Manitoba Infection Control Guidelines for Preventing the Spread of Vancomycin-Resistant Enterococci (VRE)

(ACUTE HEALTH-CARE FACILITIES)

(SEE REVERSE FOR LONG-TERM CARE FACILITIES)

VRE Working Group
Infection Control Subcommittee
Manitoba Advisory Committee on Infectious Diseases

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COMMUNICABLE DISEASE CONTROL

Manitoba
Health
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This document was prepared by the VRE Working Group, which reports to the Infection Control Subcommittee of the Manitoba Advisory Committee on Infectious Diseases (MACID).

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I. Introduction

The *enterococci* are part of the normal flora of the human gastrointestinal tract and are relatively harmless bacteria. For certain high-risk patients, however, these bacteria may cause serious infections. Two species account for the bulk of clinical isolates, *Enterococcus faecalis* (80-90%) and *Enterococcus faecium* (10-15%). While less virulent than some other gram-positive bacteria such as streptococci and *Staphylococcus aureus*, enterococci as a group have certain characteristics that enhance their ability to colonize, and subsequently to cause disease. They are durable organisms, surviving on both animate and inanimate surfaces (i.e., bed rails, night tables, curtains, bathroom sinks, call bells, electronic thermometers and other patient care equipment) for extended periods of time, increasing their potential to spread from patient to patient; and they are intrinsically resistant to many microbial agents. The relatively recent development of enterococcal resistance to glycopeptide antibiotics, including vancomycin and teicoplanin, is of great concern. With an increasing level of resistance of enterococci to both penicillins and aminoglycosides, the addition of vancomycin resistance has severely limited therapeutic options for those patients who develop infections with these highly resistant strains. Of even greater concern, and perhaps the greatest threat of VRE, is the potential transfer of vancomycin resistance to highly virulent bacteria such as methicillin-resistant *Staphylococcus aureus* (MRSA), which may cause infections in normal hosts.

II. Preamble

There are several different mechanisms for resistance to vancomycin. The most commonly described are plasmid-mediated (VanA phenotype) and chromosomally mediated (VanB phenotype). VanA phenotype constitutes high-level resistance to both vancomycin and teicoplanin and is easily transferred to *Staphylococcus aureus* in vitro. VanB phenotype represents a low- to high-level resistance to vancomycin, often with sensitivity to teicoplanin preserved.

Certain patient populations have been identified as being at increased risk for VRE colonization and, occasionally, infection. Risk factors for VRE colonization/infection include prolonged hospitalization, serious underlying medical conditions such as malignancies and immunosuppression (haematologic malignancies, bone marrow transplantation, solid organ transplantation, neutropenia, renal insufficiency, dialysis, chemotherapy), intensive care unit stays (both adult and pediatric), abdominal or thoracic surgery, urinary catheterization, and prior therapy with multiple antibiotics. Use of vancomycin, third-generation cephalosporins (especially ceftazidime), and antibiotics with anaerobic activity (including imipenem, metronidazole, and clindamycin) has been significantly associated with colonization and infection with VRE. Several studies have demonstrated the transmission of VRE by direct patient contact or via carriage on the hands of health-care workers, and through exposure to contaminated environmental surfaces and shared patient care equipment.

In Canada, the first outbreak of VRE was reported from Toronto in 1995, and an outbreak occurred in Saskatoon in 1996. In Manitoba, the first isolate of VRE was identified in Winnipeg in February 1997. Stringent infection measures have been used in a variety of settings to attempt to prevent the spread of VRE. These have met with varying degrees of success. Most facilities, however, have reported a trend toward the rapid establishment of endemicity once the first few cases of VRE are discovered. Given the portability of health care within Canada and worldwide, the fact that both provinces bordering Manitoba to the east and west have already isolated VRE, and the increasing numbers of Canadians seeking medical care in US health institutions, some of which have high endemic levels of VRE, VRE will continue to increase in Manitoba. It is therefore crucial that infection control efforts be focused on the early detection of VRE colonization and infection, the prompt and effective institution of infection control measures to prevent establishment of endemicity, and, as a last resort, the treatment of infected individuals with appropriate alternative antimicrobials, where possible.

