HEALTHCARE- ASSOCIATED METHICILLIN- RESISTANT *STAPHYLOCOCCUS AUREUS* (MRSA) INFECTIONS IN SINGAPORE

By Goh Helen

ABSTRACT

This paper presents the incidence of healthcare-associated MRSA (HA-MRSA) infections in public sector acute care hospitals in Singapore from 2002 to 2006.

INTRODUCTION

2 *Staphylococcus aureus* is a species of bacterium commonly found on the skin and/or in the noses of healthy people. Although it is usually harmless at these sites, it may occasionally enter the body (eg through breaks in the skin such as abrasions, cuts, wounds, surgical incisions or indwelling catheters) and cause infections. These infections may be mild (eg pimples or boils) or serious (eg infection of the bloodstream, bones or joints).

3 MRSA stands for methicillin-resistant *Staphylococcus aureus*, which is a type of *Staphylococcus aureus* that is resistant to the antibacterial activity of methicillin and other related antibiotics of the penicillin class. Most staphylococcal infections occur in patients with weak immune systems, usually patients in hospitals and long-term care facilities. MRSA infections in hospitalized patients are known as healthcare-associated MRSA (HA-MRSA).

4 HA-MRSA is endemic in countries such as UK and USA. For example a US Centers for Disease Control (CDC) study (conducted in 2005) based on hospital discharge data estimated that in 1999-2000, nearly 126,000 people were hospitalized each year for MRSA infections, a rate of nearly 4 per 1,000 hospital discharges². The Association for Professionals in Infection Control and Epidemiology

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¹ Goh Helen is a Manager with the Clinical Quality Improvement Division, Health Care Performance Group, MOH.
(APIC)’s nationwide study of 1,237 U.S. health care facilities (a one-day snapshot), showed the MRSA prevalence rates (2007) to be at least 46 cases per 1,000 patients\(^3\). This rate includes patients with new infections as well as those with existing infections (eg infections which started outside of the hospital).

5 This occasional paper presents the incidence of new HA-MRSA infections in our acute care hospitals.

**DEFINITION**

6 The rate of HA-MRSA is calculated using CDC’s NNIS methodology.\(^4\)

\[
\text{Incidence Rate: } \frac{\text{Number of new MRSA infections/ month on the unit}}{\text{Number of In- patient days on that unit/ month}} \times 1000
\]

\[
\text{Number of new MRSA infections/ month on the unit} \times 1000
\]

\[
\text{Number of Discharges and Deaths on that unit/ month}
\]

_The National Nosocomial Infections Surveillance (NNIS) system defines a nosocomial infection as a localized or systemic condition that a) results from adverse reaction to the presence of an infectious agent(s) or its toxin(s) and b) was not present or incubating at the time of admission to the hospital. For most bacterial nosocomial infections, this means that the infection usually becomes evident 48 hours (i.e., the typical incubation period) or more after admission\(^5\). The diagnosis of nosocomial infection is thus a combination of clinical findings and results of laboratory and other tests._

**OUTCOMES**

7 In public acute care hospitals the incidence of MRSA infection has been around 0.5 per thousand patient days since 2003. This measure relates the infection as a function of bed occupancy (or length of stay). The incidence of MRSA infection per thousand discharges and deaths decreased from 3.0 in 2002 to 2.5 in 2006. This measure relates infection as a function of the total volume of patients.

8 There are significant differences in MRSA infection rates between hospitals (Tables 1 and 2). The differing rates may be a reflection of the different casemix between the hospitals as their infection rates will be affected by their proportion of patients that are at risk for MRSA infections\(^6\):

- a. older patients with chronic diseases and have recent hospital admissions
- b. special populations such as patients in intensive care units (ICUs) and burn units

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\(^5\) However, because the incubation period varies to some extent with the patient's underlying condition, each infection must be assessed individually for evidence that links it to the hospitalization

c. respiratory infections, diabetes, dialysis, prolonged hospital stay, IV drug use, prior antimicrobial therapy etc.

