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MRSA INFECTIONS IN SURGERY PATIENTS

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Abstract:
SSI is associated with substantial increased of postoperative hospital stay, rates of hospital readmission, hospital cost, functional disability, and mortality rate. Patients in hospitals which are infected and colonized mediate the dissemination of (Methicillin Resistant Staphylococcus aureus) MRSA strains. Surgical site infection (SSI) is a major contributor of healthcare associated infection**.** ***Staphylococcus aureus*** is a pathogen responsible for both community-acquired as well as hospital-associated infections. The prevalence of MRSA and its antibiotic sensitivity pattern for proper treatment of the patients is necessary for reducing the morbidity and mortality of the patients.

Methods: All adult patients admitted to the hospital and assigned for an elective surgery were chosen to collect data on MRSA. Swabs were taken from the anterior nares and axilla. Antibiotic susceptibility testing was performed by the disk diffusion method using guidelines established by the Clinical and Laboratory Standards Institute (CLSI) and MRSA was detected by testing with Cefoxitin disc

Results: A total of 60 (30%) patients found to be were colonized with *Staphylococcus epidermidis* and 42 (21%) patients had positive nasal swabs for *Methicillin-Sensitive Staphylococcus aureus* **(MSSA) a**nd 15 (8.5%) patients were *Methicillin-Resistant Staphylococcus aureus* (MSSA).

Conclusion: MRSA strains are more prevalent in tertiary care hospital and multidrug resistant MRSA prevalence is higher in surgical units. The most effective way to prevent MRSA is surveillance of antibiotic resistance profiles of Staphylococcus aureus. Thus, control of MRSA is essential to curtail the introduction and spread of infection in the hospitals. This can be achieved by using universal precautions and conducting regular epidemiological studies.

Introduction

Staphylococcus aureus is a pathogen responsible for both community-acquired as well as hospital-associated infections. Surgical site infection (SSI) remains a major contributor of healthcare associated infection (HAI). Based on Centers for Disease Control and Prevention (CDC) prevalence survey in 2011.[i]

Staphylococcus aureus is responsible for causing a variety of human infections, which range from minor skin diseases to life-threatening infections.[ii] In 1960 Methicillin resistant ***Staphylococcus aureus (MRSA)*** were reported.[iii]

Staphylococcus aureus remains the leading cause of SSI, with half of the ***S. aureus*** were found resistant to methicillin [iv]. SSI was associated with substantial increased of postoperative hospital stay, rates of hospital readmission, functional disability, hospital cost, and mortality rate [v]

Routine decolonization of MRSA with chlorhexidine bathing and mupirocin nares application before surgery is becoming an interesting strategy option to reduce number of SSI.[vi],[vii].The emergence of chlorhexidine-resistant bacteria and mupirocin resistance are two concerns raised with the wide spread application of this strategy. Active screening followed by selective decolonization is another strategy but with associated with relatively higher cost due to additional diagnostic expense .[viii]

Methicillin resistant ***S. aureus*** (MRSA) strains have become endemic in hospitals worldwide and it is now incipient community pathogen in many geographical regions . Due to increased incidence of MRSA vancomycin has been used as an empirical treatment for Staphylococcus aureus infections which in turn results in the emergence of VRSA (vancomycin resistant Staphylococcus aureus).[ix]

Thus, control of MRSA is essential to curtail the introduction and spread of infection in the hospitals. This can be achieved by using universal precautions and conducting regular epidemiological studies.[x]

Patients in hospitals those who are infected and colonized mediate the dissemination of MRSA strains[xi], these factors increases the chance of emergence and spread of MRSA which lead to repeated hospitalization, indiscriminate use of antibiotics, intravenous drug abuse and indwelling medical devices .[xii]Therefore it is necessary to know the prevalence of MRSA and its antibiotic sensitivity

pattern for proper treatment of the patients and thereby reducing the morbidity and mortality of the patients.

Material and methods

Study design

The cross sectional study was carried out in the Dept. of General Surgery SSPM's Medical College Padve, Sindhudurg a referral hospital with Total capacity for inpatient is 350 beds.

All adult patients admitted to the hospital and assigned for an elective surgery were chosen to collect data on MRSA

Inclusion criteria:

All patients aged ≥ 18 years old, assigned for an elective surgery, and willing to participate in the study were included in the study. Swabs were taken from the anterior nares and axilla, which are the common colonization sites for MRSA. Written informed consent was obtained from each patient before obtaining the nasal swab.

Nasal swabs were collected using a sterile dry cotton swab from all eligible patients approximately 10-12 hours before the surgery. Swabs were immediately transported to the Microbiology department for further processing

Risk factors for MRSA

riRsk factors such as history of antibiotics usage in the past 3 months, history of hospitalization, history of catheterization, history of invasive procedures, history of referral from other hospital was obtained from the patients selected for elective procedure.

Antimicrobial susceptibility testing

Antibiotic susceptibility testing was performed by the disk diffusion method using guidelines established by the Clinical and Laboratory Standards Institute (CLSI) and MRSA was detected by testing with Cefoxitin disc[xiii].

Results

Total **200** Swabs were taken from the patients with elective surgery admitted in **surgery ward**. A total of 60 (30%) patients found to be were colonized with *Staphylococcus epidermidis* and 42 (21%) patients had positive nasal swabs for *Methicillin-Sensitive Staphylococcus aureus* **(MSSA) a**nd 15 (8.5%) patients were *Methicillin-Resistant Staphylococcus aureus* (MSSA).

Discussion

Proportion of MRSA varies from country to country, in Sweden it is 0.4% while in Belgium it is as high as 48.4%.[xiv] Staphylococcus aureus is one of the major pathogen causing skin and soft tissue infections in the community as well as invasive infections in patients.

Prevalence of MRSA in our study period was found to be 8.5%, in nasal and skin carriage of preoperative patients, similar prevalence was observed in the study conducted by Oh ML et al in Singapore[xv]. However some reported prevalence of MRSA from 23 to 31 % [7,12].[xvi,xvii]

While Hadley, et al. reported prevalence of MRSA colonization anterior nasal was 3.5% among patients underwent total joint replacement in hospital in United States.[xviii] Prevalence of 4.25% was reported in retrospective study among cardiothoracic and neurological surgical patients in United States.[xix]

Differernce in prevalence in hospitals shows the need of routine or selective decolonization protocol in preoperative patients.

Routine decolonization with mupirocin may be more cost effective however it may raise the possibility of resistance and lead to treatment failure.[xx] Hence Selective swabbing and decolonization for high risk preoperative patients may be more appropriate for limited resources countries.

More studies are required to adopt the policy of routine decoloniztion preoperatively as Routine screening to identify MRSA colonization by culture are not only cost burdening for developing countries, but also time consuming . PCR can give rapid result for screening but it may not readily available in all the hospitals.

Researchers also observed that these MRSA isolates are becoming multidrug resistant and were susceptible only to glycopeptide antibiotics such as vancomycin. Low level resistance even to vancomycin is also emerging.[xxi]

Association of multidrug resistant MRSA adds to the problem and hospital dust is more dangerous than other or roadside dust as former may contain MRSA which may multidrug resistant and may create problem in the hospital specially in surgical units.

Conclusion

To conclude MRSA strains are more prevalent in the hospital and multidrug resistant MRSA prevalence is higher in surgical units of our hospital. Selective swabbing and decolonization for high risk preoperative patients should be appropriately carried out, but more studies are required to know the prevalence of MRSA in the area.

Thus surveillance is the most effective way to prevent MRSA and reduce mortality and morbidity associated with surgical site infections.

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