health

Patient-centred risk management strategy for multi-resistant organisms

State Government Victoria

Department of Health

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Executive Summary

The Australian Commission on Safety and Quality in Health Care (ACSQHC) released the ***Australian Guidelines for the Prevention and Control of Infection in Healthcare*** in October 2010 to establish a nationally accepted approach to infection prevention and control within an evidence-based, risk management framework.

The ACSQHC guidelines recommend that each healthcare facility is to conduct its own risk assessment and manage patients colonised or infected with multi-resistant organisms (MROs) in the local context.

The ***Patient-centred risk management strategy for multi-resistant organisms*** is designed to assist health services in risk assessment of MROs. The MRO guideline replaces ***Guidelines for the Management of Patients with Vancomycin-Resistant Enterococci (VRE) Colonisation/Infection*** **(1999).**

The risk of transmission of MROs is dependant on factors associated with the microorganism/infectious agent, risk factors in the source patient, the patient setting and the environment.
New mechanisms of antimicrobial resistance and increasing numbers of patients with MROs are challenging health services. Routine isolation practices have significant psychological and medical care access issues for patients and financial costs in consumables and resources for health services. As the level of risk and specific MROs will differ in facilities; all healthcare facilities need to consider the risks of transmission of MROs and implement infection prevention and control strategies according to their specific circumstances. As well as an effective antimicrobial stewardship program to optimize antibiotic use, understanding the modes of transmission of infectious agents and knowing how and when to apply the basic principles of infection prevention and control is critical to the success of an infection prevention and control program.

Patient-centred risk management strategy for multi-resistant organisms

Impact of isolation precautions on quality of care and health service operations

Although isolation precautions in addition to other infection prevention and control measures have been proven to be effective in outbreak settings, there have been no prospective studies to demonstrate that routine isolation of patients is effective in reducing transmission of MROs. Studies have demonstrated that isolation has a number of unintended adverse consequences for patients such as higher rates anxiety, depression, dissatisfaction with care, fewer provider visits and increased preventable adverse drug events. Access to comprehensive medical care is impaired with an increase in waiting times in the emergency department for an inpatient admission to a single room for contact isolation.

Two level approach for the management of multi-resistant organisms

A two level patient-centred risk management approach is recommended in the ACSQHC guidelines for the management and control of MROs:

1. Core strategies for prevention and control in any situation where MRO infection or colonisation is suspected or identified
2. Organism or resistance-based approaches if the incidence or prevalence of MROs is not decreasing despite implementing core strategies

The ACSQHC guidelines state that each healthcare facility is to conduct its own risk assessment for MROs and apply transmission prevention strategies in the local context. This MRO guideline and patient-centred risk management strategy is designed to assist health services in risk assessment of individual patients and their settings.

Follow the link to the ACSQHC Infection Prevention and Control guidelines
http://www.nhmrc.gov.au/publications/synopses/cd33syn.htm

Patient-centred risk management strategy for MROs

Advantages

The advantages of a patient-centred risk management strategy are that it emphasizes consistent practice of standard precautions and tailors the use of contact precautions to local conditions. This takes into consideration the specific MROs that are prevalent and being transmitted in the local setting and the presence of risk factors for transmission in patients and the environment.

Assessing the patient and environmental risks at each episode of care ensures the current status of the patient is considered rather than routinely implementing contact precautions for every episode of care regardless of risk.

The use of standard precautions in low risk patients and settings will improve access to medical care for patients by lessening demand for single rooms and reduce financial costs in consumables and resources by removing routine contact isolation for all patients with MROs.

Disadvantages

The disadvantage of a patient-centred risk management strategy is that healthcare workers (HCWs) are required to assess the patient, environment, patient setting and microorganism/infectious agent at each episode of care.

Risk management principles

The patient-centred risk management strategy for MROs is based on established risk management principles as in Australian /New Zealand Standard on *Risk Management-Principles and Guidelines* AS/NZS ISO 31000:2009.

