

# Vancomycin Resistant Enterococci (VRE) in Victorian Health Facilities

Report of the VRE sub committee;  
a sub committee of the Victorian Advisory  
Committee on Infection Control (VACIC)

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## Preface

Recently a number of metropolitan hospitals raised with VACIC their concerns about an increasing incidence of VRE in their institutions. Specific data were presented at a VACIC meeting and included a number of isolates which were a combination of both clinical and screening isolates. Interpretation of this data was confounded by variables in screening practices, infection control policies, cleaning procedures, and antibiotic use within individual hospitals.

The major questions raised by VACIC were: 'What is the size of the problem?' and 'What should be done about it?' The VACIC discussion resulted in the recommendation for the formation of a VRE sub committee with terms of reference as outlined below.

## The VRE sub committee

### Terms of reference

1. Review literature that has reported on trends in resistance of *Enterococci* to vancomycin, incidence and management of VRE in Victoria and elsewhere
2. Examine current sources of data, within Victoria, that can or could provide data about trends in resistance and the incidence of VRE infection and colonisation from both clinical and screening isolates
3. Review current guidelines relevant to the management of VRE in Victoria
4. Report to the Victorian Advisory Committee on Infection control and make recommendations

### Membership

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Professor Lindsay Grayson	Head of Infectious Diseases, Austin Health, Melbourne
Dr Leon Worth	Infectious Diseases Physician, VICNISS coordinating Centre and The Peter MacCallum Hospital, Melbourne
Associate Professor Mary Jo Waters	Microbiologist, St Vincent's Hospital, Melbourne
Dr Lorraine Wilson	Senior Program Advisor, Statewide Quality Branch, Department of Human Services, Melbourne
Ms Wendy Bacalja	Clinical Nurse Consultant Infection Control, LaTrobe Regional Hospital
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# Executive Summary

Following extensive investigations the VRE sub committee has concluded the following:

The sub committee's VRE survey results from Type 1 hospitals indicate a substantial increase (roughly a doubling) in the percentage of VRE screening swabs taken that were positive for VRE colonisation; from approximately 2.6% - 3.5% in 2005 and 2006, to 6.6% - 7.5% in 2007 and 2008. This is matched by a substantial increase in the number of VRE infections during the past two years, including an increase in VRE bacteraemia. In Type 1 hospitals, VRE bacteraemia increased from 10-15 in 2005/2006 to 39 in 2007 and 29 for the first 6 months of 2008 (projected to be >50 in 2008).

The survey also found that approaches to the screening and management of patients who are colonised and/or infected with vancomycin resistant enterococcus (VRE) vary enormously in Victorian hospitals; no consistent approach was identified. Most, but not all, Type 1 hospitals regularly screen high risk patients for VRE colonisation (61% indicated that they had a VRE screening protocol).

The quality of hospital cleaning appears to be linked to the risk of acquiring VRE for hospital patient populations. Guidelines for the management of waste generated in caring for patients who are VRE positive are ill-defined and waste management practices are inconsistent.

The current Victorian guidelines for the management of VRE in Victoria (1998) are outdated and not considered clinically helpful. The sub committee recommends that consideration be given to the development of "Consensus VRE Management Guidelines for Victoria". Such VRE consensus guidelines could be arrived at using an approach similar to that used in the development of the Victorian CJD Guidelines. The VRE consensus guidelines should address the following aspects:

- Screening protocols and methods
- Infection control management protocols for patients colonised with VRE
- Special cleaning protocols
- Waste management protocols
- A standard reporting and data collection mechanism for patients with VRE infections, especially VRE bacteraemia
- Practical management guidelines and protocols for patients colonised with VRE who require long-term care

In some situations there is a need to be able to type VRE to determine the epidemiology of clusters of isolates within an institution to ascertain whether there is significant cross transmission or whether the isolates are all polyclonal. Such knowledge in these situations may well inform Infection Control Practices.

# Review of literature

## Introduction

Vancomycin Resistant Enterococci (VRE) was first found in the USA in the 1980s. Clinical infection with VRE was first report in England and France in 1986 (Ferguson 1999). It has since been isolated in Europe, Britain, Japan and many other countries including Australia. The first Australian isolate occurred in a Melbourne hospital in 1994 (Kamarulzaman et al 1995). VRE have now been identified in all states in Australia and reports of outbreaks have been described in Western Australia, South Australia and Victoria.

## Impact of VRE acquisition

In general VRE are much less virulent than *Staphylococcus aureus*, rarely causing disease except in people who are already ill. There is low likelihood of VRE causing significant disease in healthy populations (National Institute of Allergy and Infectious Diseases 2007). However the situation is still concerning; in the US the Centres for Disease Control and Prevention (CDC) identified enterococci as the cause of around one out of every eight infections in hospital intensive care units and that around 30% of these were VRE (National Nosocomial Infections Surveillance System 2004). VRE can complicate and prolong patients' hospital stays and in some cases, cause fatal disease, especially in the immunocompromised (Siegel et al 2006, Patel 2003).

Costs associated with the management of VRE positive patients, whether colonised or infected, can be high if isolation rooms, gowns and gloves, screening of contacts, specialised cleaning regimes and the impact on staff, bed flow and other resources are considered. Yet there is little published data that explores expected verses real risk for patients colonised with VRE, including the risk of acquiring VRE infection.

## Risks for VRE colonisation and infection

VRE acquisition is usually health care-associated. Inter-patient transmissions, transmission related to health care workers, or environmental contamination have all been shown to contribute to acquisition. The reservoirs for VRE are colonized and infected patients; however as routine facility wide screening for VRE is not recommended, many colonised patients are not identified. Patients at risk for VRE acquisition include those on antibiotics for long periods; patients with compromised immune systems, those who have undergone abdominal or chest surgery; and those with urinary catheters or central intravenous lines (CDC 2005).

VRE acquisition within health care institutions most commonly occurs through contact with a contaminated environment or contact directly or indirectly with a person who is infected or colonised with this organism. Transient health care worker hand carriage with VRE can result from contact with infected or colonised patients or from contact with contaminated shared equipment or the environment (Martinez and Ruthazer et al 2003, Goodman et al 2008).

There is good evidence suggesting that health care workers can carry VRE on their hands from one patient to another (Siegel and Rhinehart et al 2006). Such transmission is more likely to occur when health care workers are not compliant with recommended hand hygiene practice. Zachary and Bayne et al (2001) found that during the care of patients with VRE, contamination of gloves, gowns, or stethoscopes occurred two-thirds of the time. More recently Synder et al (2008) found gowns and gloves frequently become contaminated with MRSA and VRE during routine care of patients in intensive care units (ICUs). Contamination of the environment and equipment can occur from patients colonized or infected with resistant organisms (Bonten and Hayden et a. 1996, Boyce and Potter-Bynoe et al 1997, Salgado and Farr 2007).

