Centre for Healthcare Related Infection Surveillance and Prevention

GUIDELINE

Vancomycin Resistant *Enterococcus* (VRE)

This guideline provides recommendations for the management of patients with Vancomycin resistant *enterococcus* (VRE), Van A and Van B.

Process for the Management of Patients with VRE

Enterococci are Gram-positive bacteria that are naturally present in the intestinal tract of all people. Enterococci generally are of low pathogenicity but may cause opportunistic infections in patients who are immunocompromised or are receiving high-acuity healthcare. 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.

Patients can be colonised or infected with VRE. VRE infections usually occur in hospitalised patients with invasive devices in situ and recent or ongoing antibiotic treatment. In Queensland the majority of VRE isolates to date have been from colonised patients. The majority of VRE colonised patients do not develop a serious VRE infection.

VRE can be transmitted by direct or indirect contact for example via:

- shared patient equipment if not cleaned appropriately between patient uses. Disposable or patient dedicated equipment is preferred
- hands of healthcare workers after touching an infected or colonised VRE patient, contaminated equipment or environment if hand hygiene is not performed before touching another patient
- the following sections outline the minimum processes and steps that are to be taken when managing patients colonised or infected with VRE.

Isolation

Inpatient placement options (acute and sub-acute care):

- single room placement with an unshared ensuite
- cohorting of confirmed cases.

Transmission-based precaution signage should identify the isolation room and include the necessary precautions to be adopted.

Sub-acute care settings:

- patients should be permitted to participate in group meals and activities if draining wounds are covered, bodily fluids are contained, and the patients are directed to perform hand hygiene as per standard precautions
- screening the contacts of VRE patients should be undertaken in accordance with the section on screening and one of the following options should be employed for the management of contacts, taking into account the availability of beds and isolation facilities and the risk of transmission:
    - isolate contacts in a single room with a dedicated ensuite until pathology results are available
    - cohort contacts in multi-bed bays with restriction of admission to unoccupied beds pending screening results.
- in facilities where the lack of availability of beds and isolation facilities makes compliance with the above options unachievable, infection control staff should undertake an assessment of the risk of transmission of VRE associated with not isolating contacts pending screening results.

Ambulatory therapy settings:

(for example, renal dialysis unit, oncology day therapy unit):

- patients do not require segregation in the waiting room
- the preferred placement of patients in these units is single room accommodation
- where single room accommodation is not available, provide patient treatment in an area with as few adjacent stations as possible (for example, at the end or corner of the unit)
- clinical equipment and items such as examination couches/treatment chairs should be cleaned between patients as per the section on Environmental Cleaning
- remove excess stock from treatment areas prior to clinical care.

Outpatient clinics:

- patients do not require segregation in the waiting room
- contact precautions should only be required when physical examinations/procedures are being undertaken
- clinical equipment and items such as examination couches/treatment chairs should be cleaned between patients as per section on Environmental cleaning
- remove excess stock from outpatient procedure rooms prior to clinical care.

Personal Protective Equipment

Transmission-based contact precautions should be implemented routinely while providing care to all patients colonised or infected with VRE. Healthcare personnel caring for patients being managed under transmission-based contact precautions should don personal protective equipment before or upon room entry and discard before or upon exiting the patient's room.

The personal protective equipment (PPE) required in the care of patients with VRE is a barrier of the body front, from neck to mid-thigh or below, for example apron or gown, and gloves.

Aprons:

- aprons should only be used in the care of patients with VRE for patient care activities involving minimal patient contact. For activities involving extensive patient contact, staff should don a gown (see gowns section)
- staff wearing long sleeved shirts, suit jackets and jumpers (wearing this type of clothing for direct patient contact is not advised) are unable to utilise an apron and should don a gown for all patient contact
- aprons should be worn as single use items, for one procedure or episode of patient care and should be discarded into waste after use
- aprons should be removed prior to exiting the patient's environment.