1. Establishing the context
   - this risk management strategy is for use in acute hospitals
   - infection prevention resources are available
   - HCWs are trained in patient assessment and at a minimum, a basic level of infection prevention
   - hospitals have a duty of care to improve patient outcomes and protect patients from healthcare acquired infection

2. Avoiding the risk
   - accommodating patients known or suspected to be colonised or infected with a MRO is not avoidable so the risk must be managed

3. Identify the risk of a MRO by communicating with the patient's transferring healthcare facility
   - assess if the patient is known to be colonised/ infected with a MRO
   - investigate if transfer is from a setting recognised to have local transmission or endemic MROs
   - assess the patient for long term antibiotic exposure

4. Analyse the risk by considering the likelihood and consequence of transmission of the MRO
   - assess the function of the setting, for example- general ward, ICU
   - assess the patient population characteristics, for example- immunosuppressed cohort
   - assess the susceptibility of the host, for example- invasive devices in situ
   - assess clinical transmission risks, for example- diarrhoea, wounds

5. Evaluate the risk by considering measures that could be implemented to reduce the transmission/development of MRO
   - assess possible environmental controls to isolate/segregate patient
   - evaluate resources available to reduce opportunities for transmission, for example-personal protective equipment and clothing
   - consider the level of training of HCWs in infection prevention and control
   - consider the possibility and value of decolonisation to reduce/eliminate MRO
   - assess organisational support for antibiotic stewardship including restriction

6. Treat or modify the transmission risk
   - implement transmission based precautions
   - engage and provide education for HCWs on infection prevention and control strategies
   - engage and provide education for patients on their role and contribution to infection prevention and control strategies
   - environmental disinfection in addition to cleaning
   - specialist advice/referral for management/treatment of the MRO
   - consider the possibility and value of decolonisation to reduce/eliminate the MRO

7. Monitor and review MRO development and transmission risk
   - implement a surveillance program to monitor development or transmission of MRO
   - monitor HCW and patient adherence to infection prevention strategies
   - monitor and review antibiotic prescription/use trends

Risk matrix

> Risk is often expressed in terms of a combination of the likelihood of an event's occurrence and the associated consequences. For a patient-centred risk management strategy for MRO, the likelihood of transmission of the MRO is assessed against the consequences of transmission to other patients. To change the likelihood of transmission of the MRO there must be analysis and evaluation of risk factors to modify the transmission risk.*
>
> *Australian /New Zealand Standard on *Risk Management-Principles and Guidelines* AS/NZS ISO 31000:2009

Multi resistant Organisms

Key:
Vancomycin resistant E faecalis and E faecium (VRE Van A and Van B spp)
Clostridium difficile (*C difficile*)
Multi-resistant Gram-negative organisms (MRGN)
Extended-spectrum beta-lactamase (ESBL)
Metallo-beta lactamase (MBL)
Klebsiella pneumoniae carbapenemase (KPC)
Multi-drug resistant *Pseudomonas* spp (MDR *Pseudomonas* spp)
Multi-drug resistant *Acinetobacter* spp (MDR *Acinetobacter* spp)
Methicillin resistant *Staphlycoccus aureus* (MRSA)

Specific MRO transmission risks

MROs are transmitted by the same routes as antimicrobial susceptible infectious agents. Patient to patient transmission in healthcare settings via hands of HCWs is a major factor in transmission of MROs. The rising incidence of MROs and the emergence of new mechanisms of resistance are in part due to increasingly invasive medical interventions and antibiotic selection pressure.

VRE (Van A and Van B spp)
Pathogenic species such as *Enterococcus faecium* and *faecalis* are hardy Gram-positive organisms which if present in patients with diarrhoea/incontinence or wounds with copious/uncontained drainage will widely contaminate surfaces and are difficult to remove. VRE and other enterococci can be transmitted directly by person to person contact, indirectly by transient carriage on the hands of HCWs and via contact with contaminated environmental surfaces.

