Clinical and epidemiological characteristics of the hospitalised patients due to pandemic H1N1 2009 viral infection: experience at Hutt Hospital, New Zealand

Stephen Dee, Sisira Jayathissa

Abstract

Aim Pandemic H1N1 2009 virus (H1N1 2009) community transmission was first noted in New Zealand in the Wellington region. There is limited information of clinical and epidemiological characteristics of H1N1 2009 patients from USA and Mexico but no published reports available in New Zealand. We studied clinical and epidemiological features of patients with H1N1 2009 infection admitted to Hutt Valley Hospital.

Methods We collected and analysed clinical and epidemiological information of all adult inpatient admitted to Hutt Hospital with confirmed H1N1 2009 infection over 5-week period from 17 June 2009 to 22 July 2009.

Results There were 54 adult inpatient admissions with confirmed H1N1 2009 infection during the study period. Epidemic curve suggest rapid increase in number of cases during first 2 weeks with abrupt cessation of new cases by mid-July. The majority of the patients were female (74%) and belonged to Māori (38%) and Pacific (25%) races. Most of the patients were below 50 years of age (76%) but mean age of the cases increased weekly with progression of outbreak. The majority had comorbidities (78%) including asthma, obesity, and diabetes. 38% were smokers. 20% had diarrhoea and vomiting. 48% of the patient had multi-lobar infiltrates on chest X-ray. Nine patients received ICU/HDU (intensive care unit/high dependency unit) care and all of these patients had significant comorbidities. There were no deaths during this period.

Conclusions H1N1 2009 infection predominantly affected young Māori and Pacific women with relative sparing of the elderly. Patient who received ICU/HDU care had significant comorbidities. This study provides a reliable account of clinical and epidemiological features of H1N1 2009 infection in a medium-size hospital in New Zealand.

Flu pandemic due to H1N1 2009 infection is spreading rapidly throughout the world. As of the 5 August 2009, 2872 confirmed cases of H1N1 2009 in New Zealand and 14 deaths with testing only now being performed on patients with severe illness. Recent experience in Wellington region suggest high rate of transmission of virus with significant morbidity compared to seasonal winter flu. High rates of sickness associated with H1N1 2009 and hospitalisation with serious respiratory problems has lead to significant added pressure into already overstretched public hospitals.

Community transmission of H1N1 2009 was first reported on 13 June 2009, with all previous confirmed cases being international travellers. The Wellington region, of which the Hutt Valley is a part, was the first area in New Zealand to report...
community spread of H1N1 2009. Hospital admissions at Hutt Valley District Health Board due to H1N1 2009 were recognised from 17 June 2009. During the first week of the outbreak the staff noticed unique clinical and demographic characteristics of the patients presenting to the hospital.

Miller and others emphasised the relative sparing of elderly in 20th Century influenza pandemics. Several hypotheses have been postulated including previous exposure. A recent case series from California and Mexico indicate that H1N1 2009 predominantly a disease of younger people with very low rate of infection among adults over 50 years.

There are regular media reports and updates from ministry of health and public health services about H1N1 2009 infection. However, there is no published literature on epidemiological and clinical characteristics of hospitalised patients with this illness in New Zealand. Therefore we analysed epidemiological and clinical characteristics of all confirmed cases of swine flu admitted to adult medical service. Paediatric patients who were discharged from the hospital will be reported in a separate analysis.

Methods

General medical service is one of the biggest services in Hutt Hospital providing acute medical assessment in ED and an inpatient services for all adult acute medical admissions except cardiac patients. The study was carried out over a 5 week period starting from 17 June to 20 July 2009 among hospitalised patients.

As a part of planning for the outbreak a clinical protocol was developed in conjunction with regional infectious disease service and public health. According to this protocol all patients with an influenza-like illness requiring admission had a nasopharyngeal swab for influenza viruses. Swabs were transported to Capital and Coast DHB laboratory for confirmatory tests. RT-PCR testing was done in accordance with published guidelines from the US Center for Disease Control and Prevention.

