SECTION 7
RISK MITIGATION: PRECAUTIONS FOR MULTIDRUG-RESISTANT ORGANISMS AND *CLOSTRIDIUM DIFFICILE*

CONTENTS

7 Multidrug-resistant organisms

"A guiding tenet of infection control is to ensure that a patient is never denied quality care as a result of harbouring a resistant pathogen."

Harris, Paterson & Rogers, 2015(150)

Patients infected with a multidrug-resistant organism (MRO) may be at an increased risk of morbidity and mortality and often require increased length of stay in hospital along with additional diagnostic testing and treatment. Because of these reasons, a HAI caused by a MRO often results in an additional cost for the patient and the healthcare system.

To minimise MRO transmission and infection, HWs must ensure that infection prevention and control principles, such as standard and transmission based precautions and antimicrobial stewardship are practised during all patient care. In addition, local risk assessments should be conducted to assess the risk to inform the requirements of specific infection prevention measures for the management of MRO colonised or infected patients.

MROs are microorganisms that are resistant to multiple antimicrobial classes. These include but are not limited to: methicillin-resistant *Staphylococcus aureus* (MRSA), vancomycin-resistant *enterococci* (VRE), carbapenemase-producing *Enterobacterales* (CPE), carbapenemase-producing *Pseudomonas aeruginosa*, Candida *auris etc.*

Extended-spectrum beta lactamase-producing enteric gram-negative bacillus (Enterobacterales) are known as ESBLs (151, 152). The risks of nosocomial transmission from ESBL *E.coli* are considered to be low however other ESBLs should be managed using contact precautions based on local risk assessment (153, 154).

The recommendations described in this section are applicable to both inpatient and outpatient (e.g. clinic) settings. The recommendations are suitable for routine care, however additional measures may be required in the event of a MRO outbreak.

Knowledge Box : The prevalence and effect of MRSA
In a study of over 300,000 hospital inpatients in the United States, 1% of patients negative for MRSA on admission returned later cultures positive for MRSA, indicating acquisition of MRSA during their hospitalisations. Authors from this study reported that post discharge mortality of this group at one year was 10% higher compared with a carefully matched cohort who had not acquired MRSA (155).

7.1 Clostridioides difficile (formerly known as *Clostridium difficile*)

C. difficile is a spore-forming microorganism. The spore is resistant to many disinfectants and antimicrobial agents that are often used in healthcare settings. *C. difficile* often produces toxins that may cause mild to severe gastrointestinal symptoms. *C. difficile* is not a MRO, however, given that the risks associated with *C. difficile* are similar to MROs, *C. difficile* will also be considered within the scope of this section.

7.2 Antimicrobial stewardship

A HO is required to have an antimicrobial stewardship program consisting of a range of strategies and appropriate governance to meet the NSQHS – version 2 National Standards Preventing and Controlling Healthcare-Associated Infection Standard (12).

NSQHS – VERSION 2 STANDARDS 3
Safe and appropriate antimicrobial prescribing is a strategic goal of the clinical governance system

Promotion of the following principles may be helpful in developing strategies and systems to optimise antimicrobial use:

- Select correct patients for antimicrobial treatment, avoiding use where there is no evidence of benefit.
- Prescribe antimicrobials (type and dose) as specified by locally-endorsed guidelines or national antimicrobial prescribing guidelines (if locally-endorsed guidelines are not available).
- Document reason for outpatient or inpatient treatment with antimicrobials against every prescription.
- Ensure patients with presumptive severe sepsis or septic shock receive treatment within 60 minutes of triage/time of diagnosis.
- Specify a review date for each antimicrobial course.
- In almost all situations, confine use of surgical antibiotic prophylaxis to a single perioperative dose in accordance with indications specified by national antimicrobial prescribing guidelines (156).

Restriction of selected antimicrobials is one method of ensuring judicious antimicrobial use (157). The Clinical Excellence Commission's *List of Recommended Antimicrobial Restrictions* (158) and fact sheets on managing antimicrobial restrictions in small to medium-sized hospitals (159) or medium to large-sized hospitals (160) are useful starting points for HOs that are considering this strategy.

Clinical Excellence Commission
List of Recommended Antimicrobial Restrictions

Clinical Excellence Commission
Antimicrobial restrictions in small to medium-sized hospitals

Clinical Excellence Commission
Antimicrobial restrictions in medium to large-sized hospitals

It is recommended that HOs that lack local antimicrobial stewardship expertise develop strategies to upskill staff. Investing in training, establishing relationships with other HOs and providing support networks for staff may support the development of antimicrobial stewardship expertise. The effectiveness of this strategy should be reviewed periodically by the multi-disciplinary committee that oversees antimicrobial stewardship in the HO.

7.3 MRO screening and surveillance

Screening results, as well as any results obtained through diagnostic testing, should be used to inform subsequent infection prevention and control actions.

