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Impact of contact precautions on falls, pressure ulcers and transmission of MRSA and VRE in hospitalized patients

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SUMMARY

Background: Hospitals use contact precautions to prevent the spread of meticillin-resistant *Staphylococcus aureus* (MRSA) and vancomycin-resistant enterococci (VRE). There is concern that contact precautions may have adverse effects on the safety of isolated patients. In November 2010, the infection control policy at an academic medical centre was modified, and contact precautions were discontinued for patients colonized or infected with MRSA or VRE (MRSA/VRE patients).

Aim: To assess the rates of falls and pressure ulcers among MRSA/VRE patients and other adult medical-surgical patients, as well as changes in MRSA and VRE transmission before and after the policy change.

Methods: A single-centre retrospective hospital-wide cohort study was performed from 1st November 2009 to 31st October 2011.

Findings: Rates of falls and pressure ulcers were significantly higher among MRSA/VRE patients compared with other adult medical-surgical patients before the policy change (falls: 4.57 vs 2.04 per 1000 patient-days, $P < 0.0001$; pressure ulcers: 4.87 vs 1.22 per 1000 patient-days, $P < 0.0001$) and after the policy change (falls: 4.82 vs 2.10 per 1000 patient-days, $P < 0.0001$; pressure ulcers: 4.17 vs 1.19 per 1000 patient-days, $P < 0.0001$). No significant differences in the rates of falls and pressure ulcers among MRSA/VRE patients were found after the policy change compared with before the policy change. There was no overall change in MRSA or VRE hospital-acquired transmission.

Conclusion: MRSA/VRE patients had higher rates of falls and pressure ulcers compared with other adult medical-surgical patients. Rates were not affected by removal of contact precautions, suggesting that other factors contribute to these complications. Further research is required among this population to prevent complications.

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Introduction

The Centers for Disease Control and Prevention (CDC) recommend the use of transmission-based contact precautions for patients with documented or suspected infection or colonization with epidemiologically important pathogens.[1] Based on these recommendations, many acute care facilities use infection control contact precautions to prevent the spread of multi-drug-resistant organisms, such as meticillin-resistant *Staphylococcus aureus* (MRSA) and vancomycin-resistant enterococci (VRE). Patients placed under contact precautions are housed in private hospital rooms, and all healthcare workers involved in patient care are required to wear a gown and gloves while in the patient's room. However, while contact precautions are in common use, their efficacy in controlling the transmission of multi-drug-resistant organisms is unclear, compliance is poor, and contact precautions may result in unintended harmful consequences.[2–7] Specifically, reported consequences of contact precautions include: reduced patient contact with healthcare workers;[2,8–12] increased numbers of preventable adverse events;[13–15] decreased psychological well-being;[7] decreased patient satisfaction;[13] delays in access to radiological examinations;[16] and decreased quality of hospital care.[17] Stelfox *et al.* reported that patients placed under contact precautions were eight times more likely to experience supportive care failures (e.g. falls, pressure ulcers, and fluid or electrolyte disturbances) than patients who were not placed under contact precautions.[13] Unfortunately, the prevalence of MRSA and VRE infection has increased in acute care, chronic care and community settings, thus increasing the number of patients at risk of potential complications from contact precautions.

On 1st November 2010, the infection control policy of the University of Massachusetts Memorial Medical Center, Worcester, MA, USA was changed to discontinue the use of contact precautions among patients colonized or infected with MRSA or VRE (MRSA/VRE patients). Noting the work of Stelfox *et al.*,[13] the impact of the policy change on rates of falls and new-onset pressure ulcers among MRSA/VRE patients compared with the general patient population was studied. It was hypothesized that the rates of complications would decrease among MRSA/VRE patients, and the rate of hospital-acquired MRSA or VRE transmission would remain constant.

Methods

Design and setting

On 1st November 2010, the University of Massachusetts Memorial Medical Center discontinued the use of contact precautions for MRSA/VRE patients. Patients colonized or infected with selected multi-drug-resistant organisms (e.g. extended-spectrum beta-lactamase-positive or carbapenemase-positive Gram-negative organisms, other highly multi-drug-resistant Gram-negative bacteria or vancomycin-resistant *S. aureus*), as well as those soiling the environment with secretions due to active draining wounds, diarrhoeal disease or uncontrolled respiratory secretions, continued to be placed under contact precautions.

All adult patients were reviewed retrospectively one year before and one year after the policy change at the University of Massachusetts Memorial Medical Center (Memorial and University campuses). The hospital-wide cohort study was approved by the University of Massachusetts Medical School Institutional Review Board.

Study participants and data collection

All patients admitted to the University of Massachusetts Memorial Medical Center adult medical-surgical inpatient units from 1st November 2009 to 31st October 2011 were included in this study. Paediatric, maternity and psychiatric inpatient wards were excluded. Patients who fell or developed a new-onset Stage 2 (or greater) pressure ulcer during hospitalization were identified through mandatory reports entered into the web-based incident reporting system (STARZ, Chicago, USA). Only one fall and one pressure ulcer per admission were included amongst patients with multiple events. All MRSA/VRE patients admitted during the study period were identified using an infection control data management system (Theradoc, Salt Lake City, USA). All colonized or infected inpatient falls and pressure ulcers were identified at least two days after MRSA or VRE identification. As the study objective was to assess the impact of contact precautions, MRSA/VRE patients who were placed under contact precautions for other reasons after the policy change were excluded from the analysis. The total number of MRSA and VRE patient-days was calculated from Theradoc, and the total number of adult medical-surgical patient-days was calculated from hospital census data.

Hospital MRSA and VRE acquisition rates were calculated using the standard CDC national healthcare safety network definition for all actively and passively obtained cultures.[18] Active surveillance was performed on admission and weekly for both MRSA and VRE in the institution's seven adult intensive care units, and for VRE alone in the bone marrow transplant unit. Passive surveillance for MRSA and VRE was performed throughout the study period in all other inpatient units.

Patient characteristics including age, gender, date and unit of occurrence, length of hospital stay and Braden scale score[19] (risk for pressure ulcer development) were obtained from STARZ, and the Charlson comorbidity index was calculated through medical record review.

Outcome measures

First, the rates of falls and pressure ulcers among adult MRSA/VRE patients were compared before and after the policy change. In addition, the rates of falls and pressure ulcers among adult MRSA/VRE patients were compared with the rates among other adult medical-surgical patients before and after the policy change. Further, due to the association between disease severity and the occurrence of falls[20] and pressure ulcers,[21] the degree of comorbidity in MRSA/VRE patients was compared with the degree of comorbidity in other medical-surgical patients using the Charlson comorbidity index.[22] Finally, the impact of the policy change on hospital-associated MRSA and VRE transmission was assessed.