All inpatients admitted with flu-like illness were isolated initially in single rooms but as the epidemic progressed suspected patients were isolated in four bedded cubicles. Visiting was restricted and visitors were provided with appropriate barrier protection. All patients were treated with 5-day course of oseltamivir phosphate 75 mg bid and antibiotics.

H1N1 2009 PCR results from testing laboratory were notified to a single physician for ease of administration. These results were recorded in a Microsoft Excel spreadsheet. For the purpose of this study all discharge summaries and notes of the patients were reviewed to obtain demographic and clinical information. Descriptive statistics and graphs were drawn with Microsoft Excel.

Wellington regional ethics committee determined that the study fell under the category of observational research and audit conducted by employees for the purpose of outcome assessment and did not require ethical approval.

Results

Hutt Hospital is a secondary care hospital serving a population of 140,000. The ethnicity mix of the community is NZ European 67%, Māori 16%, Samoan 4.2%.
There were 54 confirmed cases of H1N1 2009 admitted under Adult Medicine Service at Hutt Valley Hospital during the first 5 weeks of the outbreak. There was rapid increase in the cases from the 17 June with an abrupt decrease around the third week of July (see Figure 1).

**Figure 1. Epidemic curve for admission with H1N1**

![Epidemic curve for admission with H1N1](image)

Majority of the patients were female (74%), under 50 years old (76%) (see the age breakdown in Figure 2). The mean age of the patients admitted during each week progressively increased with time. The respective mean ages of patients from week 1 to week 5 were 28.1, 30.5, 40.8, 55.1, and 54 years. There were high proportions of Māori (38%) and Pacific patients (25%) compared to our catchments population (see Figure 3).

The presenting symptoms of these patients are described in Figure 4, with respiratory symptoms predominating but 20% of patients had diarrhoea or vomiting. The commonest reason for admission has been pneumonia (48%) half of these had multilobar infiltrates. The next most common presentation is exacerbation of asthma (19%).
Figure 2. Ages of H1N1 adult inpatients

Figure 3. Ethnicity of H1N1 inpatients
The common comorbidities have been asthma, obesity, diabetes and other respiratory diseases (see Figure 5). Smoking was also common in our population group with 37% of patients admitted being current smokers.
Pregnancy and the post-partum patients seem to be a special at risk group. Two patients who were pregnant (3.7%) and four who were post-partum (7.4%) were admitted to hospital and one of these patients required HDU management.

The inpatient adult group included nine patients treated in HDU/ICU. All of these patients had significant comorbidities with asthma (56%), diabetes (33%) and obesity (33%) being the commonest. Two patients were ventilated and both had obesity and diabetes as comorbidities. There were no deaths reported during this period.

Discussion

Early experience during current outbreak suggests severe illness in younger patients compared to elderly. The median age of adults admitted to hospital was 31 years with three-quarters of the patients being aged less than 50 years. This is similar to the experience in California and Mexico and pattern described in other influenza pandemics where young population was predominantly affected with sparing of the elderly.

Pacific patients had six times and Māori patients had two and half times the expected admission rate based on their population size. The reasons for these populations being particularly affected is uncertain but may include social and environmental factors such as the number of people in households, the greater proportion of young people and children in these ethnic groups, increased social contact (50% of the population under 25 years of age), possibly lower immunisation rates or a greater susceptibility to this strain of influenza.

In the 1918 pandemic the death rate from Influenza was seven fold that in Māori compared to the European population in NZ. In Samoa in 1918 the incidence of cases of influenza was 80% of the population and the number of deaths was 7264 out of a total population of 36,405. This was higher than seen in most countries during that pandemic. The reason for the high incidence and mortality from influenza in Samoa (Western) is unknown though it included lack of medical assistance, food shortages and lack of an effective maritime quarantine.

