



ELSEVIER



www.elsevierhealth.com/journals/jinf

# Is MRSA admission bacteraemia community-acquired? A case control study<sup>☆</sup>

Ruth Miller<sup>a</sup>, Hanif Esmail<sup>c</sup>, Tim Peto<sup>a</sup>, Sarah Walker<sup>c</sup>,  
Derrick Crook<sup>b</sup>, David Wyllie<sup>b,\*</sup>

<sup>a</sup> Nuffield Department of Medicine, University of Oxford, John Radcliffe Hospital, Oxford, UK

<sup>b</sup> Nuffield Department of Clinical Laboratory Sciences, University of Oxford, John Radcliffe Hospital, Oxford OX3 9DU, UK

<sup>c</sup> Department of Microbiology, University of Oxford, John Radcliffe Hospital, Oxford, UK

Accepted 10 December 2007

Available online 1 February 2008

## KEYWORDS

Healthcare associated  
infection;  
Bacteraemia;  
MSSA;  
MRSA

**Summary Objectives:** To compare characteristics of methicillin resistant *Staphylococcus aureus* (MRSA) and methicillin susceptible *S. aureus* (MSSA) bacteraemia detected on admission to a UK hospital and to determine whether these organisms are community-acquired.

**Methods:** Consecutive cases of MRSA bacteraemia admitted to general medicine between 2003 and 2006 were identified and compared to MSSA age-matched and unmatched controls (35, 35 and 34 patients, respectively). Demographics, MRSA risk factors, previous health-care contact and clinical presentation were compared using patient notes. Multi-locus sequence typing was performed.

**Results:** 34/35 strains of admission MRSA bacteraemia were the health-care associated Sequence Types (ST)-22 (77%) or ST-36 (21%), whereas 20 different MSSA strains were identified. No MRSA cases fitted the CDC definition of community-acquired MRSA. Compatible with health-care associated acquisition, after matching for age MRSA cases had significantly higher levels of previous hospital exposure than MSSA controls, and more co-morbidities. Notably, 63% of MRSA cases were admitted from their own home, as opposed to secondary care facilities. Clinical presentation of MRSA and MSSA bacteraemias was similar.

**Conclusions:** MRSA strains associated with health-care were responsible for almost all cases of MRSA bacteraemia on admission to hospital during the period studied. Despite this the majority of cases with MRSA admission bacteraemia were admitted from their own homes. Further research is needed into the determinants of MRSA bacteraemia among patients outside hospital.

© 2007 The British Infection Society. Published by Elsevier Ltd. All rights reserved.

<sup>☆</sup> An abridged version of this paper has been submitted as an abstract for a poster to FIS 2007.

\* Corresponding author. Tel.: +44 1865 221226; fax: +44 1865 220524.

E-mail address: david.wyllie@ndcls.ox.ac.uk (D. Wyllie).

## Introduction

*Staphylococcus aureus* remains a key human pathogen,<sup>1</sup> with diverse clones existing among both methicillin sensitive (MSSA) and methicillin resistant (MRSA) organisms.<sup>2</sup> A recent change with major clinical implications is the appearance of MRSA clones able to spread in the community causing infection among previous healthy individuals without hospital contact.<sup>3</sup> These community-acquired (CA-MRSA) strains are prevalent in the USA where they present largely as skin and soft tissue infections in discrete populations.<sup>3,4</sup> Small clonal community-based outbreaks have also recently been reported in the UK.<sup>5</sup> If circulating in the community, these strains might be most easily identifiable within hospital isolates from infections presenting shortly after admission. Such admission infections accounted for 27% of the total MRSA bacteraemias reported in England and Wales in 2006/7,<sup>6</sup> a similar proportion to two Oxfordshire hospitals from 1997 to 2003.<sup>7</sup>

The UK epidemic of health-care associated Multi Locus Sequence Type (MLST) Sequence Type (ST)-22 and ST-36 MRSA has been ongoing since 1990.<sup>8</sup> Whilst we previously noted hospital exposure to be common in individuals admitted with *S. aureus* bacteraemia,<sup>9</sup> given the increasing prevalence of CA-MRSA globally it is unclear whether this remains the case. Additionally, despite the important contribution of admission *S. aureus* bacteraemia to total *S. aureus* bacteraemia, no detailed study has described the demographics, characteristics, clinical presentation and strain diversity among these MRSA cases in the UK, and differences between MRSA and MSSA admission bacteraemia are unclear.

