INTERNATIONAL SOCIETY FOR INFECTIOUS DISEASES

GUIDE TO INFECTION CONTROL IN THE HOSPITAL

CHAPTER 44

Enterococcal Species

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Cover heading - Topic Outline

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KEY ISSUE

Enterococci are important nosocomial pathogens because:

- They are normal flora in the human gastrointestinal tract.
- Antimicrobial resistance allows for their survival in an environment with heavy antimicrobial usage.
- They contaminate the hospital environment and survive for prolonged periods of time.

Contamination of the hands of healthcare workers coupled with poor handwashing compliance provides the potential for spread in the hospital.

KNOWN FACTS

- Enterococci are common hospital-acquired pathogens, accounting for 7.4% of all healthcare-associated infections.
- The organism is of relatively low virulence but may be difficult to treat in the compromised host, particularly when multidrug-resistant.
- Resistance to nearly every known antibiotic has been described for various strains of enterococci.
- The *vanA* gene, which confers high-level vancomycin resistance in enterococci, has been detected in *Staphylococcus aureus* strains in a small number of patients in the United States.
- Vancomycin resistance due to *vanC* is intrinsic and found in *Enterococcus casseliflavus* and *E. gallinarum*. *vanC* organisms do not appear to be epidemiologically important, and isolation of patients harboring these organisms is not necessary.
- In 2014, 44% of all enterococcal isolates in the United States involved in healthcare-associated central line-associated bloodstream infections (CLABSIs) were resistant to vancomycin. However, the two most common species display marked variability in vancomycin susceptibility, with 82.2% of *E. faecium* and 9.8% of *E. faecalis* isolates being reported as resistant to vancomycin.

- Risk factors for acquisition of vancomycin-resistant enterococci (VRE) include prior use of antimicrobial agents (vancomycin, third generation cephalosporins, antianaerobic drugs), length of hospital stay, enteral feedings, intra-abdominal surgery, presence of a decubitus ulcer, high colonization pressure, and severity of illness.
- Patient populations at highest risk for VRE colonization and infection include dialysis patients, organ transplant patients, patients with hematologic malignancies, and bone marrow transplant patients. Studies have found that approximately 30% of patients following liver transplantation are colonized with VRE, of whom over 25% develop infection. Up to 40% of allogeneic hematopoietic stem cell transplant patients are colonized, of whom over 33% develop VRE bloodstream infections in the early period post-transplant.
- Treatment with antianaerobic drugs has been shown to promote high density colonization.
- Colonization of the gastrointestinal tract (GI) tract with VRE is typically of long duration, in some cases persisting for years.
- Rectal swab cultures for VRE have suboptimal sensitivity.
- Colonization of healthy healthcare workers in the United States is unusual.
- Risk factors for VRE bacteremia include neutropenia, gastrointestinal colonization, and hematologic malignancy.
- VRE colonization is highly prevalent in some long-term care facilities, which serve as reservoirs of resistant organisms for importation into acute care facilities. However, morbidity due to VRE in the nursing home population is low.

SUGGESTED PRACTICE

- Treatment of VRE infections is problematic. Therapy should include drainage of localized infections, when possible. Daptomycin, a cyclic lipopeptide, is bactericidal against VRE. Quinupristin/dalfopristin may be

clinically useful for the treatment of infections due to *E. faecium* but is inactive against *E. faecalis*. Linezolid has good activity against VRE and an advantage is its 100% oral bioavailability, allowing for oral therapy. Quinupristin/dalfopristin, linezolid, and tigecycline are bacteriostatic against enterococci. Resistance has been detected for all three of these agents.

- A few reports have described attempts to decolonize the GI tract of VRE but results have been suboptimal. Ramoplanin has been shown to suppress carriage of VRE, but following discontinuation of the drug, the organism can again be detected in the stool.
- Infection control controversies include the effectiveness of active surveillance cultures and subsequent isolation of colonized patients to control nosocomial transmission, whether drugs that suppress GI colonization result in decreased nosocomial transmission and whether vancomycin restriction leads to decreased rates of VRE infection and colonization. Use of contact precautions (gloves and gowns) continues to be recommended by major organizations. However, there is some evidence (from resource-rich environments) indicating that this may not be universally necessary. This remains an area of controversy.

SUGGESTED PRACTICE IN UNDER-RESOURCED SETTINGS

- In resource-limited settings compliance with guidelines can be inconsistent; low nurse-to-patient staffing ratios, insufficient infection prevention training of healthcare workers, poor access to medical supplies, and hospital overcrowding can all contribute.
- Infection prevention training for healthcare workers is critical; strict compliance with hand washing should be emphasized as outlined above. [1-6]
- Limiting unnecessary antimicrobial exposure should be emphasized, especially to drugs that can promote the development of VRE.
- More data on the burden of enterococcal infections in low- and middle-income countries are needed.

SUMMARY

- Enterococci are ubiquitous Gram-positive cocci that are part of the normal flora of humans and other animals. Infections caused by enterococci include urinary tract infections, abdominal-pelvic infections, wound (especially decubitus ulcers and diabetic foot) infections, and endocarditis.
- Strains of enterococci have acquired resistance to virtually all available antimicrobial agents. In general, antimicrobial resistance has been more problematic for *E. faecium* than *E. faecalis*.
- The prevalence of vancomycin resistance among the enterococci has reached high levels. In 1989, less than 0.5% of enterococcal isolates from ICU and non-ICU settings were vancomycin resistant. Currently, 44% of all enterococcal isolates involved in healthcare-associated CLABSIs in the United States are vancomycin resistant. However, when stratified by species, *E. faecium* isolates demonstrate a markedly higher proportion of vancomycin resistance than *E. faecalis* isolate

- Numerous case-control studies have evaluated risk factors for the development of colonization and/or infection with VRE. A variety of antimicrobial agents have been implicated and include vancomycin, ceftazidime, aminoglycosides, ciprofloxacin, aztreonam, and antianaerobic drugs. Other risk factors have included severity of illness, length of hospital stay, hematologic malignancy or bone marrow transplantation, and mucositis. Colonization of the GI tract has been shown to be a risk factor for the development of VRE bacteremia. Environmental contamination with VRE is common, especially when the patient has diarrhea.
- To control VRE in the hospital setting, we recommend placing colonized/infected patients in a private room. Gloves and gowns should be worn on entering the patient's room, and strict attention paid to hand hygiene.[6] In addition, there should be no sharing of noncritical items (i.e., BP cuffs, stethoscopes, etc., should remain in the patient's room). Housekeeping staff should wipe down all horizontal surfaces in VRE patient rooms daily.
- In addition to infection control measures, controlling VRE requires prudent use of antibiotics. Vancomycin should be avoided for routine surgical prophylaxis unless high rates of methicillin-resistant *Streptococcus aureus* (MRSA) exist or the patient is known to be MRSA colonized. Vancomycin should also be avoided for the treatment of a single positive blood culture growing coagulase-negative staphylococci if contamination is likely. Vancomycin should not be used for selective gut decontamination or for routine prophylaxis of low birth weight infants, continuous ambulatory peritoneal dialysis patients, or intravascular catheters.

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