patients with a history of CRE colonisation or infection at least for the duration of the initial episode of inpatient care.<sup>3</sup>

Re-assessment of CRE carriage upon re-admission may be feasible. Any patient assessed and 'cleared' of CRE carriage must be followed up by the health service to detect possible relapse.<sup>3</sup>

## Laboratory testing for CRE

Laboratory screening methods provide early detection of carbapenemase genes in Enterobacteriaceae and thereby prevent the dissemination and establishment of CRE.<sup>3</sup>

There is currently no internationally accepted 'gold standard' laboratory screening method for carbapenemases in Enterobacteriaceae.<sup>3</sup>

Additional information on laboratory testing for CRE is outlined in *Recommendations for the control of Multi-drug resistant Gram-negatives: carbapenem resistant Enterobacteriaceae*, [www.safetyandquality.gov.au](http://www.safetyandquality.gov.au)

## Acknowledgement

This sheet is based on a model provided by the Clinical Excellence Commission, NSW. *CRE Prevention and Management*. July 2012

1 Patel,G.,S. Huprikar,S.H. Factor,S.G. Jenkins,D.P. Calfee,G. Outcomes of carbapenem-resistant Klebsiella pneumoniae infection and the impact of antimicrobial and adjunctive therapies. *Infection Control & Hospital Epidemiology*. 2008: 29:1099-106.

2 NHMRC *Australian Guidelines for the Prevention and Control of Infection in Healthcare*. Commonwealth of Australia. 2010.

3 *Recommendations for the control of multi-drug resistant Gram-negatives: carbapenem resistant Enterobacteriaceae*. Australian Commission on Safety and Quality in Health Care. 2013.

4 Healthcare Infection Control Special Interest Group – [http://hicsigwiki.asid.net.au/index.php?title=MIND\\_ME\\_acronym\\_for\\_antimicrobial\\_stewardship](http://hicsigwiki.asid.net.au/index.php?title=MIND_ME_acronym_for_antimicrobial_stewardship)

5 *Therapeutic Guidelines Antibiotic*. Version 14. Therapeutic Guidelines. Melbourne. 2010.

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