EDITORIAL

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Changes in the epidemiology and burden of community-acquired pneumonia in Korea

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Community-acquired pneumonia (CAP) is a significant cause of morbidity and mortality worldwide. Lower respiratory tract infections, including CAP, were the fourth leading cause of death worldwide, with an estimated 2.81 million deaths, and were the leading cause of years of life lost in 1990, and second in 2010 [1]. CAP is also the disease with the largest socio-economic burden worldwide, as measured using disability-adjusted life years (DALY), accounting for 94.5 million DALYs in 2004 [2]. Traditionally, death caused by CAP is regarded as the result of an unhygienic environment and inadequate nutrition, which occur mainly in undeveloped countries. CAP is still the leading cause of childhood mortality in developing countries and the most common cause of adult hospitalization. In 2011, 1.3 million children died from pneumonia, most in poor countries.

Despite the marked improvement in socioeconomic status in Korea, CAP remains a major public health problem. According to Statistics Korea data for 2013, pneumonia skyrocketed from 12th place to 6th place as a cause of death in Korea over the past 10 years, and the pneumonia death rate has increased from 5.7 per 100,000 in 2003 to 21.4 per 100,000 in 2013 [3]. Attention should be focused on discovering why the incidence of death due to pneumonia, which is considered a disease of unsanitary environments, is increasing in Korea. South Korea is a dramatic success story in terms of the economic growth that has taken place over the past three decades, and the quality of life in Korea equals that in developed countries. Therefore, the old concept of pneumonia death can no longer explain the change in pneumonia death in Korea. According to Statistics Korea for 2013, in 1983, the death rate due to pneumonia was 18.3 per 100,000 in patients younger than 15 years and 53.3 per 100,000 in those older than 65 years. In comparison, in 2013, the death rate in patients younger than 15 years had decreased to 0.2 per 100,000, while it more than tripled in patients older than 65 years, to 166.6 per 100,000. In addition, the death rate of people older than 80 years almost quadrupled from 162.8 per 100,000 in 1983 to 622.1 per 100,000 in 2013 [3]. Therefore, the issue of pneumonia at younger ages, which causes most of the socioeconomic loss in undeveloped countries, is not a problem in South Korea. The current problem in South Korea is pneumonia at older ages, and the increased death rate in older age groups caused by pneumonia comprises most pneumonia deaths.

There are many reasons for the changes in death due to pneumonia in Korea. The increased elderly population is a major factor. Korea is rapidly becoming

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an extremely aged society as it has the world's lowest birth rate. More interestingly, this change is occurring much more rapidly than in other countries with the same experiences. Generally, pneumonia occurs most frequently in the elderly. In addition, advanced age is a risk factor for CAP according to research on the Korean population [4]. Since the respiratory symptoms of pneumonia are less obvious in the elderly, an early diagnosis is difficult. Consequently, when patients present, they are severely ill and are more likely to be hospitalized than younger pneumonia patients, which results in higher medical costs for caregiver assistance [5]. Pneumonia patients older than 65 years cost 6.7-fold more than pneumonia patients 15 to 44 years old, and 75% of these medical costs are for hospitalization. Therefore, the prevention of pneumonia in the elderly and an early diagnosis are vital in terms of the effective utilization of healthcare resources.

The increasing elderly population could explain the increase in the total number of pneumonia deaths, but it cannot entirely explain the increase in the death rate per 100,000 people. This might be explained by the increase in the population with underlying diseases that might function as pneumonia risk factors. The risk factors for pneumonia include chronic obstructive lung disease, cardiovascular disease, diabetes mellitus, and smoking. Compared to individuals with no risk factors, the risk of pneumonia death is increased 4.2-fold in patients with asthma, 3.0-fold with lung disease, and 1.9-fold with cardiovascular disease. These risk factors are very common in old age and are often concomitant. The frequencies of the underlying conditions are factors that affect the clinical outcome of CAP. About half of the deaths in patients with CAP were attributable to the worsening of underlying disease [6].

In this issue of *The Korean Journal of Internal Medicine*, Lee and colleague [7] report the results of a retrospective, observational study of the disease burden of pneumonia in Korean adults older than 50 years. They observed that the elderly and those with underlying disease had a high disease burden related to treatment when hospitalized with CAP. This study has some limitations; e.g., its small sample size and the fact that it was conducted in university hospital. Despite these limitations, this study enhances our understanding of the importance of age and comorbidities in the disease burden of CAP in Korea. Their result also suggests that efforts at improving the control of underlying disease and adequate pneumonia prevention will decrease the burden of CAP.

The prolonged life expectancy and medical advances in Korea have increased the proportions of patients with CAP at advanced ages and with multiple comorbidities. These improvements have also had side effects: an increase in the number of elderly people at higher risk of pneumonia and death from pneumonia. Another concern is that the numbers of elderly patients in nursing homes and hospitals are increasing. These patients are likely to develop severe pneumonia caused by res istant pathogens, and the probability of death is expected to be higher; this is another critical cause of the increasing number of deaths from pneumonia.

In Korea, rapid social changes have occurred over the past 40 years with the extremely rapid economic growth, and changes that likely happened in other countries over 100 years have occurred in Korea within a generation. Similarly, the disease trends have changed from those of an undeveloped country to an advanced country over the past 40 years. However, few studies have analyzed these changes and identified the associated problems, including economic issues. Health spending is associated mainly with the proportion of elderly individuals in the population. Especially, the retirement of the 7 million baby boomers born between 1955 and 1963 will be a major challenge for the Korean health care system. In 2010, Korean baby boomers comprised about 15% of the total population. It is estimated that 3.1 million baby boomers are set to retire over the next 10 years. As baby boomers enter retirement, the proportion of the population 65 years and older will continue to increase, accelerating the inflation of health care expenditures and precipitating a crisis in the health insurance system [8]. These changes might result in increased morbidity and mortality from pneumonia in the near future. Therefore, it is crucial for policy makers and health care providers to provide comprehensive health services to prevent pneumonia. Vaccines targeting pneumococcal disease and influenza remain the mainstay for preventing CAP. Smoking cessation and respiratory hygiene measures, including the use of hand hygiene and masks, should be used to reduce respiratory infections [9]. Preventive strategies that identify and act on modifiable risk factors are par-

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amount for reducing CAP-related death in the elderly.

In conclusion, it is mandatory to understand the recent changes in the epidemiology and socioeconomic burden of pneumonia in our country. Establishing a prevention system for this disease should be our next objective. Since the elderly population experiences the greatest number of deaths from pneumonia, an effective prevention system is desperately needed. Cost effectiveness, of course, is a factor, and active vaccination for pneumonia and influenza and other preventive activities for the elderly and higher-risk groups for pneumonia are required.

Conflict of interest

No potential conflict of interest relevant to this article was reported.

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