In the following document, infection control guidelines are provided for:

1. Preventing the emergence of VRE through judicious use of antibiotics.
2. Screening populations at high risk for VRE colonization or infection.
3. Managing VRE positive cases and contacts when these are identified.

III. Definitions

Cohorting: Physical separation (e.g., in a separate room or ward) of two or more patients colonized or infected with the same strain of VRE from other patients who are not colonized or infected.

Colonized: Patient who is VRE culture positive and has no signs and symptoms of infection caused by the organism.

Contact: Any individual who is exposed to a VRE case in a manner in which transmission can occur.

Flagging: A system that uses specific terminology to highlight information on a patient record. Example: VRE POS. VRE SUS.

Infected: Patient who is VRE culture positive and shows signs and symptoms of infection caused by the organism.

VRE POS: A code that can be used to identify a patient with a known history of a positive VRE culture.

VRE SUS: A code (signifying VRE suspect) that can be used to identify a patient who was a contact of a patient with VRE and will require surveillance cultures if readmitted.

IV. Guidelines for the Prevention of Vancomycin-Resistant Enterococci

1. Antibiotic Usage Recommendations

Among the risk factors for VRE colonization and infection, prior use of antibiotics is probably the most amenable to preventive interventions. Therefore, all health-care institutions should develop a comprehensive antimicrobial utilization plan to:

- provide education for all medical staff;
- recommend and monitor preoperative surgical prophylaxis; and
- develop guidelines for the appropriate use of broad-spectrum antibiotics and vancomycin.

Co-ordination among infection control practitioners, pharmacy and therapeutics committees, microbiology laboratories, medical, surgical, and nursing departments, and hospital administrators will be crucial to the successful implementation of a strategic plan.

Judicious use of broad-spectrum antibiotics will minimize the ecological pressures existing in hospitalized patients favouring the acquisition and spread of antimicrobial-resistant pathogens including VRE. Pharmacy and therapeutics committees should streamline their antibiotic formularies as much as possible, providing the minimal number of broad-spectrum antibiotics necessary for treatment of all common hospital infections. Ideally, use of third- and fourth-generation cephalosporins, carbapenems, ß-lactam resistant penicillins and vancomycin should be closely monitored, if not restricted, by infectious diseases specialists or equivalent designated medical specialists. Regular monitoring of antibiograms by microbiology laboratories will also assist physicians in making informed decisions when choosing empiric antimicrobial therapies based on known sensitivity patterns of common local hospital bacterial flora.

For some bacterial species, vancomycin is the only efficacious antibiotic of choice that remains useful for therapy. Hence, careful use of vancomycin will be essential to prevent the emergence of vancomycin-resistance. In this regard, suggestions on appropriate and inappropriate uses of vancomycin should form the cornerstone of antibiotic usage recommendations designed to prevent the emergence or further spread of VRE.

Appropriate uses of vancomycin are:

1. Management of serious infections caused by ß-lactam-resistant gram-positive micro-organisms including MRSA.
2. Management of infections caused by gram-positive micro-organisms in patients who have serious life-threatening allergies to ß-lactam antimicrobials.
3. Management of severe antibiotic-associated colitis which fails to respond to repeated (two or more) courses of metronidazole therapy or management of potentially life-threatening antibiotic-associated colitis.
4. Prophylaxis for endocarditis preceding/during certain dental, oral, upper

respiratory tract, genitourinary and gastrointestinal procedures in patients at high risk for endocarditis or in patients with life-threatening allergy to ß-lactam antibiotics.

5. Prophylaxis for major surgical procedures involving implantation of prosthetic devices (including cardiac and vascular procedures, and prosthetic joints) at institutions with a high rate of infections caused by MRSA or methicillin-resistant *Staphylococcus epidermidis* (MRSE). As there are very few institutions in Canada with a significant MRSA or MRSE problem, the need for vancomycin prophylaxis in this instance is negligible at this time.

There are several clinical situations in which the use of vancomycin is felt to be desirable or preferable but not absolutely necessary. In such instances the prudent option is to choose an antibiotic other than vancomycin as initial therapy.

