

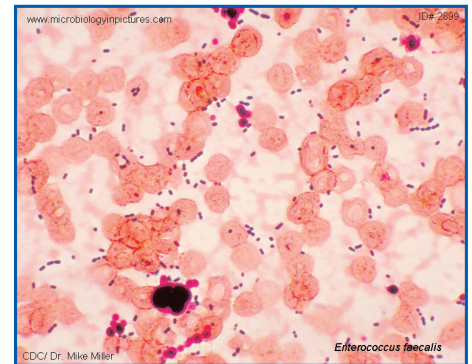
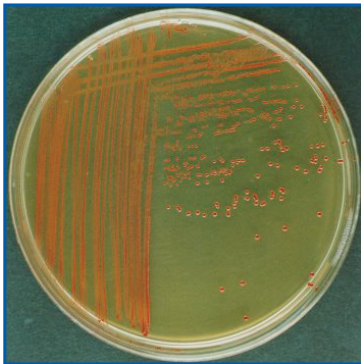
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SYNERGISING MEDICAL MICROBIOLOGY, PATIENT SAFETY AND CLINICAL PRACTICE

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The **ENTEROCOCCI** (Enterococcus - singular) are commensal bacteria that are normally present in the human intestines and in the female genital tract as well as the environment. Until 1984, scientists previously categorized these bacteria as part of the genus *Streptococcus*; but of the more than 17 species of Enterococci, only **Enterococcus faecalis** and **Enterococcus faecium** are found in humans and are responsible for 80% of all human infections.¹

They tolerate a wide variety of growth conditions, including temperatures of 10°C up to 45°C, and hypotonic, hypertonic, acidic, or alkaline environments. As **facultative organisms**, Enterococci can grow in aerobic as well as anaerobic conditions.

**KEY CONCEPTS**

Commensal – a symbiotic relationship whereby one microorganism derives food or other benefits from another organism without hurting or helping it. Commensal bacteria colonize specific body sites and may also be described as 'resident flora'.

What is the difference between colonization and infection?

Colonization is the process whereby microbes become established in body tissues with no adverse effects or host immune response. Infection results from the multiplication and local tissue invasion by the microorganism, as well as the reactive immune response to toxic agents produced by the pathogen which then cause the symptoms of disease.

Facultative microorganism – some bacteria are neither aerobic nor anaerobic and are described as being 'facultative'. For example, a 'facultative anaerobe' prefers anaerobic conditions (where oxygen is absent) but is able to survive in aerobic conditions if necessary.

Virulence - derived from the Latin word '*virulentus*', meaning 'full of poison'. It describes the degree or extent of pathogenicity of a microorganism – that is, its ability to cause disease or infection. The production of destructive endo and/or exotoxins may cause localised or even severe systemic reactions, sepsis, organ failure and death.

RISK FACTORS FOR INFECTION

Enterococcal infections usually occur in the urinary tract, bloodstream or in wounds – especially hospitalized patients and neonates with urinary and vascular catheters. Individuals who have underlying health conditions are also at a higher risk of developing infection, including life-threatening infections such as meningitis and endocarditis.

The mode of transmission is via direct and indirect contact routes only (i.e. contaminated hands, equipment and environmental surfaces.) Persons infected or colonized with *Enterococcus faecalis* or *E. faecium* are more likely to transmit the organism - transmission depends primarily on which body site(s) harbour the bacteria, whether body fluids are implicated and how frequently health care providers touch these body sites.



DEFINITIONS

β -lactam antibiotic – a class of antibiotics containing a beta-lactam ‘ring’ in their molecular structure which inhibits bacterial cell wall synthesis. β -lactam antibiotics include penicillins, cephalosporins and carbapenems.

Extended spectrum beta lactamase (ESBL) – enzymes produced by bacteria which confer resistance to beta-lactam antibiotics. The lactamase enzyme hydrolyses the beta-lactam ring, inactivating the antibiotic.

ANTIBIOTIC RESISTANCE: VANCOMYCIN-RESISTANT ENTEROCOCCI (VRE)

Enterococci are intrinsically resistant to many antibiotics. Resistance is based in chromosomal genes, and the production of *extended spectrum beta lactamase enzymes* (ESBLs) which ‘neutralize’ antibiotics which contain penicillin (e.g. ampicillin, piperacillin and the cephalosporins). This means that these antimicrobials should not be used to treat infections caused by *Enterococcus* species.

