The Seasonality of Influenza in the Asia-Pacific Region

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Background

The Asia-Pacific region spans a wide range of climatic conditions, from temperate, to subtropical, through to tropical. The periodicity and seasonality of influenza virus infections are well established in those countries with temperate climates, and there is often a clear peak in activity during winter months. However, in countries with tropical or subtropical climates, influenza activity is either poorly defined or occurs throughout the year with periods of increased activity during the rainy and winter seasons.1-4

In the South-East Asian tropical zone, the first systematic attempt to describe the population incidence of influenza using active surveillance and comprehensive laboratory confirmation was carried out in the Sa Kao province of Thailand.5,6 Influenza activity was found to occur throughout the year and was identified in 11% of hospitalised pneumonia inpatients.6 A series of studies have confirmed that influenza hospitalisation rates in Hong Kong, a subtropical city, are similar to those in temperate countries.7,8 This study of documented hospital inpatients for influenza in Hong Kong and the South-East Asian tropical zone and the importance of this region as a source of seasonal viruses for temperate countries.10 A literature review on the burden of influenza in the region suggests that surveillance to define seasonal trends in influenza activity in the region needs to be strengthened.11

Objective

The World Health Organization (WHO), through its Global Agenda for Influenza Surveillance and Control, has intensified efforts to encourage countries to include the surveillance of influenza within their seasonal influenza control strategies as a priority on their public health agendas.12,13 The main objective of this study, therefore, is to support this initiative to promote the introduction and expansion of surveillance programmes over a period of years, in order to improve the understanding of the seasonality of influenza in Asia-Pacific countries and thus clarify the appropriate implementation of vaccination strategies. This study presents existing surveillance data from multiple countries to demonstrate and compare the annual fluctuations in influenza activity.

Methods

Data were obtained from infectious disease experts and organisations from member countries of the Asia-Pacific Alliance for the Control of Influenza (APACI). APACI members with an established laboratory-based influenza surveillance system were invited to provide influenza identification data from 2005 to mid-2010, including information on influenza type, subtype and distribution per month. FluNet, the web-based data collection and reporting tool of the Global Influenza Surveillance Network (GISN)14 was also searched to supplement data collection and to include data from neighbouring countries with no APACI representative.

While there were variations in data collection protocols between different countries, all laboratory surveillance centres were designated WHO National Influenza Centres. Laboratory identification of influenza was most commonly achieved by viral isolation through standard culture; however, direct detection of the viral antigen and, increasingly, reverse transcription polymerase chain reaction methods were used by member countries. Where possible, influenza viruses were further subtyped by either A(H1N1) or A(H3N2) subtypes, and from 2009 onwards the pandemic strain of A(H1N1) was also identified.

Once collated, the influenza data from each country were plotted then analysed, with the main goal of identifying the location and magnitude of seasonal peaks of influenza activity throughout the calendar year.

Results

Influenza identification data were collected from Australia, Cambodia, China (including Hong Kong), India, Indonesia, Japan, Malaysia, Mongolia, New Zealand, the Philippines, South Korea, Singapore, Sri Lanka, Thailand and Vietnam. Data for Hong Kong was also recorded and assessed separately. Nine of the countries were able to provide comprehensive data between 2005 and 2010; six had intermittent data only (South Korea, Cambodia, India, Indonesia, Malaysia, Sri Lanka).

Influenza identification data from countries in the Northern temperate region showed clearly defined seasonal peaks of influenza activity during the winter months [Figure 1 A–D]. However, in China, data showed an increase in subtype activity during non-winter months as well, with A(H3) activity in 2005, 2007 and 2009 and A(H1) activity in 2006, which may reflect variations in activity patterns between north and south China. In the 2009/2010 winter, influenza B was the major contributor to the seasonal peak.

Data from countries in the Southern temperate region, Australia and New Zealand, showed a predictable increase in seasonal influenza activity during the winter periods, with peak activity between June and August each year [Figure 2 A and B].

In Hong Kong, A(H3) activity peaks were recorded during the wet seasons of 2005, 2007 and 2009. A smaller A(H1) peak was observed during the wet season of 2006 and the summer months of 2009. Singapore showed a bimodal pattern of increased activity in the periods April to July and November to February.

The A(H1N1) pandemic in 2009 was clearly captured in the data collected for most of the countries included in this study.

Conclusions

Every country in the Asia-Pacific region with established surveillance shows evidence of seasonal influenza activity, with almost year-round activity in tropical and subtropical zones and clear periodicity in temperate zones. The seasonality of influenza needs to be better understood in all countries to assist the development of appropriate health policies that identify the best timing of influenza vaccine administration with the most recent vaccine composition. It is hoped that the data presented will be beneficial in shaping influenza vaccination policy: awareness of influenza periodicity and seasonality in the Asia-Pacific region is an important step in tackling the disease burden of seasonal influenza.