Instances in which the use of vancomycin should be discouraged are:

1. Routine surgical prophylaxis other than in patients who have a life-threatening allergy to ß-lactam antibiotics.
2. Empiric antimicrobial therapy for febrile neutropenic patients in the absence of a confirmed infection. The only exception may be in the case of patients who have obvious evidence of an infection due to a gram-positive micro-organism (such as an inflamed central line exit site) **and** where the prevalence of MRSA in the hospital is high, in which case empiric vancomycin may be indicated.
3. Empiric antimicrobial therapy for febrile haemodialysis and continuous ambulatory peritoneal dialysis (CAPD) patients in the absence of a confirmed infection. The only exception may be in the case of patients who have obvious evidence of an infection due to a gram-positive micro-organism (such as an inflamed central line exit site) **and** the prevalence of MRSA in the hospital is high, in which case vancomycin may be indicated.
4. Treatment of a patient with a single blood culture positive for coagulase-negative staphylococcus, when contamination of the blood culture is likely (that is, other blood cultures drawn at the same time are negative). Health-care workers who draw blood cultures should take great care to minimize contamination of specimens as contamination of blood cultures with coagulase-negative staphylococci will lead to the inappropriate administration of vancomycin.
5. Continued empiric use of vancomycin for presumed infections in patients whose cultures remain negative for ß-lactam-resistant gram-positive organisms after 48 hours.
6. Systemic or local prophylaxis for infection or colonization of indwelling central or peripheral intravascular catheters.
7. Selective decontamination of the gastrointestinal tract.
8. Routine eradication of MRSA colonization.
9. Primary treatment of antibiotic-associated colitis.
10. Routine prophylaxis for very low birth-weight infants (<1,500 gms).
11. Routine prophylaxis for patients on CAPD or haemodialysis.
12. Dosing convenient treatment of infections caused by ß-lactam-sensitive gram-positive micro-organisms in patients with renal insufficiency.
13. Use of vancomycin solution for topical application or irrigation.

Vancomycin usage recommendations are only as useful as they can be implemented. Close collaboration among several hospital departments will be necessary to influence prescribing practices of physicians. Vancomycin usage will need close monitoring through the hospital's quality assurance/improvement process, or as part of the drug-use review process of pharmacy and therapeutics committees and the medical staff to ensure successful implementation of plans to control the use of broad-spectrum antimicrobials and vancomycin in hospitalized patients.

V. Guidelines for the Early Detection of Vancomycin-Resistant Enterococci

The early detection of VRE will minimize further spread. To this end, periodic surveillance activities are highly recommended.

1. Patient Rectal Swab Screening Programs

Ward Prevalence Surveys

Periodic culture surveys of rectal swabs of patients in acute care medical centres can provide for early detection of VRE. Typically, VRE intestinal colonization precedes clinical infection and hence screening of high-risk (e.g., ICU, Oncology, Transplant, Dialysis) patients can facilitate early identification and early isolation of VRE colonized patients. The frequency and intensity of a surveillance program should be based on the population at risk and the specific hospital unit(s) involved.

Screening of High-Risk Admissions

It is essential to screen all patients admitted from VRE endemic regions or hospitals or chronic-care facilities where VRE is known to be present. Currently, any health-care facility outside of the province of Manitoba should be considered at high risk for VRE. Therefore, patients who have been hospitalized for more than 24 hours within the previous six months outside of Manitoba **must** be screened for VRE (in addition to MRSA).

2. Laboratory Antimicrobial Susceptibility Surveillance

Microbiology laboratories must routinely or periodically survey for vancomycin resistance. Routine automated antibiotic sensitivities, such as those provided by Microscan, are unreliable for the detection of VRE and should therefore not be used for surveillance purposes. Laboratories may refer to HICPAC or CHEC guidelines for specific direction. (See the reference list on page 8.)

In December 1996, a VRE screening program was initiated in Manitoba. It consists of screening for VRE all stools submitted by several health-care institutions for *C. difficile* testing, assuming that such specimens will have been collected from patients who are also at high risk of being colonized with VRE. All *C. difficile* specimens submitted to Cadham Laboratory and specimens from HSC, Concordia, Grace, Seven Oaks, Victoria and Thompson general hospitals will be screened for VRE at the HSC microbiology laboratory. Specimens from St. Boniface and Misericordia hospitals will be screened at St. Boniface General Hospital laboratory. Screening will continue to take place on all specimens submitted during the first two weeks of every second calendar month.