## International trends in enterococcal resistance

Several centres and networks operate around the world to collect and report on trends of resistance for major disease-causing organisms. However, Australia is yet to implement a comprehensive nation wide surveillance program. The Expert Advisory Group on Antimicrobial Resistance (EAGAR), under the auspices of the NHMRC, prepared a report outlining the framework for a national surveillance program for

antimicrobial resistance in Australia in 2006. The report has not been released by the NHMRC and has yet to progress through the Australian Commission on Safety and Quality in Health care (ACSQH).

The European Antimicrobial Resistance Surveillance System (EARSS) is a network of European national surveillance systems, including the United Kingdom which performs continuous surveillance of antimicrobial susceptibility for several major bacterial pathogens that can cause invasive infections, including *Enterococcus faecalis* and *Enterococcus faecium*.

The EARSS Annual Report 2005 reported on the period of data collection from January 1999 through to December 2005. By December 2005, over 900 microbiological laboratories serving some 1400 hospitals from 32 countries had provided susceptibility data on almost 400,000 invasive isolates. An interactive website is available at [www.rivm.nl/earss](http://www.rivm.nl/earss), where up-to-date details can be found on country-specific resistance levels for important groups of antibiotics.

The 2005 report stated that the majority of clinical enterococcal infections in humans are caused by *Enterococcus faecalis* (around 80% of clinical isolates) and *Enterococcus faecium* in most of the remainder. Epidemiological data collected over the last two decades documented the emergence of enterococci, and in particular *E. faecium*, as important nosocomial pathogens. The emergence of *E. faecalis* and *E. faecium* was paralleled by an increase in glycopeptide and high-level aminoglycoside resistance. The report highlights that infections with these resistant enterococci are difficult to treat and dissemination can occur easily in the hospital setting.

The report concluded that outbreaks of vancomycin resistant *E. faecium* continue to afflict an increasing number of hospitals in various countries across Europe and that the spread of these hospital adapted strains occurs on a background of high level aminoglycoside resistance; "The control of glycopeptide resistant Enterococci remains a formidable task for hospital infection control practitioners and it is not difficult to predict that these problematic pathogens will continue to remain a challenge" (EARSS 2006).

In the United States the latest report from CDC on comparative health care associated infection rates was published in the June 2007 issue of *American Journal of Infection Control*. However antimicrobial use and resistance are not reported on and the reader is referred to an earlier (2004) report. The National Nosocomial Infections Surveillance (NNIS) System Report (2004) reported a 12% increase in resistance to vancomycin in enterococci when comparing data accumulated between 1998 and 2002 to data collected for the year 2003 (NNIS 2004).

To determine the prevalence of VRE colonisation, and associated risk factors at their São Paulo Hospital, Furtardo et al (2005) took rectal screening swabs from patients in two intensive-care units (one medical and the other both medical and surgical) over a two-year period. The authors reported that thirty-three percent of the 147 patients evaluated were colonised with VRE. The only significant variable in the logistic regression was the length of stay in the ICU (Furtardo et al 2005).

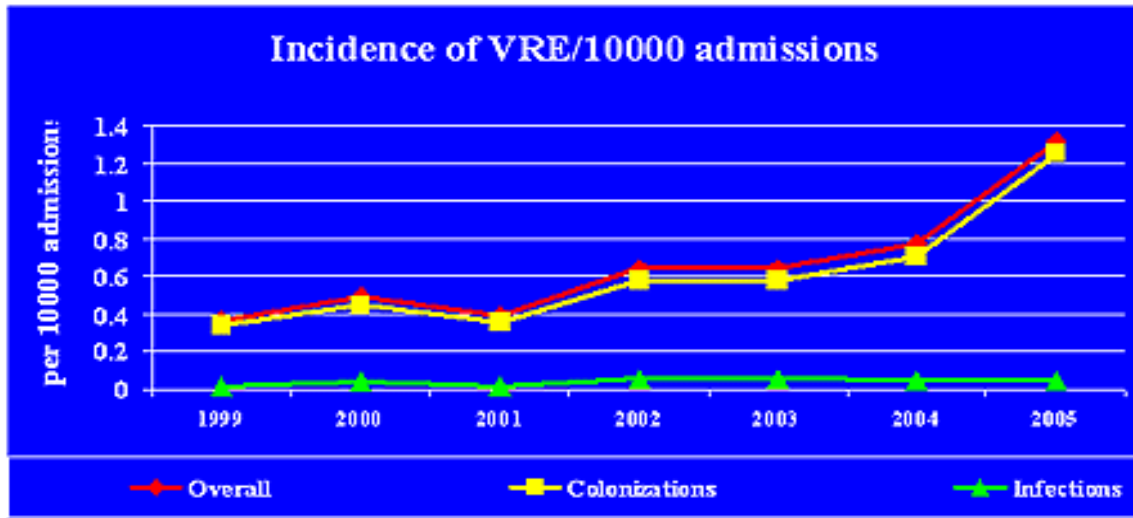
Olivier et al (2008) looked at the risk of acquiring a VRE blood stream infection (BSI) among patients colonised with VRE. The authors found that amongst their study population of 768 patients colonised with VRE, 31 (or 4%) developed VRE BSI. They reported independent risk factors for BSI among colonised patients as; being admitted from a long term care facility, infection of an additional body site, and exposure to vancomycin. Independent risk factors for death among VRE colonised patients were reported to be immunosuppression and VRE BSI.

Canada undertakes VRE surveillance and makes a distinction between infection and colonisation when reporting data. In response to anecdotal evidence of an increase in the incidence of VRE across their health care facilities the Canadian Nosocomial Infection Surveillance Program (CNISP) undertook a point prevalence study in 1996 (Ofner-Agostini et al 1997). This initial investigation found a VRE infection rate of 0.1% among high risk patients in hospitals where VRE is not endemic but a rate of 3.7% among high risk patients in hospitals where VRE is endemic, and was the impetus for establishing ongoing monitoring of VRE (Conly et al 2001).

Since that time CNISP has progressed to a comprehensive VRE data collection, analysis and reporting system requiring all new VRE infections and colonisations to be reported centrally. Figure 1 gives the results from their most recently published data, data collected between 1999 and 2005, which found that

although the number of VRE colonisations being reported had risen enormously in recent years, the rate of VRE infection has remained low (Ofner-Agostini et al 2008).

Figure 1: Results from the Canadian Nosocomial Infection Surveillance Program (CNISP) 1999-2005



## Incidence and prevalence of VRE in Australia

Reports on the incidence of VRE often do not make a distinction between VRE infection and VRE colonisation. Without such a distinction the incidence of VRE can often be seen to increase alarmingly when screening protocols are commenced for contacts of VRE positive patients, or during an outbreak.

In Australia a group of clinicians and scientists from 31 major microbiology laboratories across all states tests and gathers information on the level of antibiotic resistance in bacteria causing important and life threatening infections. The Australian Group on Antimicrobial Resistance (AGAR) formed in 1985 and collects ongoing data using standardised methodology.