An earlier date of arrival of the 1918–19 pandemic influenza virus in South Pacific nations was associated with higher mortality compared with those islands affected later in 1919 or 1920–1 including American Samoa. This may be related to change in virulence of organism or other unknown factors.

Disparity in vaccination rates may account for some difference in ethnic groups but the free Influenza vaccine in New Zealand has only been taken up in 26% of those eligible under 65 years with chronic conditions. A case control study from Mexico City shows partial protection of those immunised with the current trivalent inactivated influenza vaccine which has the same components as that administered in New Zealand this season.

In Australia, the Aboriginal population and Torres Strait Islanders are also deemed as high-risk population groups.

Comorbidities have played an important role in those with serious disease requiring admission and especially in those with very severe illness. Morbid obesity has been associated with severe illness requiring ventilation. In this case series, 9 out of 10 patients admitted to an ICU for ventilation had morbid obesity. Asthma and diabetes
were also common in those with illness requiring hospitalisation. Only 22% of the inpatients though had no significant comorbidities. According to media reports in New Zealand most of the deaths were also associated with significant comorbidities but a few deaths were reported in healthy young people.

It is interesting to note that 20% had gastrointestinal symptoms. This is similar to cases described in USA\(^{10}\) and could lead to second mode of transmission apart from droplet infection.

Jamieson and others\(^{14}\) recently reported increased rate of admission among pregnant women compared to rest of the population. In our case series there were two pregnant and four post partum women were admitted with H1N1 infection. We haven’t calculated the specific admission or attack rates but we agree with others that the H1N1 may be over represented in pregnant and post partum women.

Smoking predisposes to respiratory illness. However it has not been described during this epidemic as an important risk factor but was prevalent in our group (37%). In a previous outbreak of H1N1 influenza in a group of Israeli soldiers smoking was more prevalent among those who developed disease and those with complications.\(^{8}\)

There is no plausible explanation for abrupt cessation of cases in mid July and this may represent end of the first wave of epidemic. It was anticipated that number of cases would increase from mid July when the schools recommence but in our experience this didn’t happen.

This study has several limitations. It only describes early part of this outbreak and may not provide useful information to its evolution and its effect on older people and other high-risk groups. We have no recorded clinical information on seasonal influenza and therefore not able to compare with the clinical and epidemiological characteristics of seasonal illness with the current outbreak. However, senior physicians at this hospital have never seen such an outbreak with so many inpatients admitted with influenza type illness.

H1N1 2009 has been shown in New Zealand to have higher reproduction number than that of season influenza (that is the average number of secondary cases generated by a single primary case).\(^1\) We are not aware of clinical and epidemiological characteristics of patients presenting to other DHB areas and this result may not be generalisable. Case series are always considered as least robust study due to various biases. Nevertheless this information may guide other clinicians and epidemiologists in understanding features of the H1N1 2009 infection in their area and to identify high-risk populations.

**Conclusions**

Our experience suggest increased severity of illness due to H1N1 infection among young Māori and Pacific women aged under 50 years old and those with a background of history of asthma, obesity or diabetes. High dependency and intensive care use were usually associated with comorbidities asthma, morbid obesity, and diabetes.
The elderly appear to be spared from serious illness at the onset of epidemic. Young Samoan and Māori women represent a specific high-risk population at this early stage of the novel H1N1 epidemic.

Competing interests: None known.

Author information: Stephen Dee, Sisira Jayathissa, Consultant Physicians, Department of General Medicine, Hutt Valley Hospital, High Street, Lower Hutt, New Zealand.

Acknowledgments: We acknowledge Regional Public Health, Regional Infectious Disease Team, and staff of Molecular Genetics Laboratory at Capital Coast District Health Board.

Correspondence: Dr Stephen Dee, Hutt Valley DHB, High St Private Bag 31-907, Lower Hutt, New Zealand. Fax: +64 (0)4 5709001; email: stephen.dee@huttvalleydhb.org.nz

References:
