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The burden of *Staphylococcus aureus* infections at medicine department, IMS and SUM Hospital, Bhubaneswar

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Abstract

Background: *Staphylococcus aureus* infections are one of the major infections in hospitals and the drug-resistant strain of *S. aureus* caused mortality and morbidity throughout the globe. In this study, we evaluated the S. aureus infection and their drug sensitivity patterns at Medicine department for 5 years.
Methods: The patients admitted at medicine word were participated in this study. All clinical samples were taken for bacteriological study. After identification of bacteria, the drug sensitivity patterns were carried out by disc diffusion methods.
Results: A total of 944 S. aureus isolates were analyzed. High sensitivity of S. aureus was observed for quinupristin/dalfopristin (100%), tigecycline (98.2), imipenem (98%), nitrofurantoin (97.6%), linezolid (97.3%), teicoplanin (97.1%) and vancomycin (95.1%). High resistance was recorded against penicillin G (91.9%), trimethoprim/sulfamethoxazole (56.9%) and tetracycline (33.2%). MRSA prevalence among the patients at IMS and SUM Hospital, Bhubaneswar was 27.8%. Highest proportion (80%) of MRSA was in burns unit.
Conclusions: Both MRSA and MSSA were highly susceptible to quinupristin/dalfopristin, tigecycline, linezolid, nitrofurantoin, ampicillin/sulbactam and vancomycin and showed high resistance to commonly used antibiotics such as gentamycin, erythromycin, levofloxacin and tetracycline. A majority of isolates were from pus specimen (68%).

Keywords: Methicillin resistant, staphylococcus aureus, drug resistance, susceptibility, vancomycin

Introduction

Staphylococcus aureus is a frequent cause of health care-associated infections in acute care hospitals. It is the most common cause of nosocomial pneumonia and surgical site infections and the second most common cause of bloodstream, cardiovascular, eye, ear, nose, and throat infections [1, 2]. An increasing percentage of *S aureus* infections are caused by antimicrobial-resistant strains of the organism, with some medical centers reporting that more than half of *S aureus* isolates are methicillin resistant [3]. Knowledge of the impact of *S aureus* infections on a national level is helpful for medical personnel, hospital administrators and payers who make financial and policy decisions to prevent the spread of this organism.

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Rubin and colleagues [4] estimated the death rate, infection rate, and direct medical costs related to *S aureus* infections for all hospitalized patients in New York City in 1995. Other studies [5-10] have considered the additional costs and hospital days associated with surgical site infections and other types of hospital infections for all inpatients or for specialized groups of patients, including patients who undergo orthopedic surgery or coronary artery bypass grafting procedures. Recently, McGarry and colleagues [11] considered the clinical and financial outcomes associated with *S aureus* infections, but this study compared elderly patients with *S aureus* infections with elderly patients without *S aureus* infections and with nonelderly patients with *S aureus* infections. The scope of each of these studies was limited to a maximum of a few hospitals for specific cohorts of patients, and not all of these studies were specific to *S aureus.*

The objective of this study is to know the percentage of *S aureus* infection and their drug sensitivity patterns in the medicine department of the Indian Hospital.

Materials and Methods

Laboratory records of *Staphylococcus aureus* isolates from clinical specimens analyzed at microbiology laboratory. VITEK 2 Gram Positive identification card (bio-Merieux) was used to identify *S. aureus* sub-species *aureus*. All the isolates had an ID confidence of excellent identification with an average percent probability of 96%. Methicillin resistance was determined using cefoxitin screening. All isolates were from patients' clinical specimens (mainly pus, urine, blood and tracheal aspirates) and were analyzed according to the 2015 Clinical & Laboratory Standards Institute (CLSI M100-S25) standards. Antibiotics tested against *S. aureus* include penicillin G (10 units), oxacillin (30 μg cefoxitin), gentamycin (10 μg), fusidic acid (10 μg), cefuroxime (30 μg), cefuroxime axetil (30 μg), imipenem (10 μg), tobramycin (10 μg), rifampicin (5 μg), levofloxacin (5 μg), clindamycin (2 μg), trimethoprim/sulfamethoxazole (1.25/23.75 μg), moxifloxacin (5 μg), nitrofurantoin (300 μg), linezolid (30 μg), vancomycin (30 μg), teicoplanin (30 μg), quinupristin/ dalfopristin (15 μg), tetracycline (30 μg), tigecycline (15 μg), erythromycin (15 μg) and ampicillin/sulbactam (10/10 μg) [12].

