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Impact of active surveillance on meticillin-resistant *Staphylococcus aureus* transmission and hospital resource utilisation

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Summary The utility of active surveillance cultures (ASCs) for meticillin-resistant *Staphylococcus aureus* (MRSA) has been a controversial aspect of infection prevention. This prospective cohort study analyses the effect of ASCs for MRSA on hospital-acquired infections in a tertiary care hospital (hospital 1) and a community-based hospital (hospital 2). Both hospitals have high MRSA prevalence and are part of a large healthcare system in southeastern Michigan. Hospital-acquired infections in the intensive care unit (ICU) and in the rest of the hospital were compared before and after the implementation of ASCs in the ICUs. Patients in hospital 1 with evidence of MRSA colonisation from ASCs were placed in contact isolation during their stay in the ICU; patients from hospital 2 remained in contact isolation throughout their hospital stay. Prevalence of MRSA colonisation on admission to the ICU was 23% and 13% in hospitals 1 and 2, respectively. Average incidence of new colonisation during the study period was 1.85 per 1000 patient-days and 3.47 per 1000 patient-days in hospitals 1 and 2, respectively. A decrease in ventilator-associated pneumonia (VAP) occurred in both hospitals, whereas decrease in

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hospital-wide nosocomial MRSA infection was demonstrated only in hospital 2. We conclude that, in addition to standard infection prevention initiatives, ASC with contact precautions can be effective in reducing the incidence of VAP and nosocomial MRSA infection in healthcare communities with endemic MRSA.

Introduction

Infection and colonisation with meticillin-resistant *Staphylococcus aureus* (MRSA) have been associated with significant morbidity and mortality.[1,2] The cost associated with treatment of hospital-acquired MRSA infections is higher relative to treating other less resistant bacteria such as meticillin-susceptible *S. aureus*.[3–5] Finally, the increasing use of antimicrobial agents with activity against MRSA may be contributing to the emergence of more resistant pathogens such as vancomycin-intermediate-resistant *S. aureus*, vancomycin-resistant *S. aureus*, and vancomycin-resistant enterococcus.[6–8]

Infection prevention measures are thus necessary to decrease the spread of MRSA. Prior studies have shown conflicting results, making the utility of universal active surveillance cultures (ASCs) controversial.[9] Recent practice recommendations from the Society for Healthcare Epidemiology of America and Infectious Diseases Society of America as well as the Centers for Disease Control and Prevention (CDC) advocate a tiered approach, reserving surveillance cultures for situations in which other infection control measures have not been successful and only in patients who are at high risk.[10]

Multiple advances have been made in infection control practices for MRSA. In 2006 the Keystone group developed an infection control bundle to reduce the incidence of bloodstream infections (BSIs). This BSI bundle, which was employed during insertion of central venous catheters, included hand washing, chlorhexidine skin preparation, full-barrier precautions, the avoidance of the femoral vein as an insertion site, and prompt removal of unnecessary central access sites. A ventilator-associated pneumonia (VAP) bundle has likewise been developed which included maintaining the head of the bed at 30 degrees, sedation vacation with daily weaning trials, peptic ulcer prophylaxis, deep venous thrombosis prophylaxis and tight glycaemic control.

The Henry Ford Health System is an integrated group of hospitals across southeastern Michigan that consists of one tertiary care teaching hospital in urban Detroit and a number of satellite urban and suburban community hospitals. MRSA has been endemic in this particular geographic area and has been complicated with therapeutic challenges due to the emergence of *S. aureus* strains with reduced susceptibility to vancomycin.[6–8,11,12] To contain MRSA and eradicate nosocomial MRSA transmission is a major goal for infection control programmes. However, how best to do this remains unclear. Active surveillance cultures are a method to control MRSA transmission, but there remains no conclusion on how to proceed with it. The majority of studies on ASCs for MRSA were performed at tertiary care centres and may not be applicable to community hospitals.

This prospective cohort study was performed to evaluate the utility of adding ASCs for MRSA in the ICUs to standard infection prevention protocols in two different kinds of healthcare settings, a tertiary care hospital and a community-based hospital in the Henry Ford Health System located in southeastern Michigan.

Methods

Study design

We conducted a prospective cohort study to determine the utility of ASCs for MRSA on patients admitted to the ICUs in two hospitals. Hospital 1 is a 903-bed teaching facility located in Detroit, Michigan, with multi-organ transplant centre, level 1 trauma centre, and 124-bed ICU complex. The ICU complex is divided into medical, cardiac, surgical and neurosurgical units. The 16-bed cardiac ICU was excluded in the study due to low rate of MRSA infection. Hospital 2 is a 379-bed community hospital serving the southwestern Detroit suburbs. It provides a full range of clinical services including critical care with a 47-bed general ICU. In total, the ASC intervention was carried out in four ICUs with 171 beds. Both hospitals received approval from the Henry Ford Health System Investigational Review Board.