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Vancomycin-resistant enterococci surveillance of intensive care patients: incidence and outcome of colonisation

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Abstract. ***Background*:** Vancomycin-resistant enterococci (VRE) colonisation serves as a reservoir and increases the risk of developing an infection with VRE. Treatment difficulties and infection control measures associated with vancomycin-resistant enterococci present significant costs to health care facilities. To determine the incidence of VRE colonisation in ICU, data collected included hospital and ICU admission, discharge dates, positive and negative VRE swabs for each hospital or ICU admission.

***Methods*:** This study was performed to identify the number of VRE colonisations occurring in the Intensive Care Unit (ICU) and the outcome of these colonised patients. The clinical records of 99 VRE patients identified as having been to ICU during 2009 and 2010 were reviewed.

***Results*:** These patients had a total of 111 ICU admissions. Of these, 30 were classified as definite or probable ICU-acquired VRE colonisations. This equated to 30.1 acquisitions per 10 000 occupied bed days. Thirty-eight patients acquired their VRE from clinical areas other than ICU. In 24 other patients the place of VRE could not be ascertained. In another 19 patients VRE was present when they were admitted from the community but 15 of these (79%) had been hospitalised within the last year. Of the 30 ICU-colonised patients, none developed infections. However, three patients initially colonised in another clinical area developed an infection with VRE while in ICU.

***Conclusion*:** Our study supports the findings of others that most people at risk of VRE colonisation or infection are severely unwell. The high level of colonisation occurring in other clinical areas added to the healthcare expenses in ICU. The increased costs associated with VRE and our findings indicate a greater need to better control VRE transmission not only in the ICU, but in all health care settings.

Additional keywords: healthcare-acquired infection, ICU infections, infection control, surveillance, vancomycin-resistant enterococci (VRE).

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Introduction

Multi-resistant organisms (MROs) are an increasing concern for health care facilities.[1] Vancomycin-resistant enterococci (VRE) are important MROs, with infections first identified in France and the United Kingdom in 1986.[1] The genus *Enterococcus* consists of around a dozen species of Gram-positive cocci.[2] *Enterococcus faecalis* and *Enterococcus faecium* are the main species of concern to human health.[3] These cocci are natural inhabitants of the gastrointestinal tract and are therefore opportunistic pathogens, causing illness

Implications

- Perhaps surveillance of basic infection control methods could indicate whether improvement needs to come within existing measures or whether implementation of new methods, such as chlorhexidine washes, need to be considered.
- The establishment of a national healthcare-associated infection reporting system for Australia would be of great benefit to assessing the situation more accurately and proposing cost-effective control methods.

mainly in the severely unwell.[4] Vancomycin-resistant enterococci are usually resistant to most antibiotics including all betalactams. VRE also contain the genes vanA and/or vanB, giving *E. faecalis* and *E. faecium* additional resistance to vancomycin.[2] Natural and acquired drug resistance, together with long-lived viability on surfaces, have enabled these organisms to prosper in the hospital environment.[2] Some strains of VRE emerged due to glycopeptide use in animal feeds and increased because of the use of a vancomycin-like antibiotic (another glycopeptide called avoparcin).[5] VanA is the most common form of VRE, which is acquired via foods and is more associated with VRE vanA isolates and their emergence in Europe and Australia.[2] Elsewhere, when VRE isolates do not appear to be food-chain related, vanB are most common.[2] In Australia, Van B phenotypes now predominate, with 80% of isolates currently being Van B.[6]

There are several risk factors associated with VRE colonisation and infection. These include long hospitalisation, increased antibiotic exposure, renal failure and neutropenia, liver transplantation, elevated Acute Physiology and Chronic Health Evaluation (APACHE II) scores, severe illness and close proximity to colonised or infected patients.[2,3] Of these, increased antibiotic exposure has been noted as one of the most important risk factors.[7] In particular, the use of broad-spectrum antibiotics, such as those targeting anaerobic bacteria, provides the selective pressure by which resistant organisms such as VRE can prosper.[4] Cephalosporins and oral vancomycin have also been implicated in higher risk of VRE acquisition and infection.[3]

Transmission of VRE most commonly occurs via contaminated hands of healthcare workers. In addition, VRE can remain on contaminated medical equipment or disposable gowns for up to several weeks and, therefore, are also modes of transmission in the hospital environment.[2] There are several methods used to control VRE spread. These include education of healthcare staff, infection control measures such as gloves, hand hygiene and patient isolation, judicious use of antibiotics, particularly those mentioned as risk factors, and regular surveillance.[2,3] In addition, recent research supports the finding that chlorhexidine body washes effectively reduce the spread and burden of VRE in hospitals.[8] It is essential that hospitals implement such measures before VRE becomes endemic because subsequent infection control becomes very difficult.[3]

Vancomycin-resistant enterococci colonisation serves as a reservoir and increases the risk of developing an infection with VRE. Most vancomycin-resistant enterococci-positive patients are colonised rather than infected.[2] Perianal swabs detect mainly colonised patients and while those with infections usually have VRE isolated from infected areas including intra-abdominal sites, the urinary tract, the bloodstream, wounds, and intravascular catheters.[4] This results in increased health care costs. An additional concern is the risk of gene transfer of vancomycin resistance (vanA or vanB) to more virulent bacteria such as *Staphylococcus aureus*. In 2009, The Canberra Hospital experienced a large increase in the number of patients identified as colonised or infected with VRE. This number increased from 48 in 2008 to 147 in 2009.

The primary aim of this study was to identify the incidence of VRE colonisation in ICU. The secondary objective was to identify the outcome of those ICU colonised patients. If the number of patients identified with VRE was increasing within the ICU then consideration could be given to implementing an intervention such as chlorhexidine baths for patients within the unit.

Methods

Setting

The Canberra Hospital is a 677-bed teaching hospital of the Australian National University and serves as the tertiary referral hospital for the Australian Capital Territory (ACT) and the surrounding region with a population of 600 000. The ICU is a 22 adult mixed medical and surgical unit. No organ transplants are performed at this hospital. To help control the spread of VRE, The Canberra Hospital Infection Control policy is based on the CDC guidelines (placing patients in contact precautions).

A retrospective observational study was performed on 99 patients identified positive for VRE on ICU admission or during their ICU stay, for two calendar years (2009–10). Ethics approval was obtained for this study through the ACT Health Human Research Ethics Committee.

Surveillance

Perianal surveillance swabs were performed on Intensive Care patients on admission to ICU, then twice a week while in ICU and then on discharge from ICU.

Data collected

To determine the incidence of VRE colonisation in ICU, data collected included hospital and ICU admission, discharge dates, and positive and negative VRE swabs for each hospital or ICU admission. To determine the outcome of colonisation, pathology data was collected for those patients with positive VRE specimens in areas in addition to the surveillance swab.