As part of risk identification, any MRO positive pathology report should clearly indicate the presence of a specific MRO. If unclear on the interpretation of pathology results or required infection prevention and control action, clinicians should promptly raise queries with the local clinical microbiology service or infection prevention and control unit for interpretation and guidance.

Preoperative screening for staphylococcus aureus including MRSA and MSSA is recommended for elective procedures such as coronary artery bypass graft (CABGs) and joint replacements (Total Hip Replacement and Total Knee Replacements).

A major risk factor for acquiring an MRO is overseas travel, especially when medical care or treatment in a health care facility is involved. A risk assessment should be conducted at admission to identify people who require screening for specific MROs.

NSQHS - VERSION 2 NATIONAL STANDARDS Standard

7.4 MRO admission screening

There are certain risk factors which promote the transmission of MROs in the healthcare environment. Admission screening for extreme risk rated clinical inpatient areas, such as a NICU, renal dialysis, Haematology, oncology and transplant units should depend on local demonstrated MRO epidemiology.

CPE screening should be conducted for patients who received care/treatment in overseas facilities e.g. IVF.
Candida auris screening should be conducted for patients who received care in overseas facilities.
Refer to CPE and *Candida auris* guidelines for more information on surveillance and management of CPE and *Candida auris* in NSW health facilities.

Table 19 outlines these risk factors and requirements for admission screening.

ACSQHC
Recommendations for the control of Multi-drug resistant Gram-negatives: carbapenem resistant Enterobacteriales

NSW Health GL
Surveillance & Response for Carbapenemase-Producing Enterobacterales (CPE) in NSW Health Facilities

Standardised diagnostic methods are to be used when screening for MROs. These methods should be consistent with the international standards for microbiological investigations (1).

Table 19. Specific MRO transmission risks

MRO transmission risk	Is admission screening needed?			
	MRSA	CPE	VRE	Candida auris
Repatriation from any overseas hospital admitted to an inpatient area	YES	YES	YES	YES
Admission to high risk clinical inpatient areas with recent (past 12 months) overnight	NO	YES	NO	

admission in an overseas hospital or residence in an overseas Residential Age care facility (RACF)				YES
Admission to an extreme risk rated clinical inpatient area, such as an adult ICU, burns, renal dialysis, haematology, oncology and transplant units	YES*	YES	YES*	NO
Transfers from units in other NSW hospitals or residential care settings	Depends on local infection rate			
Admission to or transfer from a facility (e.g. NICU) with known prevalence or MRO outbreak	Screening for outbreak MRO			
Presence of a chronic wound or invasive device	Depends on local infection rate			
Other MRO Gram Negatives	Depends on local infection rate			

* According to local risk assessment and priorities

7.5 MRO screening specimens

Admission screening for MROs requires the collection of at least one swab set. Swab set requirements are included in Table 20. Seek advice from your local microbiology/laboratory service prior to sampling.

Table 20. Guide to swab set requirements (discuss with laboratory)

Microorganism	Specimen(s) Required
CPE	Rectal* (preferred) or faeces and any wound, ulcer, transcutaneous exit site(s) or urine (if indwelling or suprapubic catheter is present)
MRAB	Rectal* (preferred) or faeces and throat or sputum ± wound, ulcer, transcutaneous exit site(s) or urine (if indwelling or suprapubic catheter is present)
VRE	Rectal* (preferred) or faeces and wound, ulcer, transcutaneous exit site(s) or urine (if indwelling or suprapubic catheter is present)
MRSA	Nose + perineum and wound, ulcer, transcutaneous exit site(s) ± throat
Candida auris	Bilateral axilla and groin, blood or other body fluids
Other gram negatives e.g. ESBL	Rectal* (preferred) or faeces and any wound, ulcer, transcutaneous exit site(s) or urine (if indwelling or suprapubic catheter is present)
C. difficile	If diarrhoea is present Faecal sample (only loose stool will be tested)

*There must be faeces visible on the rectal swab

7.6 MRO screening prior to solid organ donation

The transmission of infection from solid organ donor to recipient during solid organ transplant is a rare event (161, 162) but has been reported in the literature locally and when occurs can cause catastrophic impacts on the recipient (163, 164). Transmission to the organ recipient is more likely to occur if the donor presents with symptomatic illness at the time of the procedure (161) and a MRO is involved (165).

In addition to donor screening requirements outlined in NSW Health *Organ Donation After Circulatory Death: NSW Guidelines*, the donor is to also be screened for MRSA, VRE, CPE, and any other known MROs in local circulation (e.g. carbapenem-resistant *A. baumanii*, multidrug-resistant *P. aeruginosa)* (166).

Blood cultures should also be collected and screened if the donor is febrile. Screening should be done prior to the pronouncement of death by the facility where the donor is receiving care. Results are to be made available to the facilities caring for intended organ recipients as soon as practically possible.

