



Influenza H1N1 2009 pandemic: severe complications and deaths in children < 15 years

Yvonne Zurynski, David Lester-Smith, Alison Kesson,
Marino Festa, Robert Booy and Elizabeth Elliott *and all
clinicians who report to the APSU*

- Influenza is a common *usually mild* disease
- *Thought to have biggest impact in the frail elderly and people with underlying chronic conditions*
- Children are an efficient virus transmitter
- *Severe complications and death can occur with seasonal flu*
- *June 2009 WHO declares Pandemic*
- *>37,000 confirmed cases*
- *191 deaths*



Aim:

To describe the impacts of pandemic influenza A H1N1 09 with seasonal influenza in children

Focussed on the severe end of the spectrum: severe complications and deaths

Methods

APSU: 1360 paediatricians

- Monthly reporting
 - 80% report by e-mail
 - Response rates to the card 90%
- Timely – most data received by fax at time of diagnosis
- *Surveillance for seasonal flu*
 - 2007 feasibility study for one month
 - 2008 surveillance for seasonal flu (June-September)



Article

ENHANCED SURVEILLANCE FOR SERIOUS COMPLICATIONS OF INFLUENZA IN CHILDREN: ROLE OF THE AUSTRALIAN PAEDIATRIC SURVEILLANCE UNIT

Yvonne A Zurynski, David Lester-Smith, Marino S Festa, Alison M Kesson, Robert Booy, Elizabeth J Elliott

Abstract

Influenza contributes significantly to disease burden among children aged less than five years. Existing influenza surveillance systems do not provide detailed data on clinical presentation, management, vaccination status, risk factors and complications in hospitalised children, or link such data with laboratory results. Following a number of child deaths due to influenza in 2007, the Australian Government Department of Health and Ageing approached the Australian Paediatric Surveillance Unit (APSU) to examine the feasibility of enhancing APSU surveillance to identify

life-threatening multi-system complications.¹⁻³ Significant morbidity and mortality of influenza has been reported in Australian children, with an estimated hospitalisation rate of 82 per 100,000 and death rate of 0.2 per 100,000 children aged less than five years.¹⁰ Of 22 children admitted with complications of influenza to one paediatric intensive care unit (PICU) over a short period in 2003, three died and none had been immunised.⁷ Compared with 2006, during the 2007 influenza season there were increased numbers of hospital admissions,¹¹ including a number of child deaths, attributed to

Case definition

Any child aged < 15 years and admitted to hospital with laboratory confirmed influenza and any of the following severe complications:

- *Pneumonia (X-ray confirmed)*
- *Requirement for Ventilation*
- *Encephalitis / encephalopathy with or without seizures*
- *Myocarditis; Pericarditis; Cardiomyopathy*
- *Rhabdomyolysis*
- *Purpura fulminans*
- *Disseminated coagulopathy*
- *Transverse myelitis*
- *Polyneuritis*
- *Guillain-Barré Syndrome*
- *Shock (requiring >40 ml/kg fluid resuscitation)*
- *Acute renal failure*
- *Reye's Syndrome*
- *Laboratory proven secondary bacterial infection; Bacteraemia, Septicaemia, Bacterial pneumonia*
- *Death*

Exclusion: Simple febrile seizures

Demographics

	2009	2008
N	100	59
Age (median, range)	2.8 (0 – 14.5)	1.7 (0.12-14.5)
Sex (Males)	53 (53%)	28 (47.5%)
Country of Birth		
Australia	80 (80%)	47 (80%)
Other	12 (12%)	7 (12%)
Not reported	8 (8%)	5 (8%)

