Executive Summary

1. Objectives

Seasonal influenza is associated with high morbidity and mortality especially in high-risk populations, and is known to cause social and economic loss. However, the disease burden of seasonal influenza in the Korean population is yet to be quantified. While over 10 million Koreans are vaccinated annually with the seasonal influenza vaccine, studies on the effectiveness of the vaccine are lacking. The objectives of this study are 1) evaluate the disease burden of seasonal influenza and 2) evaluate the effectiveness of the seasonal influenza vaccine in the Korean population.

2. Methods

1) Burden of seasonal influenza in Korea

Cause-specific deaths bewteen 1997 and 2008 were analyzed using National Cause of Deaths database of Statistics Korea. Using Health Insurance Review and Assessment (HIRA) claims database from 2004 to 2008, patterns of cause-specific hospitalizations and outpatient visits were examined. The weekly number of confirmed cases by influenza subtypes were defined using influenza sentinel surveillance database of Korea Centers for Disease Control and Prevention (KCDC) from the 2005/2006 season through the 2008/2009 season. The weekly number of influenza-like illness (ILI) cases was defined using the same database from the 2000/2001 season through the 2008/2009 season.

Models to assess the disease burden of seasonal influenza were constructed for pneumonia and influenza (P&I) and cardiovascular disease

(CV).

The following methods were used to estimate the excess number of death, mortality rate, number of hospitalized patients, and hospitalization rate in each season: 1) time series regression model using indicator variable, 2) autoregressive integrated moving average process (ARIMA) method, and 3) Serfling least-squares linear regression model.

Database construction and statistical analysis for seasonal influenza disease burden was performed using SAS version 9.1.

2) Effectiveness of seasonal influenza vaccine

Using influenza sentinel surveillance database of KCDC from the 2006/2007 season through the 2008/2009 season, weekly distribution of the number of ILI cases and confirmed cases, influenza vaccination status, and the match between vaccine and circulating influenza strains were assessed. A retrospective case-control design was applied for assessing the effectiveness of seasonal influenza vaccine. A total of 27,617 cases with a record of influenza vaccination was included (6,266 for the 2006/2007 season, 9,972 for the 2007/2008 season and 11,379 for the 2008/2009 season). Cases were defined as ILI patients who had laboratory-confirmed influenza, and controls were defined as ILI patients with negative results.

Age-adjusted odds ratio (OR) was calculated using logistic regression. Vaccine effectiveness (VE) was estimated by using the formula VE=1-OR.

Statistical analysis was performed using SPSS version 10.0.

3. Results

1) Burden of seasonal influenza in Korea

The annual number of excess death with P&I associated with influenza was 40~48 (1.36~1.53 per 100,000 population) in the elderly population (age 65 or higher) during 1997~2008. The annual number of excess

admissions with P&I associated with influenza was 3,043~3,209 (58.64~63.74 per 100,000 population) in the elderly population (age 65 or higher) during 1997~2008. The annual number of excess admission with P&I associated with influenza was 2,212~4,893 (69.73~134.90 per 100,000 population) in children aged 6 or less during 2004~2008. The annual number of excess death with CV associated with influenza was 87~127 (2.42~3.34 per 100,000 population) in the elderly population (age 65 or higher) during 1997~2008. The annual mean number of excess admissions with CV associated with influenza was 22,731~24,957 (441.50~478.08 per 100,000 population) in the elderly population (age 65 or higher) during 1997~2008. The number of influenza-associated death was 7,109 from 05-06 to 07-08 season, which was about 1.0% of all-cause death during the period. The P & I , respiratory, and CV death due to influenza was estimated as 423 and 3,923 respectively. Influenza-z

associated P & I admission was estimated as 306,353(28.2% of all pneumonia) during these 3 seasons by the Thompson model. Influenza-associated CV admissions was also estimated as 177.015 during the same period, which was about 5.8% of all CV admissions.

2) Effectiveness of seasonal influenza vaccine

Influenza VEs for each season were 5.7% (95% CI, -6.8~16.7) for the 20062007 season, -0.6% (95% CI, -10.3~9.2) for the 2008/2009 season, and 1.1% (95% CI,-8.1~9.5) for the 2007/2008 season. When analysis was restricted to adults aged 20-64, the VEs were 8.5% (95% CI, -23.5~32.3), 22.7% (95% CI, -1.5~41.1), and 10.7% (95% CI, -14.8~30.6), respectively. VEs did not correlated with the match between the vaccine and the circulating influenza strains.

National Evidence-based Healthcare Collaborating Agency

4. Discussion and conclusion

1) Burden of seasonal influenza in Korea

The disease burden of seasonal influenza in Korea was similar to, or less than that of other countries. Further studies are required to evaluate the socioeconomic cost of influenza and the cost-effectiveness of influenza vaccination.

2) Effectiveness of seasonal influenza vaccine

The effectiveness of influenza vaccine for preventing laboratory-confirmed influenza infection was not evident in this study due to limited accuracy of influenza vaccination history data source provided by the laboratory surveillance data of KCDC. Further studies constructing and using a new database seems necessary to assess the effectiveness of vaccination and to provide the evidence required for making appropriate public health policy decisions for influenza and vaccination.