NSW Health GL
Organ Donation After Circulatory Death: NSW Guidelines

Therapeutic Guidelines
Prevention of Infection: Immunosuppressed patients

Transplant teams and infectious diseases physicians should consider the following when interpreting donor screening results (167):

- For donors positive for MRSA and VRE:
  - Colonisation with MRSA or VRE, in the absence of infection, does not preclude organ donation.
  - Any infection of the potential allograft precludes organ donation.
- For donors positive for CPE:
  - Donor can still be a candidate for organ donation if infection is still sensitive to carbapenem (i.e. resistance gene is not expressed);

- If the donor's medical team has determined that the donor has deep-seated MRSA, VRE or CPE infection that does not affect the potential allograft, then the donor's medical team should consult with the transplant team regarding:
    - The viability of treating the donor with appropriate antimicrobial therapy prior to transplant; and
    - The need to initiate appropriate antimicrobial prophylaxis to the recipient perio-peratively.
- Any bacteraemia precludes organ donation.

7.7 MRO screening prior to faecal transplant donation

The use of faecal microbiota transplantation (FMT) has been reported for a variety of indications including severe, refractory, or relapsing CDI, and other non-infectious indications. The donor blood and serum screening protocol has been adapted from guidelines for blood transfusion (168). HOs performing FMT should have comprehensive protocols for screening donors. For more information refer to Australian Therapeutic Goods Administration-Faecal Microbiota Transplant (FMT) product regulation.

7.8 Healthcare worker MRO screening

Routine screenings of HWs for MRO colonisation is not recommended. HWs who are identified, via screening or diagnostic testing, as being colonised or infected with a MRO should be referred to staff health or infection prevention and control for assessment, treatment and management, as per local protocols (12).

NSW Health PD
NSW Health Code of Conduct

NSQHS – version 2 Standard 3
Promoting collaboration with occupational health and safety programs to decrease the risk of infection or injury to healthcare workers.

7.9 Ongoing MRO screening in extreme risk rated areas

Ongoing MRO screening may be necessary in clinical areas where there may be a high risk of transmission or where the clinical impact of MRO transmission would be severe (e.g. dialysis units, haematology units, oncology units, NICUS, ICUs).

NSW Health PD
Infection Prevention and Control Policy

What to screen for should be guided by the same principles as those indicated for admission screening and local infection prevention risk assessments and emerging concerns (see Section 7.4, *MRO admission screening*).

Where a patient is confirmed to be colonised or infected with a MRO, no further surveillance screening (except for clearance screening) is required for that MRO.

7.10 MRO screening in non-extreme risk rated areas

Routine MRO screening should only be done before defined surgical procedures (Section 7.4). Outside of extreme risk rated areas, routine MRO screening is not recommended but may be required based on local prevalence, risk assessment, part of contact tracing or in response to an outbreak.

7.11 MRSA clearance screening

Clearance screening for MRSA may be considered if all of the following criteria have been met:

- The patient has not used any antibiotics or antiseptics specific to the MRO in last three months;
- It has been at least six months since the patient has returned a positive MRO specimen; and
- Patient is no longer receiving care in an extreme risk clinical area (See Table 19, *Specific MRO transmission risks* and also Section 3*, Hospital environments*).

For patients in general wards, outpatients and community settings, clearance of a MRO is when a patient returns at least two negative swabs sets, collected from the same body sites, on the same day at different times or on separate days (i.e. the two swabs sets are “separated by time”). Only the ICP or ICP designated HW is to update any infection control alerts in patients’ medical record.

Additional practice points to consider:

- For MRSA, clearance can be determined if > 6 months after the last positive MRSA culture.
- Subsequent relapse of MRSA carriage after initial clearance may occur at a later time, either due to re-acquisition or resurgence of carriage to a detectable level.
- Clearance screening may be performed after re-admission or as an outpatient provided that the patient has not recently used either an antiseptic body wash or antibiotic that is active against MRSA.
- The presence of any indwelling device or non-intact skin is no longer a contraindication for clearance screening. However, clearance screening should include specimens from these sites if required.

For CPE, Candida auris and ESBL colonised patients, there is limited published scientific evidence defining clear guidance for clearance. A local management plan is suggested to be developed with IPC and ID teams based on the risk assessment and local epidemiology.

7.12 VRE clearance screening

VRE colonisation may persist for prolonged periods (years) and screening cultures may not detect low-level colonisation, so negative rectal or stool cultures may not reflect true clearance (169).

VRE clearance is controversial and is dependent on institutional policies (170). In the event that VRE clearance is deemed possible a patient could be consider cleared of VRE for the purposes of cessation of contact precautions if ALL the following criteria are met (171):

- any infection caused by VRE has resolved
- more than three months have elapsed since the last positive specimen
- three consecutive VRE negative faecal samples obtained at least one week apart
- the patient must have ceased all antibiotics (intravenous or oral) for at least two weeks before specimens are collected
- Clearance can also be considered in a patient who has a history of a single positive VRE faecal or rectal culture followed by multiple negative cultures over a period of 6 months or more

Patients presenting to hospital who do not meet these criteria (should be considered VRE positive for that admission) with negative screening adding to the criteria for clearance (see above).

