Queensland Health

Management of multi-resistant organisms

Department of Health Guideline

Queensland Government

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An electronic version of this document is available at Management of multi-resistant organisms (health.qld.gov.au)

Contents

1 Purpose

This guideline provides recommendations regarding best practice for the management, monitoring and prevention of transmission of multi-resistant organisms (MROs) in health care facilities.

It is important that they are implemented according to patient, organism and facility-specific circumstances.

2 Scope

This guideline provides information for all Queensland public health system employees, all organisations and individuals acting as its agents (including Visiting Medical Officers and other partners, contractors, consultants, and volunteers), and Queensland licensed private health facilities. The information found in this guideline may also be used by other health and residential care services.

3 Related documents

- Australian Guidelines for the Prevention and Control of Infection in Healthcare
- *National Safety and Quality Health Service Standards*: Preventing and controlling infections standard
- Core strategies for VRE prevention and control
- Recommendations for the control of carbapenemase-producing *Enterobacterales* (CPE): A guide for acute care health service organisations
- National Hand Hygiene Initiative Manual
- Australian Commission on Safety and Quality in Healthcare Patient placement guide: Infection prevention and control
- Queensland Health Guideline for Management of outbreaks of communicable disease in health facilities
- Queensland Health Environmental Cleaning Guidelines [internal Queensland Health document]
- Queensland Health Guideline for Bare Below the Elbows
- Management of patients with *Clostridioides difficile* infection (CDI)

4 Introduction

Multi-resistant organisms (MRO) are generally bacteria that are resistant to multiple classes of antimicrobial agents that would usually be used to treat them. Infection with an MRO can result in increased morbidity and mortality, prolonged hospital stays and economic burden to health services. Many are readily transmitted in the acute healthcare environment but are increasingly being detected in other health settings and in the community. Antimicrobial resistance challenges efforts to maintain patient safety as the range of antimicrobial treatments available is vastly reduced.

This guideline provides recommended strategies to control the transmission of MRO in healthcare.

The Australian Commission on Safety and Quality in Health Care (the Commission) provides specific advice relating to the control of carbapenemase-producing *Enterobacterales*. This can be found in the *Recommendations for the control of carbapenemase-producing Enterobacterales (CPE): A guide for acute care health service organisations.*

For information regarding *Clostridioides difficile* infection (CDI) refer to the CDI webpage.

4.1 A two-level approach

The prevention and control of MRO involves using a comprehensive two-level approach. Different combinations of variable measures may be used by different health services on top of baseline core measures. For non-acute services or smaller facilities, the appropriate strategy may be a risk assessment approach that is applied to each individual patient with MRO colonisation or infection.

Core measures should be employed across all health service organisations. These core strategies are aimed to minimise the opportunity of transmission of organisms, including MRO. They are basic infection prevention practices that should form the baseline of practice irrespective of the context or level of care.

In addition to the core measures that are used, **variable measures** are those that are organism-specific or resistance-mechanism-specific. These strategies should be employed based on an individual assessment of risk for each case of MRO in the health service setting. Infection prevention and control specialists should be consulted when specific resistance patterns, periods of increased prevalence or outbreaks are identified to ensure the right variable measures have been implemented.

4.2 Risk assessment

The purpose of a risk assessment approach to MRO management is to analyse the probability and impact of transmission and/or infection and to balance these risks against the impact of the proposed infection prevention measures.

The risk assessment approach is pragmatic and considers multiple factors.

See Appendix 1 MRO risk assessment approach for guidance.

5 Core measures

The prevention of colonisation or infection with an MRO is the goal of core measures.

The measures identified below should be implemented routinely across all acute care and other care settings, regardless of the local level of risk of transmission:

- standard precautions
- antimicrobial stewardship
- clinical governance and quality improvement systems.

5.1 Standard precautions

Standard precautions should be applied to the management of all patients and the healthcare environment.

The consistent application of all elements of standard precautions across the healthcare organisation is essential to the prevention of transmission of MRO.

Standard precautions include:

- hand hygiene, consistent with the 5 moments for Hand Hygiene
- the use of appropriate personal protective equipment
- the safe use and disposal of sharps
- routine environmental cleaning
- reprocessing of reusable medical equipment and instruments
- respiratory hygiene and cough etiquette
- aseptic technique
- waste management
- appropriate handling of linen.

For further information on standard precautions, refer to the *Australian Guidelines for the Prevention and Control of Infection in Healthcare.*

The *National Safety and Quality Health Service Standards* (the Standards) require health service organisations to have processes in place to apply standard precautions, including assessment of healthcare worker competence, as well as auditing and improvement of compliance with the components. The Standards list specific requirements for hand hygiene and environmental hygiene as crucial components of standard precautions.

5.2 Antimicrobial stewardship

Appropriate prescribing and prudent use of antimicrobials are essential for every patient. Inappropriate use and overuse of antimicrobials contributes to the emergence and increase in resistant organisms and has the potential to cause harm to the individual patient. Patients with antimicrobial-resistant infections are more likely to experience ineffective treatment, recurrent infection, delayed recovery or even death.

Antimicrobial stewardship (AMS) is considered a key strategy in local and national programs to prevent the emergence of antimicrobial resistance and decrease preventable healthcare associated infections (HAI). AMS programs have been shown to decrease inappropriate antimicrobial usage, improve patient outcomes and reduce adverse consequences of antimicrobial use in acute settings.[1]

Further information can be found on the Australian Commission on Safety and Quality in Health Care Antimicrobial Stewardship web page.

The *National Safety and Quality Health Service Standards* set out requirements for antimicrobial stewardship. The Antimicrobial Stewardship Book is also a key resource with references for public and private hospitals, community and residential aged care organisations.

Residential aged care facilities providing clinical care are also required to implement antimicrobial stewardship programs under the Aged Care Quality and Safety Commission's standards.

The Aged Care Quality and Safety Commission have resources for residential aged care facilities here: Antimicrobial stewardship.

5.3 Clinical governance and quality improvement systems

A clinical governance framework and a quality improvement system synchronise to drive facility-wide continuous improvement. Quality improvement systems should include implementation of improvement strategies, monitoring, and reporting to the appropriate clinical governance body within the organisation. The presence of a clinical governance framework and quality improvement system are essential to an infection prevention and control program that can effect change and drive continuous improvement in the prevention of infection.

