



Influenza-related hospital service requirements in Queensland: Was the swine flu year different?

**Queensland
Government**

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A new strain of influenza, Pandemic (H1N1) 2009 virus (popularly known as “swine flu”), emerged as a major population health concern for humans in April 2009¹. The first case of swine flu in Australia (and also Queensland) was confirmed in early May 2009². By June 2009, swine flu had been deemed a pandemic³.

Despite the initial concerns about the impact of swine flu, a study in the Medical Journal of Australia later reported that in the Australian community, the severity of swine flu was at most like that of an ordinary season of activity⁴. This StatBite investigates whether this observation held true for influenza in Queensland to help us to understand the impact of this pandemic on hospital service requirements.

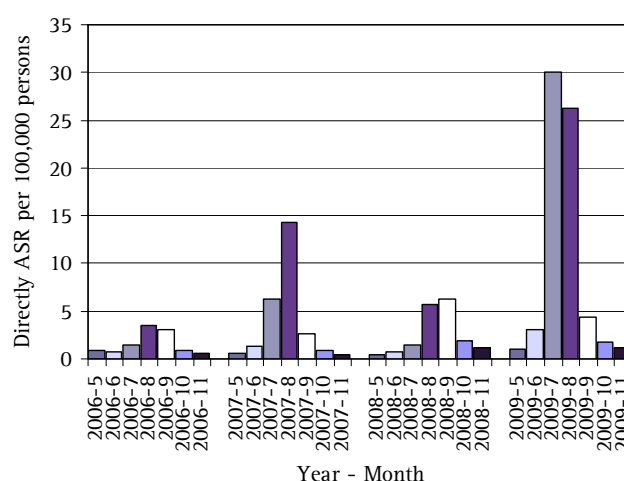
This question is not straight forward to answer because the prevalence of influenza is difficult to characterise. Surveillance information relies on data relating to confirmed cases which varies as a function of both disease prevalence and testing behaviour. For example, in 2009, when there was an increase in concern regarding testing for and diagnosing swine flu cases, the number of confirmed cases of influenza was 18,317 compared with approximately 1,700–4,500 confirmed influenza cases per year in the previous three years⁵.

Surveillance data is therefore not readily applicable to planning hospital services. In this StatBite we have analysed administrative hospital data in an attempt to describe the impact of the 2009 swine flu epidemic on service requirements. We have attempted to describe the impact on services in terms of numbers of patient admissions and presentations to the Emergency Department (ED), types of patients admitted and disease severity by comparing hospital data for influenza in 2009 with data from the previous three years. Because we could not be certain that diagnoses were coded consistently over these years, to examine severity we have included admissions with a diagnosis of influenza or pneumonia.

Hospital admissions and ED presentations

All admitted hospital episodes recorded in the Queensland Hospital Admitted Patient Data Collection (QHAPDC) with any diagnosis (principal or other) of influenza (ICD-10-AM codes J09-J11x) in 2009 (n = 3,118) were compared with those in the three previous years (2006–2008, n = 2,554). Rates of admission were significantly higher in 2009 than in previous years (Figure 1). The first month in 2009 to show a marked increase was June; consistent with laboratory-confirmed notifications of H1N1 infection⁶. There were large variations in the magnitude of admission rates across Queensland, but all health service districts showed a significant increase in admissions in 2009 (Figure 2).

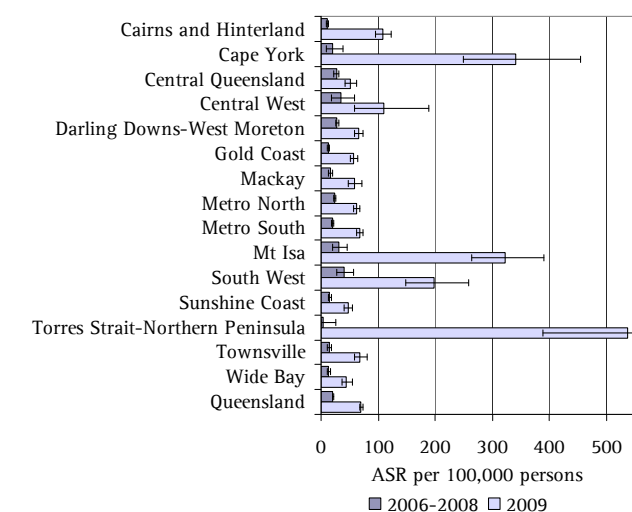
Figure 1. Directly age-standardised rates (ASRs) of influenza episodes over time, Queensland, 2006 to 2009.



Source: Queensland Hospital Admitted Patient Data Collection, p.

Swine flu was the principal reason for hospital admission in over 33% of influenza admissions in 2009. This figure is likely to be an under-representation due to the defined coding convention for suspected or probable H1N1 infections. According to advice from the National Centre for Classification in Health, suspected or probable Pandemic (H1N1) 2009 infections which were not confirmed by laboratory testing were to be classified as J11.1 *Influenza with other respiratory manifestations, virus not identified*. Confirmed cases of swine flu were to be classified as J09 *Influenza due to identified avian influenza virus*.

