

Prevalence of Methicillin-Resistant *Staphylococcus aureus* (MRSA) isolate in Healthy Staff of Health Care Personals (HCPs) in Nishtar Hospital, Multan

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ABSTRACT

Aim: To know the prevalence of Methicillin Resistant *Staphylococcus aureus* (MRSA) among the HCPs of Nishtar Hospital, Multan.

Methods: A Study was conducted on approximately 124 samples of nasal swab taken from HCPs (Medical and Para-medical) working in the concern clinical departments of Nishtar Hospital, Multan from January 2012 to March 2012 for culture and sensitivity. Samples included for study were from Surgical Units, Medical Units, O.T., Gynae and Obs. Units, Paediatric Units, and TB Chest Units.

Results: Almost 117(94%) HCPs were found to harbor *S. aureus* organism. Of these, 83(71%) were carriers of MSSA and 34(29%) HCPs were MRSA positive, 13 (38%) HCPs were from Surgical Units, 9(27%) from O.T, 4(13%) from Medical Units, 3(9%) from Gynae & Obstetrics Units, 3(9%) from Paediatric Units and 2(4%) from TB Chest Units. Among the 124 HCPs that were screened, 70(56%) were Males and 54(44%) were Females. Out of this, male MRSA carriers were 17 (50%) and Female MRSA carriers were also 17(50%).

Conclusion: High prevalence of MRSA in hospital setting indicating need of good control measures.

Key words: MRSA, Culture and sensitivity, Control measures

INTRODUCTION

Staphylococcus aureus (*S. aureus*) is a versatile human pathogen that causes diseases ranging from relatively mild infections of the skin and soft tissue to life-threatening sepsis¹. The emergence of strains resistant to Methicillin and other antimicrobial agents has become a major concern, especially in the hospital environment, because of the higher morbidity and mortality due to systemic Methicillin-resistant *Staphylococcus aureus* (MRSA) infections². Tiemersma et al have shown significant increases in MRSA isolates between 1999 and 2002 in European countries, particularly Belgium, Germany, Ireland, the Netherlands and the United Kingdom¹. MRSA prevalence varied widely, from <1% in northern Europe to >40% in southern and western Europe³. As the prevalence of healthcare-associated infections (HAIs) caused by multidrug-resistant organisms continues to increase⁴, it seems essential to prevent MRSA transmission and reduce the number of MRSA in HAIs. Most MRSA infections in healthcare workers had a mild clinical course; some infections tend to become chronic and can cause severe health problems. This may lead to long-term incapacity, as has been shown by an analysis of the database of a German workers' compensation board⁵.

Individuals can become carriers of MRSA in the same way that they can become a carrier of ordinary *Staphylococcus aureus*. If the organism is in the nose, then it may be passed around by droplet spread from the mouth and nose. MRSA is found worldwide predominantly in hospitals and institutions such as nursing homes. Much less commonly, MRSA is found in the general community. There are three main ways of spread for MRSA in hospital and institutions such as staff, patients and inanimate objects. The usual sites of colonization with MRSA are the nostrils, skin, groin, axilla and wounds.

Most health professionals whom are colonized with MRSA do not develop infections and may spontaneously clear the organism without treatment. Once the colonization has been present for more than three months, it may become much more difficult to clear. Patients, however, have 30-60% risk of infection following colonization. Colonization means the presence of the organism on the skin or in the nose or in the back of the throat but without any illness but if the patient has fever and inflammation associated with the presence of MRSA then they are considered to be infected.

When patients with MRSA are discovered in a hospital, the hospital will usually try to prevent it from passing around to other patients. This is known as infection control. The bacterium is confined to vulnerable or debilitated patients such as patients in ICUs, burn units, chest units, surgical and orthopedic

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wards. MRSA does not pose a much risk to the health of hospital staff except they are the source of transmission.

In the absence of comprehensive studies on the prevalence of MRSA, it has been questioned whether control measures in one setting can be generalized to other settings⁶. This question applies to both epidemic and endemic MRSA and also to specific settings, such as intensive care and non-acute wards, where MRSA may have widely variable transmission dynamics⁷.

The incidence of Methicillin-resistant *Staphylococcus aureus* (MRSA) has gradually increased, with strains shown to cause up to 21% of skin infections and 59.6% of nosocomial pneumonia⁸.

MATERIAL AND METHODS

A Study was conducted on approximately 124 samples of nasal swab taken from HCPs (Medical and Para-medical) working in the concern clinical departments of Nishtar Hospital, Multan from January 2012 to March 2012 for culture and sensitivity. Samples included for study were from Surgical Units, Medical Units, O.T., Gynae and Obs. Units, Paediatric Units, and TB Chest Units.

The nostrils were the second most common site of colonization, with 71% of all carriers testing positive at this site, indicating that the nose is indeed a major reservoir of MRSA. The anterior nares are considered to be the primary colonization site for *S. aureus*⁹. Similarly, the hands also showed colonization predominantly by MRSA but may also contain MSSA. MRSA carriage is far more prevalent than MRSA-positive clinical specimen¹⁰.

The isolates of HCPs are identified on the basis of staining, cultural, morphological, biochemical characteristics such as Gram's staining, Catalase, Coagulase and Dnase test. *Staphylococci* grow well both aerobically and anaerobically. Temperature range is 35-37C. Grow well on a Blood Agar, Chocolate Agar and Nutrient Agar. Specimens contaminated with mix flora, growth can be obtained on 5% Manital salt agar¹¹.