The *National Safety and Quality Health Service Standards* (the Standards) set out requirements for clinical governance and organisational leadership for all hospitals, day procedure services and public dental services in Australia. Other settings, such as residential aged care refer to the Aged Care Quality and Safety Commission Quality Standards, and for general practice refer to *RACGP Infection Prevention and Control Guidelines* and the specific standards of private general practice accreditation organisations.

6 Variable measures

Variable measures are to be implemented for MROs in all care settings including large tertiary hospitals primary care, community, long term residential care facilities and retrieval and ambulance services. Variable measures are to be applied following an assessment of the healthcare setting risk profile and the transmissibility and virulence of the MRO. Appendix 1 MRO risk assessment approach can be used to help assess the risk. Variable measures may include:

- targeted screening programs
- management of cases under transmission-based precautions
- patient placement and movement strategies
- alerts and communication
- enhanced environmental cleaning and disinfection
- outbreak management.

6.1 Targeted screening program

Acute health services should have in place a program for screening of patients for MRO based on global, national, and local epidemiology. The Standard's *Preventing and Controlling Infections Standard* requires health service organisations to have a surveillance strategy for infections and infection risks.

Strategies must include collection, analysis, reporting, and use of this surveillance data to help identify and respond early to identified infection risks. In developing a screening program, the *Australian Guidelines for the Prevention and Control of Infection in Healthcare* caution that in acute-settings, routine screening for MROs for all admitted patients is not encouraged.

Smaller health services that experience small numbers of MRO isolates should consider one clinical isolate or infection significant enough to warrant further investigation.

The Australian Government Department of Health and Aged Care requires residential aged care facilities, where clinical care is provided, to implement an antimicrobial stewardship program and to consider an organism-specific surveillance program to complement this clinical governance requirement. For further guidance see the Aged Care Quality and Safety Commission Quality Standards.

The recommended minimum approach to screening for other MRO is outlined in Appendix 2: Recommended minimum screening program.

Additionally the *Recommendations for the control of carbapenemase-producing Enterobacterales (CPE): A guide for acute care health service organisations* set out recommended minimum requirements for surveillance for CPE.

6.1.1 Acute care

In acute care settings it is recommended, at a minimum, to implement a risk-based surveillance program[2]. It is suggested that this is implemented for the following organisms:

- multi-resistant *Staphylococcus aureus* (MRSA)
- vancomycin-resistant enterococci (VRE)
- *Candida auris (c. auris)*
- multi-resistant gram-negative organisms (MRGN), specifically
  - carbapenemase-producing *Enterobacterales* (CPE)
  - extended spectrum β-lactamase producing organisms (ESBLs)
  - carbapenem-resistant Acinetobacter *baumannii* (CRAB).

See Appendix 2 for detailed screening advice.

6.1.2 Other care settings

For other care settings the decision to implement a surveillance program should be made using local epidemiology and a patient/facility-based risk assessment.

Refer to section 4.2 Risk assessment for information to support local risk assessment.

Further advice for long term residential care facilities can be found at *Victorian guideline on CPE for long-term residential care facilities*.

6.1.3 Clearance recommendations

A health service may decide to institute a program of screening patients with MRO to determine whether the MRO has been 'cleared' (the patient is no longer colonised with the MRO).

There is minimal evidence to support clearance of MROs. Where a Hospital and Health Service (HHS)/facility decides that clearance for specific MROs should occur, this clearance should be undertaken in consultation with the local infection prevention team, and where appropriate, with clinical microbiology and an infectious disease physician and following a risk assessment. A patient who has been cleared of MRO who subsequently returns a positive culture from either a clinical isolate or a screening specimen should be considered MRO colonised/infected again. Refer to Appendix 3 Clearance recommendations for detailed recommendations about clearance of MROs.

6.1.4 Contact management

The purpose of screening contacts of confirmed isolates of MRO is to determine if transmission of the MRO has occurred. Therefore, first confirm the diagnosis of the case of MRO. This may be newly acquired or pre-existing.

Decisions regarding screening contacts of MRO cases should be made by local infection prevention teams based on local patterns of transmission and population risk factors.

Screening of contacts in residential aged care or community settings is not normally recommended.

Refer to Appendix 4 Management of contacts for confirmed cases of specific multi-resistant organisms.

6.1.5 Healthcare workers as contacts or cases

Routine or outbreak screening of staff should not be undertaken. Healthy staff are encouraged to practice effective hand hygiene and infection prevention practices. If a healthcare worker is identified as being colonised with an MRO, advice should be sought from an appropriate infection prevention or infectious diseases professional to assess the individual risk of transmission.

6.2 Transmission based precautions

The following components of transmission-based precautions should be followed for patients colonised or infected with an MRO wherever it is possible to do so. These components include:

- allocation of single rooms with unshared ensuite, or cohorting (with the same MRO) if required
- the use of dedicated care equipment where practicable
- enhanced cleaning and disinfection of the environment and care equipment (e.g. increased cleaning of high touch areas, use of a 2 step, or 2-in-1 step cleaning and disinfection process)
- minimising patient movement and transfer within and between facilities if not required for patient care reasons
- communication of patient status when care is transferred within or between service providers or facilities
- transportation in a single unit ambulance where appropriate (QAS has guidance for MRO management)
- the use of alerts in the patient care record and other patient information systems to alert staff to precautions required upon readmission/transfer within the facility
- transmission based precautions are applied until the patient is discharged or clearance for the target organism.

Signage should be used to support rapid identification of the isolation room and include the necessary variable measures and precautions to be adopted.

Emerging evidence regarding the use of PPE (in particular gloves) suggests that patients colonised with VRE and MRSA may be managed with PPE for standard precautions. Quality hand hygiene compliance with “5 moments” is key to the success of this strategy. This may be considered if there are no risk factors that heighten transmission like wounds, diarrhoea or inability to control/perform personal hygiene.[9–13]

Prior to the application of PPE consistent with standard precautions alone for the care and management of patients colonised with an MRO, a local risk assessment should be carried out that considers hand hygiene compliance rates, a period of enhanced surveillance and communication of any changes communicated to the appropriate stakeholders.

