CHAPTER 1

INTRODUCTION

1.1 Introduction

Streptococcus pneumoniae or diplococci has been long recognized as an important human pathogen causing of potentially life-threatening community-acquired infection; for instance, pneumonia, bacteremia, menigitis, otitis media and sinusitis. The emergence of drug-resistant *Streptococcus pneumoniae* (DRSP) had been reported since the development of optochin and sulfonamide, which were the only antimicrobial agents against pneumococci before penicillin era in the mid-20th century. After penicillin became wide available, mortality and morbidity rate from pneumococcal infection decreased dramatically. Unfortunately, the first clinical isolate of penicillin-resistant pneumococci from a patient in Papua New Guinea was reported, and similar strains were subsequently found in Australia and South Africa in 1967. Tetracycline-resistant pneumococci isolates were also reported in 1962. Erythromycin-resistant strains were described in 1967, and in 1970 chloramphenicol-resistant pneumococcal isolates were recognized. Moreover, a report of multidrug-resistant pneumococci was becoming published in 1970s. The emergence of DRSP has elevated worldwide during the past 20 years and particularly within 5 years. The prevalence of penicillin-resistant pneumococci in some countries in Europe and Asia has been shown more than 50%, resulting from increasing global population, and extremely antimicrobial prescribing (Song, *et al*, 1999; Hsueh, *et al*, 2000; Sahm, *et al*, 2000). In Thailand, high level of penicillin-resistant pneumococci increased rapidly from 0% to 23% within 2 years in 1995 to 1997 at Siriraj Hospital, Bangkok (Aswapokee, *et al*, 1998). Furthermore, penicillin-resistant pneumococcal isolates also were increasing from 0% in 1993 to 5% in 2001 at Hat Yai

Hospital, in the south of Thailand (Chup-uppakarn, 1998; Warachit, *et al*, 2002). Thus, it is necessary to know the prevalence of DRSP in each region for rational empiric therapy.

Currently, the development of resistance has changed the approach to many infectious problems, particularly with regard to empiric antibiotic therapy and prophylaxis. Treatment of pneumococcal infectious disease is dependent on the site of infection and the level of intrinsic drug resistance. The American Thoracic Society, the British Thoracic Society and other guidelines recommended that β-lactam antibiotics such as penicillin, ampicillin, amoxicillin, cefuroxime, cefotaxime, ceftriaxone were drug of choice for nonmeningeal pneumococcal infections (e.g., pneumonia, bacteremia, otitis media). The recommended therapy for pneumococcal meningitis was cefotaxime or ceftriaxone. For area where had prevalence of cefotaxime- or ceftriaxone-nonsusceptible strains more than 5%, antibiotic therapy for meningitis should be cefotaxime or ceftriaxone with the addition of vancomycin (Friedland and Klugman, 1997; Klugman and Feldman, 1999; Jacobs, 1999; the American Thoracic Society, 2000; Chenoweth, *et al*, 2000; Harwell and Brown, 2000; Musher, 2000; the British Thoracic Society, 2001). Besides, documented antimicrobial therapy should be modified according to microbiological susceptibility testing report. However, empirical therapy for pneumococcal infection has been complicated by the emergence of antibiotic resistance. Many studies determined the relationship between the significantly clinical outcome, particularly in patients who received penicillins and cephalosporins and drug susceptibility (Friedland, 1995; Pallares, *et al*, 1995; Choi and Lee, 1998; Metlay, *et al*, 2000). The risk factors of infection caused by DRSP also was assessed (Deeks, *et al*, 1999; Chokephaibulkit, *et al*, 2000; Dejthevaporn, *et al*, 2000). The results from those studies mentioned above were applied to be the recommendations for the appropriate empirical antimicrobial choosing and avoidance inappropriate antibiotic use in the era of increasing drug resistance.

Accordingly, the degree of drug resistance was considered by the minimum inhibitory concentrations (MIC) cutoffs for identifying strains with susceptible, intermediately susceptible and resistant based on achievable drug levels at the site of infection. E test is the simple method used to determine MIC. It is accepted as accurate method relevant with another standard method, microbroth dilution (Skulnick, *et al*, 1995; Tenover, *et al*, 1996; Clark, *et al*, 1998; Wang, *et al*, 1998; Kelly, *et al*, 1999; Davies, *et al*, 2000).

1.2 Objectives

This study was conducted to

1.2.1 investigate the prevalence of pneumococci resistance to penicillin, cefotaxime, imipenem, levofloxacin and erythromycin from community-acquired infections in Southern Thailand.

1.2.2 identify the risk factors of infection caused by drug-resistant pneumococci.

1.2.3 determine the pattern of antimicrobial use and outcome of patients who were infected with pneumococci.