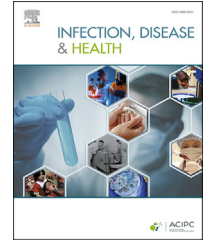


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Research paper

Have gloves and gowns had their day? An Australian and New Zealand practice and attitudes survey about contact precautions for MRSA and VRE colonisation

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Abstract *Background:* ‘Contact precautions,’ are recommended for hospitalised patients with known methicillin-resistant *Staphylococcus aureus* (MRSA) and vancomycin-resistant *Enterococci* (VRE) colonisation. Despite increasing observational evidence suggesting that gowns and gloves are of no added benefit over hand hygiene and environmental cleaning, guidelines continue to recommend them.

Methods: A cross-sectional online survey of infection prevention professionals, infectious diseases physicians and microbiologists in Australian and New Zealand hospitals was conducted. The purpose was to explore variations in current approaches to known MRSA and VRE colonisation, and determine clinical equipoise for a proposed randomised control trial (RCT) to withdraw the use of gowns and gloves in this setting.

Results: 226 responses from 122 hospitals across all Australian jurisdiction and multiple regions of New Zealand were received. While most hospitals implement contact precautions for MRSA (86%) and VRE (92%), variations based on MRSA and VRE subtypes are common. There was strong interest in removing glove and gown use for MRSA (72% and 73%, respectively) and VRE (70% and 68%, respectively). 62% of surveyed hospitals expressed interest in participating in a proposed cluster RCT comparing discontinuation of gown and glove use as part of contact precautions for MRSA and VRE, with their ongoing use.

Conclusion: The mandated use of PPE in the context of MRSA and VRE colonisation warrants further examination. An RCT is needed to definitively address this issue and to promote a widespread change in practice, if warranted.

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Highlights

- Gowns and gloves are recommended when caring for MRSA and VRE colonised inpatients.
- While studies currently favour their removal, an RCT is needed to address this question.
- Most hospitals continue to implement contact precautions in the setting of MRSA and VRE.
- Variations in practice were common for subtypes of MRSA and, less commonly, VRE.
- Most hospitals surveyed expressed interest in removing mandated PPE for VRE and MRSA.

Background

Hospital acquired infections present a significant risk to patients and a challenge to healthcare facilities. Multi-resistant organisms (MROs) such as methicillin resistant *Staphylococcus aureus* (MRSA) and vancomycin-resistant *Enterococci* (VRE) are capable of environmental contamination and can result in patient-to-patient transmission via healthcare workers' hands and medical equipment [1]. Despite being very common in the Australian setting, both MRSA and VRE continue to be of epidemiological interest due to limited effective antibiotic options and associated significant morbidity and mortality when they cause infection [2].

In the late 1980's, the need for universal protection for healthcare staff against infectious pathogens was highlighted by the HIV epidemic [3]. Under 'standard precautions,' adequate hand hygiene is essential for all patient encounters, while the use of personal protective equipment (PPE) is based on an individualised risk assessment that considers the potential for contact with blood and bodily fluids. While these measures are designed to protect healthcare workers against unknown infectious pathogens, 'contact precautions', as a component of 'transmission based precautions', are recommended when seeing patients known to be colonised with pathogens of 'epidemiological interest' [4]. Typically this consists of patient placement in a single room or cohorting, and donning of gown and gloves by healthcare staff upon entry [5].

Since their widespread implementation, many institutions have challenged the use of some aspects of contact precautions for certain MROs. For example, there have been specific concerns raised about whether the use of gloves and/or gowns for patients with MRSA or VRE is necessary. A 2021 systematic review and meta-analysis found no significant difference in rates of MRSA or VRE infections following the removal of gown and glove use in this setting [2]. However, this review also identified the absence of randomised control trials (RCTs) to inform clinical practice and policy. Similarly, many studies that have evaluated the removal of one or more elements of contact precautions have been undertaken in settings where there is a high proportion of single room use and availability.

Despite growing evidence in favour of removal of gowns and/or gloves as part of contact precautions in the context of MRSA and VRE colonisation, a properly designed and

adequately powered RCT is required to definitively determine whether patient safety might be compromised by this change, and to empower change across healthcare facilities both nationally and globally. In preparation for planning a large-scale RCT, we conducted a survey of infection control professionals, clinical microbiologists, and infectious diseases physicians in Australia and or New Zealand. Through this survey, we aim to explore the current practices within individual healthcare institutions and to determine if there is clinician equipoise for a proposed RCT to withdraw use of gowns and gloves for patients known to be MRSA or VRE colonised.

Methods

Design and setting

We undertook a cross-sectional online survey administered through SurveyMonkey. Digital participant information was supplied to all respondents, and consent was considered given if the survey was completed. Ethics approval was gained from the Avondale University Human Research Ethics Committee (reference number: ETH.2022.019).