7.13 Alerting and removing alerts (De-flagging)

Alerting or removing an MRO flag/alert in a patient's healthcare record should only be done by the local infection prevention and control unit or by other HWs designated by the local infection prevention and control unit. The minimum requirements for alerting and removing alerts for the various MROs, in both inpatient and community settings, are described in Table 21.

Where patients have met the required criteria for clearance, any flags in the system should be removed (de-flagged).

The flag should be reinstated as per any MRO positive culture and as risk assessed by the infection prevention and control team.

Table 21. Requirements for MRO alerting and removing alerts

MRO	Alerting	Removing Alerts
MRSA	Yes	Yes
Candida auris	Yes	Determine locally*
CPE	Yes	Determine locally*
VRE	Yes	Determine locally*
Carbapenemase-producing *Gram-negatives*	Yes	Determine locally*
C. difficile	Determine locally*	Determine locally*
Clinically significant MRO	Yes	Determine locally*
ESBL	Determine locally*	Determine locally*

* Determine based on local prevalence

7.13.1 Recommendations for removing alerts

- A MRO alert should be removed only if the patient meets the criteria for MRO clearance (see Section 7.11, *Clearance screening).*
- If a patient is cleared of a MRO, there is still potential for a patient to be recolonised with a MRO, including the previous strain of MRO. If recolonisation is detected, MRO flags should be reinstated.
- It is a local decision to use flags or alerts to identify patients with CDI. If alerts are used, the HO may consider removing alerts on these patients 48 hours after the return of a normal stool pattern. Refer to the national case definition for clarification on what constitutes an acute CDI episode (172).

ACSQHC
Clostridium difficile infection
A model to improve the management and control of Clostridium difficile in Australia

7.14 Audit and validation of screening programs

- HO should consider point prevalence survey of the MRO screening program to test the compliance rate towards the screening program
- Consider single or periodic point prevalence survey to validate the screening programs in high risk units.
- Recommendation: annual review within facility

7.15 Precautions

In extreme risk rated settings, patients with a MRO, should be cared for under standard and contact precautions (See Section 5, *Contact precautions in specific settings*).

If any of the risk factors described under Section 7.4, *MRO admission screening,* are present: A risk assessment should be conducted to employ additional infection prevention and control strategies.

- Patient placement -preferably accommodate the patient in a single room with ensuite
- If patient is to leave their room, the patient should perform hand hygiene before leaving are

In the absence of the risk factors described under Section 7.4, *MRO admission screening,* a patient in a low risk rated setting (e.g. mental health, rehabilitation) can be cared for under standard precautions plus:

- Patients may use the therapy pool using standard and transmission based precautions provided they comply with respiratory etiquette and hand hygiene, have no diarrhoea, uncontrolled faecal incontinence, or wounds that cannot be contained by a waterproof dressing.
- It is suggested to contact the IPC team to discuss management options for each client.

Aquatic Physiotherapy Group Australian guidelines for aquatic physiotherapists working in and/or managing Hydrotherapy pools.

- Can be cohorted with other patients that have the same MRO.
- Patient can freely visit hospital courtyards and coffee shops.
- Patient can use gym and therapy areas at any time, ensuring hand hygiene before and after contact with gym equipment. Reusable equipment is to be cleaned after every patient use.
- Patient's visitors should comply with hand hygiene requirements and not assist or visit other patients during current visit.
- Visitors are not routinely required to don PPE, unless exposure to body substance is anticipated.
- Education must be provided to visitors on donning, doffing, disposal of PPE and hand hygiene if visitors are required to wear PPE.

Each MRO patient should, where geographically possible and practical, use a separate toilet facility, and the need for additional environmental cleaning should be assessed.

NSW Health PD
Environmental Cleaning Policy

7.16 Patient placement

Unless otherwise advised by the local infection prevention and control service, the placement of a patient with a MRO should be done in line with Section 6, *Risk mitigation: patient placement*. See Table 22 Patient placement priority guide for guidance.

Section 6
Patient placement

Specific risk factors that influence MRO patient placement decisions are:

- Is the patient capable of maintaining their own personal hygiene?
- Does the patient have any discharging wounds that cannot be adequately covered?
- Has the patient had diarrhoea in the past 48 hours?
- Is the patient faecally incontinent?
- Is the patient incontinent of urine and has MRO colonisation of the urinary tract?
- For VRE placements, does the patient have any enterostomies or faecally incontinent?

