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Molecular biology, including diagnostics: Molecular typing

MALDI-TOF MS subtyping of methicillin-resistant *Staphylococcus aureus* isolates from the Kingdom of Saudi Arabia

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Objectives:

The Epidemic strains of Methicillin-Resistant *Staphylococcus aureus* (MRSA) have long been recognized as a one of the major causes of nosocomial infections leading to excess morbidity and mortality among the hospitalized patients worldwide. The increased prevalence of MRSA demands rapid and proficient methods for characterization and identification of clonal spread within the hospital settings. Rapid and accurate methods of detection of nosocomial outbreaks are essential for the appropriate management of timely intervention in infection control. Therefore, the objective of this study was to detect the MRSA outbreaks by rapid and accurate methods.

Methods:

In this study, nine commonly methods used for typing of microorganisms were used to characterize forty two MRSA isolates (22 isolates from two suspected outbreaks and 20 isolates from different sources) collected in 2013 from patients attending the major hospitals in Ha'il region of Saudi Arabia. The results obtained were compared with the subtyping method performed using MALDI-TOF-MS.

Results:

The results of this study showed a different distribution of 28-isolates (including 8isolates from one suspected outbreak) in all the typing methods including the subtyping using the MALDI-TOF-MS. However, the results of the other suspected outbreak (14 isolates) showed identical results by all the typing methods including the MALDI-TOF-MS (Table-1) and were confirmed as an outbreak.

Conclusions:

The High speed and accuracy of obtaining results using the MALDI-TOF MS make this method a potentially important tool for a rapid and sensitive identification of nosocomial outbreaks caused by different microorganisms. Our present study suggests that MALDI-TOF MS can be successfully used in routine clinical microbiology for real-time identification of nosocomial outbreaks from MRSA isolates before results from DNA-based systems are available. This method might be considered for typing outbreak isolates because of it is easy to perform, economical, less time consuming, has a greater discriminatory power, and high reproducibility. Pulsed field gel electrophoresis (PFGE) exhibited superiority as a technique for typing MRSA isolates with high discrimination. However, PFGE is difficult to perform and is time consuming.

Typing method	No of isolates (14)	Time test (h)
Antibiogram	1	<24
Biotyping	A	<72
PFGE	B11	<72
SCCmec	IIIA	<5
HVR	1	<5
COA	4	<5
SPA	1	<5
TRIPLEX	141	<5
RS-PCR	A6	<5
MALDI-TOF Sub typing	Identical pattern	<1

Table-2: Characterization results of confirmed outbreak of 14-MRSA isolates.