C difficle
Clostridium difficile is a spore-forming Gram-positive anaerobic organism which may be present in small numbers in the gut. Overgrowth associated with toxin production can produce illness which may be severe. Important factors that contribute to healthcare-associated outbreaks of *C difficile* include environmental contamination, persistence of spores for prolonged periods of time, resistance of spores to routinely used disinfectants and antiseptics, hand carriage by HCWs to other patients, and exposure of patients to frequent courses of antimicrobial agents.

MRGN
Gram-negative organisms have a secondary outer membrane which impedes the entry of antimicrobials making them naturally more resistant. Some of the mechanisms of resistance currently being identified are extended-spectrum beta-lactamases (ESBL), metallo-beta lactamases (MBL) and Klebsiella pneumoniae carbapenemases (KPC). Definitions for multi-resistance vary, but in general, MRGN organisms are resistant to one or more drugs from three classes of antibiotics.

ESBL
Extended-spectrum beta-lactamases confer antibiotic resistance on microorganisms and are mostly found in Gram-negative organisms of the *Enterobacteriaceae* family such as *Klebsiella pneumoniae, Klebsiella oxytoca* and *Escherichia coli.* Beta-lactamases are able to hydrolyse cephalosporins making them ineffective. Plasmid-mediated transmission occurs between members of a single strain or different strains of bacteria, as well as spread by contact through hands of HCWs, contaminated items or equipment and the faecal oral route. Increasingly, a genotype of ESBL is being seen in community settings in *E coli* which are resistant to fluoroquinolones, aminoglycosides and co-trimoxazole.

MBL
Metallo-beta lactamases (MBL) are mechanisms of resistance which produce enzymes that inactivate carbapenems. These genes can transfer from one organism to another in different patients or within the same patient. New Delhi metallo-beta lactamase (NDM-1) is a recent carbapenemase identified.

KPC
Klebsiella pneumoniae carbapenemases (KPC) are becoming more common and confer resistance to all classes of beta-lactam antibiotics. KPC may also transfer between members of a single strain or different strains of bacteria and specific laboratory tests are required to detect KPC-producing organisms.

MDR *Pseudomonas* spp
Pseudomonas spp are Gram-negative organisms which are naturally resistant to antibiotics and normally reside in soil and contaminated water. MDR *Pseudomonas* spp are resistant to one or more drugs from three classes of antibiotics. They can survive under conditions that few other organisms can tolerate producing a slime layer that protects them from destruction. *Pseudomonas* spp rarely cause infection in healthy individuals; however people with Cystic Fibrosis are frequently colonised/infected with mucoid and non-mucoid varieties of *Pseudomonas aeruginosa*. Patients with immunodeficiency or burns and those with indwelling catheters or on respirators are at risk of hospital acquired infection with *Pseudomonas* spp. These organisms can multiply in a wide assortment of environments including eye drops, soaps, sinks, anaesthesia and resuscitation equipment, fuels, humidifiers and even stored distilled water. Transmission to patients may also be indirectly through contamination of HCW hands.

MDR *Acinetobacter* spp
Acinetobacter spp are Gram-negative organisms which are naturally resistant to antibiotics and widely present in the soil and water, posing very little risk to healthy people. MDR *Acinetobacter* spp are resistant to one or more drugs from three classes of antibiotics particularly carbapenems. Hospitalized patients, especially very ill patients on a ventilator, those with a prolonged hospital stay, open wounds, or with invasive devices such as urinary catheters are at greater risk for *Acinetobacter* spp, particularly *Acinetobacter baumannii-complex* infection. *Acinetobacter* spp can be spread to susceptible persons by person to person contact or contact with contaminated surfaces. *Acinetobacter* spp may transiently colonise the skin and may survive in the wet and dry environment for several days and weeks.