Figure 2. Directly age-standardised rates (ASRs) of influenza episodes over time by health service district, Queensland, 2006 to 2009.



Black capped bars represent 95% confidence intervals
Source: Queensland Hospital Admitted Patient Data Collection, p.

When all patients with either influenza (J09-J11x) or pneumonia (J12-J18x) diagnoses were considered, there were 23,861 admissions in 2009 compared with approximately 18,000-22,000 per year in the three previous years.

A new code was developed in 2009 to allow ED presentations with suspected swine flu to be recorded. Overall, 5,923 patient presentations where swine flu was suspected occurred in 2009 in addition to just over 3,000 other influenza presentations. This compared with approximately 100-300 presentations coded as due to influenza in the previous three years. When all presentations coded as either pneumonia or influenza were considered, there were 24,803 presentations to the ED in 2009 compared with approximately 8,000-15,000 in the three previous years.

Risk factors

The age-distribution of influenza admissions in 2009 was markedly different to earlier years, with smaller proportions of young children and the elderly being admitted, and greater proportions of those aged 10 to 64 years (Figure 3).

The presence of other risk factors was also investigated. Episodes were considered as belonging to the 'at risk' group if they had at least one of the risk factors publicised by Queensland Health (see Figure 4).

More admissions had at least one risk factor recorded in the QHAPDC in 2009 than in previous years (47% vs. 34%). Individual risk factors for which a significant increase was observed in 2009 were pregnancy, Indigenous status, obesity, asthma, bronchitis/emphysema/COPD and any chronic lower respiratory disease (Figure 5).

It should be noted that when these risk factors are not the principal reason for admission, Australian Coding Standard 0002 specifies that they are only recorded when they "affect patient management [by] requiring any of the following:

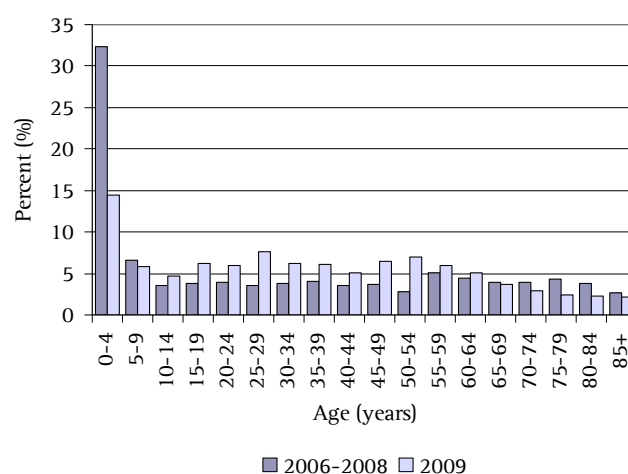
- commencement, alteration or adjustment of therapeutic treatment;
- diagnostic procedures; and
- increased clinical care and/or monitoring."

Thus, these results are likely to be underestimates of the true prevalence of the risk factors among patients.

Severity

Indicators of severity available for analysis were length of stay, ventilation support (non-invasive ventilation lasting at least 24 hours, mechanical ventilation or extra-corporeal membrane oxygenation (ECMO)) and mortality rate. The average length of stay for influenza and pneumonia diagnoses combined was 8.9 days in 2009 compared with 9.8 days in 2006-08 (both periods had a median stay of 5 days). This

Figure 3. Age distribution of influenza episodes, Queensland, 2006 to 2009.



Source: Queensland Hospital Admitted Patient Data Collection, p.

difference was especially pronounced among patients with influenza diagnoses and a risk factor present (average of 7.2 days [median: 3 days] in 2009 vs 11.6 days in 2006-08 [median: 6 days]). This result suggests that there may have been a tendency to admit patients who had a risk factor as a precaution in 2009.

Non-invasive ventilation lasting at least 24 hours or more serious forms of ventilatory support, were required in 6.8% of admissions in 2009 compared with 6.1% in previous years. It should be noted that this is the rate for the entire cohort of influenza and pneumonia cases and is therefore not a valid indicator of the severity of swine flu cases per se. In 2009, nine episodes required ECMO (the 'most severe form of life support available'⁷). This procedure had not been recorded in the three years previous.

In-hospital mortality for these episodes was slightly lower in 2009 (8.2%) than in 2006-08 (9.4%) however, this may have been due to the larger number of patients admitted: comparing the number of deaths in 2009 with the average number of deaths in the three previous years found an excess of 3.6% in 2009 (average 2006-08 = 1881.3 [deaths range 1827-1961]; 2009 = 1951).

