ORIGINAL ARTICLE

Methicillin-resistant *Staphylococcus Aureus* (MRSA) in a Malaysian Hospital

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Summary

Between August 1990 to November 1991, 905 of 2583 (35.4%) isolates of *Staphylococcus aureus* were found to be methicillin-resistant in a general hospital in Malaysia. A detailed study of 539 of these isolates showed a high prevalence of methicillin resistant Staphylococcus aureus (MRSA) in the surgical/orthopaedic wards, paediatric wards and the special care unit. The yield of MRSA was highest from wounds/ulcers/skin swabs accounting for 64.2 per cent followed by 6.9 per cent in blood cultures. Vancomycin remains the drug of choice with no resistance detected. The resistance to ciprofloxacin was 6.7 per cent, rifampicin 4.5 per cent and fusidic acid 2.0 per cent. Most isolates were resistant to aminoglycosides. In view of the high prevalence of MRSA in this hospital, the authorities must introduce more effective measures to control its spread as a nosocomial pathogen. Otherwise it may seriously disrupt the efficient delivery of health care services in the country.

Key words: Methicillin-resistant Staphylococcus aureus, Nosocomial infection.

Introduction

Methicillin-resistant *Staphylococcus aureus* (MRSA) was first recognised more than 20 years ago[1]. It has since become an increasing clinical problem worldwide both in community-acquired and nosocomial infection[2]. In the 1960s, the sporadic isolation of MRSA in most countries was usually associated with small isolated outbreaks in hospitals. However, since the mid 1970s, an increasing incidence of hospital colonisation and outbreaks of severe infection with MRSA have been reported from many countries including USA, Europe, Japan, Hong Kong and Australia [3, 4, 5, 6, 7, 8]. Most strains of MRSA appear to possess similar virulence as methicillin-sensitive *Staphylococcus aureus*, causing invasive disease and bacteraemia. Immunocompromised patients are more prone and the resultant invasive infection is often associated with a high mortality. Vancomycin remains the drug of choice for MRSA infection, although treatment failures have occurred[9, 10].

Methicillin-resistant *Staphylococcus aureus* is also an important nosocomial pathogen in Malaysia occurring in 10 - 20 per cent of hospitals surveyed[11]. A local university hospital reported a prevalence of MRSA of 3 per cent in 1971 but this figure has increased to 21 per cent by 1985[12].

This paper describes our experience with MRSA isolates at the General Hospital, Kuala Lumpur, Malaysia from August 1990 to November 1991.

Materials and Method

This was a prospective study conducted at the Kuala Lumpur Hospital, a 3,000-bed tertiary referral centre for the country and the teaching hospital for Faculty of Medicine, Universiti Kebangsaan Malaysia. The Division of Microbiology of the hospital received a total of 166,364 specimens for culture in 1991.

Microbiology

Staphylococcus aureus isolates were identified by morphology, latex agglutination (Wellcome) and by the production of catalase and coagulase from the cultures obtained daily in the Microbiology Laboratory. Antibiotic sensitivity testing was performed by the comparative disc-diffusion method (modified Stokes method)[13] on Diagnostic Sensitivity test agar (Oxoid) incubated at 37°C using *S. aureus* NCTC 6571 as a control. The disc contains the following antibiotics: penicillin, 1 unit; erythromycin, 5 ug; gentamicin, 10 µg; cotrimoxazole, 25µg; fisidic acid, 10 µg; netilmicin, 30µg; amikacin 30µg; rifampicin, 2µg; ciprofloxacin, 5µg and vancomycin, 30µg. Methicillin-resistant *Staphylococcus aureus* was identified when the isolates were resistant to disc containing 10µg methicillin on Diagnostic Sensitivity test agar incubated overnight at 30°C. We were unable to do phage-typing or plasmid profiling for the isolates.

Results

Specimens were received from a total of 72 wards in the hospital covering 18 disciplines. During the study period, there were 2,586 isolates of *Staphylococcus aureus* of which 905 (35.5%) were MRSA. The material for this report was obtained from a detailed analysis of 539 isolates.

The isolates were from 360 males and 179 females of which 269 were Malays (50.8%), 145 Chinese (26.9%), 117 Indians (21.7%) and eight others.

One hundred and thirty (24.1%) isolates were from patients less than one year of age, 48 (9.0%) from 1-12 years, 222 (41.2%) from 13-45 years and the remainder 139 (25.8%) were from patients more than 46 years of age.

The sources of MRSA isolates are shown in (Table I).

The type of specimens from which MRSA was isolated were: peritoneal fluid, nine; blood, 37; respiratory tract (bronchial aspirate, tracheotomy, sinuses, nasopharynx, pleural fluid), 31; ears, 11; eyes, 22; cerebral spinal fluid, 13; throat, six; wounds/ulcers/skin, 346; umbilicus, 14; urine, 12 and miscellaneous (bile juice, CVP lines and other tissue) 38.

The antibiotic sensitivity pattern of the MRSA isolates is shown in (Table II).