The group reported on the prevalence of antimicrobial resistance in enterococci. Christiansen et al (2007) analysed data from 22 sites around Australia which collected 100 consecutive enterococci isolates and tested them for susceptibility to a range of antimicrobials, including vancomycin. Results were compared with similar surveys conducted by the group in 1995, 1999 and 2003. Vancomycin resistance was found to be uncommon in *E. faecalis*. However trend data for *E. faecium* showed a marked increase in vancomycin resistance from 1995 when VRE was not detected, to 7.2% of isolates found to be resistant in 2005. Data from the 2007 study are currently being analysed.

In Victoria the Public Health Laboratory at the University of Melbourne supports the activities of the Victorian Hospital Pathogen Surveillance Scheme (VHPSS). For the first half of 2007 24 Victorian laboratories associated with 97 Victorian hospitals submitted microbiology data. An unpublished summary of reports of bloodstream infections and meningitis to VHPSS for the first half of 2007 includes the prevalence of vancomycin resistance among enterococci isolates. Whilst the mean from accumulated data (2002 – 2006) shows vancomycin resistance in 15% of enterococci isolates, the six months from January to June 2007 demonstrates a marked increase with vancomycin resistance found in 30% of enterococci isolates.

In Australia VRE is only notifiable in Tasmania. It is reportable (but not a notifiable disease) in South Australia. In Western Australia MRSA infection is a notifiable disease, but not MRSA colonisation nor VRE. Richards and Russo (2007) reported that three states in Australia, undertaking surveillance of hospital-acquired infections, include surveillance of VRE; New South Wales, Queensland and South Australia. Regarding species and type, *E. faecium* vanB is the organism most frequently seen in Australia (Christiansen et al 2007, Burrell et al 2005)

## Review of guidelines for management of VRE in health facilities

There are a number of current guidelines that relate to the management of VRE in Victorian health facilities; the most pertinent being the Department's 'Guidelines for the Management of Patients with VRE' (1998). The following is a brief summary of relevant guidelines for the management of VRE in Victorian health facilities;

Victorian Government Department of Human Services (1998) *Guidelines for the Management of Patients with VRE*.

These guidelines are very specific for VRE management however it is now a decade since publication and the guidelines therefore require a complete review.

- Provides guidance for acute care, rehabilitation and long term care facilities including palliative care, nursing homes, hostels, psychiatric facilities, hospices, hospital in the home, home services by Royal District Nursing Service and other settings.
- Provides information on colonisation and infection, epidemiology and standard and additional precautions.
- Separate guidance for management in acute care, rehabilitation and long term care facilities.
- Covers issues such as linen and waste management, patient placement, hand hygiene requirements, personal protective equipment (PPE) non critical patient care equipment, movement of patients, discontinuation of isolation and patient transfer.

Victorian Government Department of Human Services (2006) *Infection Prevention in the Satellite Haemodialysis Setting*.

These guidelines are specific only to the satellite haemodialysis setting and are therefore not transferable to other health care settings. They provide minimal information, often non specific and referring the reader to local policy.

- Provides guidance on screening, surveillance (although does not specify how this should be undertaken), patient admission and transfer.
- Provides non specific advice on cleaning of patient equipment and the environment, referring the reader to local policy.

CDC (2006) *Management of Multi-Drug Resistant Organisms (MDROs) in Health Care Settings*

These guidelines make, wherever possible, evidence based recommendations in relation to the management of all MDROs including VRE and should be used to help inform a review of the Department's 1998 guidelines.

- Provides recommendations on; administrative issues, education and training of health care workers, antimicrobial use, surveillance, use of contact and/additional precautions in various settings, patient placement and environmental measures such as cleaning.

Department of Health and Ageing (2004) *Guidelines for the Prevention of Transmission of Infection in the Health Care Setting*.

[Pages 30 - 1 thru 30 - 9 (Part 4, Managing infectious diseases in the health care setting)

Pages 15 - 1 thru 15 - 4 (Part 3 Effective work practices and procedures)].

These national guidelines are currently under review. The current (2004) version is very non specific in relation to VRE management, for example it states that 'additional precautions are recommended for all patients colonised or infected with VRE'.

- The guidelines identify; high risk groups of patients, modes of transmission, and risk of acquisition.
- In terms of patient management the guidelines refer to additional precautions.
- In terms of instruments and the environment the guidelines refer to disinfection with hospital grade disinfectants.
- Waste management issues are covered but not specifically for VRE.

In summary the only VRE specific guidelines currently available for use in all health care facilities are the Department's 1998 guidelines for the management of patients with VRE. This document is now almost a decade old and requires complete review as much has changed since its publication including the epidemiology of VRE and issues relating to hand hygiene and environmental cleaning.

# Existing sources of VRE data in Victoria

## Laboratory data

Data were requested from the Melbourne Diagnostic Unit's (MDU's) Victorian Hospital Pathogen Surveillance Scheme (VHPSS), Gribbles Pathology Service, Dorevitch Pathology Service and Melbourne Pathology Service laboratories. Data were sought about VRE isolates sent to them for Polymerase Chain Reaction (PCR) studies and the number of organisations or institutions who had sent isolates, since 2005.

Melbourne Pathology Service responded that PCRs are not performed in house; specimens are sent on to MDU and thus would be captured in the VPHSS data.

Gribbles stated that the number of VRE isolates received would be so small as to be negligible; they receive specimens from general practitioners rather than hospitals.

Victorian Hospital Pathogen Surveillance Scheme (VHPSS) stated that they represent, or capture, approximately 70% of all hospitals in Victoria; however hospitals not captured include the Austin, the Royal Melbourne, St Vincent's, Peter MacCallum and the Monash Medical centre.

None could provide any data about VRE colonisation. See *Appendix 1: Existing sources of VRE data from Victorian laboratories* for data provided by laboratories for this investigation.

## VAED dataset

The Victorian Admitted Episodes Dataset (VAED) provides data regarding patient demographics, health care utilisation, and diagnoses made during individual admitted episodes. An admitted episode includes same-day or multi-day hospitalisation. For each episode diagnoses are listed according to ICD-10-am codes (up to 40 per episode). Currently there is no specific ICD-10-block for the coding of VRE infection or colonisation. There is, however, a code for Streptococcus, group D. This category would be expected to be used for enterococcal infections. However, it will also be used for other group D Streptococcal infections (for example *Streptococcus bovis*), and is therefore not a specific category for enterococci (including VRE).

Although there is a code for vancomycin resistance, this category should not be used for primary coding. It is recommended that this category be used as a supplementary or additional coding when it is desirable to identify the antibiotic to which a bacterial agent is resistant, in bacterial infection classified elsewhere.