We have therefore conducted a clinical and molecular study of *S. aureus* admission bacteraemias, particularly considering whether the organism was likely to be community acquired, rather than associated with hospital or other health-care contact.<sup>10</sup> In order to exclude any potential health-care associated routes of *S. aureus* transmission, a sensitive definition of health-care exposure is required. Diverse definitions have been used previously, which complicate comparisons;<sup>10</sup> here we used the widely accepted and stringent US Centres for Disease Control (CDC) definition (see Box 1).<sup>11</sup> We investigated characteristics

differentiating MRSA and MSSA infection among those patients admitted with *S. aureus* bacteraemia.

## Method

### Case and control selection

Individuals were included if they had MRSA (case) or MSSA (control) bacteraemia on admission to the general medical service of the Oxford Radcliffe Hospital Trust, Oxford between April 2003 and September 2006. This group was chosen because they are responsible for most admission MRSA bacteraemias in our centre.<sup>7</sup> Admission bacteraemia was defined as *S. aureus* isolated from blood cultures taken within 48 h of arrival; consistent with the CDC definition of CA-MRSA<sup>11</sup> and UK mandatory surveillance.<sup>6</sup> Cases comprised all consecutive MRSA isolates meeting inclusion criteria, selected from electronic records. Two groups of MSSA admission bacteraemia controls were identified. One was unmatched and consisted of an equal number of MSSA admission bacteraemias selected randomly from the same time period. The second group was age-matched with age within 6 years of each MRSA case. Age-matched controls were re-sampled until every MRSA case had an age-matched control.

### *S. aureus* characteristics

A structured questionnaire identifying demographics, risk factors for *S. aureus* infection,<sup>10–15</sup> previous health-care contact, clinical presentation and medication was completed from case notes by two independent reviewers, resolving disagreements by consensus. Previous hospital admissions to the Oxford Radcliffe Hospital Trust (including the Horton General Hospital, Banbury) and MRSA isolation were determined from electronic records from 1997 onwards. If previous hospital admissions were not recorded electronically and were also not recorded in patient notes (where admission to other hospitals were also identified), patients were assumed not to have been admitted to any hospital in the last 3 years, and were censored at this time point. Four separate measures of health-care contact were considered; (i) previous hospital exposure, including time since most recently in hospital and length of time spent in hospital in the last year. (ii) health care portals of entry, any of: invasive surgery or intervention in the last year, concurrent vascular access, current use of a urinary catheter, any previous renal dialysis or any previous admission into an intensive care unit; (iii) co-morbidity score from 0 to 6, with one point for each of the following concurrent conditions: diabetes, heart failure, oral steroids, vascular disease, chronic obstructive pulmonary disease (COPD) and chronic renal failure; (iv) the measures of health-care contact listed in the CDC CA-MRSA definition (Box 1).<sup>11</sup>

### Microbiology

*S. aureus* isolates were recovered from glycerol stocks. Identity and sensitivity testing was performed using

#### Box 1. CDC definition of Community Acquired MRSA

- MRSA diagnosed in outpatient or within 48 h after admission to hospital
- No medical history of MRSA infection or colonisation
- No history in the past year of
  - Hospitalisation
  - Admission to a nursing home, skilled nursing facility, or hospice
  - Dialysis
  - Surgery
- No permanent indwelling catheters or medical devices that pass through the skin into the body<sup>1</sup>

Download English Version:

<https://daneshyari.com/en/article/3375619>

Download Persian Version:

<https://daneshyari.com/article/3375619>

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