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# INFLUENZA BURDEN AND ITS IMPLICATIONS IN 2020

Dr Wong Sin Yew, Dr Lam Mun San

## ABSTRACT

**In temperate countries, the seasonal influenza epidemics in the winter months have been predictable. While this "seasonal" pattern is less clear in tropical countries such as Singapore, the burden of influenza is no less than in temperate countries. In Singapore, a recent study has estimated that from 2010 to 2017, the influenza-associated hospitalisation for pneumonia and influenza was 50 per 100,000. Vaccination has been the most important public health prevention tool for influenza. The vaccine efficacy of the current influenza vaccines has been suboptimal, and efforts are underway to improve this to develop a universal influenza vaccine. The public health crisis brought upon by SARS CoV2 in 2020 has resulted in changes to the epidemiology of many respiratory infections, including influenza. While the reduction of seasonal influenza cases in the first three quarters of 2020 has been a welcome relief, it is critical to maintain vigilance as seasonal and pandemic influenza remains a global health threat.**

**Keywords: Influenza, burden, vaccines, COVID-19**

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## INTRODUCTION

Influenza is a global health threat both in its seasonal and pandemic forms. In this article on the burden of influenza, we will focus on the former. The annual seasonal influenza epidemics that cause significant morbidity and morbidity are familiar to all of us, and WHO estimates that up to ten percent of the global population is affected by influenza annually. The annual spikes in cases have been best described in temperate countries such as the United States of America and Europe where a winter peak of influenza cases has been consistently predictable.[1] Although there has been concern that the influenza burden in the Asia Pacific region is no less than in the US and Europe, there has been less epidemiological data available to quantify this. Quantifying influenza's burden is important. It allows the resourcing of public health capacities to cope with these regular epidemics and determine if additional interventions will be needed to reduce its impact.[1] There have been recent advances in methodologies used to measure influenza disease burden.[2]

Using data from WHO FluNet from 2010 to 2017, peak influenza circulation coincided with the winter seasons in several countries in the Asia Pacific region. This allowed recommendations for the appropriate timing of influenza vaccinations.[3] However, in other Asia Pacific countries, including Singapore, where there is no clear cut seasonality of influenza circulation, the accurate timing of seasonal influenza vaccination as a beneficial health intervention has been more difficult to demonstrate.[3,4]

## QUANTIFYING INFLUENZA BURDEN

Many countries have focused on estimating influenza's impact, the cost-effectiveness of public health interventions such as public awareness campaigns, vaccination, and others.[2] The common influenza-related measures chosen include outpatient visits, especially in the high-risk groups, hospitalisations related to influenza and influenza mortality data. High-income countries have reported many studies on influenza burden, but the information generated may not always be relevant in the low-income setting in certain countries in Asia, Africa, and South America where provision, financing and access to healthcare are structured differently.

In the Global Burden of Disease Study 2017, influenza-associated lower respiratory tract infections (LRTI) were responsible for an estimated 145,000 deaths.[1] In the same study, influenza-associated LRTI was also estimated to account for between 3,709,000 to 22,935,000 hospitalisations in 2017. The burden of influenza LRTI was not uniform by regions or age groups. Deaths attributable to Influenza LRTI accounted for 0.26 percent of all deaths in 2017. Most of the mortality attributable to influenza LRTI occurred in the elderly, especially in those aged 70 years and older.[1]

## IMPACT OF INFLUENZA IN THE TROPICS, ASIA PACIFIC REGION AND SINGAPORE

In recent years, more research data on the influenza burden in the tropics and countries in the Asia Pacific have improved our understanding.[3-6] In the tropics, the pattern of influenza cases has also been different.[3,5] In essence, influenza activity in the tropics occurs throughout the year. For the countries near the equator, multiple minor peaks.[4,6]

There have been numerous studies on the burden of influenza in Singapore. Suffice to say that the annual influenza activity in Singapore differs from the temperate countries of the West.[7,8] The most appropriate description for influenza activity in Singapore is a year-round activity with bimodal peaks occurring at the beginning and in the middle of the year, coinciding with seasonal influenza epidemics in the Northern and Southern Hemispheres. This may be due to the travel patterns of Singaporeans during the midyear and year-end holidays. A recent study by the Epidemiology and Disease Control Division