Therefore, if the supplementary code were to be used to screen VAED data, all vancomycin resistant organisms would be extracted. Because this code may be used for other organisms, for example *Staphylococcus aureus*, it is non-specific, and the number of infections identified by this method would (arguably) not be reflective of the true numbers of patients with VRE.

In the absence of specific ICD-10 coding for VRE infections, further evaluation is required to determine if hospital coders are aware of and use the 'group D streptococcus' category appropriately for these infections. At this stage, the VAED is not considered a robust or sufficiently validated tool for monitoring of VRE infections in Victoria.

# VRE survey of Victorian health facilities

## Survey objectives and development

Survey questions were developed by the VRE sub committee with a view to investigating

- the incidence of VRE infection and colonisation across the state in a variety of health care settings over the years since 2005
- the capacity of health care services to provide microbiological data about the incidence of VRE in their organisations over this period of time.

Information about screening practices was sought to investigate whether there was a link between any increase in the incidence of VRE colonisation over these years and an increase in the amount of screening that health care services undertook. Further questions were developed to investigate aspects of the management of patients with VRE within health care services.

The survey questionnaire was then piloted to a group of infection control nurse consultants and underwent a rigorous Department of Human Services internal Data Management Advisory Committee (DMAC) process that included the development of a business case to support the statewide data collection and dissemination of aggregated data. The business case and proposed VRE survey also underwent an executive briefing process that included the minister of health.

The Department's web communications team developed an on-line version of the questionnaire allowing respondents to enter data electronically and for central secure management of data submissions.

## Participants

The committee accepted that an appropriate list of Victorian health services had already been identified and is currently used by the Victorian Hospital-Acquired Surveillance System (VICNISS). VICNISS has an established methodology for the collection and analysis of data on hospital acquired (nosocomial) infections in acute care public hospitals in Victoria. The co-ordinating centre reports individual hospital and aggregate data back to participants and the Department of Human Services (the Department). Surveillance activities are targeted to those patients at highest risk of hospital acquired infections.

Type 1 hospitals are described as large hospitals that have more than 100 beds, perform large numbers of procedures and often have intensive care units. Type 2 hospitals are described as smaller hospitals with low surgical throughput and no, or few, intensive care beds; mostly in rural and regional areas (VICNISS Year 2 report March 2004 pp 13). However Type 2 hospitals also include the Peter MacCallum Cancer centre and several metropolitan hospitals.

A letter from the Department was sent to Type 1 and Type 2 health service CEOs. The letter provided background information underpinning the VRE survey and sought data submissions by 05 December 2008. An email containing similar information was sent to infection control consultants in Type 1 and Type 2 health services where email addresses were known.

## Summary of survey results – Type 1 hospitals

There was a 100% response rate for Type 1 hospitals. The VICNISS list identified 28 Type 1 hospitals however some submitted survey data combining multiple Type 1 hospital sites across their health service meaning that, for the purposes of this survey, there was a total of 24 Type 1 respondents covering all 28 VICNISS-listed Type 1 hospitals. Respondents for Type 1 hospitals often answered for a mix of acute, sub acute and aged care across their health services.

Not all respondents were able to answer all questions. Response rates are given for individual questions. Refer to *Appendix 2: Vancomycin Resistant Enterococcus (VRE) survey of Victorian health facilities* for a copy of the survey questionnaire denoting the sections (Parts A, B, C and D) and question numbers for further information.

### **VRE screening practices (Part B)**

All respondents answered this part of the survey. Around 61% indicated that they had a VRE screening protocol. Of these most (13/15) indicated that selected patients were screened on admission,

particularly if the patient had a past history of VRE. Some units also screened patients on admission (8/15); ICU (6/15) renal (4/15) and oncology units (4/15).

Routine screening of contacts of a VRE positive patient is more likely to occur in acute care services; 66% of respondents (18/24) indicated that they routinely screen the contacts of VRE positive patients in acute care services. Less routine screening of contacts occurs in the sub acute sector (5/24) and infrequently in aged care services (1/24).

Most often contacts are those patients who have been in the same room as the VRE positive patient within the past 48 hours (10/18 for acute care).

Almost all respondents indicated that they would screen patients or selected units during an outbreak of VRE (22/24). More than half indicated that all patients in the unit(s) where a VRE outbreak was occurring would be screened (12/22).

### **Incidence of VRE infection and colonisation (Part C)**

Respondents were asked whether they were able to provide all, some, or none of the data requested for this section. Only 11 said they were able to provide all data requested. 12 indicated that they could provide some data and one indicated they were unable to provide any data.

Respondents were given the opportunity to describe any barriers that prevented them from providing the requested data. The majority of comments pointed to a lack of capacity by their pathology services where these services were contracted out, as the following examples demonstrate:

“Data not provided to us by Pathology.”

“Still waiting for data to be forwarded from external pathology service.”

“Unable to obtain information from Pathology on VRE results for previous years.”

“Time constraints and IT issues for pathology provider.”

The request for this data raised an interesting issue for many health services given that health services pay for all screening swabs processed. Some have since elected to review existing service contracts with their pathology providers to include such information for future years, as they see a benefit in having such data.

In some hospitals VRE data is collected under local ward names rather than under medical specialties. Although this can be useful for internal bench marking it means that data are unable to be bench marked outside the organisation’s confines.

The following tables summarise the data provided. Table one illustrates how Victorian Type 1 hospitals have been screening patients for VRE more and more over the years. It is easy to understand therefore how these practices have resulted in an increase in the known incidence of VRE colonisation.

Table 1: Type 1 total number of VRE screening swabs and VRE colonisations reported by year

<b>Year</b>	<b>2005</b>	<b>2006</b>	<b>2007</b>	<b>2008 (six month period only; from 01 January to 30 June)</b>
Total VRE screening swabs taken	11,401	14,214	16,284	8,996
Total VRE colonisations	295	494	1213	592
Percentage of colonisations in relation to screening swabs taken	2.6%	3.5%	7.5%	6.6%

However the percentage of screening swabs that are reported positive for VRE colonisation has also increased markedly since 2005, indicating that VRE colonisation is becoming more prevalent in acute hospital patient populations.

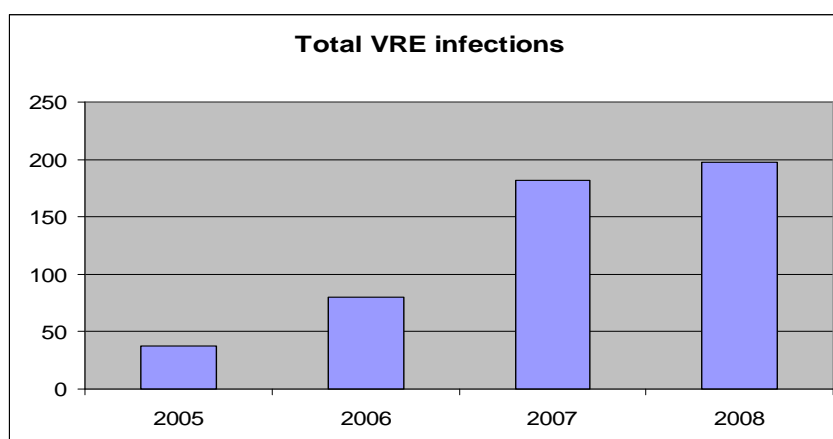
The number of VRE infections reported for patients in Type 1 hospitals shows an increase over the years. Table 2 gives the data for both the total number of infections and the total number of VRE bacteraemia reported for Type 1 hospitals.

