

## Global trends of antibiotic resistance

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Infectious diseases still remain the major cause of death despite the remarkable advance in modern medicine. Disease burden of infectious diseases has been amplified due to the emergence of new infectious diseases such as SARS and antimicrobial resistance in major human pathogens. Antimicrobial resistance encompasses all major pathogens including bacteria, fungi, mycobacteria, and virus. During the previous 60 years of modern chemotherapy since the introduction of penicillin, various types of antimicrobial resistance have been developed by human pathogens against most of antibiotics used in the clinical medicine. Among Gram-positive cocci, resistance in *Staphylococcus aureus* is a classic example of antimicrobial resistance. Methicillin-resistant *S. aureus* (MRSA) has become the most common nosocomial pathogen in many hospitals worldwide since the 1980s. Recently, MRSA are emerging in the community setting in the United States, Australia, Taiwan, and some countries, mainly as skin and skin structure infections or necrotizing pneumonia. Furthermore, since 1997, *S. aureus* with reduced susceptibility to glycopeptides has emerged. Vancomycin-intermediate *S. aureus* (VISA) has been isolated in more than 20 cases, while high-level vancomycin-resistant *S. aureus* (VRSA) was isolated in 4 cases in the United States to date. Antimicrobial resistance in *Streptococcus pneumoniae* has become a serious problem in many countries, especially in some Asian countries since the 1990s. Vietnam, Korea, Taiwan, and Hong Kong showed alarmingly high rates of resistance to penicillin, macrolides, and multiple drugs. Vancomycin-resistant enterococci (VRE) is one of the major nosocomial pathogen with very limited therapeutic options. Gram-negative pathogens are also causing the therapeutic problems by producing extended-spectrum beta-lactamase (ESBL). Prevalence rates of ESBL-producers among *Escherichia coli* and *Klebsiella pneumoniae* range from 5-40% depending on the region. ESBL-producing Gram-negative bacilli could be treated with carbapenems. Multidrug-resistant non-fermenters such as *Pseudomonas aeruginosa* or *Acinetobacter* spp. are becoming another serious therapeutic issues. Not only bacterial resistance but also resistance in mycobacteria, fungi, protozoa, and virus is a real threat to clinical practice. Given the past trend of increasing prevalence of resistance, antimicrobial resistance in various pathogens will further increase in the future. Global effort to control and prevent the emergence of antibiotic resistance is strongly warranted.