Westman Laboratory in Brandon performs routine VRE screening on all hemodialysis patients and on all enterococcal clinical isolates. Since January 1997, they have also been screening all *C. difficile* stools for VRE.

VI. Guidelines for the Management of VRE in Hospitals

1. Identification of a Patient with VRE

The laboratory must immediately notify Infection Control and the patient's ward of preliminary VRE identification.

Isolation precautions must be established promptly (see Section VI, # 4, Isolation/ Infection Control Precautions, on the next page).

Patients and visitors must receive verbal and written instructions about VRE and precautions (see the Patient VRE Information Sheet at the back of this publication).

A patient identification system (i.e., chart flagging arranged by Infection Control and Medical Records) should be established for rapid identification of VRE status on future admissions. The appropriate time to de-flag must be identified by Infection Control.

2. Admission of an Individual with Prior History of VRE

If a patient with a known history of a positive VRE culture is admitted to an acute care health facility:

- take surveillance cultures
  - rectal or ostomy swab, open wounds or skin lesions, if any
  - mark requisitions "Look for VRE"; and
- initiate isolation precautions.

3. Admission and Screening of High-Risk Patients

For an individual who has been identified as a contact of a known VRE case but was discharged before follow-up cultures were taken, or for a patient who has been hospitalized for more than 24 hours within the previous six months outside of Manitoba:

- take surveillance cultures as above
- use good handwashing practices
- initiate isolation precautions until culture results are known to be negative. Facilities may isolate all patients being screened or consider isolation during the screening period for:
  - direct transfers from hospitals where VRE is endemic;
  - high-risk patients (e.g., dialysis, oncology, intensive care patients); and
  - patients who might fecally contaminate the environment (e.g., patients with diarrhea, fecal incontinence, or in whom basic personal hygiene practices may be compromised by illness or age).

4. Isolation/Infection Control Precautions for Acute Care Facilities

4.1 Room

Place VRE-infected or colonized patients in a single room with a private bathroom. Patients with the same strain of VRE may be cohorted in the same room if necessary.

In areas with only cubicles (e.g., Emergency), every effort should be made to transfer the patient to a private treatment room as soon as possible. In the interim, drawing the curtains around the patient may serve as a reminder that isolation is in effect.

An Infection Control Precaution Sign, as per facility policy, must be placed on either the door of the room or the cubicle curtain.

4.2 Handwashing

Handwashing is the most effective method of preventing transmission of VRE.

Hands must be washed with a hospital-approved antimicrobial soap:

- before and after direct and indirect patient contact;
- after handling contaminated equipment/articles, linen, dishes or garbage;
- after touching environmental surfaces around the patient; and
- after removing gloves because hands can be contaminated via glove punctures or when removing gloves.

4.3 Gloves/Gowns

Wear gloves and a gown to enter the room of a VRE positive patient.

A change of gloves may be necessary during the course of patient care (e.g., after contact with material such as stool that may contain a high concentration of VRE).

Remove gown and gloves before leaving the patient's room and wash hands immediately with an antimicrobial soap. Ensure that after gown and glove removal, hands and clothes do not contact contaminated surfaces, (e.g., door knob, curtain) in the patient's room.

4.4 Masks

Masks are not routinely required. VRE is not airborne spread (with the possible exception of VRE pneumonia) and it does not colonize the nasopharynx of health-care workers.

Masks are required only if a patient has VRE pneumonia.

4.5 Equipment/Articles/Supplies

Dedicate the use of patient equipment to the single patient or room of the cohort of patients with VRE. This equipment (stethoscopes, blood pressure cuffs, rectal thermometers, IV poles, commodes) should remain in the room, and must be adequately cleaned and disinfected before removal from the room.

Equipment used for multiple patients (e.g., portable X-ray, EKG or pulse oximetry) must be adequately cleaned and disinfected after use with a VRE patient.