MRSA
Methicillin-resistant *Staphlycoccus aureus* (MRSA) is a Gram-positive organism which can commonly cause infection, particularly skin and soft tissue infections and device related bloodstream infections, or colonise the anterior nares or skin, especially moist skin folds. These organisms are spread by person to person contact or via the hands of HCWs, contaminated items or equipment and lack of aseptic technique during invasive procedures.

Screening for MROs

There is no national or international consensus on screening for MROs. Health facilities need to consider factors such as the local prevalence of specific MROs, the likelihood a patient may be colonised with a MRO, the type of facility, the consequences of transmission and available resources for screening.
Where VRE or MRGN are prevalent, admission and interval screening in specialised units is an important way to detect new or relapsed colonisation. There is evidence of prolonged colonisation with MRGN organisms for six months or more however the practicability and usefulness of screening outside of an outbreak setting remains unresolved.

MRO Clearance

MRSA
Based on the 2005 *Multi-Resistant Organism Screening and Clearance Recommendations*' the following criteria should be satisfied prior to certifying that a patient has cleared MRSA:

- 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 three months; and
- consecutive negative screens from screening sites on two separate occasions OR evaluation of a single set of screening swabs

VRE
Some health services have protocols for VRE clearance based on three negative rectal swabs/ specimens not less than one week apart.
Patients with VRE may appear to 'clear' with time but relapse with antibiotic therapy.

MRGN
There is evidence of prolonged colonisation with MRGN organisms, possibly for six months or longer however the practicability and usefulness of screening outside of an outbreak setting remains unresolved.

Standard and transmission-based precautions

Standard precautions:
The primary strategy to prevent healthcare associated infection is to build into the culture of each healthcare setting routine practices or standard precautions for all patients regardless of any known infection/colonisation.

Standard precautions include hand hygiene before and after patient contact, use of personal protective equipment where there is a risk of contamination with blood or body fluids, appropriate handling and disposal of sharps to prevent transmission of blood-borne diseases, aseptic techniques in patient care, reprocessing of medical equipment and instruments, environmental controls, routine environmental cleaning and administrative controls such as education for patients and HCWs.

Transmission-based precautions:
In addition to standard precautions, transmission-based precautions are required for infectious agents spread by the airborne, droplet or contact routes.

- Airborne precautions

Airborne precautions include the use of particulate filter masks for staff and patient placement in a negative pressure room, or room where air does not circulate to other areas, with a closed door.

- Droplet precautions

Droplet precautions include the use of surgical masks for staff, single room or segregated patient placement.

- Contact precautions

Includes the use of personal protective equipment for all patient contact, disinfection of equipment and environment, single room or segregated patient placement and minimum patient transfers.

The MROs addressed in this guideline are generally spread directly or indirectly by contact therefore all patients and visitors are also to be encouraged to hand wash or apply alcohol based hand rub on entry and exit of patient rooms.

Patient-centred risk assessment for management of MROs

Patients	Treat/modify transmission risk
No clinical or additional risk factors	Standard precautions including: Hand hygiene Clean shared patient equipment between use

For patients with MROs and clinical or additional risk factors, transmission-based infection prevention and control strategies are recommended.

Patients with clinical risk factors	Treat/modify transmission risk
Copious or uncontained drainage from wound/abscess	Standard precautions and Contact precautions Single room Contain wound drainage Disinfection in addition to cleaning the environment
-Diarrhoea*[#] -Incontinent of stool/intestinal stoma/colorectal procedure or surgery	Standard precautions and Contact precautions Single room and toilet if diarrhoea Disinfection in addition to cleaning the environment
Copious or uncontained respiratory secretions/urine	Standard precautions and Contact precautions Single room Disinfection in addition to cleaning the environment
Skin-shedding lesions	Standard precautions Single room Cover lesions if possible Screen for MRSA
Urinary catheter	Standard precautions Aseptic technique with catheter care