The following recommendations are dependent on availability of rooms, the health service’s resources, local risk assessment and outbreak status.

6.2.1 Visitors

During MRO outbreaks or periods of increased prevalence, local procedures should be reviewed, and visitor precautions altered as necessary by the infection prevention team.

All visitors should be asked to perform hand hygiene prior to contact with the patient’s environment and upon exiting the patient’s environment. Visitors should not wear aprons and gloves unless that are actively participating in care and need to be protected as per standard precautions. Visitors should be encouraged to only visit the person with an MRO.

Visitors intending to visit more than one patient should be asked to see the patient with an MRO last.

While PPE is not normally required for visitors to patients who are on contact precautions, in an outbreak setting visitors may be requested to wear PPE in the patient's environment.

6.2.2 Patient placement - acute care settings

For the management of patients with MRO in acute care settings:

- a single room is recommended. Rooms with unshared ensuites are preferred
  - When a single room is not available, consultation with the health service's infection prevention team is recommended to assess the various risks associated with alternative accommodation options such as cohorting.
- interfacility transportation should be in a single unit ambulance where appropriate
  - Consultation with the health service's infection prevention team is recommended to assess the various risks associated with alternative transportation options such as cohorting.
- communicate with the patient to explain the nature of the MRO and address any concerns around the impact to care
- display clear transmission-based precautions signs when transmission-based precautions are required
- keep bedside charts and digital health system devices outside the room where possible.
- remove excess stock from patient rooms and avoid open storage of excess stock in rooms.

In most circumstances, there is no need for a patient colonised with an MRO to be moved to the last position on appointment or operating theatre lists as cleaning and standard precautions that are regularly employed for all patients should be sufficient to mitigate the risk of transmission.

6.2.3 Resident placement - long term residential care facilities

Examples of long-term accommodation settings include residential aged care and disability facilities. A local risk assessment should be performed to determine the variable measures that are required.

Generally, residents should be permitted to engage with their regular program of activities and therapy. Residents may not require isolation and contact precautions once all wounds are healed, antimicrobials are completed, and the resident is able to independently manage hygiene. Daily cleaning of the resident's environment is recommended until they are cleared of the MRO. Hand hygiene should be encouraged for all visitors, especially when leaving the resident's environment. Variable measures in this context generally include:

- covering draining wounds, containing bodily fluids to permit participation in group meals and activities
- directing (and physically assist where necessary) resident to perform hand hygiene as per standard precautions.

Where isolation and contact precautions are required:

- communicate with the resident or their care decision maker to explain the multi-resistant organism and address any concerns around the impact of the variable measures on care
- a single room is recommended. Rooms with unshared ensuites are preferred
  - When a single room is not available consultation with the infection prevention and control lead is recommended to assess the various risks associated with alternative accommodation options such as cohorting (refer to section on Risk assessment).
- display clear transmission-based precautions signs.

Refer to Appendix 5 and the Queensland Health web page Multi- Resistant organisms (MRO) - information for residential care facilities.

6.2.4 Ambulatory therapy and community clinics

A local risk assessment should be performed and the following recommendations applied in settings such as renal dialysis units, oncology day therapy and general practices:

- patients do not require segregation in the waiting room or single unit ambulance transportation
- patients do not need to be seen at the end of a list of appointments due to colonisation with an MRO
- the preferred placement of patients for therapy in ambulatory units is single rooms
- where a single room is not available, provide therapy in an area with as few adjacent stations as possible (for example, at the end or corner of the unit)
- ensure alcohol-based hand rub is available at the point of care
- PPE for contact precautions is only recommended when physical examinations and/or procedures are being undertaken and should be used as per Transmission based precautions section
- clinical equipment and items such as examination couches/treatment chairs should be cleaned between patients as per the section Equipment and Environmental cleaning
- if shared non-critical medical equipment is used e.g., blood pressure cuff, thermometer, etc, clean shared equipment before and after each patient use with recommended cleaning product as per manufacturer's instructions
- perform hand hygiene in alignment with the 5 moments for hand hygiene
- remove excess stock from treatment areas and avoid open storage of excess stock in procedure rooms.

6.3 Alerts and communication

Healthcare organisations should have procedures in place to record an alert on the health record or patient management system of patients who are found to have an MRO. Procedures should be in place to ensure that the patient management system produces a trigger alert to assist staff with the appropriate management of the patient regarding isolation, placement and transmission-based precautions.

Communication of alerts and the transmission-based precautions required should occur on transfer of the patient to another ward/unit, facility, or organisation. Communication regarding the MRO should occur with the nominated general practitioner on discharge. Patients should be offered information that explains what having an MRO infection or colonisation means for their current or future care. Patients found to have an MRO should be educated to inform health services they attend following discharge.

Communication about the MRO(s) should occur with the patient and, if the patient consents, with their visitors or relatives. Ideally, this information should be provided in a written form and in a fashion that has been reviewed by a health consumer.

Some examples of this type of information can be found for CPE on the Australian Commission on Safety and Quality in Health care CPE: Information for patients | Australian Commission on Safety and Quality in Health Care and other MROs on the National Health and Medical Research Council's website Methicillin Resistant *Staphylococcus aureus*: Healthcare-Associated Infections Information for patients (nhmrc.gov.au) and Vancomycin Resistant Enterococci: Healthcare-Associated Infections Information for patients (nhmrc.gov.au).

6.4 Equipment and environmental cleaning

6.4.1 Daily cleaning of patient room

All patient surrounds and frequently touched surfaces (e.g., bedrails, trolleys, bedside commodes, doorknobs, light switches, tap handles and ensuite facilities) should be cleaned and disinfected daily as a minimum. It is recommended that patients who require transmission-based precautions have more frequent environmental cleaning.

Minimum frequencies for routine cleaning are outlined in the internal Queensland Health – Environmental Cleaning Guidelines and the Australian Guidelines for the Prevention and Control of Infection in Healthcare.

6.4.2 Cleaning and disinfection product selection

It is recommended that all rooms and non-critical medical devices used for patients with an MRO are physically cleaned with products that make specific claims for use against MRO and have been entered into the Australian Register of Therapeutic Goods by the Australian Therapeutic Goods Administration. See the Australian Register of Therapeutic Goods for more product information about Class I (cleaning of medical devices) or Class IIb (disinfection of medical devices) and hospital grade listed disinfectants (environmental disinfection).