4.6 Linen

Soiled linen should be bagged within the patient's room. It should be contained in a manner that avoids transfer of organisms to personnel or the environment; if leakage through the bag may occur, use two linen bags.

4.7 Dishes

The dietary delivery tray remains outside the room. Dishes, utensils, etc., are removed from the tray and taken into the room. After use, the dishes are returned to the tray outside the room. (The hot water and detergent in the hospital dishwashers are sufficient to decontaminate dishes, glasses, cups and eating utensils).

Disposable dishes are not necessary, but a facility may choose to use them.

4.8 Waste

Used needles and syringes must be disposed directly into a sharps container in the room.

Used supplies and other garbage must be contained in a manner that prevents those handling it from becoming contaminated.

4.9 Environmental Cleaning

The room of a patient with VRE becomes heavily contaminated. Enterococci are hardy organisms that can survive well on environmental surfaces. Appropriate cleaning is essential.

Cleaning must be done with a hospital-approved disinfectant with particular attention paid to areas/items that are frequently touched, such as handrails and light cords.

When the patient is discharged or moved to another room, thorough cleaning of all surfaces in the room is required. Bed curtains and cloth or string light and call bell cords must be changed. Gowns and gloves must be worn until the terminal cleaning is completed.

4.10 Visitors

Visitors to patients on VRE precautions must be instructed regarding handwashing and the wearing of gloves and gowns.

4.11 Duration of Isolation

Optimal requirements for duration of isolation are unknown. Since VRE colonization may persist indefinitely, stringent criteria are recommended.

Isolation should be maintained for the duration of the hospitalization, or until discontinued by Infection Control, based on five consecutive negative surveillance cultures taken one to two weeks apart.

5. Management of Contacts and Outbreak Investigation

5.1 Patient Contacts

Culture all ward patient contacts from the date VRE positive patient was admitted to the date isolation was instituted.

- Rectal or ostomy swab
- Wounds, open skin lesions or draining sites (if any)
- Sites of invasive lines/devices (if any), which have been insitu more than 72 hours
- Mark requisitions "Look for VRE"

In selected high-risk areas (Dialysis, Oncology, Intensive Care Units), Infection Control may request a second rectal swab to ensure that a minimum of five days have transpired between the time of the contact's exposure and the surveillance culture.

Isolation is not necessary unless cultures are positive.

If a patient contact is VRE positive, follow-up outbreak investigation of contacts of this individual will be required in consultation with Infection Control.

If the patient contact has been discharged, the chart must be flagged, (e.g., VRE SUSPECT/CONTACT) so that surveillance cultures can be taken when/if the patient is readmitted.

If the patient contact has been transferred to another facility, notify Infection Control in that facility so that appropriate surveillance cultures may be obtained.

5.2 Staff and Environmental Cultures

Routine culturing of staff and the environment is not necessary. In outbreak situations, at the discretion of Infection Control, it may be useful to culture staff common to the positive patients and shared patient equipment that might be implicated in the transmission of VRE.

5.3 Family Contacts

Culturing of family contacts is not necessary.

6. Diagnostic Procedures, Transporting and Transfer of Patients within the Facility

Diagnostic procedures must be performed at the bedside whenever possible. All non-urgent procedures and therapy outside the patient's room must be discouraged. If off-the-ward (i.e., Physio, O.T.) treatment is deemed essential to the patient's recovery, this should be discussed with the attending physician, affected departments and Infection Control. Infection Control will recommend appropriate precautions to be followed.

If the patient must be transferred, the referring ward or clinic must notify the receiving department of the infection control precautions necessary.

Prior to transporting, the patient must have open wounds or lesions covered. Wrap the patient in a sheet if he/she has extensive skin lesions or shedding. Only the person transporting the patient must gown and glove since he/she is likely to have patient contact.

The minimum amount of equipment necessary to perform a diagnostic procedure should be used. Equipment used in the transporting or testing of the patient must be wiped with a hospital-approved disinfectant immediately after use and allowed to dry.

7. Discharge or Transfer of Patients to Another Facility

Advise the patient of the importance of informing other facilities and health-care workers of his/her VRE status.