Participants and recruitment

The online survey was disseminated via email to members of the Australasian Society of Infectious Diseases (ASID; n = 1050) and Australasian College for Infection Prevention and Control (ACIPC; n = 1775). The survey remained open for a 3-week period, commencing early November 2022. People were asked to respond to the survey only if they have a direct role in infection prevention and control in Australian or New Zealand hospitals. Hence only a subset of those who received the survey were eligible to respond to it.

Data collection

We designed a 23-question survey exploring current approaches to patients with known MRSA or VRE colonisation in hospitals across Australia and New Zealand (See supplementary information for the survey). Respondents were asked a series of questions with regards to the use of 'contact precautions', and specifically isolation rooms, gowns and gloves for both MRSA and VRE, within their healthcare facility. The opportunity to elaborate on their

responses by way of comment was given and expressions of interest in participating in a RCT further exploring this concept was sought.

As the aim of the survey was to explore the current practices within individual healthcare institutions, responses were analysed as follows.

- Where a hospital name was not provided, postcode and private/public classification was used to identify the facility most-likely referred to by the respondent
- Where a hospital name and postcode was not provided, the facility was termed “unknown” and excluded from hospital specific analyses
- Where a respondent referred to multiple hospitals within their response, the largest hospital (determined by bed number) within the nominated health district or geographical area was determined to be the hospital of interest
- Where duplicate responses for that region or health district were submitted, the next largest hospital within that group was allocated to the next respondent, provided that the hospital in question was public or private acute group B or larger. Responses not meeting these criteria were considered duplicate responses and excluded from hospital specific analyses.
- Where duplicate responses were received for an individual hospital, the response received from the most senior infection control professional was included for analysis, with duplicate responses excluded from hospital specific analyses.
- Responses not pertaining to hospital inpatients were excluded from hospital specific analyses.
- Responses referring to greater than one health district were excluded from hospital specific analyses.
- Duplicate responses from a respondent were excluded from the study
- All comments were considered, and all responses where personal opinion was sought were included for analysis.

Results

In total we received 227 responses, representing 122 individual hospitals and 226 respondents. Of the 226 respondents, 128 were infection control professionals (57%), and 66 (29%) infectious diseases physicians (± clinical microbiologists). For the 122 hospitals who responded to the survey, principal referral hospitals were most represented ($n = 31$), followed by public acute group A ($n = 29$) and public acute group B ($n = 12$) (Table 1) [6].

More than 50% of hospitals were from New South Wales and Victoria, but responses were received from all Australian states and territories, and multiple regions of New Zealand. Included were 4 Paediatric hospitals, 2 Women’s hospitals, and 1 mixed Women’s and Children’s hospital. 80% of hospitals were predominantly publicly funded. The mean number of overnight beds was 394.

Use of contact precautions for MRSA and VRE were reported in 86% and 92% of facilities, respectively (Table 2). In most facilities, contact precautions required both the use of a single room in addition to gown and gloves use. Variations were common, however, such as the use of standard

Table 1 Details of hospitals about which the survey was completed.

Geographical region	N (%)
New South Wales	32 (26)
Victoria	31 (25)
Western Australia	21 (17)
Queensland	15 (12)
South Australia	8 (7)
New Zealand	6 (5)
Tasmania	5 (4)
Northern Territory	2 (2)
Australian Capital Territory	2 (2)
Hospital classification	N (%)
Principal referral	31 (25)
Public acute group A	29 (24)
Public acute group B	12 (10)
Public acute group C	11 (9)
Public acute group D	3 (3)
Private acute group A	8 (7)
Private acute group B	3 (3)
Private acute group C	4 (3)
Private acute group D	3 (3)
Children’s hospital	4 (3)
Women’s hospital	2 (2)
Very Small hospitals	1 (1)
New Zealand hospitals	6 (5)
Not classified	3 (3)
Combined Women’s and Children’s	1 (1)
Mixed sub- & non-acute hospitals	1 (1)
Predominantly publicly funded	98 (80)
Mean overnight bed capacity (days)	394

Denominator = 122 hospitals.

precautions for non-multi-resistant strains of MRSA reported in New Zealand, the Northern Territory, Western Australian and Queensland. In Victorian hospitals, a patient centred risk-based approach which considers patient and clinical risk factors for MRO transmission is used to determine the need for standard versus contact precautions. While less common, differing approaches for VRE Van A and Van B were also reported, with either standard precautions for Van B isolates, or enhanced PPE requiring the mandated use of long-sleeved gowns rather than aprons in the context of Van A. For many facilities, local epidemiology was an important consideration in guiding decisions around the use of standard versus contact precautions for both MRSA and VRE. In some instances, patient vulnerability, i.e. immunosuppression and critical care areas, mandated the use of contact precautions for all MRO colonised patients, with individual risk assessments applied only outside of these contexts.