All products selected should be used according to manufacturer instructions.

6.4.3 Cleaning and disinfection process

The process of environmental decontamination should involve either:

- a physical 2-in-1 clean using a combined detergent and disinfectant solution or impregnated wipe. Where a combined detergent/disinfectant-impregnated wipe is used, the process should also involve a mechanical/manual cleaning action, or
- a physical 2-step clean using a detergent solution or impregnated wipe to manually clean the surface followed by a disinfectant solution or wipe.

Surfaces must be allowed to dry completely before moving to the next step or allowing the patient to use the equipment. Advice on the use of emerging environmental cleaning technologies has been produced by the Australian Commission on Safety and Quality in Healthcare.

6.4.4 Management of care equipment

Non-critical medical devices (e.g., electronic thermometers, sphygmomanometers, glucometers, hoists, pat slides) may transmit organisms when devices are shared between patients. To reduce the risk of transmission, disposable or dedicated equipment is preferred. Dedicated isolation rooms or cohort areas should be de-cluttered prior to patient occupancy. The room should only be stocked with essential clinical equipment or supplies. Shared equipment must be cleaned, disinfected and allowed to dry before and after use and between use with different patients.

6.4.5 Discharge cleaning of rooms

A discharge clean of inpatient isolation rooms or cohort areas must be finalised before accommodating the next patient. Refer to Appendix 5 Discharge cleaning of rooms.

6.5 Outbreak management

Refer to the *Queensland Health Guideline for Health Facilities Communicable Disease Outbreak Preparedness, Readiness, Response and Recover* for detailed information about identification and management of outbreaks.

Outbreak management falls into four phases described as:

- identifying the outbreak
- investigating and responding to the outbreak
- managing the outbreak
- evaluating the outbreak.

In practice, there is considerable overlap between the phases.

Briefly, identification involves a trigger. A trigger is a point at which the incidence of a particular infectious organism is higher than would be normally expected. A trigger is not necessarily an outbreak but may be natural variation in the incidence of an organism.

Surveillance data should be reviewed regularly to determine local epidemiology of MROs. Local epidemiological factors should be utilised to inform targeted screening in addition to that recommended in Appendix 2 and to inform trigger points.

If an increase in cases or transmission is identified, outbreak control measures should be considered. Suspicion or confirmation of an MRO outbreak will be guided by the local infection prevention and control service.

For smaller organisations or long-term accommodation facilities, the outbreak may be managed by the internal infection control lead supported by visiting clinicians or with input/support from external supporting infection control professionals.

For specific advice on the management of outbreaks of CPE refer to *Recommendations for the control of carbapenemase-producing Enterobacterales (CPE): A guide for acute care health service organisations*.

7 Glossary

Definitions of terms used in this guideline

Term	Explanation	Source
Antimicrobial stewardship (AMS)	A quality program aimed at preserving and maximising therapeutic benefits of anti-microbials within a healthcare facility. The Commission requires AMS programs be implemented in acute settings and strongly recommends implementation in other settings, particularly in residential aged care facilities.	National Health and Medical Research Council (2019) *Australian Guidelines for the Prevention and Control of Infection in Healthcare* https://www.nhmrc.gov.au/about-us/publications/australian-guidelines-prevention-and-control-infection-healthcare-2019 Access date: 7 December 2022
Candida auris (C. auris)	*C. auris* is an emerging multidrug resistant yeast (sometimes called fungus) that can cause invasive infections that may be extremely difficult to treat. Infection more commonly occurs in hospitalised patients, residents of long-term care facilities and those with significant medical co-morbidities. *C. auris* can be spread from person to person and can survive on surfaces for lengthy periods if they are inadequately cleaned and disinfected.	Queensland Health *Candida auris (C. auris)* infection prevention and control https://www.health.qld.gov.au/clinical-practice/guidelines-procedures/diseases-infection/infection-prevention/management-advice/candida-auris-prevention-control Access date: 7 December 2022
Carbapenem-resistant Acinetobacter *baumannii* (CRAB)	A common bacteria found in soil and water. Human infections may present in the blood, urinary tract, wounds or lungs. Hospital acquired CRAB infections have demonstrated multi-drug resistance.	World Health Organisation (2017) Guidelines for the prevention and control of carbapenem-resistant Enterobacteriaceae, Acinetobacter *baumannii* and Pseudomonas aeruginosa in healthcare facilities https://www.who.int/publications/i/item/9789241550178 Access date: 7 December 2022

Term	Explanation	Source
Carbapenemase-producing *Enterobacterales* (CPE)	CPE are members of the *Enterobacterales* order of bacteria. They are resistant to carbapenems, a class of 'last resort' antibiotics for treating serious infections. *Enterobacterales colonise* the normal human gastrointestinal tract, generally without causing disease. However, they can also cause common infections, including urinary tract infection, abdominal infection, and bloodstream infection. 'Enterobacteriaceae' are the largest family of gram-negative bacteria causing human infection. This family includes common pathogens such as Escherichia coli, *Klebsiella pneumoniae*, *Enterobacter cloacae and Proteus* species. In 2020, a nomenclature change adopted the use of '*Enterobacterales*' as the order. 'Enterobacteriaceae' are now a family within this order.	Australian Commission on Safety and Quality in Health Care. (2021) *Recommendations for the control of carbapenemase-producing Enterobacterales (CPE). A guide for acute care health facilities*. https://www.safetyandquality.gov.au/our-work/infection-prevention-and-control/carbapenemase-producing-*Enterobacterales* Access date: 7 December 2022
Clostridioides difficile (*C.diff or CDI*)	*C. difficile* is an anaerobic, Gram-positive, spore-forming rod associated with gastrointestinal disease. This pathogen is often associated with prolonged and unnecessary use of antimicrobial therapy. Previously called *Clostridium difficile*, in 2016 the organism was re-named as *Clostridioides difficile*. New molecular whole-genome evidence had demonstrated closer taxonomic traits with a different family prompting the re-classification.	Moore, R.J., and Lacey, J.A. (2019). Genomics of the pathogenic Clostridia. Microbiol Spectrum. 7(3): GPP3-0033-2018. National Health and Medical Research Council (2019) *Australian Guidelines for the Prevention and Control of Infection in Healthcare* https://www.nhmrc.gov.au/about-us/publications/australian-guidelines-prevention-and-control-infection-healthcare-2019 Access date: 7 December 2022
Cohorting	The practice of grouping patients infected or colonised with the same infectious agent together to confine their care to one area and prevent contact with susceptible patients	Implementation manual to prevent and control the spread of carbapenem-resistant organisms at the national and healthcare facility level (2019) *World Health Organisation, Chapter 4, page 53*. https://apps.who.int/iris/bitstream/handle/10665/312226/WHO-UHC-SDS-2019.6-eng.pdf?sequence=1&isAllowed=y Access date: 7 December 2022