Discuss arrangements for temporary passes, discharges or transfers with all appropriate persons.

Prior to discharge or transfer, the receiving facility, physician, health-care agencies (e.g., Home Care, VON), or other health-care departments (e.g., Physiotherapy) must be notified by a telephoned report of the patient's VRE status. Notification of community health-care agencies will serve two purposes: to reinforce that basic infection control practices, including handwashing, are sufficient to prevent client-to-client transmission of VRE; and to maintain communication links within community health services so that when community health-care workers (such as VON) refer clients to acute health-care institutions, proper identification of VRE carrier status can accompany the client.

The VRE Infection Control Communication Form (see page 9) must also be completed by the Infection Control Practitioner or other appropriate individual and sent with the patient or by fax.

VRE status alone does not warrant the need of an ambulance. Other transportation systems (e.g., stretcher, car service) may be used.

Persons transferring the patient should be advised about VRE and infection control precautions. Transportation company individuals having direct contact with the patient should gown and glove. Vehicle surfaces, the stretcher/wheelchair and any equipment in contact with the patient must be wiped with an appropriate disinfectant immediately after use.

If the patient is being discharged home in a private vehicle, disinfection of the vehicle and gloving and gowning by family members is not required. These measures are taken by health-care facilities and medical transportation companies to prevent transmission of VRE to other high-risk patients.

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VRE Infection Control
COMMUNICATION FORM

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Referring Facility _____

Receiving Facility _____

Patient Name _____

Date of Birth _____ MHSC# _____

PHIN # _____

Physician Name _____

Date VRE Identified _____ Where (Facility/Lab) _____

Infection ☐

Colonization ☐

Describe Treatment _____

_____

_____

_____

SITE(S)	DATE	POS.	NEG.	NOT DONE
RECTAL SWAB OR OSTOMY SITE	_____	☐	☐	☐
INVASIVE LINE/DEVICE SITES Specify _____	_____	☐	☐	☐
WOUND Specify Where _____	_____	☐	☐	☐
OTHER DRAINING SITES Specify Where _____	_____	☐	☐	☐

Contact follow-up completed in referring facility: ☐ Yes ☐ No

Signature _____ Date _____

Health-Care Worker Name/Position _____

VRE Working Group,
Manitoba Advisory Committee on Infectious Diseases, 1997

VANCOMYCIN-RESISTANT ENTEROCOCCI (VRE)

INFORMATION FOR PATIENTS

What is VRE?

Enterococci are common germs that live in the gut, and sometimes genital tract, of most people and do not cause any illness. When Vancomycin, a modern antibiotic, cannot kill this germ, it is said to be "resistant." VRE stands for Vancomycin-Resistant Enterococci.

How can VRE spread?

VRE can survive on surfaces like toilet seats, tables and equipment. Diarrhea, poor hygiene and inadequate cleaning are ways in which the germ can spread. Good handwashing and hygiene are the best way to prevent spreading the germ. It is important for ALL patients, ALL staff and ALL visitors to wash their hands.

What does this mean for you?

One of your test results (cultures) shows that you have VRE. It is important that special precautions are taken to stop the germ from spreading to other sick and weak patients in hospital.

What special precautions will be followed in the hospital?

- You will be asked to stay in your room.
- People caring for you will wear a gown and gloves.
- It is important for all people entering and leaving your room to wash their hands.
- A special instruction card to alert staff and visitors, and a cart with extra supplies, will be placed outside your door.
- Special arrangements will be made in co-operation with your doctor for treatments and tests during your stay in hospital.

What about your family and visitors?

You may have visitors. They will be asked to wear a gown over their clothes and to put on gloves (these are available in the cart outside your door and should be removed before the visitors leave the room). It is important that visitors wash their hands before they leave the room.

Patients with VRE do not pose a risk to their families or to other healthy people. VRE is only a problem for people who are already seriously ill and are prone to develop infections.

What can you do?

- Wash your hands well and frequently.
- If you are admitted to this or another health-care facility, please tell the doctor or nurse you had VRE.
- We understand the inconvenience caused you by this problem with VRE. Your co-operation in assisting us to keep this problem from spreading further will be most appreciated.

Thank you.