

# Genotyping and molecular epidemiology of bacterial pathogens causing hospital acquired infections in Taiwan hospitals

Abstract:

**Background and Purpose.** Antimicrobial resistance is an increasing public health problem worldwide. Organisms causing hospital acquired infections have the highest rates of antimicrobial resistance. This project utilized isolates collected in the 4 rounds of Taiwan Surveillance of Antimicrobial Resistance (TSAR) project in 1998, 2000, 2002, and 2004 to study the molecular epidemiology and mechanisms of resistance in methicillin resistant *Staphylococcus aureus* (MRSA) causing hospital acquired infections in Taiwan. **Methods.** Pulsed-Field Gel Electrophoresis, multilocus sequence typing, and DNA sequencing were used to study the evolution and relatedness of the strains. Polymerase chain reactions were used to study the genes (SCCmec) responsible for methicillin resistance and to detect the presence of PVL toxin genes. **Results.** MRSA comprised 68 to 80% of the *S. aureus* causing hospital acquired infections (HAI) in Taiwan. A total of 226 MRSA isolates causing HAI from the 4 study years were studied for their molecular characteristics and resistance mechanisms. Four main pulsed field gel electrophoresis types (pulsotypes) were found. The majority (77%, 174 isolates) of the isolates belong to pulsotype A, and there were 19 isolates (8.4%) in pulsotype B, 9 isolates (4.0%) in pulsotype C, and 15 isolates (6.6%) in pulsotype D. Although pulsotype A isolates remained the predominant clone in all 4 years, accounting for 90.5% of the MRSA in 1998, only 57.4% of 2004 MRSA isolates belong to pulsotype A. In contrast, pulsotype D was not found in 1998 but increased to account for 20.4% of the MRSA isolates causing HAI in 2004. The proportions of pulsotypes B and C also changed over the years. Isolates in pulsotypes B and C share characteristics usually found in community-onset MRSA (C-MRSA), such as the possession of SCCmec types IV (pulsotype B & C) and PVL toxin (in pulsotype C). **Conclusions.** These results indicated that the epidemiology of MRSA causing hospital infections is changing in Taiwan and C-MRSA may be migrating into the hospital environment. Further studies on disease spectrum and risk factors associated with each clone.

Keyword: Hospital acquired infection, antimicrobial resistance, methicillin resistant *Staphylococcus aureus* (MRSA), molecular epidemiology