Term	Explanation	Source
Colonisation	The sustained presence of replicating infectious agents on or in the body without causing infection or disease.	National Health and Medical Research Council (2019) *Australian Guidelines for the Prevention and Control of Infection in Healthcare* https://www.nhmrc.gov.au/about-us/publications/australian-guidelines-prevention-and-control-infection-healthcare-2019 Access date: 7 December 2022
Extended-spectrum beta-lactamase producing organism (ESBL)	Bacteria that produce enzymes called extended-spectrum beta-lactamases (ESBL) are resistant to many penicillin and cephalosporin antibiotics and often to other types of antibiotics.	Public Health England (2014) Extended-spectrum beta-lactamases (ESBL): guidance, data, analysis. https://www.gov.uk/government/collections/extended-spectrum-beta-lactamases-esbls-guidance-data-analysis Access date: 7 December 2022
Healthcare associated infection (HAI)	A potentially preventable adverse event where patient infection is a direct or indirect result of healthcare. HAIs are the most common complication affecting patients in hospital. International studies demonstrate the burden of HAI in long-term care facilities.	National Health and Medical Research Council (2019) *Australian Guidelines for the Prevention and Control of Infection in Healthcare* https://www.nhmrc.gov.au/about-us/publications/australian-guidelines-prevention-and-control-infection-healthcare-2019 Access date: 7 December 2022
Multi-resistant *Staphylococcus aureus* (MRSA)	Strains of *Staphylococcus aureus* that are resistant to many of the antibiotics commonly used to treat infections. Epidemic strains also have a capacity to spread easily from person-to-person.	National Health and Medical Research Council (2019) *Australian Guidelines for the Prevention and Control of Infection In Healthcare* https://www.nhmrc.gov.au/about-us/publications/australian-guidelines-prevention-and-control-infection-healthcare-2019 Access date: 7 December 2022
Multi-resistant Gram-negative organism (MRGN)	Gram-negative bacteria that are resistant to multiple drugs and are increasingly resistant to most available antibiotics. These bacteria have built-in abilities to find new ways to be resistant and can pass along genetic materials that allow other bacteria to become drug resistant as well. Important classes of MRGNs include CPEs like ESBL *E.coli* and *K.pneumoniae*, and CRAB.	National Health and Medical Research Council (2019) *Australian Guidelines for the Prevention and Control of Infection In Healthcare* https://www.nhmrc.gov.au/about-us/publications/australian-guidelines-prevention-and-control-infection-healthcare-2019 Access date: 7 December 2022

Term	Explanation	Source
Multi-resistant organism or multi-drug resistant organism (MRO)	Bacteria that are resistant to one or more classes of antimicrobial agents and usually are resistant to all but one or two commercially available antimicrobial agents.	National Health and Medical Research Council (2019) *Australian Guidelines for the Prevention and Control of Infection In Healthcare* https://www.nhmrc.gov.au/about-us/publications/australian-guidelines-prevention-and-control-infection-healthcare-2019 Access date: 7 December 2022
Vancomycin resistant enterococci (VRE)	Enterococci are Gram-positive bacteria that are naturally present in the intestinal tract of all people. Vancomycin is an antibiotic to which some strains of enterococci have become resistant. These resistant strains are referred to as VRE and are frequently resistant to other antibiotics generally used to treat enterococcal infections.	National Health and Medical Research Council (2019) *Australian Guidelines for the Prevention and Control of Infection In Healthcare* https://www.nhmrc.gov.au/about-us/publications/australian-guidelines-prevention-and-control-infection-healthcare-2019 Access date: 7 December 2022

Additional resources can be found in Appendix 6 of this guideline.

8 Document approval

Document custodian	Dr Heidi Carroll, Acting Executive Director CDB
Approving officer	Dr Heidi Carroll, Acting Executive Director CDB
Approval date	8 June 2023

9 Version control

Version	Date	Prepared by	Updates
1.0	13 June 2012	CHRISP	New guideline
2.0	25 August 2014	CDB	
3.0	20 November 2017	CDB	Updated version of Australian Commission on Safety and Quality in Healthcare's *Recommendations for the control of carbapenemase-producing Enterobacteriaceae (CPE) May 2017*. General update and revision also undertaken.
4.0	8 June 2023	CDB	Major reorganization of key sections Major content revision based *on Australian Guidelines for the Prevention and Control of Infection In Healthcare, 2019*. Updated nomenclature on reclassifications *C.diff* and CPE. Revised glossary and references.
4.1	26 June2023	CDB	Added missing screening guidance.

10 References

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Appendix 1: MRO risk assessment approach

Information on risk management in infection prevention and control can be found in Section 2.2 Overview of risk management in infection prevention and control of the Australian Guidelines for the Prevention and Control of Infection in Healthcare.

The risk assessment approach is guided by the principles outlined in the Australian/New Zealand Standard on Risk Management-Principles and Guidelines AS/ANS ISO 31000:2009.

