



## SILENT NASAL CARRIERS OF *STAPHYLOCOCCI* AMONG HEALTH CARE WORKERS – IS IT A PROFESSIONAL HAVOC?

Gowri Subbiah and Poongodi Santhana Kumarasamy

Department of Microbiology Tirunelveli Medical College

### ARTICLE INFO

#### Article History:

Received 6<sup>th</sup> January, 2022

Received in revised form 15<sup>th</sup>

February, 2022

Accepted 12<sup>th</sup> March, 2022

Published online 28<sup>th</sup> April, 2022

#### Key words:

Silent carriers, *staphylococci*, health care workers, nosocomial infection

### ABSTRACT

**Background:** Nasal carriage of Methicillin resistant *Staphylococcus aureus* (MRSA) among health care workers (HCWs) is a known risk factor for hospital acquired infections. **Aims and objectives:** To estimate the prevalence of *Staphylococcus aureus* (*S.aureus*) nasal carrier rate and MRSA among HCWs working in intensive care units and their antibiotic sensitivity pattern. **Materials and methods:** A total of 100 nasal swabs were collected from HCWs in ICUs. Specimens were processed as per standard protocol and antibiotic sensitivity testing was done for those isolates as per CLSI guidelines. **Results:** Of the 100 swabs collected, 30% were culture positive for *staphylococci*. Of this 30 isolates, 20% were identified as *S. aureus* and 10% as coagulase negative *staphylococci* (CoNS). Of this 20 *S. aureus* strains, 13(65%) were MRSA. Multidrug resistant MRSA was observed in 4(20%) of the isolates. **Conclusion:** Screening among HCWs and early detection are pivotal in reducing the ongoing resistance.

Copyright©2022 Gowri Subbiah and Poongodi Santhana Kumarasamy. This is an open access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

### INTRODUCTION

*Staphylococcus aureus* consistently remains as a major cause of outbreaks in the hospitals for the past 30 years. It causes mild skin and soft tissue infections to critical life threatening infections such as infective endocarditis and septicaemia. Multidrug resistance in methicillin resistant *Staphylococcus aureus* (MRSA) is a routine phenomenon in the hospital which further poses difficulties in selecting the drug for empirical therapy. Globally Hospital Acquired Infections (HAI) caused by *S.aureus* is being reported as 20% (Kim *et al* 2014). Different studies done worldwide noted that the prevalence of MRSA carrier rate among Health care workers (HCWs) was 10- 40% (Mathanraj *et al* 2009).

Hence, HCWs are at the interface in the transmission of MRSA between patients. Based on this background, the present study was undertaken to estimate the prevalence of *S.aureus* nasal carrier rate and MRSA among HCWs working in intensive care units and their antibiotic sensitivity pattern.

### MATERIALS AND METHODS

This cross sectional prospective study was carried out in a tertiary care hospital from May- August 2021. A total of 100 nasal swabs were collected from HCWs in ICUs after getting informed consent. Data such as age, sex, demographic profile, work profile, relevant history if any were recorded in proforma. Ethical clearance was obtained before the commencement of the study. Specimens were processed as per standard protocol and antibiotic sensitivity testing was done for those isolates as per CLSI guidelines.

#### Inclusion criteria

- HCWs including doctors, nurses, Compulsary Rotatory Residential Internships (CRRIs), postgraduates, auxiliary healthcare workers (AHCWs) and sanitary workers
- Willing to participate
- Free from respiratory tract infection
- No antibiotics for the past one week

#### Exclusion criteria

- Admission to hospital within the previous one year
- Reluctant to participate
- On antibiotics within past one week

### RESULTS

A total of 100 healthcare workers in intensive care areas were participated during the study whose age ranged from 18-57 years. Of them 79% were females and the rest were males. The recruited study subjects were AHCWs (28%), post graduate students (25%), staff nurses (20%), CRRIs (10%), sanitation workers (10%) and doctors (7%). Of the 100 swabs collected, 30% were culture positive for *staphylococci*. Of this 20% were identified as *S. aureus* and 10% as coagulase negative *staphylococci* (CoNS). Of this 20 *S. aureus* strains, 13(65%) were MRSA by disc diffusion method (Table 1). All the strains (100%) were sensitive to linezolid, 19(95%) sensitive to gentamicin, 18(90%) sensitive to vancomycin, 16(80%) sensitive to clindamycin, 13(65%) sensitive to erythromycin and 12(60%) sensitive to ciprofloxacin.

\*Corresponding author: Gowri Subbiah

Department of Microbiology Tirunelveli Medical College

Multidrug resistant MRSA was observed in 4(20%) of the isolates.

**Table 1** Distribution of staphylococcal nasal carrier

HCWs	Gender		Staphylococcus positive		MRSA positive		MDR staphylococci positive	
	Number (%)		Number (%)		Number (%)		Number (%)	
	M	F	M	F	M	F	M	F
Doctors	0(0)	7(7)	0(0)	3(4)	0(0)	1(4)	0(0)	0(0)
Nurses	0(0)	20(20)	0(0)	6(8)	0(0)	5(22)	0(0)	1(4)
CRRIs	3(3)	7(7)	2(10)	2(3)	0(0)	0(0)	0(0)	0(0)
PGs	8(8)	17(17)	3(14)	4(5)	2(29)	0(0)	2(29)	0(0)
AHCWs	9(9)	19(19)	2(10)	4(5)	1(14)	1(4)	0(0)	0(0)
Sanitation workers	1(1)	9(9)	0(0)	4(5)	0	3(13)	0(0)	1(4)
	21(21)	79(79)	7(33)	23(29)	3(43)	10(44)	2(29)	2(9)

M- Male, F- Female, CRRIs- Compulsory Rotatory Residential Internship, PGs- Post graduates, AHCW- Auxillary Health Care Workers

**DISCUSSION**

Despite covid appropriate measures during this pandemic, high rate (30%) of asymptomatic nasal colonization of *staphylococcus* was noted in HCWs. This may be due to high workload, crowdedness, and relative shortage of HCWs leading to failure to practice appropriate infection control measures. Previous study done in 2018 in our institute reported the prevalence of nasal carrier was 16% and MRSA colonization was noted in only 4% of HCWs (Velvizhi *et al* 2018).