*Diarrhoea suspected to be due to an infectious agent. Diarrhoea is defined as 2 or more episodes of loose bowel actions (categorised as type 6 or 7 stool on the *Bristol Stool Form Scale*) in a 24 hour period.
[#]Including hypervirulent strains of *Clostridium difficile*

Patients with additional risk factors	Treat/modify transmission risk
Patient not compliant with hygienic practices for example- soiling environment outside immediate bed area	Standard precautions and Contact precautions Single room Disinfection in addition to cleaning the environment
High risk setting such as open cubicle ICU	Standard precautions and Contact precautions Consider single room
High risk cohort such as immunosuppression in haematology or burns unit or invasive devices	Standard precautions Consider single room for the patient with MRO
Patient has multiple invasive devices/wounds and transferred from an overseas healthcare facility known to have endemic MROs	Standard precautions Consider single room Screen for MRO

Patients with MROs may ambulate around shared care areas providing they are continent of faeces, urine or wearing incontinence aids and hand wash or apply alcohol based hand rub on exiting their room.

Patients with MROs and clinical or additional risk factors are not to visit other patient rooms or use communal facilities.
Adapted from Provincial Infectious Diseases Advisory Committee (PIDAC) Revised July 2011 *Routine Practices and Additional Precautions in all Health Care Settings.*

Implementation

The best people to lead implementation of the patient-centred risk assessment strategy are the infection prevention team with the support of their infection prevention committee. The OSSIE (Organisational leadership, Solutions and strategies for implementation, Stakeholder engagement, Implementation, Evaluation and maintenance) toolkit is a companion document for the implementation of *The Australian Guidelines for the Prevention of Infection in Health Care 2010.*
The OSSIE framework has been adapted by the Health Care Associated Infection (HAI) program at ACSQHC to be used as a framework to assist clinicians, leaders and managers to plan for, implement, evaluate and maintain use of the Infection Prevention and Control Guidelines in clinical practice, regardless of context. These principles will be a valuable resource to engage stakeholders, implement and evaluate the ***Patient-centred risk management strategy for multi-resistant organisms.***

http://www.safetyandquality.gov.au/internet/safety/publishing.nsf/Content/com-pubs_OSSIE-Toolkit-PoliHC

Patient-centred risk management strategy for multi-resistant organisms

Implementation scenarios

1. Patient T

VRE identified in a rectal screening swab in 2010. Patient now admitted to an open plan ICU post extensive abdominal surgery (not breaching the colon). All wounds are covered, has a CVC and IDC in situ.

Risk assessment:
Standard precautions, consider single room as patient has MRO and an additional risk factor (high risk setting)

2. Patient U

VRE identified in a urine specimen whilst on a general ward. Commenced on antibiotic treatment, has no IDC and is faecally continent and self caring.

Risk assessment:
Standard precautions as no clinical or additional risk factors.

3. Patient V

VRE cultured from multiple chronic leg ulcers. The dressings are intact. The patient is on a general ward and has longstanding colostomy.

Risk assessment:
Single room, contact precautions, environmental disinfection as patient has MRO and a clinical risk factor (intestinal stoma).

4. Patient W

VRE colonisation identified in 2000. Patient is now on a trauma ward with extensive chest injuries, chest drains and a tracheostomy in situ. Has copious amounts of sputum and is coughing.

Risk assessment:
Single room, contact precautions, environmental disinfection as patient has MRO and a clinical risk factor (copious and uncontained sputum).

5. Patient X

Patient with extensive infected trauma wounds returns from ICU in a country known to have endemic carbapenemase *Enterobacteriaceae.*

Risk assessment:
Standard precautions, consider single room and screen for MROs as patient has an additional risk factor (transferred from environment endemic for MROs).

6. Patient Y

Patient with altered conscious state and tracheostomy in neurosurgical wound has MDR *Pseudomonas* spp in sputum and urine.

Risk assessment:
Single room, contact precautions and environmental disinfection as patient has MRO and a clinical risk factor (uncontained sputum).