Table 22. Patient placement priority guide

Priority level for single room allocation	Route of transmission	Isolation Management	Examples
High – Must be placed in single room with bathroom	**Airborne**	**DO NOT COHORT** **Airborne Precautions**	Measles Pulmonary tuberculosis Chickenpox
High– Must be placed in single room	**Droplet**	**DO NOT COHORT** Single room Droplet precautions	Pertussis (Whooping cough) Meningococcal disease (< 24 hours after antibiotics commenced) Rubella (German Measles) Mumps
Medium – single room where available	**Droplet**	Influenza-like illness (ILI – seasonal Influenza) Risk assess clinical symptoms for the duration of isolation	Other respiratory viral illnesses such as adenovirus, human metapneumonvirus, parainfluenza, RSV,
High– Must be placed in single room	**Contact**	Single room with ensuite or dedicated bathroom facility Contact precautions **DO NOT COHORT ACUTE DIARRHOEA, CPE or CANDIDA AURIS**	Order of priority for single room allocation: 1. CPE 2. Acute diarrhoea (3 or more loose stools within 24 hours. Risk assess clinical symptoms for the duration of isolation)
Medium – single room where available	**Contact**	Cohorting can occur in this category (VRE, MRSA). Risk assess for prioritisation Contact precautions Single room with ensuite or dedicated bathroom facility or designated commode	3. MRSA 4. ESBLs 5. VRE 6. Shingles

7.17 Precautions for community health settings

The precautions required to prevent MRO transmission in a community health setting should be based on a risk assessment which should address the following:

Section 5
Contact precautions in specific settings

- Are invasive procedures performed?
- Is direct physical contact with blood, body substances, tissue, infectious materials or surfaces/equipment anticipated?
- Patient has open wounds or invasive devices or is immunocompromised?

Refer to Figure 4 for additional advice on risk assessing for MRO transmission in community settings.

Additional factors such as duration of appointment, age, setting, patient's/client's compliance with infection prevention and control requirements, faecal or urinary incontinence, available resources

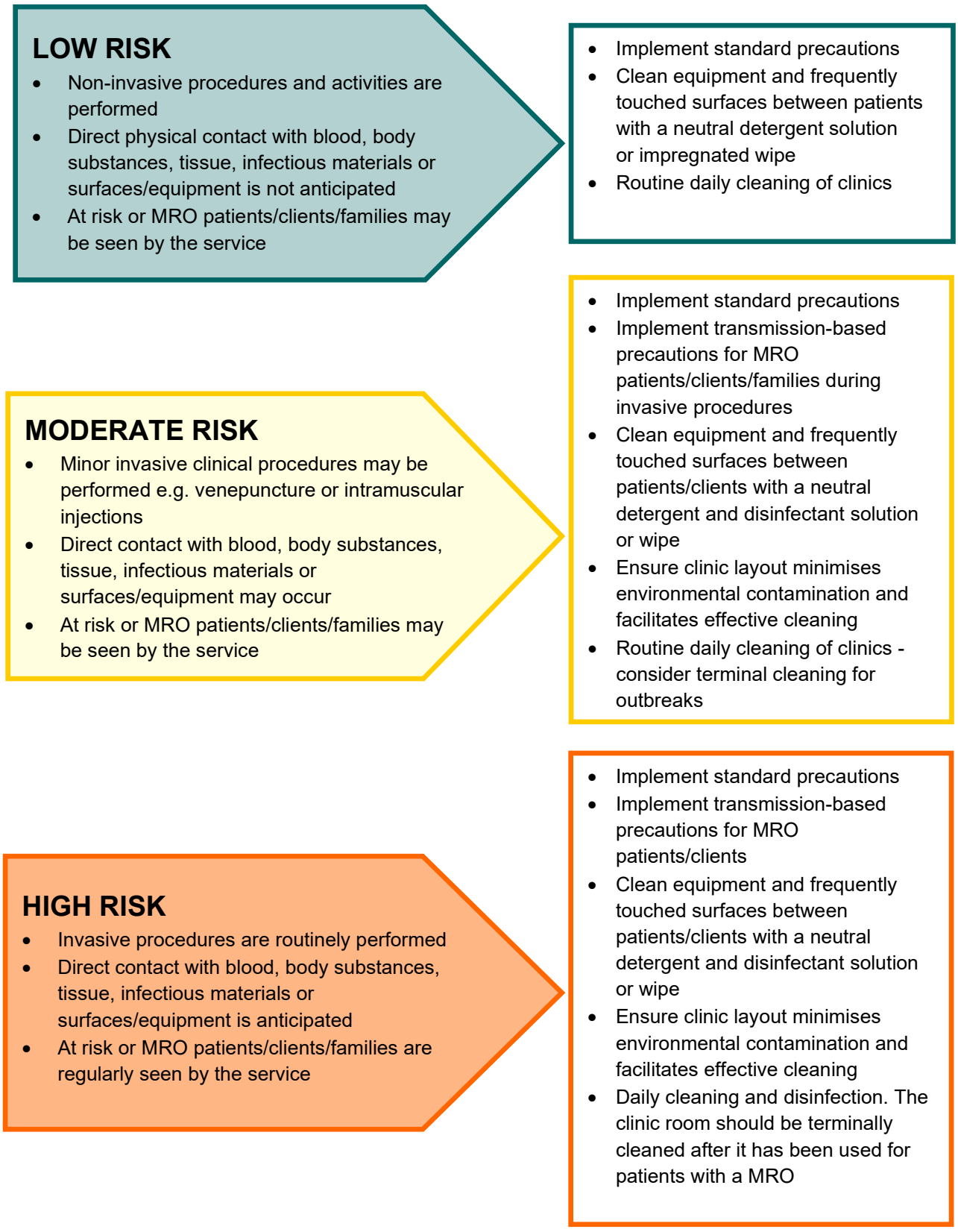
or outbreak incidents may impact on the level of risk and should be considered when conducting a risk assessment.

