

ARE MEDICAL STUDENTS AND INTERNS AT RISK OF ACQUIRING METHICILLIN RESISTANT STAPHYLOCOCCUS AUREUS (MRSA)?

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ABSTRACT

Introduction: MRSA is conventionally considered as a nosocomial pathogen (though of late it is seen in the community). It is a pathogen which can infect patients and be carried innocuously, most commonly on the hands and for a longer duration in the anterior nares. This study was done on Medical Students and Interns in a medical college in India to check if they colonised with MRSA.. The risk factors among the subjects were found to be low.

Objectives: This study was aimed at finding the prevalence of Nasal carriers of MRSA and contributing risk factors among Medical Students and Interns.

Methods: This was a cross sectional study. The study group included medical students and interns above the age of 18 years. The study involved 150 medical students and interns. The students who participated in the study were 30 each from the first year to interns.

Results: One subject was found to be positive for MRSA.

Conclusion: From the study it was concluded that the prevalence of MRSA among medical students was low. It was also noticed that students were aware of the need for good hygiene practices.

Keywords: MRSA, Methicillin Resistant Staphylococcus Aureus, nasal swab, medical students, interns.

INTRODUCTION

Healthcare workers who interact with patients are exposed to the pathogens being carried on or infecting the patient. Methicillin Resistant Staphylococcus Aureus (MRSA) is conventionally considered as a nosocomial pathogen (though of late it has found its way into the community). It is a pathogen which can infect patients and can be carried innocuously, most commonly on the hands (transiently), groin, axilla¹ and for a longer duration in the anterior nares^{2,3,4}. Medical students are exposed to patients, the hospital environment and fomites from the second year as a part of their clinical training and are at risk for colonisation. Healthcare workers colonised with this pathogen

serve as a potential source of infection for susceptible patients^{5,6}. Screening for carriage of patients at the time of admission or for health care workers is not followed routinely. If patients have discharging wounds or if physicians suspect carrier states then nasal swabs from patient are sent to the laboratory. Nasal swabs cultures from health care workers are carried out when there is a suspicion of increased occurrence of MRSA among patients in a particular service area^{3,6}.

OBJECTIVES

This study was aimed at finding the prevalence of Nasal carriers of MRSA and its contributing risk

factors among Medical Students and Interns in a medical college in South India.

MATERIALS & METHODS

This study was a cross-sectional study. The study was undertaken from July to December 2014, and completed in a period of 6 months (two months for sampling and culture for MRSA from all the 150 students). Ethical approval was obtained prior to the start of the study (IEC Study Ref.No.82/2014). Assuming a prevalence of 1 per 100 and a precision of 1%, the sample size was calculated at 138 subjects using the N-master software. Assuming a non-response rate of around 10%, a sample size of 150 was calculated. The study group included consenting medical students and interns above the age of 18 years, both male and females. Students who reported having an upper respiratory tract infection at the time of sampling or were on antibiotics at the time of the study or upto one week preceding the study were excluded. The study involved 150 medical students and interns. The students who participated in the study were 30 each from the first year, second year, third year, final year and interns. The 30 students from each category were randomly selected from among their entire class by using a statistical software package. The study was explained and consenting students were included in the study. Presence of MRSA was looked for in all the 150 students. However, the proforma to look at the risk factors for MRSA colonisation and transmission was distributed to the 120 students of IInd year, IIIrd year, Final Year and Interns as they were in patient contact and were thus at risk. The first year students were not included in this part as they had no patient con-

tact. Details regarding demographic data, personal hygiene, nature of materials used, nature of work with patients and frequency of contact with patients, departments visited was documented. Samples from selected students belonging to a particular batch were collected at the same time period (within 6 weeks from the first subject to the last). Samples from all students were collected by the same technical staff in the same manner from both nostrils. Each nostril was sampled with pre moistened (sterile normal saline) sterile swabs, coded with laboratory identifiers and transported to the laboratory as soon as possible. Each swab was plated directly on 5% Sheep blood agar and the same swab was incubated overnight in enrichment broth (with 4% sodium chloride). One blood agar plate was used for each subject. After enrichment, the swabs were cultured on to 5% Sheep blood agar. Colonies resembling Staphylococcus were processed further for identification and susceptibility testing by conventional methods. MRSA was defined as isolates that were not susceptible to Cefoxitin (CLSI).

Statistical analysis: Data collected was entered into an excel sheet and analysed using descriptive statistics such as frequency, mean and standard deviation. Associations were looked at using the Chi Square test. Data collected was analysed using Statistical Package for Social Sciences (SPSS) version 16.0. A p value of <0.05 was considered to be statistically significant.

RESULTS

The study involved 150 medical students and interns. One subject (0.7%) was found to be positive for MRSA among the 150 subjects.