Table 2: Type 1 total number of VRE infections and VRE bacteraemia reported by year

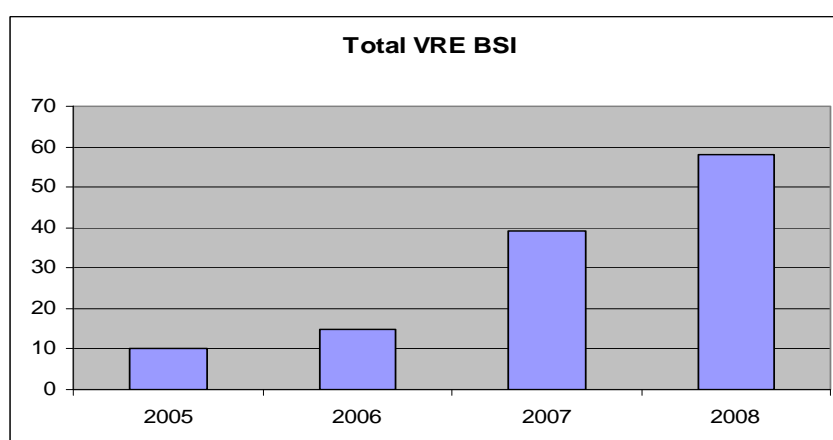
Year	2005	2006	2007	2008 (six month period only; from 01 January to 30 June)
Total VRE infections	38	80	182	99
Total VRE bacteraemia	10	15	39	29

The following graphs provide an over all trend in the incidence of VRE infection and blood stream infection (BSI) or bacteraemia where the data for the first six months from 01 January 2008 to 30 June 2008 have been doubled to reflect the likely (speculative) outcome for the 2008 year.

Graph 1: Type 1 trend total VRE infections by year



Graph 2: Type 1 trend total VRE BSIs by year



Only 9 of respondents that could provide data for this section of the survey could separate out further where their VRE infections occurred. The following table gives the incidence of VRE infection (all

infections) for each of the clinical areas in the years 2005 to 2008 based on the data provided by these 9 respondents.

Table 3: Type 1 total infections reported by clinical areas and years

Clinical Area	2005	2006	2007	2008 (six month period only; from 01 January to 30 June)	Total
Oncology	4	1	11	9	25
Haematology	2	3	5	2	12
Transplant: solid organ					0
Transplant: bone marrow			1	3	4
ICU	1	8	7	7	23
Renal	3	4	3	2	12
General acute hospital ward	21	20	67	32	140
					<b>216</b>
Annual Totals for Table 3	31	36	83	55	
Annual total infections reported from Table 2	(38)	(80)	(182)	(99)	

Around 65% of VRE infections reported in this survey occurred in general acute ward areas. However the data only report on the incidence of VRE infection and the actual rate of infection for high risk patient groups may be higher than for general acute ward areas. Future investigations into the relationship between VRE infection and clinical areas and/or medical specialities may be more useful once standardised methods for the collection and reporting of data have been established, including a standardised denominator.

### Management of VRE positive patients (Part D)

23 of the 24 respondents answered this section.

Patients found to be VRE positive are nearly always isolated or cohorted with other VRE positive patients in acute care settings (21/23) and less often in sub acute areas. In aged care facilities patients are sometimes isolated or cohort with other VRE positive patients where resources permit or only while the patient is at an increased risk of transmitting VRE to other residents.

9 out of the 24 respondents indicated that, in acute and long term care facilities, they would not isolate or cohort patients who are contacts of another patient who had been identified as VRE positive. This was also the case for 8 out of 24 respondents describing management sub acute areas.

Most respondents indicated that the rooms, equipment and ensuite used by VRE positive patients are cleaned daily with sodium hypochlorite, as well as when the patient is discharged. However some respondents also indicated that only routine cleaning occurs for inpatients across all types of care (5/24).

General waste generated in caring for VRE positive patients was most often disposed of in the clinical waste stream in acute and sub acute areas whilst in aged care facilities it is most often disposed of in the general waste stream.

Once a patient became known as VRE positive they were often never cleared of this identifier: 74% indicated that in acute care setting they would never clear this identifier from patients. Four respondents indicated that they would clear VRE positive patients in acute care setting after a clearance protocol that consisted of three consecutive negative VRE screening swabs taken one week apart, and a further two respondents would clear the patient of this identifier using their own clearance protocol.

## Summary of survey results – Type 2 hospitals

Respondents often answered for a mix of acute, sub acute and aged care across their health care services. Some health services submitted data that were for multiple sites. Out of a total of 70 Type 2 health services, the number of respondents was 50 (71.4% response rate), however all metropolitan Type 2 hospitals responded and all regions were well represented. Not all respondents were able to answer all questions.

Refer to *Appendix 2: Vancomycin Resistant Enterococcus (VRE) survey of Victorian health facilities* for a copy of the survey questionnaire denoting the sections (Parts A, B, C and D) and question numbers for further information.

### **VRE screening practices (Part B)**

In contrast to Type 1 hospitals 66% of Type 2 hospital respondents indicated that they did not screen any patients for VRE; 29/50 respondents indicated that they did not have a VRE screening program. A further 4 respondents indicated that their policy was not to screen any patients on admission.

Of those with screening programs in place these were most often initiated prior to 2005 (14/21). Screening on admission most often occurred in acute health care settings when a patient had a past history of VRE, had been transferred from a high risk unit or where a risk of VRE was identified.

Type 2 hospitals were also less likely to screen the contacts of a VRE positive patient; 40% (20/50) indicated that they would not screen the contacts of VRE positive patients in acute care settings. There is no consistent approach to screening amongst those that do undertake the screening of contacts.

30% (15/50) indicated that they do not screen patients during an outbreak of VRE. However this may reflect a situation where there have been no outbreaks of VRE; the question could have been more clearly worded, for example "Do you, *or would you*, screen patients or selected units during an outbreak?"

### **Incidence of VRE infection and colonisation (Part C)**

37 Type 2 hospitals submitted data for the following section. However two of the three metropolitan type 2 hospitals' data were submitted as part of a single admission from Type 1 health services and could not therefore be separated out. The third metropolitan Type 2 hospital (Hospital A) accounts for the majority of screening swabs, colonisations, infections and BSIs. VRE screening, colonisation and infection remain very low in rural Type 2 hospitals.