The outcome of the risk assessment will be different for every patient, MRO and local care setting. In assessing the risk and deciding on appropriate infection prevention and control measures, factors to consider include, but are not limited to:

- Individual patient factors:
  - Is the patient colonised or infected? (An infection may pose a greater risk of transmission, depending on the site of infection.)
  - Does the patient have infected or discharging wounds? (An infected or discharging wound may pose a greater risk of transmission.)
  - Does the patient have indwelling devices? (The presence of indwelling devices may pose a greater risk of transmission.)
  - Is the patient immunocompromised? (Immunocompromise increases the chance of an infection being caused by the MRO.)
  - How much hands-on care is required for the patient? Is the patient capable of attending to their own personal hygiene? (Increased direct staff contact with the patient increases the opportunities for transmission.)
  - Is the patient able to comply with advice about infection prevention and control interventions? (If the patient is willing and able to comply with infection prevention and control advice such as increased hand hygiene or remaining in a single room the risk of transmission may be reduced.)
- Patient population factors:
  - Is the surrounding patient population at high risk for infection, or at high risk for serious outcomes of infection?
- Environmental factors, e.g.:
  - What is the availability of effective isolation facilities?
  - What is the level of healthcare worker compliance with infection prevention and control activities e.g., hand hygiene, standard and transmission-based precautions, environmental and equipment cleaning and disinfection?
- Organism-specific factors, e.g.:
  - Are there resistance mechanisms or profiles that are more concerning?
  - If an infection was caused by the MRO, are effective antimicrobial therapies available?
  - How virulent is the MRO? How likely is the MRO to cause infection vs colonisation?
  - Is the MRO endemic locally?

- What outcomes are foreseeable/likely for patients, the facility and/or the wider organisation in the event of:
  - an outbreak
  - individual infection
  - widespread colonisation.
- What level of risk is acceptable to facility and organisational management?

Tool 2: Risk assessment tool in the Queensland Health Facilities Communicable Disease Outbreak Preparedness, Readiness, Response and Recovery Guideline may be used to develop MRO risk assessment tools tailored for specific MROs and care settings.
Where a workplace risk is identified beyond the normal level presented by an MRO, this should be assessed and managed using the local risk management procedure. This may require engaging with the local workplace health and safety team.

Appendix 2: Recommended minimum screening program

Table 2 Recommended minimum screening program in acute care settings for multi-resistant organisms

Organism	Screening criteria*	Frequency	Anatomical site
Carbapenemase-producing *Enterobacterales* (CPE)	For specific advice regarding screening strategies for CPE refer to the Recommendations for the control of carbapenemase-producing *Enterobacterales* (CPE): A guide for acute care health service organisations. As a minimum, screen: • Admissions from high-risk settings (e.g. all patients who have received treatment in an overseas hospital in the previous 12 months) • Contacts of confirmed cases • Inter-hospital transfers* • High risk units on admission, for example: – Intensive care – Haematology/oncology – Burns – Solid-organ transplant – Haemodialysis – Gastroenterology/gastrointestinal surgery – Aged care (in the context of a risk assessment)	• On admission where screening criteria are met. Contacts: • Three suitable specimens at least 24 hours apart. Routine: • Weekly for high-risk units, outbreak management or endemic CPE.	Rectal swabs or stool specimens. Urine from catheterised patients. All wounds, ulcers, transcutaneous exit sites, aspirates from tubes or drains as indicated should also be considered. Perianal swabs are not recommended unless rectal swab is contraindicated by patient condition.

Organism	Screening criteria*	Frequency	Anatomical site
	– Rehabilitation • Repeated prevalence surveys in the context of established local transmission or if CPE is endemic.		
Candida auris	Refer to Queensland Health Guideline for Infection prevention and control of Candida auris • Patients who have had international/overseas hospital treatment within the last 12 months • Interhospital transfers from overseas hospitals • Interhospital transfers from a hospital that has detected C. auris (until the outbreak is declared over) • contacts of confirmed cases.	• On admission where screening criteria are met. Contacts: • please refer to the Queensland Health guidance https://www.health.qld.gov.au/clinical-practice/guidelines-procedures/diseases-infection/infection-prevention/management-advice/candida-auris-prevention-control for contact swabbing advice.	Bilateral axilla and groin. Clinical specimens (e.g. blood, urine, sputum) as clinically indicated.
Other multi-resistant gram-negatives (MRGNs) + • carbapenem-resistant *Acinetobacter baumannii* (CRAB), • extended spectrum beta lactamase-producing (ESBL-producing) organisms (e.g. ESBL *E. coli, K. pneumoniae*)	• High risk units: – Intensive care unit – Neonatal intensive care – Solid-organ transplant unit • Specialty centres (e.g. burns, neurosurgery) • Patients who have received treatment in an overseas hospital in the last 12 months • Interhospital transfers*.	• On admission where screening criteria are met. Contacts: • two suitable specimens at least a week apart Routine: • weekly in identified cohorts of interest.	Rectal or Groin. Clinical specimens (wounds, catheter urine, respiratory, other as clinically indicated).

Organism	Screening criteria*	Frequency	Anatomical site
Vancomycin resistant Enterococci (VRE) +	• High risk inpatient units: – Intensive care unit – Nephrology/renal unit – Haematology/oncology unit – Solid organ transplant unit • Patients at high risk of carriage – Inter-hospital transfers* – Any recent hospitalization – Long duration of stay and severity of illness – Chronic disease and impaired functional status – Presence of urinary catheters – Prolonged or broad-spectrum antibiotic use, particularly Vancomycin • High risk ambulatory units – Dialysis patients – Ambulatory haematology/oncology patients • People who are identified as a VRE contact during their hospitalisation and have not been shown to have post-contact negative screens.	• On admission where screening criteria are met Contacts: • two specimens at least a week apart Routine: • weekly in patients at high risk of carriage and high-risk inpatient units • every 3 months in ambulatory cohorts of interest (haemodialysis, haem/oncology outpatient units).	Rectal swabs or stool specimens.

Organism	Screening criteria*	Frequency	Anatomical site
• Methicillin-resistant *Staphylococcus aureus* (MRSA)+ • Methicillin-resistant *Staphylococcus aureus* • Multi-resistant *Staphylococcus aureus* • Non-multi-resistant methicillin-resistant *Staphylococcus aureus* (nm-MRSA) • UK-MRSA • UKE-MRSA	Interhospital transfers* • Transfers from long term care facilities • Patients who are known to have previously been infected or colonised with MRSA who meet the clearance criteria • Patients with chronic wounds • Patients from locales or populations where community-acquired strains of MRSA are prevalent • High risk units: – Intensive care unit – High dependency unit – Spinal unit – Burns unit • Patients with planned prosthetic surgery (joint replacement, cardio-thoracic surgery).	• On admission where screening criteria are met. Contacts: • two suitable specimens at least a week apart Routine: • Weekly for high-risk units or areas identified by risk assessment a requiring screening.	Nose and groin or rectal. Clinical specimens (wounds, catheter urine, respiratory, other as clinically indicated).