**Wong Sin Yew**
Infectious Disease Physician
Gleneagles Medical Centre

**Lam Mun San**
Consultant, Infectious Disease Physician

of the Ministry of Health has estimated that from 2010 to 2017, the influenza-associated hospitalisation rate for pneumonia and influenza was 50 per 100,000.[7]

## UPDATE ON INFLUENZA IN 2020

Recent data on the burden of influenza in 2020 during the COVID-19 pandemic has been published. Data from Singapore and Taiwan demonstrated an early reduction of influenza cases in the first 3–4 months of 2020 during the Northern hemisphere influenza 2019/2020 epidemic.[9,10] A similar conclusion has also followed based on data from certain countries in the Southern hemisphere that had reported much lower influenza rates in the Southern hemisphere 2020 influenza season compared with the preceding years.[11] The exact cause of this reduction is unclear. It was postulated that the public health measures instituted during the COVID-19 pandemic, including the use of face coverings, safe distancing, "lockdown measures", had played a significant part in the recent reduction in influenza incidence. There are also postulates that "viral" factors may also play a role in reducing influenza incidence in the first three quarters of 2020, but these possible factors remain to be elucidated.

## INFLUENZA VACCINATION UPDATE

The influenza virus is a moving target. The readers are familiar that the currently commercially available influenza vaccines have shown variable and often suboptimal efficacy when there is a vaccine mismatch.[12,13] For example, in the 2017-2018 seasonal influenza epidemic, it was estimated that vaccine efficacy against Influenza A (H3N2) was a dismal 25 percent, and against Influenza A (H1N1) pdm09, it was 67 percent. Despite the influenza vaccine's current limitations, vaccination remains the current best means to control influenza epidemics. There are specific plans to address our knowledge gaps and to improve vaccine efficacy.[14] The main categories of influenza virus vaccines that are commercially available worldwide are detergent split inactivated influenza virus vaccine (IIV), recombinant influenza vaccine (RIV) and live attenuated influenza virus vaccine (LAIV). The latter two (RIV and LAIV) are not registered for use in Singapore as yet.

The influenza viruses in IIV may be grown in egg embryo or cell culture. Growth of the influenza viruses in eggs may lead to mutations in the Haemagglutinin (HA) head region and may reduce the efficacy of vaccine-induced antibody responses to the circulating viruses. This has been a major concern for the H3N2 component of the influenza vaccine.[12,13] Whether vaccine efficacy will be improved with the cell culture-based IIV vaccines remains to be answered.

## THE RATIONALE FOR INFLUENZA VACCINATION IN 2020 AND 2021

In the preceding paragraphs, data has been provided on the reduced incidence of seasonal influenza in the first three quarters of 2020. What then is the rationale for advocating seasonal influenza vaccination for the end of 2020 and beyond?[15] In the countries experiencing a second/third wave of COVID-19 cases such as those in Europe and the Americas, the answer appears clear cut with the seasonal influenza epidemic looming. Influenza and SARS CoV are transmitted in a similar person-to-person manner, and these two infections are difficult to differentiate by symptoms alone. The increasing cases of COVID-19 threaten to overwhelm the healthcare system in certain countries. With access to SARS CoV2 vaccination still many months away, it would be appropriate to advocate influenza vaccination to reduce the healthcare burden of respiratory tract infections in the community.

But are these reasons relevant to countries like Singapore, where the number of community cases of COVID-19 has been very low from early November 2020? The advocates of continuing seasonal influenza vaccination have cited the importance of keeping the immune system at a high level of readiness to combat all respiratory infections. Without seasonal influenza vaccination, there are also fears that the declining antibody levels to seasonal influenza viruses will place the population at risk for a large epidemic in the coming years.

## CONCLUDING REMARKS

There is a significant burden of influenza infection that impacts healthcare services usage, including outpatient attendances and hospitalisations. This has also translated to mortality, especially in the elderly. The major healthcare intervention is influenza vaccination for at-risk populations. While we look forward to future improvements in influenza vaccine efficacy, the COVID-19 pandemic has demonstrated that health interventions such as face-covering, safe distancing can also significantly reduce the incidence of seasonal influenza and other airborne respiratory infections. While the reduction in seasonal influenza incidence in the first three quarters of 2020 has been a welcome relief, it is critical to maintain vigilance against seasonal and pandemic influenza.

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