Type 2 hospitals reported being more able to provide the data requested in the VRE survey. This may be due to the very low number of VRE screening, colonisation and infection that occurs in Type 2 hospitals; if no screening is undertaken and there are no VRE positive clinical isolates it is an easy matter to provide this data as the following comments illustrate:

"As far as I am aware we have never had a case of VRE infection or colonisation in this hospital."

"We have no incidence of VRE in our health care facility."

"We have only ever had one VRE patient in our hospital and she was admitted to us from a major hospital pre 2005."

"Transfers from other hospitals [are] declined if [they] have known VRE status."

Respondents were given the opportunity to describe any barriers that prevented them from providing the requested data. Some described issues with their pathology provider similar to the Type 1 respondents:

"Have asked our pathology provider for the information more than two weeks ago."

"Unable to obtain information from pathology on VRE results for previous years if ever – request has been logged but may take some time."

“Unable to access data from pathology supplier. They are writing a program to extract this information but it will not be available prior to the submission deadline.”

The following table summarises the data provided. ‘Hospital A’ denotes data submitted by one metropolitan Type 2 hospital and ‘All Other’ means all other Type 2 hospitals that submitted data.

Table 4: Type 2 total number of VRE screening swabs taken, colonisations, infections and BSI reported by year

Year	2005		2006		2007		2008 (6 months only from 01 Jan - 30 June)	
	All Other	Hospital A	All Other	Hospital A	All Other	Hospital A	All Other	Hospital A
Total VRE screening swabs taken	33	640	38	626	67	568	51	383
Total VRE colonisations	0	15	2	13	9	52	10	24
Total VRE infections	0	1	1	0	1	8	1	1
Total VRE BSI	0	1	0	0	0	7	0	0

### Management of VRE positive patients (Part D)

In Type 2 hospitals acute care patients who are identified as being VRE positive are most often isolated or cohorted with other VRE positive patients. In aged or long term care facilities such patients are either isolated, or isolated only when they pose an increased risk of infection such as when they are faecally incontinent or on antibiotics.

The contacts of patients who have been identified as VRE positive are less likely to be isolated or cohorted, or isolated only where resources permit.

Special cleaning of patients’ rooms, equipment and ensuite with sodium hypochlorite most often occurs on a daily basis and always occurs when patients are discharged. Waste generated in caring for VRE positive patients is most often placed in the clinical waste stream although around a third of respondents indicated they would use the general waste stream for this purpose.

There is no consensus about clearance protocols for patients who have been identified as VRE positive. Some never clear the patient of this status, even for those in aged or long term care facilities whilst others favour clearance after three consecutive negative swabs taken one week apart have been obtained. A few have developed their own clearance protocols (4 in acute care, 1 in sub acute care and 4 in aged or long term care facilities).

## Report Summary

A review of related literature found that VRE is a growing concern for many acute health care services around the world and that VRE acquisition is usually health care-associated. Acquisition within health care facilities most commonly occurs through direct or indirect contact with contaminated shared equipment or a contaminated environment as well as by health care worker hand carriage. This highlights the importance of hand hygiene as well as cleaning standards in health care facilities and their relationship to the containment of VRE.

In Australia resistance to vancomycin among enterococci isolates has been shown to have increased from 15% in 2002-2006 to 30% for the six months from January to June 2007. The VRE sub committee’s Victorian VRE survey found an increasing trend in the rate of colonisation occurring in Type 1 hospitals where screening is undertaken, as well as an increasing number of VRE infections; most importantly in

VRE bacteraemia. The incidence of VRE colonisation and infection remained very low in Victorian Type 2 rural health services.

Possible sources of existing VRE data in Victoria, such as the VAED data set, were found to be unhelpful. Although the Victorian VRE survey assisted the sub committee to achieve its objectives, there were limitations and a standardised methodological approach to the surveillance of VRE and other multi-resistant organisms (MROs) should be considered at a local (health service) level as well as statewide and nationally. There can be some argument about definitions of infections that are not blood borne; indeed such international argument is ongoing in relation to definitions for the surveillance of health care associated infections such as ventilator-associated pneumonia. However bacteraemia data are very defensible and would provide a robust starting point for surveillance programs.

Guidelines for the management of VRE in health services are inadequate and there is a lack of consensus, both in the literature generally as well in current clinical practice, with regards to best practice for VRE screening protocols and patient management.

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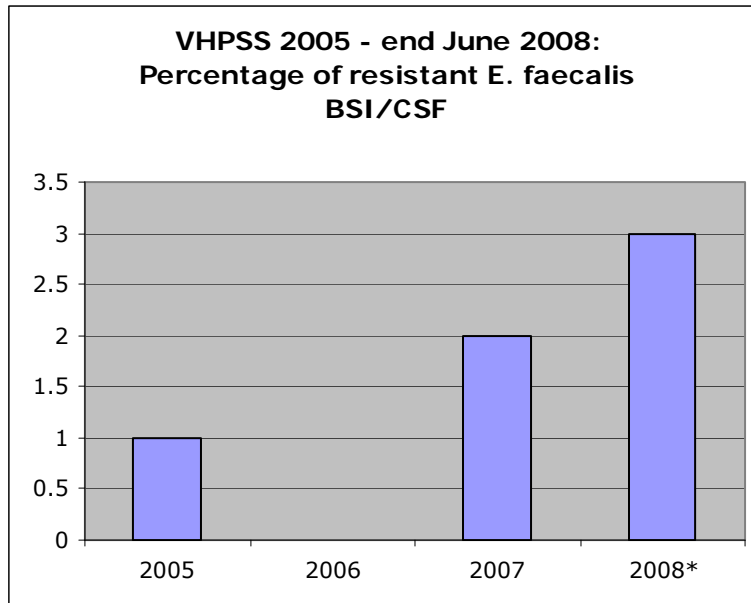
## Appendix 1:

Existing sources of VRE data from Victorian laboratories

**Data from MDU (VHPSS)**

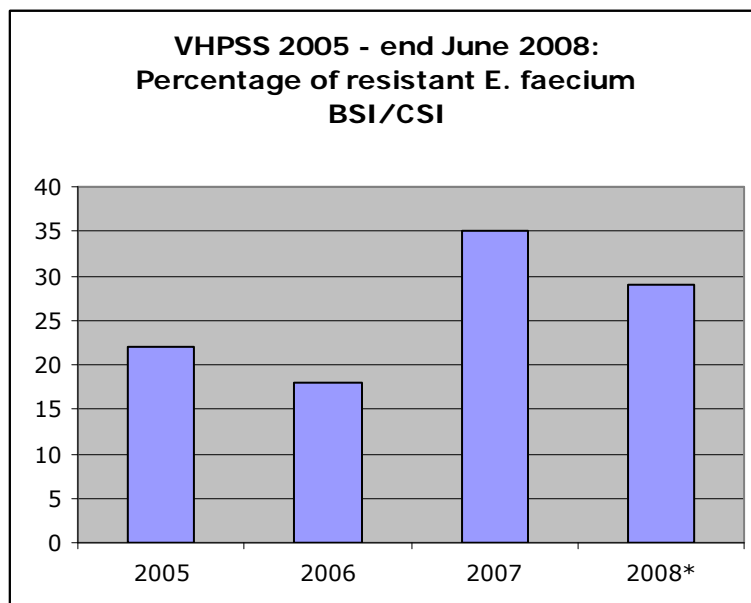
*E. faecalis* is the most common *Enterococcus* species reported to VHPSS; between 100 and 200 have been reported annually since 1996 however vancomycin resistance remains rare in *E. faecalis*, four or less isolates per year (1 to 2%).