Results

A sum of 944 S. aureus secludes were examined, 33% (311/944) of microbes were segregated in 2014, 62% (586/944) in 2015 and 5% (47/944) in 2016. Greater part of the broke down disconnects, 54% (511/944), were from male patients. Inward Medicine division recorded the biggest number of disconnects, 187/944 (20%). A greater part of the secludes were from discharge example, 638/944 (68%), tracheal suction (15%) and blood (11%). Other example types, 26/944 (3%) included tissue, sputum, eye, throat, CSF and the unindicated examples. High vulnerability was seen with quinupristin/dalfopristin (100 percent). High opposition was seen with penicillin G (92%) and trimethoprim/sulfamethoxazole (57%).

Secludes from discharge to HVS examples showed high defenselessness to ampicillin-sulbactam (100 percent) while disengages from blood showed least vulnerability (90%) Isolates from discharge example recorded high protection from cephalosporins (17%). Disconnects from all examples showed high helplessness to imipenem. Staphylococcus aureus secludes from HVS showed high protection from tobramycin (16%) and gentamycin (24%), however showed high weakness to quinupristin/dalfopristin (100 percent), cefuroxime (100 percent) and imipenem (100 percent) High defenselessness to quinolones was seen in detaches from different examples (90%) and low weakness was seen in segregates from tracheal suctions (75%). As displayed in Table 1, detaches from every one of the examples showed 100 percent aversion to quinupristin/dalfopristin. Detaches from HVS showed high protection from

antibiotic medication (41%), erythromycin (34%) and clindamycin (19%), no obstruction was recorded from segregates from CSF to clindamycin. Nine percent of segregates from tracheal suctions recorded total protection from vancomycin (VRSA) and 3% recorded middle of the road protection from vancomycin (VISA). Separates from tracheal suctions likewise showed lower powerlessness to teicoplanin (93%). S. aureus disconnects from CSF (100 percent) and discharge (close to 100%) recorded high defense less-ness to tigecycline. Disconnects from discharge examples recorded high protection from trimethoprim/sulfamethoxazole (60%). High protection from linezolid was seen in disconnects from tracheal suctions (7%). Detaches from HVS recorded high protection from fosfomycin (24%), mupirocin (36%) and nitrofurantoin (6%).

Discussion

In this study, MRSA was tried utilizing cefoxitin screening. Generally speaking MRSA commonness was 27.8%. This distinction could be owing to mediations that might have been affected during the review time frame, for example, disease control and worked on antimicrobial stewardship as well as suitable anti-toxin use, this distinction in MRSA commonness could likewise be credited to the different lab procedures used to recognize MRSA accurately. VITEK@ 2 Gram Positive ID card utilized for delicate and well defined for subspecies S. aureus [18, 19]. Conversely, MRSA commonness was lower in examinations done in two other confidential medical clinics, which showed a 3.8% pervasiveness [20]. A concentrate in Eritrea that kept 9% predominance and 0.03% pervasiveness in Dutch emergency clinics [13, 21]. The low pervasiveness of MRSA in confidential emergency clinics could be ascribed to better disease controls. This shows there is high change of MRSA commonness from various nations. Greater part of MRSA was separated from discharge examples, 154/232 (66%). Our finding agrees with concentrates on finished in two confidential emergency clinics in Nairobi, a Namibian establishment of pathology and a tertiary wellbeing organization in Nigeria [14, 15, 22]. Conversely, different examinations done in Nigeria, Iran and Jamaica showed various examples were transcendent [9, 23, 24]. The big number of MRSA from discharge in our review could be because of openness of wounds and abscesses to S. aureus. Carriage of S. aureus on the skin makes wounds more inclined to MRSA diseases. In this review, 5% of MRSA confines were impervious to vancomycin. This finding is like a review done in Iran which showed 5% of the MRSA segregates were impervious to vancomycin [11]. This differences comparative examinations done in a tertiary consideration emergency clinic in India and pediatrics and neonatal escalated care patients at IMS and SUM Hospital, Bhubaneswar which, separately showed 3.5 and 1% protection from vancomycin among MRSA [12, 23]. Concentrates on finished on antimicrobial helplessness of MRSA in hospitalized patients in Iran, two emergency clinics in India and two confidential emergency clinics in Kenya showed 100 percent defenselessness to vancomycin [8, 22, 25]. Our review showed *S. aureus* disengages were profoundly helpless to more up to date sedates. These medications incorporate; quinupristin/dalfopristin, tigecycline, imipenem, teicoplanin, vancomycin and linezolid. Comparative examinations done in Kenya and USA have shown *S. aureus* to be exceptionally vulnerable to ceftobiprole, tigecycline, linezolid, teicoplanin, vancomycin and daptomycin [22, 26]. This finding varies from a review done by Arianpoor *et al*. on antimicrobial helplessness example of S. aureus secludes against recently showcased anti-microbials in Iran which showed 5.5% of MRSA detaches were impervious to linezolid, 5.9% of to quinupristin-dalfopristin and 18.9% to tigecycline [11].

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