

Methicillin-susceptible and -resistant *Staphylococcus aureus* with high-level antiseptic and low-level mupirocin resistance in Malaysia

ABSTRACT

The prevalence and spread of mupirocin and antiseptic resistance among colonizing and infectious *Staphylococcus aureus* were determined. *S. aureus* isolated from anterior nares and infection sites of patients hospitalized in the largest tertiary care referral hospital in Malaysia was investigated for mupirocin and antiseptic susceptibility testing, and for PCR detection of *mupA*, *qacA/B*, and *smr* genes. Twelve isolates showed resistance to mupirocin by disk diffusion, of which 10 (3.8%) harbored the *mupA* gene. Minimum inhibitory concentrations (MICs) ranged from 64 to 768 g/ml for *mupA* positive and below 46 g/ml for negative isolates. The *mupA* was more common among ST239 isolates (70%). The *qacA/B* was carried in 67 out of 95 methicillin-resistant *Staphylococcus aureus* (MRSA) (70.5%) and 3 out of 164 methicillin-susceptible *Staphylococcus aureus* (MSSA) (1.8%), while *smr* was carried in 6 out of 95 MRSA (6.3%) strains. MICs ranged from 3.9 to 15.6 g/ml for benzethonium chloride (BTC) and benzalkonium chloride (BKC), and from 10.3 to 20.7 g/ml for chlorhexidine digluconate (CHG). Isolates with *qacA/B* and *smr* or *qacA/B* alone showed higher MIC (20.7 g/ml for CHG and 15.6 g/ml for BTC and BKC) than the isolates that lacked antiseptic resistance genes (10.3 g/ml for CHG and 3.9 g/ml for BTC and BKC). In 16 cases, ST239 was isolated from the infection site and the nares simultaneously, and shared identical resistance patterns (*qacAB* or *qacAB+smr*), suggesting possible endogenous infection. Spread of low-level mupirocin resistance expressing ST239 MRSA and high-level resistance expressing emerging ST1, co-existing with antiseptic-resistant genes showing elevated MICs, should be monitored for effective infection control.

Keyword: *Staphylococcus aureus*; Antiseptic resistance; Mupirocin; Methicillin-susceptible; Methicillin-resistant