Gowns:

- gowns should be worn as single use items, for one procedure or episode of patient care
- gowns should be removed prior to exiting the patient's environment
- disposable gowns should be discarded into waste after use
- non-disposable gowns should be placed in a linen skip to be sent for laundering after use
- a gown is to be donned prior to entering the patient environment. The gown should include full coverage of arms and body front, from neck to mid-thigh or below if staff:
  - will be performing patient care activities involving extensive patient contact. Extensive patient contact is described as direct contact with the areas not covered

by the apron, for example, contact with staff forearms. Examples of extensive patient contact are providing cares such as: dressing large or complex wounds; hygiene cares for incontinent patients; hygiene cares or pressure area care when a patient is fully dependant, urinary catheter cares

- o are wearing long sleeved shirts, suit jackets and jumpers that cannot be removed (wearing this type of clothing for direct patient contact is not advised).

Gloves:

- clean non-sterile gloves should be donned prior to entering the patient's environment
- gloves should be worn as single use items
- gloves should be changed between different care/treatment activities for the same patient
- remove gloves and perform hand hygiene upon exiting the patient's environment.

Visitors:

- all visitors should be directed to perform hand hygiene prior to contact with the patient's environment and upon exiting the patient's environment
- visitors are generally not required to wear PPE to visit patients with VRE
- visitors intending on visiting more than one patient should be directed to visit the patient with VRE last or to wear a plastic apron in the patient's environment
- during outbreaks/periods of increased prevalence, local procedures should be reviewed and visitor precautions altered as necessary by the infection control practitioner.

Hand Hygiene

When caring for patients colonised or infected with VRE, hand hygiene should be performed with either liquid soap (antimicrobial or non-medicated) and water or alcohol based hand rubs with an appropriate alcohol content.

Principles of hand hygiene and facility specific hand hygiene work unit instructions should be followed. Guidance on hand hygiene is available from Hand Hygiene Australia accessed at:

http://www.hha.org.au/AboutHandHygiene.aspx

Screening

As a minimum standard, screening should be undertaken according to the following table:

Targeted screening	Frequency of screening	Screening sites
High risk inpatient units • Intensive care unit • Nephrology/renal unit • Haematology/oncology unit • Solid organ transplant unit **Dialysis patients** **Ambulatory haematology/oncology patients** **Contacts of VRE positive patients**	In these high risk units or patient populations, screen on admission (whether this be admission from the emergency department / community, transfer from another unit within the facility, or inter-hospital transfer) and weekly thereafter. In ambulatory haemodialysis units or ambulatory haematology/oncology units screen every 3 months. For contacts of VRE positive patients, one swab is to be collected.	Stool, rectal or perianal swabs are generally considered a sensitive method for detection of VRE.

All patients who meet the above criteria should be screened unless they are already known to be colonised with VRE. Repeat routine screening of patients already known to be colonised with VRE should not be undertaken unless for the purposes of clearance screening.

Screening should also be performed as part of outbreak control and management strategies.

Clearance

There is very little evidence to support performing clearance of VRE on a routine basis. In instances when clearance of VRE is to be undertaken, an assessment of the risk should be performed.

Information to be used to inform the risk assessment can be found in *Queensland Health Screening and Clearance of Multi-resistant Organisms (MRO) Guideline* available from: http://www.health.qld.gov.au/chrisp/policy_framework/guideline_4_MRO.pdf

In addition to an assessment of the risk, the following criteria should be fulfilled prior to commencing the process of VRE clearance:

- at least 6 months since the last positive VRE specimen
- a period (at least 6 months) free from the following:
  - hospitalisation (acute episode)
  - antimicrobial therapy
  - invasive devices.

Clearance screening should be undertaken according to the following:

- three consecutive negative stool, rectal or perianal swabs separated by a minimum period of one week per negative specimen.

A patient who has been cleared of VRE colonisation should only be re-screened if required as per the section on Screening. A patient who has been cleared of VRE colonisation who subsequently returns a positive culture from a either a clinical isolate or a screening specimen will be considered to be VRE positive again. The process for clearance should then be recommenced as above.