Hand hygiene is to be adhered to by all HWs who have contact with the patient or patient's surroundings. HWs should encourage all patients/clients and carers to perform hand hygiene when they attend community health outpatient clinics to minimise environmental contamination.

Standard precautions (see Section 4, *Risk mitigation: standard precautions*) are adequate for activities where HW contact with the patient is minimal (i.e. only social contact is anticipated) and the risk of MRO transmission is low. Standard and transmission-based precautions (see Section 5, *Risk mitigation: transmission-based precautions*) should be implemented if there is a high risk of MRO transmission. For example, an Occupational Therapist assessing a patient's home who is known to have VRE and is incontinent of faeces; MRO infected patients/clients attending nursing procedural clinics for wound management.

Reusable/shared clinical equipment and frequently touched surfaces are to be cleaned between patients/clients with neutral detergent. The cleaning process should be as per local protocols and be based on the risk assessment below [Figure 4]. In medium and high risk community settings this may include the additional action of disinfection with hospital-grade disinfectant for reusable or shared clinical equipment and frequently touched surfaces that are in contact with an MRO patient/client.

Figure 4. Risk assessment for community health outpatient settings



For clinics where invasive procedures are performed, it is essential that the layout minimises environmental contamination and facilitates cleaning. This may include:

- Keep clinic surfaces such as desks and floors clear of clutter
- Utilise wall displays or posters that are washable
- Maintain minimal patient care stock in clinic rooms
- Store patient care stock in cleanable containers or cupboards after use

At a minimum, all community health clinics are to be cleaned daily when in use. Clinical staff are responsible for cleaning of the patient equipment and high touch surfaces, including examination chair/bed and examination light between each patient. An additional terminal cleaning may be required between patients or prior to the start of the next clinic session to minimise the potential for MRO transmission.

7.18 Transferring or transporting a patient with a MRO

The transfer and transport of a patient within a hospital or between hospitals is not to be delayed by MRO colonisation or infection and should be guided by clinical need and urgency. Only a minority of patients who are colonised with a MRO will have been identified by screening or a previous infection. Therefore, theoretically, any patient could be colonised.

Transfer or transport agencies are to, as a minimum, exercise standard precautions and, where possible, contact precautions during the transfer and transport of a MRO patient based on risk assessment. If this is not possible, refer to local procedures and/or seek advice from the local infection prevention and control unit for alternative arrangements.

It is critical that the transfer/transport agency adheres to all elements of standard precautions, particularly hand hygiene and environmental cleaning, and implements measures to increase the spatial distance between patients during transport/transfer.

The facility booking the transfer or transport is to notify all agencies involved in the transfer or transport, including the receiving HO, of the patient's MRO status and type of colonising MRO prior to the patient being transferred or transported. The HO booking the transfer should assist the patient with hand hygiene.

The following general principles should be followed while transporting a patient with a known MRO status:

- Patient treatment or transport should not be delayed as a consequence of MRO status.
- Non-infected patients and patients with an MRO may travel in the same vehicle, provided;
- Patient Transport Service employees maintain standard precautions and, where possible, contact precautions during the transport if required.
- Patients perform hand hygiene with an alcohol based hand rub when they enter and leave the transport vehicle.
- Patients have the capacity to abide by instructions to reduce chances of physical contact between patients
- Patients identified at the time of booking as having an increased risk of transmission (e.g. incontinent, uncontained wound) must not be transported in a mixed Patient Transport vehicle. These patients are usually considered high shedders, causing greater risk of transmission of organisms.

NSQHS - VERSION 2 NATIONAL STANDARDS Standard 3

NSQHS - VERSION 2 NATIONAL STANDARDS Standard 3

NSW Health PD
Service Specifications for Transport Providers, Patient Transport Service

7.19 MRSA decolonisation

For some patients, reducing the skin burden of MRSA reduces the risk of post-operative infection. To achieve this, clinicians should consider the feasibility of pre-operative load reduction or decolonisation. In the short term, pre-operative load reduction can be considered for some procedures (e.g. cardiothoracic, joint replacement) whereas decolonisation should be used to reduce the risk of recurrent skin infection.

Despite the commencement or completion of any load reduction or decolonisation regimen, a patient is to be considered as colonised and appropriate precautions to counter further transmission are to be maintained until clearance has been microbiologically determined and documented in the patient's health care records.

7.19.1 MRSA pre-operative decolonisation

Clinicians should strongly consider the initiation of a pre-operative load reduction regimen for MRSA colonised patients undergoing elective cardiothoracic, orthopaedic (total joint replacements), infrarenal vascular and haemodialysis procedures, particularly in units known to have moderate to high levels of MRSA in circulation (173)**.** A pre-operative load reduction should be initiated within a sufficient timeframe to optimise efficacy.

