

Influenza – our constant companion



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On 11 June 2009, Dr Margaret Chan, the Director-General of the World Health Organization, announced to the world that following the emergence of a novel influenza A virus in late April 2009 and its extensive spread that, “I have therefore decided to raise the level of influenza pandemic alert from phase 5 to phase 6. The world is now at the start of the 2009 influenza pandemic.” Dr Chan also commented, “No previous pandemic has been detected so early or watched so closely, in real-time, right at the very beginning. The world can now reap the benefits of investments, over the last five years, in pandemic preparedness.” Also observed was that, “Globally, we have good reason to believe that this pandemic, at least in its early days, will be of moderate severity”.

Much has changed since the last “influenza” issue of *Microbiology Australia* published in November 2006 and yet much remains the same. In the 2006 issue, the influenza community was focused on South-East Asia and the possibility that an avian influenza A virus, possibly the deadly, highly pathogenic H5N1 or the H7N7 or the H9N2 virus, may become the next human pandemic virus. Hence surveillance and vaccine development were largely directed at these targets. Instead the pandemic virus emerged from a swine reassortant H1N1 virus from North America (Mexico initially). The virus was fortunately not highly pathogenic in swine, birds or humans and generally caused little or mild disease (although some groups were more adversely affected such as the obese, pregnant women and Indigenous people). Nevertheless, even with the early detection of the new virus, the world was unable to stem the global spread of the virus. By 1 June 2009, little more than a month after the virus had been detected, WHO reported that the virus had been detected in 62 countries with 17,410 cases detected (a vast underestimate), with 115 deaths and by the year’s end, 208 countries had reported cases (too many to be counted) with 12,220 deaths, far fewer deaths than had been predicted in most pandemic plans. Vaccine development, despite being under way barely a month after the first cases and producing vaccine within six months, was still not quick enough to moderate the first wave in the southern hemisphere or to avert majority of the second wave in the northern hemisphere, late in 2009. Antiviral drugs, while effective against the virus, were only

readily available in developed countries and were generally used by those who did not really require them or were not infected.

Since the appearance of the H5N1 virus in Southern China in 1996, our understanding of the behaviour of influenza viruses has undergone a paradigm shift. Pigs were no longer essential for the transmission of avian influenza viruses into the human population and 15 years later sporadic human infections continue to occur. However, the 600-odd known human cases and 400-odd deaths are probably both gross underestimates. In addition to these H5N1 cases, human infections with H7N7, H9N2 and H10N7 have also occurred by direct bird to human transmission. The outbreak of H10N7 in New South Wales commercial poultry in 2010 and the subsequent identification of human infections was also a notable local influenza event. In 2007 Australia experienced its first outbreak of equine influenza, which spread to horses over vast areas of New South Wales and South-Eastern Queensland. Through a combination of quarantine, movement restrictions and vaccination, the epizootic was eventually brought under control and Australia declared free of the infection. Cross-species transmission of H3N8 equine influenza to racing greyhounds in the United States and a multitude of avian influenza virus infections detected in pigs, cats, dogs, horses, seals, mink and whales means that we must be ever vigilant in monitoring for influenza viruses as the cause of unusual disease events. The heightened awareness resulting from H5N1 infections in humans has had the effect of strengthening both the human and animal health surveillance systems and increasing the cooperation and collaboration between the two groups so that when the 2009 pandemic hit, we were well prepared. This increase in collaboration has resulted in the “One Health” concept, which examines the risks caused by interactions between human and animal disease and the environment.

This issue of *Microbiology Australia* examines how the pandemic affected Australia and how we responded to this event and also covers important influenza issues in animals such as the equine influenza outbreak in Australia in 2007, pandemic H1N1 2009 in Australian pigs and the ongoing situation with H5N1 and avian influenza in Australia and elsewhere. While New Zealand had some of the earliest pandemic H1N1 cases detected in

the southern hemisphere (in late April 2009) that initially were successfully contained, it was a different case in Australia, where the virus entered without detection at a similar time and spread, especially in Victoria, well before the first official case was announced in Queensland on 9 May 2009¹. Following the outbreak of the first influenza pandemic of the 21st century, a myriad of questions about the virus/disease emerged, such as the following: What is the severity of the pandemic? Who is at risk? How can we detect it? What is the attack rate? How does it relate to the currently circulating seasonal H1N1 viruses? Is it similar to the swine 1976 virus? Is it the same as previous pandemics? What vaccine do we need to make? Is the virus sensitive to existing licensed antiviral drugs? The transmission of the virus to swine from humans raised many more important issues to be considered and discussed. The authors of the articles contained in this issue were at the front line in responding to and answering many of these questions. The depth and skills of these and many other infectious disease specialists, scientists and public health officials have been tested over these past few years and will no doubt be tested further in years to come.

Australia is in a fortunate position to have on hand such a large pool of expertise and knowledge covering influenza and other potentially pandemic infectious diseases, a situation that one hopes will not be forgotten and will be retained in coming years as other health-related priorities arise. Governments and agencies will hopefully learn the most important lesson that influenza workers know from experience, that “influenza is a variable disease” and this applies to both human (seasonal and pandemic influenza) and animal influenza; hence, contingency plans and stockpiles should attempt to cover this range of possible outcomes, from mild to catastrophic. In this way it is hoped that we will have truly learned some valuable lessons from the 2009 influenza pandemic which will serve us better with future pandemics, which will assuredly come ... in time!

Reference

1. Kelly, H.A. *et al.* (2010) Pandemic (H1N1) 2009 influenza community transmission was established in one Australian state when the virus was first identified in North America. *PLoS ONE* 5, e11341.

In Focus

Swine flu – lessons we need to learn



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Important lessons need to be learnt from the recent swine flu pandemic. Overall the population health effects of swine flu were less than a moderately severe seasonal influenza outbreak. A pandemic should not be declared unless we have both the spread of the virus but also when its virulence is above a predefined level. We need to ensure that we improve techniques to decrease the spread of infection both in the community and within our hospitals. This means improved infection control

and hygiene with the use of masks, alcohol hand rubs and so on We also need to have a different approach to vaccines. Effective vaccines were produced only after the epidemic had passed and so had relatively little efficacy in preventing many infections. Mass population strategies involving vaccines and antivirals also misused large amounts of scarce medical resources.

In April 2009 a new H1N1 strain of influenza, with what appeared to be a high mortality rate (5%), was reported from Mexico. Worldwide, fear quickly spread that we might be about to see a recurrence of the “Spanish flu” of 1918–19, when tens of millions of people died. Internationally, pandemic plans designed to cope with new virulent strains of influenza such as the spread of “Bird flu” (H5N1) were triggered.

The “swine flu” virus (pandemic H1N1 2009) spread quickly around the world. However, by May 2009, data from the US and elsewhere showed that its virulence was considerably less than initially reported^{1,2}. The case fatality rate was no greater than seasonal influenza and likely less than 1 in 10,000 people infected^{1,2}. However, there remained concerns that enhanced virulence might still be seen during winter.