Clearance can also be considered in patients who have a history of one solitary VRE positive screening specimen followed by multiple negatives over a period of six months or more, regardless of the presence of the above risk factors (hospitalisation, antimicrobial therapy, invasive devices). However, these patients should not be cleared if they are inpatients in high risk units (intensive care unit, renal unit, solid organ transplant unit, haematology/oncology unit) or in units with high proportions of patients in the high risk groups.

Environmental Cleaning

The requirements for environmental cleaning are as follows:

- the process for environmental cleaning should be a one-step process using a combined detergent and chlorine disinfectant product. This product should have 1000 parts per million (ppm) available chlorine when diluted as per the manufacturer's recommendations
- this process should be used for daily cleaning of inpatient rooms of VRE carriers, discharge cleaning of inpatient rooms of VRE carriers, and discharge cleaning of renal dialysis and day therapy unit areas of VRE carriers. This process should also be used by nursing staff and other categories of staff undertaking cleaning of patient care devices used for patients with VRE
- mechanical or manual physical cleaning is the most important step in cleaning. Application of the combined detergent and 1000ppm available chlorine solution should be by active damp cleaning

- products containing quaternary ammonium compounds (QACs), for example benzalkonium chloride, should not be used for cleaning or disinfection in clinical areas due to a risk of development of reduced susceptibility of some micro-organisms[1-3]
- cleaning equipment including mops, cloths and solutions should be changed between patient environments
- staff undertaking cleaning activities should observe transmission-based contact precautions at all times when in the patient's environment
- staff should don additional personal protective equipment in accordance with the cleaning product manufacturer's instructions. For further information, refer to the relevant Safety Data Sheet (SDS). The SDS for stock solutions can be found at: http://qheps.health.qld.gov.au/safety/hazards/chemalert.htm
- minimum frequencies for routine cleaning are outlined in the *Queensland Health – Cleaning Services Operational Guidelines*. Further information on minimum cleaning frequencies for routine cleaning are also found in the National Health and Medical Research Council *Australian Guidelines for the Prevention and Control of Infection in Healthcare*.

An assessment of the risk of using the combined detergent and 1000ppm available chlorine solution on specific surfaces such as flooring and patient care equipment items should be undertaken. It may be necessary to modify the method of application for use on some surfaces. For example, some items/surfaces may require damp wiping to remove the disinfectant after an appropriate contact time (usually 10 minutes) in order to prevent corrosion or product build-up.

During an outbreak, it may be necessary to intensify and reinforce training of staff undertaking the cleaning. In some instances the use of dedicated cleaning personnel (in line with the roles of nursing and operational streams) in the affected patient care unit may be warranted. Studies have reported the use of such dedicated staff enhances consistency of cleaning and disinfection.

Facilities may choose to utilise a disclosing agent to assist in staff training and ascertaining the effectiveness of current cleaning practices.

Patient Care Equipment

Patient-care devices (e.g. electronic thermometers, sphygmomanometers, glucometers, hoists, pat slides) may transmit VRE if devices are shared between patients. To reduce the risk of transmission, disposable or patient dedicated equipment is preferred. Equipment that is unable to be dedicated should be cleaned and disinfected after use, allowed to dry and stored clean. The disinfectant used should be a combined detergent and 1000ppm available chlorine solution.

Daily cleaning of patient's room

Minimum frequencies for routine cleaning are outlined in the *Queensland Health – Cleaning Services Operational Guidelines*. All patient surrounds and frequently touched surfaces (such as, bedrails, trolleys, bedside commodes, doorknobs, light switches, tap handles and ensuite facilities) should be cleaned daily.

Discharge cleaning of inpatient rooms and renal dialysis

Cleaning should not commence until all the patient's personal effects have been removed from the room. Privacy curtains and window curtains if present should be removed for laundering prior to cleaning commencing.

The room and all patient care equipment remaining in the room should be physically cleaned. All furniture, patient equipment items, horizontal surfaces, frequently touched surfaces (e.g. light switches and call buttons) and bathroom / toilet shower area should be thoroughly cleaned. All consumables that are unable to be cleaned should be discarded.