This usually requires the regimen to be initiated at least five days prior to surgery. An example regime (Table 23) is included in the next Knowledge Box. However it remains effective if commenced at least one day prior to surgery. Any MRSA pre-operative load reduction regimen should consider local antibiotic formulary restrictions and should be determined in consultation with a clinical microbiologist and/or infectious diseases physician and/or the local infection prevention and control unit. Load reduction can also be performed for MSSA colonised patients; use local protocols for this.

Table 23. MRSA Decolonisation Regime

Knowledge Box : Example of a preoperative MRSA decolonisation regime (to be undertaken in the hospital and home environment)

Duration: Five days prior to surgery and continue after surgery if required. Ideally the full regimen should be completed prior to surgery. If this is not possible, administer as many doses as possible pre-operatively then complete the regimen post-operatively as needed.

Pre-operative load reduction for adults positive for MRSA:

- *Hair and body:* Use antimicrobial body wash (2% aqueous chlorhexidine or Triclosan) when showering. Leave body wash in place for at least 3 minutes before rinsing well. After shower, dry with clean towel or use daily application of non-rinse aqueous 2% chlorhexidine wipes.

- *Nostrils:* Treat with 2% mupirocin, two-three times daily (if resistance to mupirocin demonstrated, seek specialist ID advice). Apply inside nostril with cotton bud or swab (no further than 2cm deep) and then discard cotton bud. Repeat with new cotton bud or swab for other nostril. Press nose with thumb and forefinger, spread in the nostril using a circular motion.

Treatment for fomites and inanimate objects:

- *Bed linen:* Linen should be changed daily.
- *Personal clothing:* Freshly cleaned clothing and clean footwear should be worn after showering.
- *Frequently touched surfaces:* Wipe surfaces such as bed rails and bedside equipment daily using a clean cloth and detergent. Discard the cloth after use.

This protocol has been adapted from the following sources:

Hunter New England Local Health District, *Policy Compliance Procedure – Management of Multi-resistant Organisms and Clostridium difficile (2014).*

7.19.2 MRSA decolonisation for ongoing carriage

MRSA decolonisation should be limited to the colonised patients who have completed treatment for a symptomatic MRSA infection but remain at risk of recurrent symptomatic infection. Decolonisation for MRSA may not be effective if the individual (or other household members if decolonisation is being carried out at home) has an active chronic skin condition or is unwilling or unable to participate in the regime.

MRSA decolonisation **should be considered** only if **all** of the following criteria are met:

- The individual has not used any antibiotics or antiseptics in last two weeks;
- The isolate is susceptible to the decolonisation regimen;
- The individual does not have any invasive devices present;
- All wounds or ulcers have healed;
- The individual does not have any exfoliative skin conditions;
- The individual is cooperative, cognisant and able to follow MRSA decolonisation regimen where required; and
- The patient has completed treatment for MRSA symptomatic infection and decolonisation is expected to prevent recurrent infection.

An example regime is included in the next Knowledge Box (Table 24). Current evidence indicates that MRSA decolonisation regimens have variable efficacy for long term elimination of MRSA and efficacy is dependent on a number of patient factors (174). Information should be provided to patients and their carers regarding the expected efficacy of MRSA decolonisation prior to the commencement of any regimen. Where patients and/or carers are to carry out a MRSA decolonisation regimen, clear instructions should be provided to these individuals by the treating clinician.

NSQHS - UPDATE TO VERSION 2 NATIONAL STANDARDS Standard 3

World Health Organization
Global Guidelines
For The Prevention Of
Surgical Site Infection

After the decolonisation regime is completed, the individual should be screened to determine if MRSA clearance has been achieved.

Screening procedures can be worked up locally but at a minimum should address:

- The time-points for screening
- The specimen type(s) required
- The involvement of primary care follow-up
- Alternative strategies to be employed if decolonisation attempts are unsuccessful; and
- If a HW, workforce management during and after decolonisation.

Repeated decolonisation attempts can lead to the emergence of resistance to the antimicrobial agents used in the regimen. Therefore further advice from a clinical microbiologist or an infectious diseases physician should be sought if MRSA colonisation persists after two attempts at decolonisation.

Table 24. MRSA decolonisation regime for ongoing carriage

Knowledge Box : Example of a MRSA Decolonisation Regime

Preparation of the individual

- Remove all body piercings for several days prior to commencing decolonisation regime and keep piercings out for the duration of decolonisation.
- Clean earrings and other piercing elements with soap and water and store dry

Preparation of the household

- Replace old toothbrushes, razors, opened roll-on deodorant, skin adhesive tapes, skin creams and solutions, pumice stones, sponges, make up brushes, creams and implements.
- Discard or hot wash all fluffy toys.
- Discard magazines, newspapers and other clutter.
- Wash hair brushes and combs, nail files, plastic toys, and clippers in the dishwasher or discard.

