TITLE: **Using Casemix System Data in Estimating Economic Burden of Influenza Among the Elderly**

Introduction

Influenza is an infectious disease caused by a range of influenza virus may cause life-threatening complications among the high-risk groups especially the elderly. The condition is preventable with effective vaccination programme. Estimation of the economic burden are essential to guide policy makers in establishing the influenza vaccination program, especially in resource-limited settings. Casemix system data base with extensive costing information is an excellent source of information for estimating economic burden of influenza. The aim of the study was to estimate the economic burden of influenza from the provider's perspective among elderly in Malaysia.

Methods

MY-DRG casemix database in a teaching hospital in Malaysia from 2010 to 2020 with 16 clinical and non-clinical variables was the main source of data in this study. Cases with principal diagnosis or secondary diagnosis coded in ICD-10 as J09, J10.0, J10.1, J10.8, J11.0, J11.1, J11.8, J12.8 and J12.9 that represent influenza and its complications were included in the study. Direct cost of influenza disease for all severity level, adjusted for year 2020 tariff, was calculated from the casemix data and guided by clinical pathway developed by experts. Two outpatient visits prior to hospital admissions were assumed to calculate the annual cost per patient. Sensitivity analysis was conducted to assess the impact of variations in costs and incidence rate of influenza for both costing approaches.

Results

A total of 1,738 cases of influenza were identified from the casemix database. Most of the cases were less than 18 years (91.2%), while only 79 cases (4.5%) were among the elderly. Severity level 1, 2 and 3 cases were 56.5%, 35.1% and 8.4%, respectively. Top five MY-DRG casemix groups were J-4-16-I (Simple Pneumonia-Mild; 50.9%), J-4-16-II (Simple Pneumonia-Moderate; 13.6%), J-4-18-II (Asthma & Bronchiolitis-Moderate; 12.7%), U-4-13-I (Upper Respiratory Tract Infection & Otitis Media-Mild; 2.8%) and J-4-16-III (Simple Pneumonia-Severe; 2.8%). The average cost per admission for mild, moderate, and severe cases was RM3,677 (USD 876) RM4,200 (USD 1,000) and RM 7,087 (USD 1,1688), respectively. Average annual direct costs of managing mild, moderate and severe influenza were estimated to be RM2,435 (USD 579), RM6,504 (USD 1549) and RM13,282 (USD 3,163), respectively. The estimated total annual economic burden of influenza among the elderly aged 60 years and above in Malaysia was RM3.28 billion (USD 782 million) which is equivalent to 10.7% of MOH budget for 2020. Sensitivity analysis indicated that influenza incidence rate and cost of managing severe influenza were two most important factors that influence the total economic burden.

Conclusions

Overall, our results have shown that influenza is responsible for a substantial economic burden in Malaysia. The high cost of influenza suggests that further efforts are required to

implement preventive programme such as immunisation in the elderly to reduce the disease and economic burden.