Interest in removing glove use was similar for MRSA and VRE, expressed by 70% of all hospitals. Facilities were more supportive of removing gown or apron use for MRSA compared to VRE (73% vs 68%). Interest in being involved in an RCT to explore the safety in removing gowns and gloves from contact precautions for MRSA and VRE was expressed by 74 (62%) of participating hospitals.

A reciprocal need for enhanced standard precautions through improved hand hygiene compliance and

Table 2 Current approaches to contact precautions for MRSA and VRE colonised patients in Australian and New Zealand Hospitals.

Survey category	MRSA (%)	VRE (%)
Routine use of 'contact precautions'	103/120 (85.8)	109/119 (91.6)
Routine use of a single room	104/120 (86.7)	111/120 (92.5)
Routine use of gloves	102/120 (85)	103/118 (87.3)
Routine use of gowns	103/120 (85.8)	107/119 (89.9)
Interest in removing glove use	86/120 (71.7)	83/118 (70.3)
Interest in removing gown use	88/120 (73.3)	80/118 (67.8)
Interest in participating in an RCT exploring removal of gown and glove use for MRSA and VRE	74/120 (61.7)	

Note: The denominator for each variable above varies due to differences in the response rate for each item. Abbreviations: MRSA = methicillin-resistant *Staphylococcus aureus*, VRE = vancomycin-resistant *Enterococci*, RCT = randomised control trial.

environmental cleaning was commonly referred to by respondents. A 5% increase in MRSA and VRE blood stream infections and sterile site isolates following the removal of gowns and gloves as a component of contact precautions was considered unacceptable to 62% of all respondents.

Discussion

The responsible use of PPE continues to be a vital component of infection prevention in healthcare, in ensuring adequate protection for patient and staff against infectious pathogens. Other important considerations include the cost of PPE to the health system (if not warranted), as well as the environmental impact of PPE. The ever-expanding list of pathogens of 'epidemiological interest' and changing local epidemiology means that contact precautions as they currently stand, may not be sustainable. This survey demonstrates wide variations in practice are currently in place in Australian and New Zealand hospitals, as hospitals find themselves unable or unwilling to comply with contradictory guidelines, incompatible with their local epidemiology, constrained resources, and a lack of a strong evidence base.

The idea that using a varied or risk-based approach to transmission-based precautions will create confusion amongst HCWs and ultimately lead to poor compliance is commonly touted as a reason to resist changes to current practice. Conversely, there are concerns that any change to contact precautions should be grounded in high quality evidence, such that harm is not caused to patients and or healthcare workers. It should be acknowledged, however, that the ability to risk-assess is a requirement of general infection control and clinical practice. Instead, the

mandated use of PPE for all MROs threatens to disempower and deskill HCWs [7]. In the state of Victoria, the implementation of a risk-based approach is a good example of how a shift in focus towards symptomatology and transmission pathways, rather than MRO labels, presents an opportunity to reframe the discussion around transmission-based precautions and explore novel approaches for widespread implementation.

Our survey results demonstrate that within Australian and New Zealand hospitals there is strong interest in changing the current approach to contact precautions, and equipose in a proposed research trial to establish safety in doing so. Of those hospitals who expressed interest in trial participation (n = 74), 57 were public or private acute group B or larger, including 23 principal referral and 16 public acute group A hospitals. Pending further statistical considerations, a sample size of this magnitude might allow for comparisons of clinically meaningful outcomes in the setting of a pragmatic embedded RCT, enabling the widespread implementation of evidence-based recommendations in the future. Of note, most survey respondents indicated a 5% increase in MRSA and VRE blood stream and sterile site infections following the removal of gown and glove use would be considered unacceptable from a patient safety perspective. Due to the relative infrequency of these events, in order to have sufficient power for a smaller non-inferiority margin, the primary outcome of an RCT would likely need to include both sterile and non-sterile site isolates.

The mandated use of PPE in the context of MRSA and VRE colonisation warrants further examination. While high quality data in favour of PPE reducing MRSA and VRE transmission are lacking, multiple non-randomised studies have failed to demonstrate measurable harms following their removal [2]. Importantly, glove use presents a barrier to adequate hand hygiene and may negatively impact on patient safety while incurring additional financial cost [8]. In Australia, healthcare currently contributes 7% of total carbon dioxide emissions, with hospitals accounting for almost 50% [9]. Reducing the environmental impact of healthcare must be prioritised, with those involved in infection prevention and control having a key role in ensuring this is considered in policy and local guidelines. Importantly, however, this shift in focus must not be at the cost of effective infection control measures. An RCT is needed to definitively address this issue, and to promote a widespread change in practice if warranted.

Authorship statement

SB, JD and BM conceived the research project and developed the research proposal. SB was primarily responsible for data analysis. All authors contributed to the development of this paper.

Conflict of interest

The authors have an editorial affiliation with the journal. They played no role in review or decision making process related to this paper.

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Provenance and peer review

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Ethics approval

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Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.idh.2023.03.006>.

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