Conclusion

These results suggest that there was a greater burden on hospital resources in terms of the number of ED presentations and admissions due to influenza and influenza or pneumonia in 2009 compared with the three previous years. A proportion of the influenza admissions appear to have been precautionary in nature as suggested by the presence of a risk factor in combination with a shorter length of stay. Despite the shortened average length of stay, the hospital burden in terms of total patient days was higher than that in previous years for influenza: approx. 17,600 patient days (2009) vs. 4,700-7,500 (2006-08); and similar to previous years when influenza or pneumonia was included:

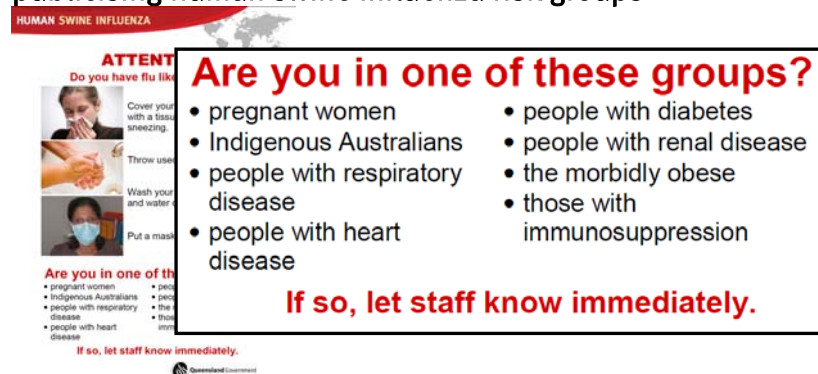
approx 212,000 (2009) vs. 182,000-216,000 (2006-08). A slightly higher demand for non-invasive ventilation (≥ 24 hours) or more serious ventilatory support was observed, with a number of very severe ventilation cases observed in 2009 but none recorded in the previous three years. In-hospital mortality rates were similar to previous years, consistent with Australian data showing that the case fatality for confirmed swine flu cases was lower than influenza mortality in other influenza seasons⁴.

References

1. Center for Disease Control and Prevention. Swine Influenza A (H1N1) infection in two children --- Southern California, March--April 2009. *Morbidity and mortality weekly report* 2009;58(15):400-402.
2. Queensland Health. First case of swine flu identified. *Media Release* 2009 9 May.
3. Chan M. World now at the start of 2009 influenza pandemic. *World Health Organization*, 2009 11 June.

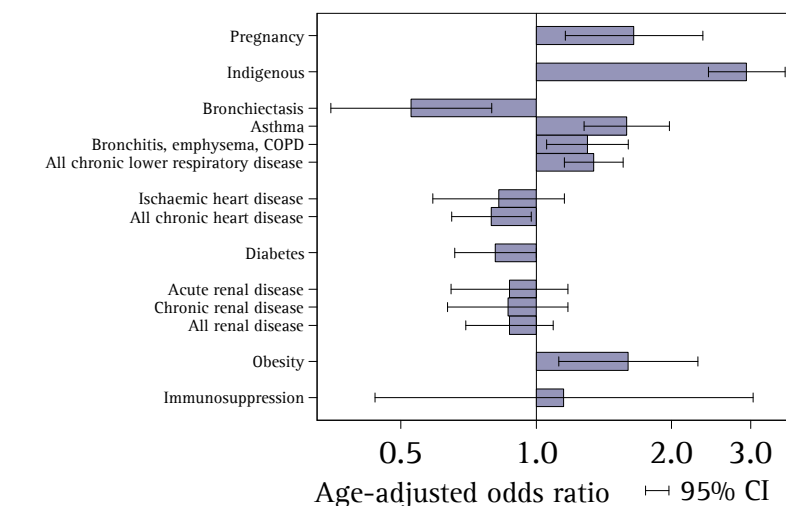
p. Preliminary and subject to change (extracted 24 November 2010)

Figure 4. One of the Queensland Health brochures publicising human swine influenza risk groups



Source: Pandemic (H1N1) 2009 (Human Swine Influenza) response website, Queensland Health

Figure 5. Age-adjusted odds ratios of risk factors among influenza patients in 2009 compared with 2006-2008, Queensland



Source: Queensland Hospital Admitted Patient Data Collection, p.

4. Collignon PJ. Swine flu - lessons learnt in Australia. *Medical Journal of Australia* 2010;192(7):364-365.
5. Personal communication, Communicable Diseases Branch, Queensland Health, 15 November 2010
6. Appuhamy RD, Beard FH, Phung HN, et., al. The changing phases of pandemic (H1N1) 2009 in Queensland: an overview of public health actions and epidemiology. *Medical Journal of Australia* 2010;192(2):94-97.
7. Davies AR, Webb SA, Seppelt IM, Bellomo R. Comparison of adult patients hospitalised with pandemic (H1N1) 2009 influenza and seasonal influenza during the "PROTECT" phase of the pandemic response [Letter]. *Medical Journal of Australia* 2010;192(6):356-357.

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