Treatment for adults positive for MRSA (and their household contacts):

- *Hair and body:* Treat with 1% Triclosan **OR** 2% aqueous chlorhexidine daily for 5 days. Apply to skin for at least three minutes and then rinse off. Avoid use of other soaps and body washes during this time. Usual shampoo and conditioners are suitable for use.
- *Nostrils:* Treat with 2% mupirocin, twice daily for first week and then 2-3 times a week afterwards. Apply inside nostril with cotton bud or swab. Discard cotton bud after use. Repeat with new cotton bud or swab for other nostril. Spread in nostril by squeezing nose with thumb and forefinger and rubbing together in a circular motion. If the colonising MRSA strain is mupirocin resistant, seek further advice from a clinical microbiologist or infectious diseases physician.
- *Dentures:* Remove dentures early evening and clean with mild soap and water or denture paste. Immerse in a denture cleaning solution every night for 1 hour or as long as prescribed.

Treatment for non-preterm neonates positive for MRSA:

- *Body:* Treat with 1% chlorhexidine cream daily from Day 1 (day of birth) until Day 3. Wipe with water then apply by lightly smearing chlorhexidine cream.
- *Body*: Treat with mild soap and chlorhexidine on alternate days after Day 4. Wash with mild soap and then apply by lightly smearing chlorhexidine cream.

Treatment for household items:

- Disinfect reused personal items with an alcohol-based cleanser (large alcohol-containing wipes) several times during the decolonisation period.
- Clean and disinfect the shower floor and/or bath tub daily with a bleach-based cleanser.
- On days 2 and 5 of treatment, clean the house well (especially the bedrooms and bathrooms). Clean dust off all surfaces then vacuum clean floor surfaces and soft furnishings. Wipe over all frequently touched surfaces with detergent wipes. Wash vinyl/leather covered furniture with warm soapy water and dry with a clean towel.

Pets:

- Dogs and other companion animals can be colonised with the same strains of *S. aureus* without showing any signs of infection.
- Wash animal bedding in hot wash with laundry detergent and dry in the sun or replace.
- Wash the animal at least once with an antiseptic solution.

This protocol has been adapted from the following source:
Hunter New England Health Pathways. Recurrent Staphylococcal Infections. [Online] 2015.

7.19.3 Decolonisation of other MROs

To date, there is a lack of evidence to support using a decolonisation regimen for the long-term elimination of any other MRO. This section will be updated when reliable and valid evidence emerges to support such regimens.

7.20 Communication about MROs

7.20.1 Communicating with patients and carers

Each HO is to ensure that clinicians inform and communicate with patients and their carers affected by MRO colonisation or infection and establish an understanding of the necessary infection prevention and control precautions required.

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Where screening or clinical diagnostic testing has indicated MRO colonisation or infection, the treating medical officer, or their designate, is to advise the patient of this result. This will provide an opportunity to discuss and determine an appropriate management plan and address any concerns the patient, or their carer, may have about MRO colonisation and its potential impact on their health and wellbeing. The HO should ensure that MRO colonised patients are provided with easy-to-understand written and verbal information on the MRO. At a minimum, this should contain the following information:

- What is a MRO?
- What is the MRO that has colonised the patient?
- What is the difference between colonisation and infection?
- How is the MRO transmitted between individuals or from the environment?
- How long will the MRO be carried?
- How can the patient assist in limiting the spread of the MRO?
- Can the MRO be treated?
- Are other individuals at risk of getting the MRO from the patient?
- What infection prevention and control precautions are required as an inpatient, such as transmission-based precautions, visitor policies and any movement restrictions for patient and HWs?
- What infection prevention and control precautions are required after discharge (i.e. at home)?
- Who the patient should tell about their MRO colonisation and/or infection (e.g. other healthcare providers including transport agencies).

The Clinical Excellence Commission provides a number of resources for patients and clinicians. For MRSA (175), VRE (176) and *C. difficile* (177) the National Health and Medical Research Council (NHMRC) has produced patient information brochures. For CPE, the Australian Commission on Safety and Quality in Health Care (ACSQHC) has produced a patient factsheet (178). It is sufficient to use these brochures and fact sheets for patient communication. Where a HO has specific local MRO concerns, the HO may prefer to publish and distribute their own patient information. In the event of an outbreak or increasing endemicity, a HO must provide rapid response communication and feedback to colonised patients and their carers.

7.20.2 Communicating with other hospitals

As described in Section 7.18, *Transferring or transporting a patient with a MRO,* the facility booking a transfer must notify the transport agency and receiving HO of the patient's MRO status and type of colonising MRO prior to the patient being transferred. If screening or diagnostic results were not available before the transfer, and the presence of a MRO is identified by the booking HO after the transfer, the booking HO is responsible for informing the receiving HO of this new information. The receiving facility is responsible for conveying this new information to the patient and their family or carer.

7.21 MRO outbreak management

The outbreak management principles outlined in Section 11, *Outbreak management,* should be adhered to if an MRO outbreak occurs.