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letter

Detection and Resistance Pattern of *Staphylococcus aureus* Causing Blood Stream Infections Among ICU Patients

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Dear Editor,

Bacteremia is a serious condition for hospitalized patients and delays in treatment can increase length of stay, hospital costs, and mortality rate, as it can trigger more serious events such as septic shock, occasionally with multiple organ failure, and death (1).

With regard to the fact that bacteremia is the complication of a critical illness, it occurs in approximately 5% of all patients admitted to ICUs owing to the paucity of new antimicrobials in the industry pipeline, and the emergence of strains resistant to recent antimicrobials (2).

The prevalence of multidrug resistant microorganisms is constantly growing, despite various strategies for their prevention, and this is a concern for health professionals. One of the common bacterial pathogens present in the bloodstream infections (BSIs) in our region is *Staphylococcus aureus* (3,4). Overcoming methicillin resistant *S. aureus* (MRSA) infections is an obstacle due to the resistance to beta-lactam antibiotics.

Considering the increasing rate of infections caused by MRSA, doing a reliable, accurate, and rapid test for detection of MRSA is essential for both antibiotic therapy and infection control measures.

The present study aimed to determine BSI caused by *S. aureus* at a large teaching referral hospital in Karaj, Iran.

This hospital-based study was carried out in the Microbiology Department of a hospital in Karaj, Iran, from December 2016 to September 2017. During the study, a total of 1500 patients, clinically suspected of BSI, were enrolled.

Patients admitted to the inpatient units were investigated for BSI by physicians. At least a blood culture specimen was taken from the patient with the body temperature above 37°C or in the presence of any clinical BSI symptoms, and incubated at 37°C for 28 days. After isolation, the isolates were identified using standard microbiological techniques (5).

The susceptibility pattern of *S. aureus* isolates against various antibiotics was tested by the disk diffusion method on Mueller Hinton agar according to the Clinical and Laboratory Standards Institute (CLSI) recommendations. All the isolates were tested for MRSA using Cefoxitin (30 µg) disc based on the CLSI guidelines. In addition, MICs of oxacillin were determined according to the CLSI guidelines. The concentration of oxacillin used was 0.25 mg/mL to 0.0039 mg/mL. The antibiotic discs and oxacillin powder were purchased from Rosco Company (Denmark). *S. aureus* ATCC 25923 was used as a quality control in all the experiments.

During the study, 60 cases were diagnosed with bacteremia with a bacterial origin, out of which 46.6% (n= 28) were females and 53.4% (n= 32) were males. The mean age of the patients was 63 years (25-90 years).

The mean length of hospital stay was 8 days with a range of 1 to 38 days. Twelve isolates (20%) were identified as *S. aureus* strains.

Table 1 represents the antimicrobial resistance pattern of *S. aureus*; these isolates were generally resistant to the most agents tested. All the *S. aureus* isolates were MRSA by cefoxitin disc diffusion method. The MIC of oxacillin for *S. aureus* isolates ranged from 0.25 mg/mL to 0.0039 mg/mL.

As abovementioned, more serious situation is the increasing rate of resistance in this bacterium, which usually leads to high level of treatment failure and eventually death. In the United States, the prevalence of MRSA is as high as

Table 1. Antibiotic Resistance Pattern of Isolated *Staphylococcus aureus* Strains by Kirby Bauer Disc Diffusion Method

Antibiotics	*Staphylococcus aureus* Isolates Number											
	1	2	3	4	5	6	7	8	9	10	11	12
Erythromycin	S	R	R	S	R	I	S	R	R	R	I	R
Tetracycline	S	S	R	S	R	S	R	R	R	R	S	R
Cotrimoxazole	S	S	R	S	S	S	S	S	S	S	S	S
Gentamicin	S	R	R	S	R	S	S	R	R	R	S	R
Mupirocin	S	R	S	S	S	S	S	S	S	S	S	S
Rifampin	S	R	S	S	R	S	S	R	R	R	S	R
Chloramphenicol	S	I	I	S	S	S	S	S	S	S	S	S
Ciprofloxacin	S	R	R	S	R	S	S	R	S	R	S	R
Vancomycin	S	S	R	S	S	S	S	S	S	S	S	S
Penicillin G	I	R	R	R	R	R	R	R	R	R	R	R
Clindamycin	S	R	R	S	R	S	R	R	R	S	S	R
Cefoxitin	S	R	R	S	R	S	S	R	R	R	S	R

Note. R: Resistant, S: Susceptible.

60%, however great geographic variations exist worldwide particularly in Iran (4,6). It is difficult to determine the morbidity and mortality rates attributable to MRSA; likewise, many studies have reported conflicting results for the bacteremia caused by *S. aureus*.

We suggest that additional BSI control measures should be implemented and antibiotic policy and guidelines be introduced to reduce the high resistance to *S. aureus*.

Ethical Approval

Not applicable.

Conflict of Interest Disclosures

None.

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