None of the isolates were resistant to vancomycin in-vitro. The majority were resistant to the aminoglycosides. Five isolates were resistant to both ciprofloxacin and rifampicin, and two to fusidic acid and rifampicin. Only one isolate was resistant to all three.

Table I
Distribution of sources of MRSA isolates by discipline at the General Hospital, Kuala Lumpur

Discipline	No. of isolates
Cardiothoracic	22
Orthopaedic	116
Paediatric (Special care nursery)	142
Surgery (& Plastic)	61
Medical	46
Urology/Nephrology	72
Neurology	51
Intensive Care Unit	10
Oncology	8
ENT/Eye/Dental	9
Gynaecology	1
Psychiatry	1
Total	539

Table II
Sensitivity pattern of 539 MRSA isolates at the General Hospital, Kuala Lumpur

Antibiotics	n	Sensitive	Resistant (%)
Cotrimoxazole	302	84	218 (71.0)
Erythromycin	539	16	523 (97.0)
Fusidic acid	539	528	11 (2.0)
Gentamicin	539	7	532 (98.7)
Netilmicin	539	33	506 (94.4)
Amikacin	539	59	480 (89.0)
Rifampicin	539	515	24 (4.5)
Vancomycin	539	539	0 (00.0)
Ciprofloxacin	539	503	36 (6.7)
Penicillin	539	0	539 (100.0)

Discussion

There has been a marked increase in the prevalence and clinical significance of MRSA infection since the mid-1970s. Its prevalence rate varies widely depending on the geographical location and hospital characteristics[8, 14, 15, 16]. These organisms are difficult to eradicate once they are established in the hospital.

In Malaysia MRSA has been isolated from patients at the Kuala Lumpur Hospital since 1978[11]. The present report highlights the growing problem of MRSA in the Kuala Lumpur Hospital. During the study period, 35.5 per cent of all clinical isolates of *Staphylococcus aureus* were MRSA. (As some specimens may have come from the same patient, this figure may be an overestimation). The organism was isolated from all the races without sparing any particular age groups although it seems to be common in both extremes of lives. The large number of isolates from the orthopaedic, surgical and urology wards was not unexpected. However the increasing frequency in the paediatric wards and the special care nursery is a cause for concern. As we do not have facilities for phage-typing or plasmid profiling, we were unable to determine whether the isolates came from a single source or from multiple sources. The yield of MRSA was highest from wounds/ulcers/skin swabs accounting for 64.2 per cent followed by 6.9 per cent in blood cultures. This pattern is in keeping with the fact that even though MRSA was frequently isolated, the majority of cases had been present as a coloniser, or as minor superficial infection. Severe infections were uncommon. MRSA bacteraemia was seen mainly in neonatal sepsis, osteomyelitis, endocarditis and cancer patients. There are many reasons for the high prevalence of MRSA in our hospital. It is primarily due to the difficulties in maintaining an adequate standard of hygiene in a very large crowded tertiary hospital. Cross-infections from the large number of staff members who may be asymptomatic carriers of MRSA may also be an important factor. Although patients serve as reservoirs for MRSA, the medical personnel are often the vectors. In several epidemics, the MRSA carrier rate of doctors and nurses has been noted to be very high[17]. MRSA infections have been shown to occur with increasing frequency in medical school affiliated hospitals[18]. In this context, it may be significant that the hospital became the teaching school of Universiti Kebangsaan of Malaysia in 1977, a year before the first isolate of MRSA.

It is reassuring that many of the isolates in this study remain sensitive to the standard anti-MRSA antibiotics available in the hospital namely vancomycin, rifampicin and fusidic acid. However, other drugs like cotrimoxazole, erythromycin and especially the aminoglycosides have been rendered practically useless. The 36 isolates that were resistant to ciprofloxacin deserves a special mention because the drug was only recently approved for use in the country. With the wider use of quinolones worldwide, increasing resistance of *Staphylococcus aureus* to ciprofloxacin have been reported[19]. Our result confirms that, of the currently available antistaphylococcal antibiotics, vancomycin remains the most effective agent against MRSA in our hospital. However the drug is not easy to administer and the cost is prohibitive in most developing countries. Alternatively MRSA infection could be treated with combinations of other antibiotics to which it is sensitive. Oral ciprofloxacin and rifampicin was shown to be effective in moderately severe infection in our local patients[20].

Methicillin-resistant *Staphylococcus aureus* is not a problem we should ignore as it can disrupt the efficient delivery of health care services of a country. Preventing MRSA colonisation/infection in hospitals remains the most effective measure to control their spread. These measures should include isolating patients colonised/infected with MRSA, cohorting nurses working with such patients, strict enforcement of handwashing and other aseptic techniques, early discharge of infected patients, educating doctors as to their role as vectors, and last but not least, the appointment of an effective Infection Control Team in every hospital. Until we appreciate the impact that MRSA is having on the practice of medicine, the spread will continue.

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