*A local decision on the application of interhospital screening should be made, principally for rural and regional HHS. In making this decision, an assessment of the risks involved is necessary. This risk assessment should consider local epidemiology, and outbreaks. Where the risk of unrecognised transmission of MROs is deemed to be low/negligible, HHS may determine that screening patients transferring between facilities within a HHS is not required and apply a minimum admission screening recommendation of inter-HHS transfers. Ongoing risk assessments considering local factors should occur.

+It is recognised that some HHS/facilities no longer isolate certain MROs or sub-types of MROs. Consideration should still be given to screening on admission and for high-risk settings and patients for clinical management purposes.

Screening references:

National Health and Medical Research Council, Australian Guidelines for the Prevention and Control of Infection in Healthcare. 2019: www.nhmrc.gov.au/health-advice/public-health/preventing-infection.

Australian Commission on Safety and Quality in Health Care. Recommendations for the control of carbapenemase-producing *Enterobacterales* (CPE): A guide for acute care health service organisations. Sydney: ACSQHC, 2021.

Centers for Disease Control. Infection prevention and control for Candida auris. 2021 [cited 9 Dec 2022]; Available from: https://www.cdc.gov/fungal/candida-auris/c-auris-infection-control.html.

Appendix 3: Clearance recommendations

Table 3: Recommended clearance program for multi-resistant organisms in acute care settings

Organism	Action to take	Criteria	Timing	Additional notes
Carbapenemase-producing *Enterobacterales* (CPE)	There is very little evidence to support clearance of CPE. Where a facility decides to clear CPE, patients who have been cleared for CPE should be re-screened on every over-night admission.[4]	Only consider CPE clearance screening if the sustainability of maintaining transmission-based precautions for increasing case numbers and impact on patient care and patient flow are significant issues.	A patient colonised with CPE cannot be considered cleared within 12 months of a positive result.[1]	A cautious approach to clearance screening for CPE is strongly recommended and should be locally confirmed with an infection control professional and where appropriate a clinical microbiologist or infectious diseases physician. For detailed advice see Recommendations for the control of carbapenemase-producing *Enterobacterales* (CPE): A guide for acute care health service organisations
Candida auris (C. auris)	It is advised that patients are not cleared and continue to be managed under transmission-based precautions for their entire admission and any subsequent admissions.	There is not currently sufficient available evidence to guide clearance screening.[5]	There is not currently sufficient available evidence to guide clearance screening.[5]	Of the few confirmed cases identified in Australia, the patients had been admitted in hospitals overseas where C. auris was common. Current evidence suggests that patients remain colonised for many months, if not longer.[1,5,6]

Organism	Action to take	Criteria	Timing	Additional notes
Other multi-resistant gram negatives (MRGNs) and extended spectrum beta lactamase-producing (ESBL-producing) organisms (excluding CPE)	A health service may decide to clear a patient with MRGN and ESBL-producing organisms.	Evidence is not sufficient to provide clear guidance for the clearance of MRGN and ESBL-producing organisms. However, to reduce risk the following should be observed: • More than 3 months elapsed time from the last positive specimen • All wounds healed, no indwelling medical devices present • No enterostomy or tracheostomy present • No exposure to any antibiotic or antiseptic body wash for at least 2 weeks prior to screening • No antimicrobial therapy in the past 3 months.	Consecutive negative screens from screening sites rectum and groin on at least 2 separate occasions. The minimum period that the swabs are to be collected is three weeks. There is no maximum period over which the specimens may be collected, this may be over a period of months.	

Organism	Action to take	Criteria	Timing	Additional notes
Vancomycin resistant enterococci (VRE)	As there is little evidence regarding clearance of VRE, in instances where clearance is to be undertaken, a risk assessment should first be performed. Patient groups with the highest risk of infection include: • Haemodialysis • Oncology/haematology • Solid organ transplant • Intensive care unit. Highest risk of long-term carriage or relapse of carriage include: • Renal/haemodialysis AND long length of stay in acute care environment[2] • Frequent admissions[2] or recent hospitalisation[3] • Recent antimicrobial therapy (within one month).[2,3]	Prior to VRE clearance the following should be observed: • at least 6 months has elapsed since the last positive VRE specimen • all wounds healed, no enterostomy or tracheostomy present[1] • a period of at least 6 months free from the following[1] – hospitalisation (acute episode) – antimicrobial therapy – invasive/indwelling devices.	Three consecutive negative stool samples or rectal swabs separated by a minimum period of one week per negative specimen. A condensed clearance screening procedure may be considered where VRE is endemic or there is pressure on the service: Two consecutive negative stool samples or rectal swabs, a minimum of 24 hours apart.	Some patients with VRE may appear to 'clear' VRE with time but may relapse with the use of antibiotic therapy. Clearance for most VRE colonised patients is not recommended as it is often not sustained. Emerging evidence suggests that patients positive for VRE may be managed with standard precautions if there are no risk factors that heighten transmission like diarrhoea or inability to control/perform personal hygiene.

Organism	Action to take	Criteria	Timing	Additional notes
Methicillin resistant *Staphylococcus aureus* (MRSA)	The risk assessment performed by the infection control team will determine if the prescription of a decolonisation program is suitable based on the level of risk from ongoing colonisation and availability for follow-up. Topical plus/minus systemic decolonisation may be considered for: • healthcare workers epidemiologically linked to transmission • prolonged hospitalisation • chronic conditions like haemodialysis where readmission is likely • prior to high-risk elective cardiac or prosthetic implant surgery.	The following should be observed: • More than 3 months elapsed time from the last positive specimen • All wounds healed, no indwelling medical devices present • No exposure to any antibiotic or antiseptic body wash for at least 2 weeks prior to screening • No exposure to specific anti-MRSA antibiotic therapy in the past 3 months.	Consecutive negative screens from the screening sites nose and groin on 2 separate occasions. There must be minimum one week period between the collection of the swabs, but there is no maximum time period over which the swabs can be collected. This may be over a period of many months. Ensure results of screening are returned prior to surgery to ensure the treating team can make informed treatment decisions. Screening should occur as close as practicable to surgery while ensuring results are available prior to surgery.	Health services may consider using the evaluation of a single set of screening swabs with a broth amplification technique for clearance. This process should be based on local factors and agreements with local laboratories.