If patients with VRE have used the waiting areas of renal dialysis and day therapy areas, these areas do not require cleaning in addition to the routine cleaning practices for the area.

Cleaning of ambulatory areas (excluding renal dialysis and day therapy areas)

All patient care equipment items that the patient comes into contact with should be cleaned with a combined detergent and 1000ppm available chlorine solution.

Facility-wide standard use of a combined detergent and 1000ppm available chlorine solution

As an alternative to the cleaning and disinfection process specific to the VRE patient's environment as described above, a facility may choose to substitute the general detergent product with a combined detergent and 1000ppm available chlorine solution for routine cleaning in clinical areas. If this alternative is to be undertaken, the facility should perform an assessment of the risk associated with the change of product for routine cleaning. The substitution would not apply to specialised cleaning products designed for flooring, kitchens or glass/mirrors.

Surveillance and outbreak screening

All facilities should undertake surveillance of VRE as required under the Queensland Health Guideline for the Surveillance of Healthcare Associated Infection accessed at: http://www.health.qld.gov.au/qhpolicy/docs/gdl/qh-gdl-321-7-1.pdf

Infection control staff should review surveillance data on a regular basis to determine if there has been an increase in cases, or transmission between cases. If an increase in cases or transmission is identified, infection control staff should consider outbreak control measures including intensifying active screening. Infection control staff in smaller facilities that see a small number of cases should consider one clinical isolate or infection significant enough to warrant further investigation.

If an increase in VRE clinical isolates occurs in a facility/ambulatory care unit without an on-site infectious diseases physician and/or a CNC level infection control practitioner, outbreak management advice (including whether to implement active screening or contact screening) should be sought from the nearest/nominated infectious diseases physician (or clinical microbiologist) and/or CNC level infection control practitioner.

For further advice on management of outbreaks refer to the Queensland Health Guideline for the Management of Outbreaks of Communicable Diseases in Health Facilities available from: http://www.health.qld.gov.au/chrisp/policy_framework/Outbreak_Guideline.pdf

Infection Control Alerts

Australian National Safety and Quality Health Service Standards require facilities to have mechanisms in place to check for pre-existing healthcare associated infections and to communicate a patient's infectious status. Infection Control Alerts provide this information regarding the patient, micro-organism and the need for transmission based precautions.

Infection prevention and control staff are responsible for ensuring alerts are placed on VRE positive patient's records, and that alerts are removed upon VRE clearance. This includes the facility's medical alert system (e.g. HBCIS) and any Emergency Department patient management applications, for example, EDIS. Refer to the HBCIS Infection Control Alerts document available from:
http://qheps.health.qld.gov.au/chrisp/documents/HBCIS_alert_codes.pdf.

Staff Colonised with VRE

Routine or outbreak screening of staff should not be undertaken. There may be circumstances when a healthcare worker has been identified as being colonised or infected with VRE in the course of receiving health care, either at their own facility or elsewhere. If a healthcare worker is

identified as colonised with VRE, advice should be sought from an appropriate infection control or infectious diseases professional, on an individual basis, to assess the risk of transmission to patients when the healthcare worker returns to work.

