

## High prevalence of antimicrobial resistance among clinical *Streptococcus pneumoniae* isolates in Asia (an ANSORP study)

### ABSTRACT

A total of 685 clinical *Streptococcus pneumoniae* isolates from patients with pneumococcal diseases were collected from 14 centers in 11 Asian countries from January 2000 to June 2001. The in vitro susceptibilities of the isolates to 14 antimicrobial agents were determined by the broth microdilution test. Among the isolates tested, 483 (52.4%) were not susceptible to penicillin, 23% were intermediate, and 29.4% were penicillin resistant (MICs  $\times$  2 mg/liter). Isolates from Vietnam showed the highest prevalence of penicillin resistance (71.4%), followed by those from Korea (54.8%), Hong Kong (43.2%), and Taiwan (38.6%). The penicillin MICs at which 90% of isolates are inhibited (MIC90s) were 4 mg/liter among isolates from Vietnam, Hong Kong, Korea, and Taiwan. The prevalence of erythromycin resistance was also very high in Vietnam (92.1%), Taiwan (86%), Korea (80.6%), Hong Kong (76.8%), and China (73.9%). The MIC90s of erythromycin were  $>32$  mg/liter among isolates from Korea, Vietnam, China, Taiwan, Singapore, Malaysia, and Hong Kong. Isolates from Hong Kong showed the highest rate of ciprofloxacin resistance (11.8%), followed by isolates from Sri Lanka (9.5%), the Philippines (9.1%), and Korea (6.5%). Multilocus sequence typing showed that the spread of the Taiwan19F clone and the Spain23F clone could be one of the major reasons for the rapid increases in antimicrobial resistance among *S. pneumoniae* isolates in Asia. Data from the multinational surveillance study clearly documented distinctive increases in the prevalence rates and the levels of antimicrobial resistance among *S. pneumoniae* isolates in many Asian countries, which are among the highest in the world published to date.

**Keyword:** *Streptococcus pneumoniae*; Asia; Antimicrobial resistance