Vancomycin Resistant Enterococci (VRE)

Manitoba Health
Public Health
Communicable Disease Control Unit

Case Definition

Laboratory isolation of VRE by culture from any site, but primarily rectum, stool, blood, tissue, pleural fluid, bone or lesions. However, the presence of VRE in stool may only indicate colonization, not infection.

Reporting Requirements

- Cases are reportable by laboratory for surveillance purposes only.

Clinical Presentation/Natural History

Enterococci are part of the normal flora of the human gastrointestinal tract. These bacteria may at times, however, cause serious infections such as urinary tract and intra-abdominal infections, infective endocarditis and others. This makes the relatively recent development of enterococcal resistance to glycopeptide antibiotics, including vancomycin and teicoplanin, of great concern. 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 (e.g., bed rails, night tables, curtains, bathroom sinks, call bells, electronic thermometers and other hospital patient care equipment) for extended periods of time. This increases their potential to be spread from person-to-person. They are intrinsically resistant to many antimicrobial agents.

With the increasing resistance of enterococci to both penicillins and aminoglycosides, the addition of vancomycin resistance has severely limited therapeutic options for those persons who develop infections with these highly resistant strains. However, a new class of antimicrobials, streptogramins (specifically quinupristin/dalfopristin) is effective in infections due to vancomycin resistant *Enterococcus faecium*.

Perhaps the greatest threat of VRE is the potential transfer of vancomycin resistance to highly virulent bacteria such as methicillin resistant *Staphylococcus aureus*. 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.

Etiology

Two species account for the bulk of clinical isolates, *Enterococcus faecalis* (80-90%) and *Enterococcus faecium* (10-15%).

Epidemiology

Reservoir and Source: Humans. Reports from Europe suggest that VRE exist elsewhere in the environment including animal feces and human foods of animal origin. Antimicrobial resistance in enterococci has been more prevalent in farm animals exposed to antimicrobial drugs.

Transmission: Enterococci, including VRE, are found in the human bowel and are passed from the body through stools. They survive on a person's hands or on environmental objects such as toilet seats, door handles or furniture. Several studies have demonstrated nosocomial 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. VRE is not spread by airborne transmission. There are no data to support significant acquisition and transmission of VRE outside the health care setting.

Occurrence:

General: VRE, first reported in Europe in 1988, are emerging as a global problem. The

incidence of VRE infection and colonization among hospitalized patients has increased rapidly since 1990. From 1989, the year VRE was first identified in the United States, through 1993, the proportion of reported enterococcal isolates resistant to vancomycin increased twenty-fold. In Canada, the first outbreak of VRE was reported from Toronto in 1995.

Manitoba: The first isolate of VRE was identified in Winnipeg in February 1997. Since then a number of cases have occurred in Winnipeg acute care facilities, the majority of which have been in persons returning from hospitalization out of province. However, several persons have now acquired VRE infection nosocomially in Manitoba hospitals. Since official reporting began in 1999, 20 cases of VRE (to July 2000) have been identified.

Incubation Period: Unknown

Susceptibility and Resistance: Certain populations are at increased risk for VRE colonization and infection. Multiple factors predispose a person to infection with VRE, but colonization precedes most infections. Risk factors for colonization and 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;
- prior therapy with multiple antibiotics, including vancomycin. Vancomycin use in hospitals has increased in the past 15 years for preoperative prophylaxis, and due to increases in the incidence of methicillin resistant staphylococci, for the treatment of prosthetic device-related infections and *Clostridium difficile* colitis. Inappropriate use of the drug also occurs;
- 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.

Period of Communicability: Unknown

Diagnosis

Diagnosis is established by culture. Identification of the species of enterococci may be useful to predict antimicrobial susceptibility. Susceptibility testing of enterococci is important to determine ampicillin and vancomycin susceptibility.

Key Investigations

- No public health investigation is required.

Control

Management of Cases:

- The management of cases within acute and long-term care facilities is described in the document: *Manitoba Infection Control Guidelines for Preventing the Spread of Vancomycin-Resistant Enterococci (VRE)* (see **Additional Resources**).
- Cases occurring in home-care settings should be managed using routine infection-control practices, as described in the document *Infection Control Guidelines for Health Care Workers in the Community* (see **Additional Resources**).
- Cases occurring in community settings are generally not followed by public health.

Management of Contacts:

- A contact is a person who is exposed to a VRE case in a manner in which transmission can occur. Contacts within the community setting are generally not followed by public health, except possibly in outbreak situations.

Management of Outbreaks:

- A search for cases, the source of infection and investigation of contacts should occur in hospital outbreak situations. Search for and treat those with clinical illness, especially with diarrhea or draining lesions. Institute strict personal hygiene with emphasis on handwashing. Institute infection control precautions within institutions or in home care settings.

Preventive Measures:

- Educate the public and health care workers in personal hygiene, especially handwashing and the importance of avoiding common use of toilet articles.
- Promote awareness of the following infection control guidelines for health care facilities:
  - the judicious use of antibiotics (see for example the recommendations of the U.S. Hospital Infection Control Practices Committee (HICPAC));
  - screening of hospitalized patient populations at high risk for VRE colonization or infection;
  - effective management of VRE cases and contacts.
- In the community setting, the following measures should be taken when a person has, or lives with, someone who is colonized with VRE.

  Handwashing
  A 10 to 15 second handwash with soap and running water is the most effective method of preventing the spread of infective microorganisms. Paper towels or a clean towel must be used to dry hands and turn off faucets. Use only liquid soap or bar soap that is well drained. Liquid soap containers should be washed before refilling.

  Caregivers should wash hands before and after direct care; after removing gloves; after handling body substances, contaminated equipment, articles and surfaces, linen, garbage and dishes; and before leaving the client's home.

  Cleaning
  Regular cleaning with household disinfectants or bleach (one part bleach to nine parts water) is indicated. As the bacteria are found in stool, toilets and bathroom facilities, including faucets and doorknobs, should be cleaned regularly.

  Personal hygiene
  Persons with VRE must use proper toilet hygiene. Ample paper should be used for cleansing and good handwashing afterwards is essential. If the person is incontinent of stool, proper diapering and hygiene measures should be used.

  Laundry and waste disposal
  The bacteria are destroyed during the normal laundering process. Garbage can be disposed of in the usual fashion.

  Activities of daily living
  Persons with VRE should not be restricted from moving freely throughout their homes and communities. However, as with other illnesses, infected persons who are ill should not in general visit hospitals or personal care homes.

Additional Resources

For Health Care Professionals:

- *Manitoba Infection Control Guidelines for Preventing the Spread of Vancomycin-Resistant Enterococci (VRE).*
- *Infection Control Guidelines for Health Care Workers in the Community.*
- *Manitoba Infection Control Guidelines for Preventing the Spread of Vancomycin-Resistant Enterococci (VRE) in Acute Health-Care Facilities.*

For the Public:

- *What You Should Know About Vancomycin Resistant Enterococci (VRE).*

All resources available from Audiovisual and Publications Department, Manitoba Health, telephone (204) 786-7112, fax (204) 772-7213.