Prevalence varies in different geographical region, from hospital to hospital, different specialities and areas within the hospitals. Increasing colonization leads to increased infection rates not only in the hospitals but also in the community.

Of the 20 *S.aureus* isolates, six were isolated from staff nurses due to prolonged exposure to this organism in intensive care units. Apart from colonized HCWs, colonized patients and contaminated environment in the hospitals also act as a reservoir for the spread of MRSA to other patients and HCWs (Kirecci *et al* 2010). In the present study, CoNS was isolated in 10% of the HCWs. Once they were branded as culture contaminants, now considered as opportunistic pathogens especially in debilitated or immunocompromised patients with indwelling devices. They are responsible for 10% of nosocomial infections (Ferreira *et al* 2003). Infections caused by MDR MRSA have been associated with catastrophic outcomes, increased mortality, prolonged hospital stay, prolonged use of higher antibiotic and escalated healthcare cost.

Primarily *staphylococci* resides in nose, and other sites including the skin, perineum, pharynx, and less commonly gastrointestinal tract and vagina (Krishna *et al* 2012; Liu 2009). Colonization may be transient or persistent and at a single or multiple body sites (Zierdt 1982). But nasal carriers appear to play a major role in the epidemiology and pathogenesis of infection (Kluytmans *et al* 1997). Further it increases the risk of infection to the colonized individuals and it has been reported in approximately 5% of the colonizers (Brown *et al* 2014).

**CONCLUSION**

Screening of asymptomatic nasal colonization among HCWs is mandatory in nosocomial infection control, since they serve as reservoirs and disseminators of MRSA. Resistance to *Staphylococcus* has become endemic worldwide and infections due to these strains are escalating at an alarming rate.

Hence, protocol for the frequency of screening among HCWs and early detection are pivotal in reducing the ongoing resistance to decolonizing agents such as Mupirocin and Chlorhexidine.

**Acknowledgment**

We sincerely thank and express our gratitude for the kind sponsorship and support provided for this study by The Tamilnadu State Research Committee, King Institute of Preventive Medicine and Research, Guindy, Chennai, Tamilnadu.

**References**

1. Brown AF, Leech JM, Rogers TR, et al. *Staphylococcus aureus* colonization: modulation of host immune response and impact on human vaccine design. *Front Immunol*.2014; 4507 e1 -19.
2. Ferreira RBR, Iorio NLP, Malavar KL, et al. Coagulase negative *staphylococci*: Comparison of phenotypic and genotypic oxacillin susceptibility tests and evaluation of the agar screening test by using different concentrations of oxacillin. *J Clin Microbiol*. 2003;41: 3609-14.
3. Kim CJ, Kim HB, Oh MD, et al. The burden of nosocomial *Staphylococcus aureus* bloodstream infection in South Korea: a prospective hospital-based nationwide study. *BMC Infectious Diseases*. 2014;14:590.
4. Kirecci E, Ozer A, Aral M, et al. A research of nasal methicillin resistant/sensitive *Staphylococcus aureus* and pharyngeal beta-hemolytic streptococcus carriage in Midwifery students in Kahramanmaras. *Turkey Ethiop J Health Dev*. 2010;24:57-60.
5. Kluytmans J, van Belkum A, Verbrugh H. Nasal carriage of *Staphylococcus aureus*: Epidemiology, underlying mechanisms, and associated risks. *Clin Microbiol Rev*.1997; 10: 505-20.
6. Krishna S, Miller LS. Host - pathogen interactions between the skin and *Staphylococcus aureus*. *Curr Opin Microbiol* 2012;15: 28-35.
7. Liu GY. Molecular pathogenesis of *Staphylococcus aureus* infection. *Pediatr Res* 2009; 65 :71R–77R.
8. Mathanraj S, Sujatha S, Sivasangeetha K, et al. Screening for Methicillin Resistant *Staphylococcus aureus* among patients and healthcare workers of a tertiary care hospital in south India. *Indian J med microbial*.2009; 27: 62-4.
9. Velvizhi G, Sucilathangam G, Srinivasananth K, et al. Nasal screening for Methicillin Resistant

*Staphylococcus aureus* (MRSA) among health care workers at a tertiary care hospital. Indian J Applied Res.2018; 8: 83-4.

10. Zierdt CH. Long term *Staphylococcus aureus* carrier state in hospital patients. J. Clin Microbiol. 1982; 16:517-20.

**How to cite this article:**

Gowri Subbiah and Poongodi Santhana Kumarasamy (2022) 'Silent Nasal Carriers of Staphylococci Among Health Care Workers – Is It A Professional Havoc?', *International Journal of Current Advanced Research*, 11(04), pp. 652-654.  
DOI: <http://dx.doi.org/10.24327/ijcar.2022.654.0147>

\*\*\*\*\*