

## Methicillin-resistant *Staphylococcus aureus*: risk assessment and infection control policies

E. Tacconelli

Department of Infectious Diseases, Catholic University, Rome, Italy

### ABSTRACT

The endemic state of methicillin-resistant *Staphylococcus aureus* (MRSA) occurs through a constant influx of MRSA into the healthcare setting from newly admitted MRSA-positive patients, followed by cross-transmission among inpatients and an efflux of MRSA from the hospital with discharged patients. To date, most MRSA prevention strategies have targeted cross-transmission among hospitalised patients. Intensive concerted interventions that include isolation can reduce the MRSA incidence substantially. However, debate continues about the cost-effectiveness of infection control policies, including screening protocols, to control the influx of MRSA into hospitals. The rationale and cost-effectiveness of wide screening, as compared to targeted screening, should be further studied using appropriate statistical approaches and economic modelling.

**Keywords** Infection control, methicillin resistance, MRSA, risk-factors, screening policies, *Staphylococcus aureus*

*Clin Microbiol Infect* 2008; **14**: 407–410

Methicillin-resistant *Staphylococcus aureus* (MRSA) has been a common nosocomial pathogen since the 1960s and is now a major problem in hospitals worldwide [1]. A recent study of 216 644 inpatients in the UK revealed that rates of *S. aureus* bacteraemia rose significantly between 1997 and 2003, and that MRSA was responsible for this increase [2]. In 2005, the European Antimicrobial Resistance Surveillance System (EARSS) reported percentages of methicillin resistance ranging from 0% in Iceland to 61.4% among *S. aureus* isolates in Romania (<http://www.earss.rivm.nl>). In the same year, data from The Surveillance Network-USA (TSN), which collects data from 300 clinical microbiology laboratories across the USA, reported MRSA rates of 59%, 55% and 48% for isolates from non-intensive care unit (ICU) inpatients, ICU patients and outpatients, respectively [3]. However, a recent systematic review of policies for the hospital management of MRSA demonstrated that intensive concerted interventions that include isolation policies can substantially reduce MRSA rates, even in settings with a high level of endemic MRSA [4].

To develop effective prevention strategies, it is first necessary to understand the various components responsible for an endemic state. In recent years, MRSA has been diagnosed with increasing frequency upon hospital admission [5]. In a cohort study of 127 patients with MRSA bacteraemia diagnosed upon admission, independent risk-factors included a history of MRSA colonisation or infection within the preceding 90 days, the presence of a central venous catheter (CVC), and skin ulcers or cellulitis [5]. These 'community-acquired' MRSA strains arise from two different patient populations: those with true community-acquired MRSA strains that have emerged *de novo* from community-based *S. aureus* strains, and health-care-associated strains that have been acquired during a previous exposure to a healthcare setting or intervention. The latter patient population is twice as likely to harbour MRSA than individuals without exposure to a healthcare setting [6]. Once admitted to the hospital, this patient population can serve as an important reservoir of MRSA, contributing substantially to patient-to-patient transmission and to MRSA dissemination. The CDC has recently updated guidelines for preventing transmission of infectious agents in healthcare settings (<http://www.cdc.gov/ncidod/dhgp/pdf/isolation2007.pdf>). Among other changes, the term

Corresponding author and reprint requests: E. Tacconelli, Istituto Clinica Malattie Infettive, Università Cattolica, L.go F. Vito 8, 00164 Rome, Italy  
E-mail: [etacconelli@rm.unicatt.it](mailto:etacconelli@rm.unicatt.it)

'nosocomial infections' is replaced by 'healthcare-associated infections' to reflect changing patterns in healthcare delivery and the difficulty in determining the geographical site of exposure to an infectious agent and/or acquisition of infection. For physicians, this new categorisation of infections has a significant impact on the choice of empirical therapy for infections diagnosed upon admission and on infection control policies.

Whether MRSA screening upon admission is worthwhile remains a matter of debate. UK and US guidelines recommend that patients should be screened routinely before admission to an ICU in a hospital where MRSA is endemic [7,8]. In an endemic setting in France, where the prevalence of MRSA carriage upon ICU admission was 7%, risk-factors associated with MRSA carriage were an age >60 years, transfer from other departments or hospitals, prolonged hospitalisation in other wards, previous hospitalisation for surgery, and the presence of open skin lesions. Using a cost-benefit analysis, it was demonstrated that universal screening and isolation were beneficial in this setting [9]. Another study evaluated the impact of different components of a screening programme for MRSA carriers upon hospital admission on the value of two risk-adjusted rates: the proportion of imported MRSA as an indicator of the MRSA colonisation pressure, and the incidence of nosocomial MRSA [10]. Screening patients with risk-factors resulted in a 51% increase in the calculated proportion of imported strains and a 58% decrease in the indicator of the MRSA colonisation pressure.

In 2006, legislation that made mandatory the use of active surveillance cultures to screen hospitalised patients for colonisation by MRSA and vancomycin-resistant enterococci were introduced in two US states. In response, the Society for Healthcare Epidemiology of America (SHEA) and the Association for Professionals in Infection Control and Epidemiology Inc. (APIC) developed a position statement asserting that, although evidence supporting the use of active surveillance for high-risk patients and during outbreaks is available, there is insufficient evidence to justify the mandatory use of this control measure. The lack of support for this legislation is related to the uncertainties and the potential unintended consequences, which include the exclusion of local

infection control professionals from their role in leading risk assessments and resource allocation, the still open controversies regarding the epidemiological, biological and clinical implications of active surveillance, and the potential negative effects on patients of contact isolation [11]. Targeted surveillance of the highest-risk patients in medical or surgical wards might be a more effective use of resources. In a surveillance study, independent risk measures for MRSA upon admission were a previous stay in a nursing home, previous MRSA infection, and a third variable, representing the combined effects of homelessness, imprisonment, promiscuity, and intravenous and other drug use. Multivariable models had greater sensitivity for detecting MRSA upon admission than any single risk measure, and allowed detection of 78–90% of MRSA strains from admission surveillance cultures for 46–58% of admissions [12].

Risk-factors for nosocomial MRSA have been extensively studied and include underlying disease, previous hospitalisation, use of antimicrobial agents, surgery, length of hospitalisation, a CVC and endotracheal intubation, enteral feeding, admission to the ICU, high nursing staff workload, and non-compliance with hand disinfection procedures [13,14]. A 12-month Italian multicentre study of 864 inpatients starting antibiotic treatment revealed that the incidence of newly acquired nasal colonisation by MRSA per 1000 days of therapy was 8.2 for macrolides, 7.9 for carbapenems, 3.2 for glycopeptides, 3.1 for quinolones, and 2.4 for third-generation cephalosporins. The highest rates were revealed for carbapenem use in diabetic and dialysed patients (47th Interscience Conference on Antimicrobial Agents and Chemotherapy, Chicago, 2007; C2-2037). A 1-year study in an ICU in a university hospital in the UK [15] revealed that urgent admission, high APACHE II score at 24 h, bronchoscopy and days of staff deficit were all independent risk-factors for nosocomial MRSA acquisition. Staff shortage was the only factor associated significantly with cross-transmission. It was predicted that a 12% improvement in adherence to hand hygiene guidelines might have compensated for staff shortage and prevented transmission during periods of overcrowding, shared care and high workload, but this would be difficult to achieve.

Download English Version:

<https://daneshyari.com/en/article/3398680>

Download Persian Version:

<https://daneshyari.com/article/3398680>

[Daneshyari.com](https://daneshyari.com)