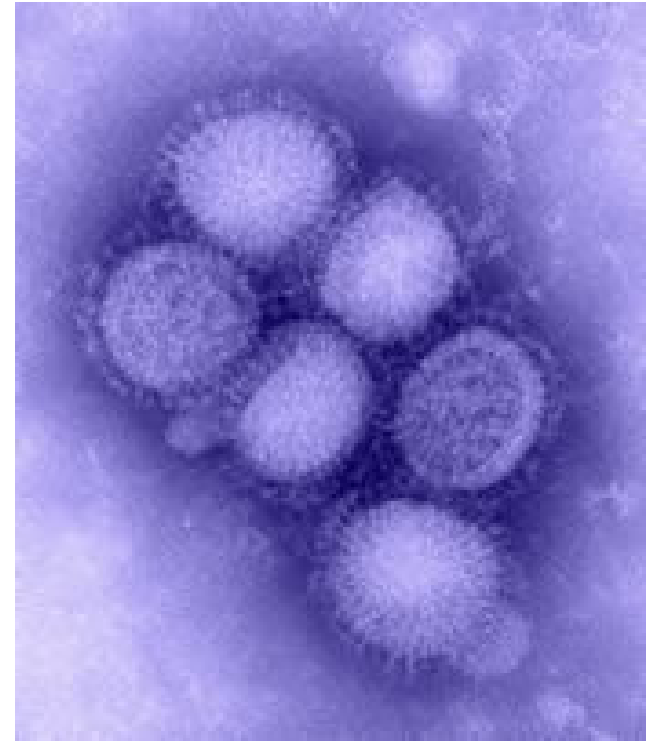
Flu types

2009

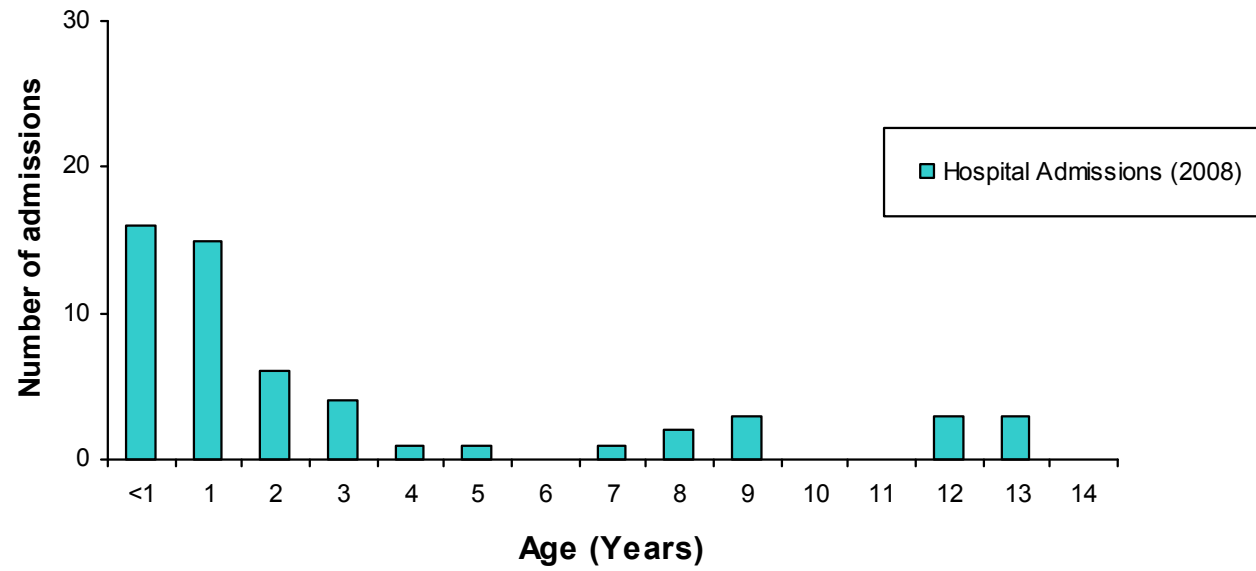
- Flu A 100 (100%)
- H1N1 2009 77
- A but NOT H1N1 6
- H3 2
- 15 Flu A not further sub-typed