\*2008 shown is six months to end of June data doubled to provide trend.



There were between 20 and 40 reports of *E. faecium* BSI/CSF per year from 1996 until 2004. This increased to around 60 per annum for 2005 and 2006 and rose to 92 for 2007. The percentage of those isolates that were resistant has also increased in the past three years. Over 2005 and 2006 the percentage of isolates that were resistant was around 17%. In 2007 this rose to 32% of isolates.

\*2008 shown is six months to end of June data doubled to provide trend.



Additional data from VHPSS showing species and type as well data from years prior to 2005:

**VRE bloodstream isolates reported to VHPSS, 2000-2008**

	2000	2001	2002	2003	2004	2005	2006	2007	2008-end of August
<i>E. faecalis</i> (all)	110	122	147	147	165	141	162	178	119
<i>E. faecalis</i> VRE	0	0	1	0	1	2	0	4	4
%VRE	0%	0%	1%	0%	1%	1%	0%	2%	3%
<i>E. faecium</i> (all)	52	39	49	51	59	64	60	92	85
<i>E. faecium</i> VRE	6	3	3	11	15	14	11	32	25
%VRE	12%	8%	6%	22%	25%	22%	18%	35%	29%
VRE (total)	6	3	4	11	16	16	11	36	29
<i>VanA</i> detected	0	0	0	0	0	4*	0	0	2*
<i>VanB</i> detected	6	3	3	8	15	12	11	34	24
Not <i>VanA, B, C</i> etc.	0	0	0	0	0	0	0	1	0
No information on <i>Van</i> genes	0	0	1	3	1	0	0	1	3
<i>VanA</i> species					* 1 <i>E. faecalis</i> , 3 <i>E. faecium</i>				* 2 <i>E. faecium</i>
VRE Isolate at MDU	5	1	0	8	13	12	4	12	16

**Data from Dorevitch Pathology Service**

In the following tables 2008 refers to the six months from January to end of June.

VRE isolates sent for PCR				
	Results (where is it practicable to extract this data)		Total VRE isolates received for PCR	No. of institutions sending VRE isolates for PCR
	vanA	vanB		
2005				
2006	0	4	6	4
2007	0	40	127	30
2008*	3	20	81	30

E. faecalis BSI and CSF				
	Vancomycin resistant	Vancomycin sensitive	Sensitivities not reported	Annual total E. faecalis BSI and CSF
2005	0	22	3	25
2006	0	67	2	69
2007	2	54	3	59
2008*	0	24	2	26

<b>E. faecium BSI and CSF</b>				
	<b>Vancomycin resistant</b>	<b>Vancomycin sensitive</b>	<b>Sensitivities not reported on</b>	<b>Annual total E.faecium BSI and CSF</b>
2005	0	7	0	7
2006	1	19	2	22
2007	3	19	0	22
2008*	0	8	0	8

## Appendix 2:

Vancomycin Resistant Enterococcus (VRE) survey of Victorian health facilities.



## Vancomycin Resistant Enterococcus (VRE) Survey of Victorian health facilities

### Preamble

VRE is a significant pathogen amongst patients receiving health care. The emergence of VRE poses several problems including a limitation of treatment options; vancomycin is the antibiotic of choice in treating other resistant organisms such as methicillin-resistant *Staphylococcus aureus* (MRSA). Additionally there is a potential risk of transmission of VRE from one patient to another, and/or of transmission of resistant genes to other microbes.

Data from selected Victorian health services were presented to the Victorian Advisory Committee on Infection Control (VACIC) which suggested an increase in the incidence of VRE.

As the current incidence of VRE across Victoria is unknown VACIC convened a sub committee to investigate VRE in Victorian health. This on-line survey of Victorian health facilities forms part of that investigation.

Data collected from this survey will, where possible, be used to establish the incidence of VRE within health facilities over recent years and used to determine future management and screening practices. Data that identifies individual health facilities are sought, however only de-identified data will be reported back to key stakeholders.

### Who should complete this survey?

The on-line survey should be completed and submitted by the person responsible for the infection control program in your health facility or health service; for example the Clinical Nurse Consultant or Manager of the Infection Prevention and Control Service. The information submitted by the Infection Control Practitioner should first be authorised for submission by the health service's Infection Control Executive Sponsor or CEO.

## Guide to answering questions and submitting the completed survey

### Part A: General information

Although the survey seeks identifying data only de-identified data will be reported to key stakeholders. Identifying data are used to assist survey return rates and provide contact details in the event that further clarification is needed.

Other data are sought in all parts of the survey with the aim of finding out some of the VRE management practices that are currently in use in Victorian health services; particularly in relation to isolation and screening practices. In addition the survey seeks to better understand the capacity of infection control services to provide data related to the incidence of VRE colonisation and infection within their organisations.

Please read through the entire survey before answering any questions and ensure that your Infection Control Executive Sponsor and/or CEO has authorised the information you will be providing. You may need to discuss and prepare the information required in Part C of this questionnaire with your microbiology department before you are able to submit the completed questionnaire. You can print a blank copy of the survey questionnaire and/or a copy of the completed questionnaire for your records before you submit it to the department on-line.

If you require any further assistance please contact Lorraine Wilson on 9096 7912 or by email at [lorraine.wilson@dhs.vic.gov.au](mailto:lorraine.wilson@dhs.vic.gov.au)

### Part B: Questions related to VRE screening practices

Admission refers to admission to an acute hospital, sub acute or rehabilitation facility, aged care facility or to a specialist unit such as an ICU, renal or oncology unit.

VRE Screening swabs refer to either faecal or rectal swabs taken specifically to determine whether a patient is colonised with VRE.

### Part C: Incidence of VRE infection and colonisation

You may require the assistance of someone from your microbiology team to assist in gathering the data to complete this section (questions 18 through 22).

The years 2005, 2006 and 2007 refer to calendar years; i.e. from January 01 to December 31. The year 2008 refers to the first six months of the current year from 01 January to 30 June.

