



Prevalence and antibiotic sensitivity profiles of *Staphylococcus aureus* nasal carriage among preclinical and clinical medical students in a Malaysian university

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ABSTRACT

Aims: Prevalence of Methicillin-resistant *Staphylococcus aureus* (MRSA) strains in healthcare (HA-MRSA) and community (CA-MRSA) incurred costly morbidity and mortality. This study assessed the prevalence and antibiotic sensitivity profile of *S. aureus* and MRSA isolates from medical students.

Methodology and results: A cross-sectional study of nasal swabs from 60 medical students yielded 93% positive *S. aureus*. In this study, erythromycin, fusidic acid, gentamicin, penicillin, vancomycin and methicillin were used. The most significant antibiotic sensitivity against *S. aureus* was fusidic acid (p -value = 0.0042). The *S. aureus* and MRSA isolates from clinical students were more resistant than those of preclinical students against erythromycin (44%; 15%), fusidic acid (33.3%; 10%), penicillin (85%; 86.9%), vancomycin (11.1%; -) and methicillin (19.4%; 15%) respectively while the isolates from preclinical students were more resistant than those of clinical students against gentamicin (5%; -).

Conclusion, significance and impact of study: In this study, gender, age and duration of clinical exposure had no significant bearing on the prevalence of nasal *S. aureus* and MRSA respectively. No MRSA infections were detected in preclinical (15%) and clinical (19%) students positive for MRSA, suggesting that these students may be carriers of CA-MRSA. A larger study will be implemented to provide baseline data for monitoring CA-MRSA infections, genotyping and constructing of phylogenetic tree.

Keywords: Methicillin-resistant, *Staphylococcus aureus*, medical students, nasal

INTRODUCTION

Staphylococcus aureus (*S. aureus*) is a Gram-positive bacteria, cluster-forming cocci and normal flora found on nasal passages, skin and mucous membranes of human. It is present in approximately 30% of healthy people population (von Eiff *et al.*, 2001). Staphylococci, ubiquitous colonisers of human epithelia are implicated in soft tissue infections and invasive diseases namely osteomyelitis, necrotizing fasciitis, severe sepsis and endocarditis (Miller *et al.*, 2005; Klevens *et al.*, 2007). Methicillin-Resistant *Staphylococcus aureus* (MRSA) was first documented in 1960 (Barber, 1961) and classified into Hospital-acquired Methicillin-Resistant *Staphylococcus aureus* (HA-MRSA) and Community-acquired Methicillin-Resistant *Staphylococcus aureus* (CA-MRSA) (Naimi *et al.*, 2003; Kluytmans-Vandenbergh and Kluytmans, 2006; David and Daum, 2010).

Previous studies had shown that developing countries for instance, Nigeria (14%), India (16%) and Malaysia

(26%) had lesser *S. aureus* carriers than developed countries like United State (32%) and Netherlands (35%) (Klevens *et al.*, 2007; Alvarez-Uria and Reddy 2012, Al-Talib *et al.*, 2013; Dulong *et al.*, 2014). However, Asia is currently among the regions with the highest prevalence rates of HA-MRSA and CA-MRSA in the world (Song *et al.*, 2011; Chen and Huang, 2014; You *et al.*, 2017). Prevalence of HA-MRSA infections had been reported to be 70-80% in Asia region (Boucher and Corey, 2008; Song *et al.*, 2011). While a study reported 7% of adults were carrying MRSA in their nasal passageway (Hidron *et al.*, 2005), nasal carriage MRSA colonization rate was found higher in healthcare setting than in community (Berthelot *et al.*, 2004; Trepanier *et al.*, 2013; Dulong *et al.*, 2014). Studies also suggested that healthy individual may act as medium that transferred MRSA among the communities causing an increase in MRSA infections (Kluytmans-Vandenbergh and Kluytmans, 2006; David and Daum, 2010; Conceicao *et al.*, 2013; Conceicao *et al.*, 2014). CA-MRSA showed high resistance against

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