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Methicillin resistant *Staphylococcus aureus* among nurses in a tertiary care hospital in northern Sri Lanka

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(Index words: methicillin resistant *Staphylococcus aureus* (MRSA), infection control, hand hygiene)

Abstract

Methicillin resistant *Staphylococcus aureus* (MRSA) carriage in the hands among 109 nursing staffs of Teaching Hospital, Jaffna, Sri Lanka was screened. Of those screened, 43 (39.44%) strains of *S. aureus* were isolated and among that one third were MRSA. Antibiotic resistant pattern of MRSA strains were found to be highly variable. Resistance to ampicillin, cefuroxime, ciprofloxacin, netilmicin and amikacin were found to be 76.9%, 76.9%, 53.8%, 23% and 23% respectively. More than one tenth of the nursing staff were at risk of transmitting the infection and therefore standard infection control precautions should be followed to minimise carriage and transmission.

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Introduction

Methicillin-resistant *Staphylococcus aureus* (MRSA) is a specific strain of *S. aureus* that has developed antibiotic resistance to all β -lactams [1]. MRSA causes a variety of diseases ranging from mild, superficial dermatological infections to severe and potentially fatal

systemic infections [2]. MRSA asymptotically colonise the nasal cavity, axillae and groin region of patients and transient carriage in hands may occur due to the poor hand hygiene. Health care workers are the major source of MRSA in the hospital environment. Hand washing is the most important method in the prevention of transmission of MRSA [4].

Previous studies in Sri Lanka have shown that approximately 12%-47% of patients were positive for MRSA [1, 2]. Other studies have proposed that healthcare workers may act as carriers for MRSA transmission [5]. Therefore we set out to determine MRSA carriage in hands among health care workers in the Teaching Hospital, Jaffna, Sri Lanka as identifying transient carriage of hands is important in preventing spread by health care workers.

Methods

The study was approved by the Ethical Review Committee of the Faculty of Medicine, University of Jaffna, Sri Lanka. This descriptive study was carried out to identify the occurrence of MRSA carriage among the nursing staff in different units of Jaffna Teaching Hospital. The study

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Table 1. Microbiological data of isolates

Units staff attached	No of sample	Percentage of MRSA (n)	Positive antibiotic resistant of MRSA				
			Ampicillin	Ciprofloxacin	Cefuroxime	Netilmicin	Amikacin
Surgical	49	18.4% (n=9)	7	5	9	3	1
Oncology	11	9% (n=1)	1	S	1	S	S
Orthopaedic	11	9% (n=1)	S	S	S	S	S
EU	10	10% (n=1)	1	1	S	S	1
SICU	9	0%	NA	NA	NA	NA	NA
MICU	8	0%	NA	NA	NA	NA	NA
PBU	7	14.3% (n=1)	1	1	S	S	1
Hemodialysis	4	0%	NA	NA	NA	NA	NA

EU – emergency unit; PBU – pre mature baby unit; MICU – medical intensive care unit; SICU – surgical intensive care unit; S – Sensitive; NA – Not applicable.

was conducted in March 2013. The sample consisted of 109 nursing staff. Written informed consent was obtained from patients. Pre-moistened sterile cotton swabs were used to obtain specimens from the palms, between the fingers and tip of the nails of the nursing staff. Specimens were obtained 30 minutes after the last hand wash.

Swabs were inoculated in 7.2% of sodium chloride solution on the same day and sub-cultured after overnight incubation at 35°C onto blood agar and nutrient agar. Colonies suggestive of *S. aureus* were identified with standard tests (Gram stain, catalase, and slide and tube coagulase tests) used to identify *S. aureus* [6].

Identified *S. aureus* colonies were subsequently tested for methicillin resistance based on Kirby-Bauer disk diffusion method using oxacillin discs (1 µg). The isolates were considered methicillin resistant if the zone of inhibition was 10 mm or less. Further, the antibiotic susceptibility pattern of MRSA strains was determined on the day of isolation by the modified Kirby Bauer disc diffusion method on Muller Hinton agar using the criteria of standard zone sizes of inhibition to define sensitivity or resistance to different antimicrobials. Ampicillin (25 µg), cefuroxime (30 µg), amikacin (30 µg), netilmicin (10 µg) and ciprofloxacin (5 µg) were used to test resistance. *S. aureus* NCTC 6571 was used as reference strain for antibiotic susceptibility testing [7].

Results

In this study 109 nursing staff from different units were selected. Out of 109 samples screened 43 (39.44%) strains of *S. aureus* were isolated (Table 1). These included

13 (11.9%) MRSA and 30 (27.52%) methicillin-sensitive *Staphylococcus aureus* (MSSA).

The nursing staff working in the surgical wards had the highest percentage of MRSA carriage (18.38%) followed by staff working in the premature baby unit (14.28%) (Table 1). Even though *S. aureus* was isolated in the Dialysis Unit, Medical Intensive Care Unit and the Surgical Intensive Care Unit, they were negative for MRSA.

Discussion

MRSA is recognised as an important nosocomial pathogen worldwide because of the increased rate of multi-drug resistant strains among hospital acquired MRSA [7]. Studies have proposed that healthcare workers may act as carriers for MRSA transmission [9]. Our findings are in agreement with other international data where rates of MRSA carriers in health care workers range from 5.8% to 17.8% [8].

Asymptomatic carriage of MRSA is common, particularly in the anterior part of the nasal cavity. Apart from nasal and nasopharyngeal carriage the other frequent site is the skin. Poor hand hygiene is the main source of MRSA transmission within the hospital [5]. Hand washing is the most important method of reducing the spread of infection. Hands should be decontaminated before direct contact with patients and after every contact with patients, or potentially contaminated equipment or environment. Accurate and rapid detection of MRSA is important, not only for choosing appropriate antibiotic therapy for the individual patient, but also for control of MRSA transmission [8].

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