RESULTS

During the study period, 124 Health Care Personals (HCPs) screened by taking their nasal swab in the various departments of Nishtar Hospital. Out of these, which are screened, 49(40%) were from Surgical Units, 21(17%) from O.T., 20(17%) from Medical Units, 16(13%) from Gynae and Obstetrics Units, 10(8%) from the Paediatrics Units and 8(5%) from TB Chest Units.

Almost 117(94%) HCPs were found to harbor *S. aureus* organism. Of these, 83(71%) were carriers of MSSA and 34(29%) HCPs were MRSA positive, 13 (38%) HCPs were from Surgical Units, 09 (27%) from O.T, 04 (13%) from Medical Units, 3(9%) from Gynae & Obstetrics Units, 3(9%) from Paeditic Units and 2(4%) from TB Chest Units.

Among the 124 HCPs that were screened, 70(56%) were Males and 54(44%) were Females. Out of this, male MRSA carriers were 17(50%) and Female MRSA carriers were also 17(50%) as shown in Table 1

Table 2 shows the relation of MRSA carriers to the duration of service showed that HCPs whose duration of service more than 10 years were 15 (44%), those with duration service between 1-10 years were 12 (35%) and those with duration of service less than one year were 07(21%). Thus the prevalence of MRSA in HCPs in this study is 29%.

Table 1: MRSA screening data in relation to Gender

Gender	Total Screening	MRSA Carriers
Males	70 (56%)	17 (50%)
Females	54 (44%)	17 (50%)

Table 2: MRSA isolation in relation to the duration of service of HCPs.

Total MRSA isolation	HCPs having service > 10 year	HCPs having service 1-10 year	HCPs having service < 1 year
34	15 (44%)	12 (35%)	07 (21%)

DISCUSSION

For healthcare facilities, surveillance is an important and generally accepted method to assess the incidence of infection due to multidrug-resistant bacteria and if necessary, to improve infection control measures¹². Surveillance of MRSA is a means of identifying colonized or infected HCPs and patients for whom specific control measures may be implemented⁷. The implementation of a program of active surveillance cultures beside contact precautions is recommended by different national guidelines as a way of preventing nosocomial transmission of MRSA¹³. However, it is difficult to determine the range of MRSA rates from existing literature¹⁴, as surveillance is primarily performed during outbreaks and generalization of these results is hampered, as the findings are not applicable to non-outbreak situations⁷.

In the last 10 years, significant increases in MRSA (expressed as percentage of *S. aureus* blood isolates) have been shown by two surveillance systems, with an increase of MRSA from 1% in 1990

to 20% in 2007, and stable proportions between 20% and 26% in the years between 2001 and 2007¹⁵.

The prevalence of MRSA among the HCPs in Nishtar Hospital, Multan was found to be 29%. In our study 09% HCPs were screened, 29% (34 out of 124) were found to be carriers of MRSA. The role of staff carriage in the spread of MRSA infection is controversial and the value of screening staff has been questioned by many authors.

The site most commonly used for screening of MRSA among HCPs in this study was the anterior nares. The anterior nares has also been identified as one of the most common sites of carriage in other studies and in fact, nasal carriage has been shown to increase the risk of wound infection. Moreover, as the recognition of MRSA as a hospital problem largely depends on clinical samples or swabs taken either only on admission or selectively for high risk patients, the true case load of a hospital or a specific setting remains largely unknown¹⁶.

Infection with MRSA strains, which are resistant to wide range of antibiotics, is associated with considerable morbidity and mortality^{17,18}. The spread of MRSA may indicate that recommended preventive strategies are either inadequate or improperly implemented⁹.

The carrier rate of *Staphylococcus aureus* in the nostril among the healthy people range from 20-30%. From the healthy carriers among the hospital HCPs, there are more chances of spreading from their hands, nose or throat by way of touching, sneezing, coughing, talking etc¹⁹.

In current study, frequency of *Staphylococcus aureus* is 94% and MRSA is 29% respectively which is lower than Rezvan et al but nearly same if compare to Rajaduraipandi et al. study. For the studies using only nasal swabs, cultures of the nares identify only 60%-73% of the *S. aureus* carriers^{20,21,22}. That is why in national guidelines screening of additional sites is recommended, though no consensus has been reached²³. For reasons of accessibility, compliance and consistency with other investigations, it is recommended by Hori that the investigation of MRSA prevalence should be confined to nasal swabs¹⁷.

Vancomycin is the primary antimicrobial agent used to treat MRSA infections. This drug is beyond the reach of the majority of patients with MRSA infection in Pakistan. Since an estimated 30-60% of patients colonized with this organism will become infected, the absence of affordable treatment is a very significant problem. The emergence of resistance to vancomycin in *S. aureus*, has been reported in Japan. Now a days, in the recent studies, many cases are being recorded which are resistant to Vancomycin. During the past 15 years, the

appearance and world-wide spread of many such clones have caused major therapeutic problems in many hospitals, as well as diversion of considerable resources to attempts at controlling their spread.

CONCLUSION

High prevalence of MRSA in HCPs of hospital setting indicating need of good control measures such as Establishment of Infection Control Department, proper hand hygiene, avoiding mobile phone while wound dressing and treating patient, surveillance cultures and monitoring of susceptibility patterns of MRSA may also help in arresting the spread of infections. *S. aureus* strains, that are resistant to Methicillin / Oxacillin and all other β-Lactam antibiotics have spread worldwide from the last four decades.

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