VRE infections include:

- Blood stream infections (confirmed blood cultures); count one per patient episode, not every positive blood culture; count as a new episode of infection if 14 days have passed since the previous episode of blood stream infection
- Urine; count both CSU and MSU
- Sterile sites; count CSF and ascites only

Transplant Units are divided under sub headings of Solid Organs Transplant and Bone Marrow Transplant. Bone Marrow Transplant includes stem cell transplant.

## Part D: Questions related to the management of VRE positive patients

Standard and additional precautions, for example isolating or cohorting patients, refer to the standard and additional precautions as described in the Department of Health and Ageing (2004) *Infection control guidelines for the prevention of transmission of infectious diseases in the health care setting*.

Specialist cleaning refers to cleaning as described on page 8 of the Victorian Department of Human Services (1999) *Guidelines for the Management of Patients with Vancomycin-Resistant Enterococci (VRE) Colonisation/Infection*.

### Part A: General information

1. Your name: \_\_\_\_\_

2. Role: \_\_\_\_\_

3. Workplace address: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

4. Telephone: \_\_\_\_\_

5. Email: \_\_\_\_\_

6. *Please indicate what type(s) of facilities your answers relate to.*

- Acute hospital
- Sub acute and/or rehabilitation facility
- Aged/Long term care facility
- Other (please describe)**

7. *Where available, please enter the VICNISS code for the facility(s)*

\_\_\_\_\_

8. *Do you have your Infection Control Executive Sponsor's or CEO's authorisation to submit the survey?*

- NO; please do not submit your completed survey until you have authorisation
- YES

**Part B: Questions related to VRE screening practices**

9. Does your health service have a program or protocol for screening patients for VRE?

- NO; go to question 14
- YES

10. What year was this introduced?

- Prior to 2005
- 2005
- 2006
- 2007
- 2008

11. What type of VRE screening protocol do you have for patient admission?

	Acute care	Subacute care	Aged/long term care	Other
No patients are screened <i>(go to question 14)</i>				
All patients are screened <i>(go to question 14)</i>				
Selected patients are screened for VRE <i>(answer question 12)</i>				
All patients are screened on admission to selected units, for example ICU <i>(answer question 13)</i>				

12. Which selected patients are screened for VRE on admission?

	Acute care	Subacute care	Aged/long term care	Other
Patient has a past history of VRE				
Patient has been transferred from a high risk unit, for example from an ICU at another hospital				
Patient is identified as being at risk by infection control nurse, microbiologist or infectious diseases physician				

13. In your VRE screening protocol which selected units screen all patients for VRE on admission?

- ICU
- Renal unit within the facility
- Renal unit - satellite
- Oncology unit
- Haematology unit
- Solid Organ Transplant units
- Bone Marrow Transplant units

14. Do you routinely screen the contacts of a VRE positive patient?

	Acute care	Subacute care	Aged/long term care	*Other
Yes				
No (go to question 16)				

15. Which of the following best describes the contacts of VRE positive patients that you routinely screen?

	Acute care	Subacute care	Aged/long term care	*Other
All patients who have been in the same room as the VRE positive patient within the past 7 days				
All patients who have been in the same room as the VRE positive patient within the past 48 hours				
Only patients that are currently in the same room as the VRE positive patient				

16. Do you screen patients or selected units during an outbreak of VRE?

- Yes
- No (go to question 18, Part C: Incidence of VRE infection and colonisation)

17. Which of the following best describes the patients you screen during a VRE outbreak?

- Contacts of VRE positive patients only
- All patients in the unit(s) where the VRE outbreak is occurring
- All patients in selected high risk units regardless of where the VRE outbreak is occurring
- All patients across the facility where the VRE outbreak is occurring

## Part C: Incidence of VRE infection and colonisation

You may require the assistance of someone from your microbiology team to assist in gathering the following data. Refer to the 'Guide to answering questions and submitting the completed survey' on page 2 for further information about this section.

18. Please indicate whether you are able to provide the data for this section

- Yes, all data requested has been provided
- Some, but not all, data could be provided (*answer question 17*)
- None of the data requested was able to be provided (*answer question 17*)

19. What were the barriers that prevented the data requested in this section being provided?

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20. Incidence of VRE infection and colonisation over the past 4 years

**NOTE: For all tables in this section, the years 2005 – 2007 refer to calendar years. 2008\* refers only to the 6 months from 01 January to end of June 2008.**

	VRE colonisation				VRE infection			
	Total VRE screening swabs taken	Total VRE colonisations	Colonisations identified through:		Total VRE infections	BSI; per pt episode	Urine; CSU & MSU	Sterile sites; CSF & ascites
			Screening	Clinical isolates				
2005								
2006								
2007								
2008* (6 months)								

21. Incidence of VRE infection in selected high risk patient groups over the past 4 years.

	Patient groups							Annual total for all listed groups
	Oncology	Haematology	Transplant		ICU	Renal	General acute hospital wards	
			Solid organ	Bone marrow				
2005								
2006								
2007								
2008*								

22. Incidence of VRE colonisation in selected high risk patient groups over the past 4 years.

	Patient groups							Annual total for all listed groups
	Oncology	Haematology	Transplant		ICU	Renal	General acute hospital wards	
			Solid organ	Bone marrow				
2005								
2006								
2007								
2008*								

**Part D: Questions related to the management of VRE positive patients**

23. Do you isolate or cohort patients who are identified as VRE positive?

	Acute care	Subacute care	Aged/long term care	*Other
No				
Always				
Where resources permit				
Only while the patient has diarrhoea, is faecally incontinent, on antibiotics, or not capable of self care				

\* Only use the 'Other' column in this and the following tables if you have ticked and described 'Other' in 'Part A: General Information' on the previous page.

24. Do you isolate or cohort patients who are contacts of another patient who has been identified as VRE positive?

	Acute care	Subacute care	Aged/long term care	*Other
No				
Always				
Where resources permit				
Only while the patient has diarrhoea, is faecally incontinent, on antibiotics, or not capable of self care				

25. What type of daily cleaning of a VRE positive patient's room, equipment and bathroom/toilet facilities are undertaken?

	Acute care	Subacute care	Aged/long term care	*Other
Routine cleaning				
Special cleaning using sodium hypochlorite				
Other special cleaning				

26. What type of discharge or terminal cleaning of a VRE positive patient's room, equipment and bathroom/toilet facilities are undertaken?

	Acute care	Subacute care	Aged/long term care	*Other
Routine cleaning				
Special cleaning using sodium hypochlorite				
Other special cleaning				

27. Where does general waste generated from a VRE positive patient go?

	Acute care	Subacute care	Aged/long term care	*Other
General waste stream				
Yellow clinical/infectious waste stream				

28. When is a VRE positive patient deemed to be cleared of VRE?

	Acute care	Subacute care	Aged/long term care	*Other
Never				
After three consecutive negative VRE screening swabs taken one week apart				
Other clearance protocol				

*Thank you. Your time and effort is much appreciated.  
Please refer to the next page for the checklist for completed surveys.*