Table 1: Comparison of Knowledge of various aspects related to transmission of MRSA

Questions	II, III and Final Year students (n=90) (%)	Interns (n=30) (%)	P value
Number of patients contact per day?			
≤ 10 patients	83 (92.2)	4 (13.3)	< 0.001 ^{a*}
> 10 patients	7 (7.8)	26 (86.7)	
Touching an open wound without gloves in the Hospital?			
Yes	11 (12.2)	6 (20)	0.44 ^b
No	79 (87.8)	24 (80)	
Sharing of articles (towels, beds, clothes, sheets etc.) with friends or relatives?			
Yes	24 (26.7)	14 (46.7)	< 0.05 ^{a*}
No	66 (73.3)	16 (53.3)	
Patients coughed on to your face?			
Yes	36 (40)	19 (63.3)	< 0.05 ^{a*}
No	54 (60)	11 (36.7)	
Number of times hand washing is practiced per day in the Hospital?			
≤ 5 times	78 (86.7)	10 (33.3)	<0.001 ^{a*}
> 5 times	12 (13.3)	20 (66.7)	
Usage of mask while working with patients or infectious material?			
Yes	1 (1.1)	2 (6.7)	0.30 ^b
No	89 (98.9)	28 (93.3)	

^aChi-Square; ^bFisher's Exact Test; *statistically significant at α=5%

Of the 120 study subjects who responded to the proforma looking at associated risk factors, 90 (75%) were 2nd, 3rd and final year students (hereafter collectively referred to as 'students') and the remaining 30 (25%) were interns. Among the interns, 86.7% reported coming in contact with more than 10 patients per day. Among the students, 92.2% reported coming in contact with ≤ 10 patients per day, and this difference was statistically significant ($p < 0.001$). Though a higher proportion of the Interns reported touching an open wound without gloves, this difference was not statistically significant compared to the students. It was reported by 53.3% of interns that they did not share articles such as towels, beds, clothes, sheets, etc. with friends or relatives, in contrast to 73.3% of the students who did not share these articles, and this difference was statistically significant ($p < 0.05$). A higher proportion of the Interns reported patients having coughed onto their face, this difference was statistically significant compared to the proportion of students reporting the same ($p < 0.05$). The number of times of hand washing per day were significantly higher among interns compared to that among the students ($p < 0.001$). The awareness of hand washing practices before and after patient contact was high among both Interns and Students, being 90% and 96.7% respectively. It was also seen that 76.7% of those who resorted to hand washing after patient contact preferred to use alcohol based hand rubs. The comparison of all these components that may constitute a risk for contracting MRSA is included in Table 1.

DISCUSSION

There have been few studies that have been published on the carriage of MRSA in medical students in contrast to the numerous studies done in health-care workers. One such study done in Thailand⁷ on 128 medical students evaluated the pattern of colonisation of *Staphylococcus aureus* and its antibiotic susceptibility in Medical students, before and after their rotation in the Hospital using nasal swabs. In this study, though they reported an increase in the colonisation by *Staphylococcus aureus* among the students, none of them were methicillin resistant. No participants showed MRSA. The study concluded that after clinical rotation in the hospital, the prevalence rate of asymptomatic nasal carriage of *Staphylococcus aureus* increased and the *Staphylococcus aureus* isolated has shown a relatively high resistance to erythromycin and clindamycin⁷.

A study done at the Belgrade University aimed at finding out the number of nasal carriers of MRSA among Medical Students of the Second, Third and Fourth Year. A total of 533 nasal swabs were col-

lected, incubated in enrichment media and examined by molecular methods. They found no carriers in the first year students, while 2 out of the rest of the students were positive for MRSA (0.37%)⁸. Xiaoxue et al reported a prevalence of 9.4% of nasal colonisation of MRSA among 2103 randomly selected pre-clinical medical students from China⁹.

Another study done in Louisiana reported a low prevalence (3.1%) of nasal MRSA carriage among medical students and graduates of the hospital¹⁰.

A study done in Guntur in Andhra Pradesh, India aimed at understanding the prevalence rates of *Staphylococcus aureus* in the nasal cavity of medical students and also aimed to identify MRSA among detected carriers. The study showed that the overall prevalence of MRSA was 2% and concluded that apparently healthy medical students could also pose a risk for transmission of MRSA to patients¹¹.

The results of the previous studies are however all in accordance to our study of having a low prevalence of MRSA carriage (0.7%) among medical students.

Among the 120 students and interns included in this study, it was observed that more number of Interns came in frequent patient contact as compared to the students, this possibly being due to the interns working in the hospital for long hours as compared to students who had fixed timings set in the hospital during their clinical postings. No significant difference was seen between the Interns and students with regard to contact with an open wound without wearing gloves, thus demonstrating that both interns and students knew the importance of using gloves before coming in such patient contact.

However, it was also notable that almost all Interns and Students did not want to wear a mask when working with patient or infectious materials. More number of Interns claimed to have come in contact with patients who had coughed on their face as compared to the students, probably due to a larger number of patients seen per day by interns compared to students. It was seen that more number of Interns compared to students had history of sharing of articles such as towels, bed sheets, clothes, personal belongings etc. with friends, other interns or other family members, this being probably due to their working atmosphere and a large number of patients to attend to in a given time. Though the awareness of hand washing need was high among both the interns and students, the Interns group resorted to more frequent hand washing than the students, possibly due to more frequent patient contact, and the awareness of risk of transmission of infection and the importance of hand washing.

10% of Interns claimed of having come in contact with an open wound, and this was seen in General Surgery department due to the work load of ulcer dressings. The greater use of alcohol based rubs to the conventional washing with soap and water was possibly due to its availability in the hospital, and the ease of application. The effectiveness of the methods in contrast with each other was however not elicited.

CONCLUSION

From the study it was concluded that the prevalence of MRSA among medical students was low. It was also noticed that the students were aware of the need for hand washing, use of gloves before patient contact. However, preference of washing hands with soap and water was found to be less as compared to alcohol based rub. There were other risk factors for MRSA transmission such as low mask usage, patient coughing on the face of the student/ intern and sharing of articles in the hospital premises with peers. The risk of spread of MRSA by this population could be tackled by emphasis of proper use personal protective equipment and awareness of the importance of counter-ing MRSA in hospital settings.

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