Definition of Terms

Term	Definition	Source
Ambulatory settings	Medical care involving diagnosis, observation, treatment and rehabilitation that is provided on an outpatient basis.	Medline Plus Medical Dictionary http://www.merriam-webster.com/medlineplus/ambulatory
Cohorting	Placing together in the same room patients who are infected or colonised with the same pathogen and are suitable roommates.	National Health and Medical Research Council (2010) *Australian Guidelines for the Prevention and Control of Infection In Healthcare* www.nhmrc.gov.au/book/australian-guidelines-prevention-and-control-infection-healthcare-2010/glossary
Colonisation	The sustained presence of replicating infectious agents on or in the body without the production of an immune response or disease.	National Health and Medical Research Council (2010) *Australian Guidelines for the Prevention and Control of Infection In Healthcare* www.nhmrc.gov.au/book/australian-guidelines-prevention-and-control-infection-healthcare-2010/glossary
Detergent solution	A detergent product which is intended to be used in the cleaning of surfaces or other medical devices diluted with water as per manufacturer's instructions.	National Health and Medical Research Council (2010) *Australian Guidelines for the Prevention and Control of Infection In Healthcare* www.nhmrc.gov.au/book/australian-guidelines-prevention-and-control-infection-healthcare-2010/glossary
Disinfectant	A TGA-registered disinfectant chemical product that is intended for use in disinfection of surfaces or medical devices.	National Health and Medical Research Council (2010) *Australian Guidelines for the Prevention and Control of Infection In Healthcare* www.nhmrc.gov.au/book/australian-guidelines-prevention-and-control-infection-healthcare-2010/glossary.
Endemic	Adjective describing a disease which is constantly present to a greater or lesser extent in a particular locality. Epidemiologically an infection is said to be endemic in a population when that infection is maintained in the population without the need for external inputs.	Medline Plus Medical Dictionary http://www.merriam-webster.com/medlineplus/endemic.
Frequently touched surfaces	Surfaces that are close to the patient and surfaces that are frequently touched in patient-care areas should be cleaned frequently. Examples of frequently touched surfaces are; bedrails, over-bed tables, doorknobs, tabletops, light switches and wall areas around the toilet.	National Health and Medical Research Council (2010) *Australian Guidelines for the Prevention and Control of Infection In Healthcare* http://www.nhmrc.gov.au/book/australian-guidelines-prevention-and-control-infection-healthcare-2010/b1-4-2-routine-environme
Invasive medical device	An invasive device is usually considered to have higher potential hazard than an equivalent non-invasive device (e.g. there are invasive and non-invasive blood pressure monitors).	World Health Organisation (2003) *Medical Device Regulations: Global overview and guiding principles* http://www.who.int/medical_devices/publications/en/MD_Regulations.pdf.

Term	Definition	Source
Sub-acute healthcare	Providing care for patients with conditions of moderate or low acuity who require specific packages of medical, nursing, and related services. For example, rehabilitation services.	Gray, L. (2002) Subacute care and rehabilitation, *Australian Health Review*, 25(5): 140 http://www.publish.csiro.au/?act=view_file&file_id=AH020140.pdf.
VRE Van A	A phenotype of VRE characterised by the presence of the *vanA* gene, which encodes for inducible high level resistance to vancomycin as well as to teicoplanin.	Teixeira, L.M., Carvalho, M.G, Shewmaker, P.L., & Facklam, R.R. (2011). Enterococcus. In *Manual of Clinical Microbiology 10th Edition*, J.Versalovic, K.C.Carroll, G.Funke, J.H.Jorgensen, M.L.Landry, D.W.Warnock, ASM Press, Washington DC.
VRE Van B	A phenotype of VRE characterised by the presence of the *vanB* gene, which encodes for variable (moderate to high) levels of inducible resistance to vancomycin only.	Teixeira, L.M., Carvalho, M.G, Shewmaker, P.L., & Facklam, R.R. (2011). Enterococcus. In *Manual of Clinical Microbiology 10th Edition*, J.Versalovic, K.C.Carroll, G.Funke, J.H.Jorgensen, M.L.Landry, D.W.Warnock, ASM Press, Washington DC.

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1. Rutala WA, Weber DJ, Infection Control Practices Advisory Committee, Guideline for Disinfection and Sterilization in Healthcare Facilities. [Online] 2008 [cited 2012 May 18]; Available from: URL: http://www.cdc.gov/hicpac/pdf/guidelines/Disinfection_Nov_2008.pdf

2. McDonnell G, Russell AD, Antiseptics and disinfectants: Activity, action, and resistance. Clinical Microbiology Reviews 1999 12(1):147-179.

3. Sheldon AT, Antiseptic “resistance”: Real or perceived threat? Antimicrobial Resistance 2005 40:1650-6.

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