Treatment with the cephalosporin group of antibiotics is clinically inappropriate, and the synergistic use of penicillin with an aminoglycoside (e.g. gentamycin) is recommended for severe infections. Resistance to vancomycin is of global concern, and suitable antibiotics are often not available to treat serious Vancomycin-resistant enterococcal (VRE) infections. *It is recommended that a clinical microbiologist be consulted regarding the options for antimicrobial therapy.*



FAST FACT

Vancomycin – this antibiotic was first sold in 1954 and is made by the soil bacterium *Amiclotopsis orientalis*. Vancomycin is considered the last resort for treating serious, life-threatening infections by gram-positive bacteria unresponsive to other antibiotics.

The emergence of vancomycin-resistant enterococci (VRE) has resulted in the development of guidelines for the use of Vancomycin by the U.S. Centers for Disease Control (CDC) Hospital Infection Control Practices Advisory Committee and the South African Antimicrobial Stewardship Programme.²

INFECTION PREVENTION AND CONTROL MEASURES

Enterococci are most commonly transmitted due to poor hygiene - therefore infected or colonized patients may be cared for in any patient care setting with minimal risk of transmission to other patients provided appropriate infection control measures are taken.

PERSONS AT RISK OF DEVELOPING VANCOMYCIN-RESISTANT ENTEROCOCCAL INFECTION (VRE)

- Hospitalized patients who have received prolonged treatment with the antibiotic vancomycin or other antibiotics
- People with weakened immune systems such as patients in intensive care units, premature neonates or those in oncology or transplant units
- Patients who have undergone surgical procedures such as abdominal or thoracic surgery
- Patients with invasive medical devices such as urinary and intravenous catheters
- Individuals who are colonized with vancomycin-resistant *Enterococcus* (VRE)



Scrupulous hand hygiene and the use of standard precautions – either handwashing with soap and water or through the frequent use of alcohol-based hand rub, before and after every patient contact.

- Handwashing with soap and water is indicated when hands are visibly soiled, after contact with blood or other body fluids, after the removal of gloves and using the toilet.
- Wet hands should be dried thoroughly with paper towelling.
- Any contact with intravenous lines and catheters should be preceded by hand hygiene and aseptic technique used for all procedures.
- Appropriate personal protective equipment (PPE) such as plastic disposable aprons and gloves should be worn for all contact with faeces, faecal and wound fluids.
- Treat all used linen as contaminated, never carry used linen against the body and keep linen receptacles as near as possible to the work area.
- Bedpans should NOT be soaked but washed either with a detergent based sodium hypochlorite disinfectant or ideally, in a bedpan washer at 85°C and stored in an inverted position to drain.
- Patient visitors and contractors should also be required to practice hand hygiene upon entering and leaving patient care areas.
- Ensure patients wash their hands after using the toilet and before eating or drinking.
- Avoid the shared use of personal hygiene items, such as soaps, washcloths, towels, and razors.
- Deter staff, patients and visitors from sitting on the beds of other patients.

Environmental cleaning: *Enterococci can remain viable on surfaces despite routine cleaning methods.*

- All patient care surfaces should be damp-dusted at least daily with a detergent-based sodium hypochlorite disinfectant (e.g. Biocide-D®, Sintol®). Cleaning cloths and bucket systems should be colour-coded to denote the different clinical areas.
- Careful attention should be paid to the routine cleaning of **frequently touched surfaces** such as wheelchairs, cot sides, tray tables, door handles, light switches, telephones and remote controls, bathroom basins, toilet seats, flush handles and shower cubicles.
- The use of supervisor checklists for terminal cleaning (i.e. after the patient has been discharged, transferred etc.) is recommended.
- Correct procedures for the containment and cleaning up of body fluid spills must be adhered to.
- There should be schedules for the regular cleaning of sluice rooms, linen receptacles as well as the lids and external surfaces of waste bins to prevent cross infection.
- Areas where people congregate such as waiting rooms, restaurants, public toilets and restrooms should be cleaned thoroughly and regularly.

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YOUR COMMENTS OR SUGGESTIONS FOR FUTURE TOPICS?

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1. The U.S. Centers for Disease Control and Prevention (CDC). VRE in Healthcare Settings. <https://www.cdc.gov/HAI/organisms/vre/vre.html> [Accessed 19.6.2018] 2. The S.A. Antibiotic Stewardship Programme (SAASP) 2015. A Pocket Guide to Antibiotic Prescribing for Adults in South Africa. <https://www.fidssa.co.za/SAASP/Publications> [Accessed 19.6.2018]