Clearance references:

1. National Health and Medical Research Council, Australian Guidelines for the Prevention and Control of Infection in Healthcare. 2019: www.nhmrc.gov.au/health-advice/public-health/preventing-infection.
2. Correa-Martinez, C.L., et al., Risk Factors for Long-Term Vancomycin-Resistant Enterococci Persistence-A Prospective Longitudinal Study. Microorganisms, 2019. 7(10).
3. Karki, S., et al., Long-term carriage of vancomycin-resistant enterococci in patients discharged from hospitals: a 12-year retrospective cohort study. J Clin Microbiol, 2013. 51(10): p. 3374-9.
4. Australian Commission on Safety and Quality in Health Care. Recommendations for the control of carbapenemase-producing *Enterobacterales* (CPE): A guide for acute care health service organisations. Sydney: ACSQHC, 2021.

5. Centers for Disease Control. Infection prevention and control for Candida auris. 2021 [cited 9 Dec 2022]; Available from: https://www.cdc.gov/fungal/candida-auris/c-auris-infection-control.html.7 Australian Commission on Safety and Quality in Healthcare, *National Safety and Quality Health Service Standards*. 2021, ACSQHC: Sydney.
6. Australian Commission on Safety and Quality in Healthcare, *National Safety and Quality Health Service Standards*. 2021, ACSQHC: Sydney.

Appendix 4: Management of contacts

Table 4: Management of contacts of confirmed cases of multi-resistant organisms

<table>
<tr><th>Organism</th><th>Definition of a contact</th><th>Screening strategy to identify contacts</th><th>Management of contacts</th><th>Additional recommendations</th></tr>
<tr><td>Carbapenemase producing Enterobacterales (CPE)</td><td rowspan="5">A contact may be defined as a person who has shared a room, bathroom, or toilet facility with a confirmed MRO case for more than 24 hours.
(Note: this would be from the time the specimen that is positive for an MRO is taken)</td><td colspan="2">Recommendations for the control of carbapenemase-producing Enterobacterales (CPE): A guide for acute care health service organisations</td><td rowspan="5">• Bed and/or isolation space availability will impact contact management.
• Cohort contacts in multi-bed bays with restriction of admission to unoccupied beds pending screening results. Conduct local risk assessment if this is not practicable.
• In health services where the lack of availability of beds and isolation facilities makes compliance with the above options unachievable, the infection prevention and control unit should undertake analysis of risk of transmission of MRO associated with not isolating contacts pending screening results.</td></tr>
<tr><td>Candida auris</td><td colspan="2">Guideline for Infection prevention and control of Candida auris.</td></tr>
<tr><td>Other multi-resistant gram negatives (MRGNs) and extended spectrum beta lactamase-producing (ESBL-producing) organisms (excluding CPE)</td><td>Screening of contacts should be coordinated by the local infection prevention team.
Screening is recommended in acute and high-risk settings.</td><td rowspan="3">Where possible, isolate contacts in a single room with an unshared ensuite until pathology results are available.</td></tr>
<tr><td>Vancomycin resistant enterococci (VRE)</td><td>Screening is recommended in acute and high-risk settings.</td></tr>
<tr><td>Methicillin resistant staph aureus (MRSA)</td><td>Screening of contacts should be determined by the local infection prevention team.</td></tr>
</table>

Appendix 5: Discharge cleaning of rooms

Table 5: Discharge room cleaning and disinfection for multi-resistant organisms

Check
• enough time is allocated to complete the full discharge clean and disinfection • patient is discharged and has vacated the room • all reusable clinical equipment has been cleaned and removed • all items in the room that cannot be cleaned are discarded • change disposable curtains if heavily soiled or damaged, or after 12 months use, or as advised by infection control, or launder curtains that are reusable • use 2-in-1 or 2-step detergent and disinfectant active against MROs • wear additional PPE as per the material safety data sheet
Clean
• bedroom first (‘clean’ area); ensuite second (‘dirty’ area) • working from high to low surfaces • wipes or cloths are used flat– ‘no scrunching!’ • every surface with manual pressure in an ‘S’-shaped direction • all furniture, mirrors, soap dispensers, doors, handles, rails, toilets, basins, sinks, floors, outside and inside of bins • spot clean walls where visibly soiled
Confirm
• fresh curtains have been hung (as required) • mop head or microfibre has been changed and discarded as foul linen • if used, mop bucket emptied and cleaned to be filled with fresh solution • PPE removed and discarded with room waste • hand hygiene is performed with alcohol-based hand rub or with soap and water • cleaned surfaces are left to completely air dry • nurse in charge is notified that discharge clean is complete

Appendix 6: Additional resources

Consumer factsheets from the National Health and Medical Research Council for *Clostridioides difficile*, Healthcare Associated Infections, methicillin-resistant *Staphylococcus aureus* , vancomycin-resistant enterococci
https://www.nhmrc.gov.au/about-us/publications/australian-guidelines-prevention-and-control-infection-healthcare-2019#toc__28

Consumer and clinician factsheets from the Australian Commission on Safety and Quality in Healthcare for Carbapenemase-produing *Enterobacterales*
https://www.safetyandquality.gov.au/our-work/healthcare-associated-infection/cpe-guide

Signage for standard and transmission-based precautions (co-branded QLD Government and ACSQH)
https://www.safetyandquality.gov.au/our-work/infection-prevention-and-control/standard-and-transmission-based-precaution-posters

Therapeutic Goods Administration regulation of disinfectants and sterilants
https://www.tga.gov.au/resources/resource/guidance/disinfectants-sterilants-and-sanitary-products

Antimicrobial Stewardship in Australian Health Care (The AMS Book)
https://www.safetyandquality.gov.au/our-work/antimicrobial-stewardship/antimicrobial-stewardship-australian-health-care-ams-book