7. Patient Z

Patient admitted from community to day procedure area with soft tissue infection for drainage. Exudate is contained with dressings and MRSA is cultured.

Risk assessment:
Standard precautions (wound contained and no additional risk factors).

Patient-centred risk management strategy for multi-resistant organisms

References:

Australian Commission on Safety and Quality in Healthcare 2010 *Prevention and Control of Infection in Healthcare.*

Australian Commission on Safety and Quality in Healthcare 2010 *The OSSIE Toolkit for the implementation of The Australian Guidelines for the Prevention of Infection in Health Care 2010*

Backman C, Taylor G, Sales A, Marck P. "An *integrative review of infection prevention and control programs for multidrug-resistant organisms in acute care hospitals: A socio-ecological perspective*." Am J Infect Control 2011,39:368-378

Bristol Stool Form Scale Heaton K, Bristol University of Bristol 1997.

Chen LF, Falagas ME, Peleg AY. *"Facing the rising tide of multidrug resistant Gram-negative pathogens".* Healthcare Infection 2011, 16, 1-5

Department of Human Services 1999. *Guidelines for the Management of Patients with Vancomycin Resistant Enterococci (VRE) Colonisation/Infection.*

Huskins WC et al. "*Intervention to reduce transmission of resistant bacteria in intensive care".* N Engl J Med 2011, 364:1407-1418 April 14 2011

McLemore A et al. "*Effect of contact precautions on wait time from emergency room disposition to inpatient admission".* ICHE Vol 32 No 3 p298-299

Multi-resistant Organism Screening and Clearance Recommendations Healthcare Infection Surveillance Subcommittee, Healthcare Associated Infection Advisory Committee, National Quality and Safety Council. 2005

Provincial Infectious Diseases Advisory Committee (PIDAC) Revised July 2011 *Routine Practices and Additional Precautions in all Health Care Settings*

Standards Australia AS/NZS ISO 31000:2009 *Risk management—Principles and guidelines*

Victorian Advisory Committee on Infection Control (2009) *VRE in Victorian Health Facilities.*

Appendix 1

Quick guide to patient-centred risk assessment for management of MRO

Does the patient have clinical risk factors?

Yes

Clinical risk factors

- -Copious or uncontained drainage from wound/abscess ☐
- -Diarrhoea* ☐
- -Incontinent of stool/intestinal stoma/ colorectal procedure or surgery ☐
- -Uncontained sputum/urine ☐

Standard precautions
Single room and dedicated toilet if diarrhoea
Contact precautions
Disinfection in addition to cleaning the environment

- - Skin-shedding lesions ☐

Standard precautions
Single room
Cover lesions if possible
Screen for MRSA

- -Urinary catheter ☐

Standard precautions
Aseptic technique with catheter care

No

Standard Precautions

Hand Hygiene

Clean shared equipment between use

Does the patient have additional risk factors?

Yes

Additional risk factors#

- -Patient not compliant with hygienic practices for example- soiling environment outside immediate bed area ☐

Standard precautions
Single room
Contact precautions
Disinfection in addition to cleaning environment

- -High risk setting such as open cubicle ICU
- -High risk cohort such as immunosuppression, haematology or burns unit or invasive devices ☐

Standard precautions
Consider single room for the patient with MRO

- -Patient has multiple invasive devices/wounds and transferred from an overseas healthcare facility known to have endemic MROs ☐

Standard precautions
Consider single room
Screen for MRO

No

Standard Precautions

Hand Hygiene

Clean shared equipment between use

Patients with MROs and risk factors may ambulate around shared care areas providing they are continent of faeces, urine or wearing incontinence aids and hand wash or apply alcohol based hand rub on exiting their room

*Diarrhoea suspected to be due to an infectious agent. Diarrhoea is defined as 2 or more episodes of loose bowel actions (categorised as type 6 or 7 stool on the *Bristol Stool Form Scale*) in a 24 hour period.