Table 1.
Incidence of MRSA Infections in Public Acute Care Hospitals
Per 1000 Patient Days

<table>
<thead>
<tr>
<th></th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
</tr>
</thead>
<tbody>
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<td>0.6</td>
<td>0.5</td>
<td>0.5</td>
<td>0.5</td>
<td>0.5</td>
</tr>
<tr>
<td>Alexandra Hospital</td>
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<td>0.3</td>
<td>0.3</td>
<td>0.2</td>
<td>0.3</td>
</tr>
<tr>
<td>National University Hospital</td>
<td>0.8</td>
<td>0.8</td>
<td>0.9</td>
<td>0.8</td>
<td>0.7</td>
</tr>
<tr>
<td>Tan Tock Seng Hospital</td>
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<td>0.6</td>
<td>0.6</td>
<td>0.6</td>
<td>0.5</td>
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<td>0.1</td>
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<tr>
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<td>0.03</td>
<td>0.1</td>
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<td>0.1</td>
</tr>
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<td>Singapore General Hospital</td>
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<td>0.7</td>
<td>0.8</td>
<td>0.7</td>
</tr>
</tbody>
</table>

Table 2.
Incidence of MRSA Infections in Public Acute Care Hospitals
Per 1000 Discharges and Deaths

<table>
<thead>
<tr>
<th></th>
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<th>2005</th>
<th>2006</th>
</tr>
</thead>
<tbody>
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<td>2.7</td>
<td>2.6</td>
<td>2.5</td>
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<td>1.7</td>
<td>1.8</td>
<td>1.2</td>
<td>1.6</td>
</tr>
<tr>
<td>National University Hospital</td>
<td>4.0</td>
<td>4.2</td>
<td>4.1</td>
<td>3.7</td>
<td>3.2</td>
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<tr>
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<td>4.1</td>
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<td>3.6</td>
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<tr>
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</tr>
<tr>
<td>Kandang Kerbau Hospital</td>
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<td>0.3</td>
<td>0.3</td>
</tr>
<tr>
<td>Singapore General Hospital</td>
<td>5.9</td>
<td>5.2</td>
<td>4.0</td>
<td>4.5</td>
<td>4.0</td>
</tr>
</tbody>
</table>

9 The National Health Service (NHS), UK reports MRSA bloodstream infections (bacteraemias) – a subset of more serious MRSA infections. Similar to our local data, significantly different rates of infection were observed between acute teaching hospitals and acute specialist (children) hospitals (0.17 per 1000 bed days compared to 0.03 per 1000 bed days, respectively, from Oct 2006-Mar 2007). Their data also showed significant difference across specialties with nephrology having the highest rate of MRSA bacteremia of 0.32 per 1000 bed days.7

Measures taken in addressing HA-MRSA in our local setting

10 Our hospitals have introduced several measures to tackle HA-MRSA such as:
   a. Active surveillance of high-risk patients. Patients entering and leaving the ICU, patients who came from other healthcare institutions (eg. step-down facilities) and admitted to the general ward, and patients with chronic

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* Public sector data does not include IMH’s data
7 http://www.hpa.org.uk/infections/topics_az/hai/Mandatory_Results.htm
wounds are screened for MRSA. These patients are either isolated or cohorted and managed with the appropriate infection control precautions (in accordance to the institution’s MRSA protocol)
b. Emphasis on infection control measures, in particular hand hygiene. Hospitals have made handwashing facilities and alcohol hand rubs easily available at each point of care with regular reminders.  
c. Training and equipping healthcare personnel. MOH and the hospitals have been inviting overseas experts from CDC, Joint Commission International (JCI) etc to address issues such as nosocomial infection surveillance for hospitals, antimicrobial resistance and improving infection control measures

CONCLUSION
11 Our MRSA infection rates have remained relatively stable through a programme of surveillance, benchmarking and quality improvement. Nevertheless we recognize that hospital acquired infections remain a significant issue and there is always room for further improvement. It is thus important for healthcare institutions to remain vigilant and continue to improve and sustain their infection control efforts.

Feedback to MOH

If you have any comments or questions on the information paper, you can either email us directly at moh_info@moh.gov.sg. Alternatively, you can also fax or write to us at:

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