2008

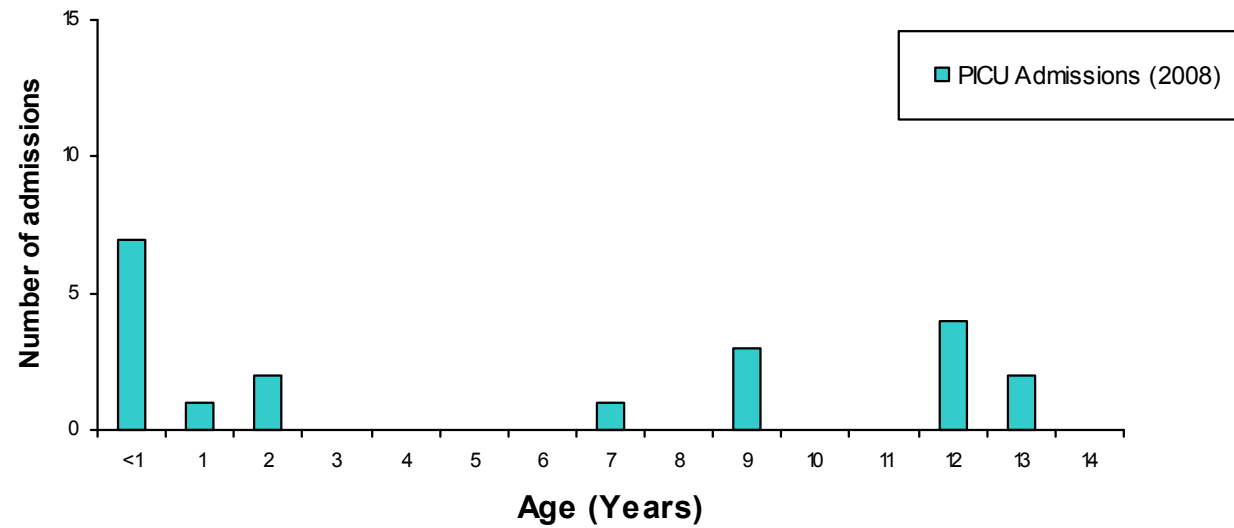
- Flu B 47
- Flu A 11
- Unknown 1



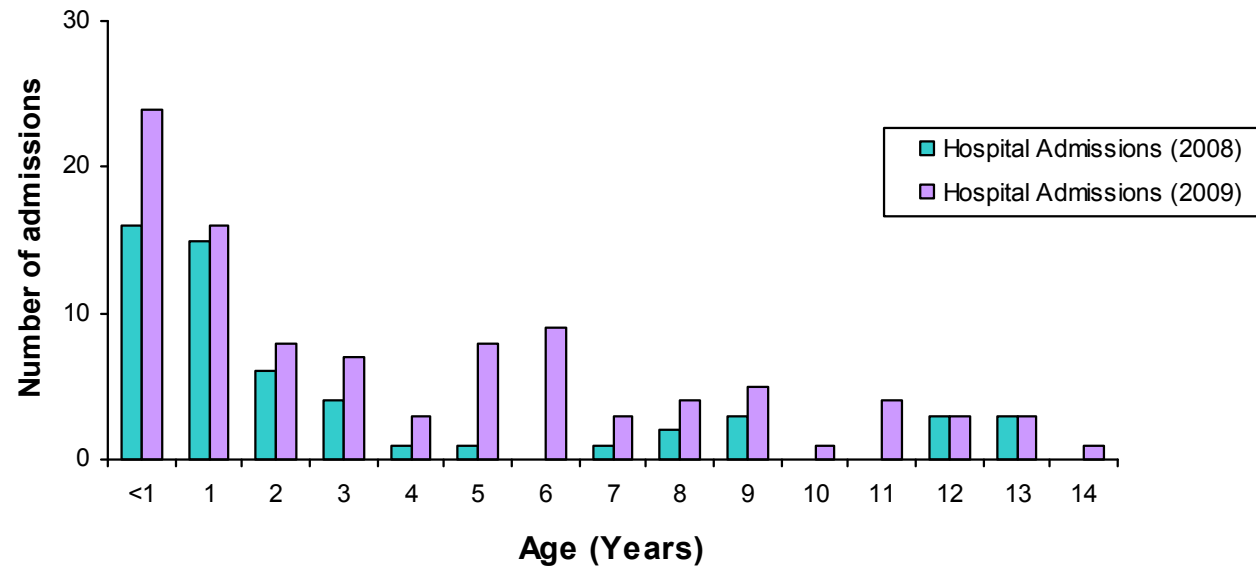
Age distribution - hospital admissions



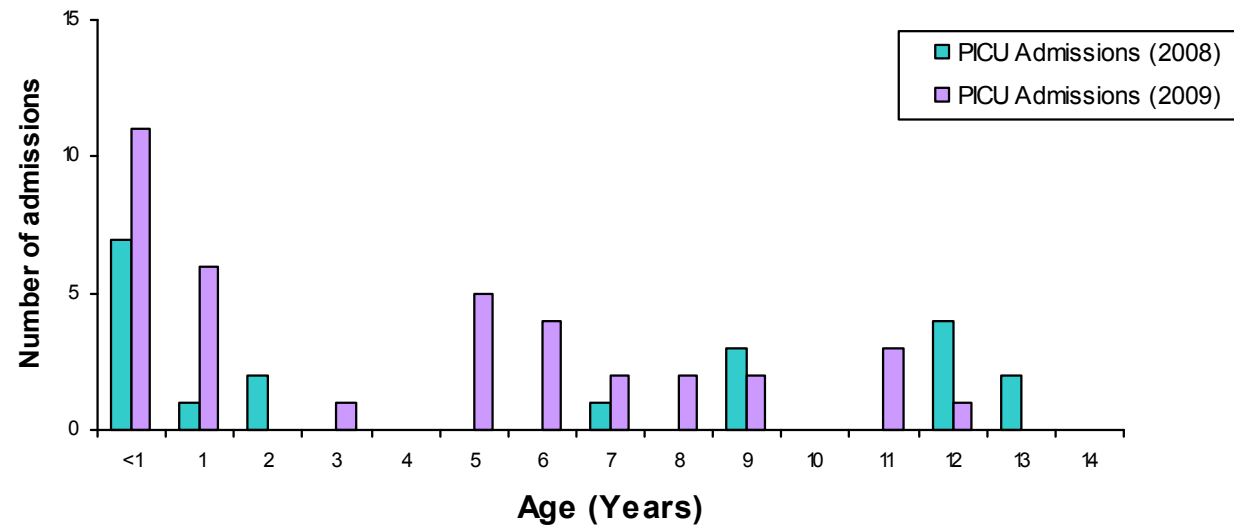
Age distribution - PICU admissions



Age distribution - hospital admissions



Age distribution - PICU admissions



Presenting symptoms

Symptoms	2009 N (%)	2008 N (%)
Fever	84 (84)	55 (93)
Cough	76 (76)	50 (85)
Dyspnoea	45 (45)	23 (39)
Malaise	33 (33)	23 (39)
Vomiting	27 (27)	13 (22)
Diarrhoea	12 (12)	11 (19)
Seizure/Unconscious	9 (9)	6 (10)
Myalgia	12 (12)	3 (5)
Rash	5 (5)	2 (3)
Apnoea	4 (4)	2 (3)

Complications

Complications	2009 N (%)	2008 N (%)
Pneumonia (X-ray)	69 (69)	46 (78)
Ventilated	28 (28)	15 (25)
Encephalopathy	13 (13)	5 (8)
Shock	5 (5)	5 (8)
Seizure	9 (9)	3 (5)
Lab-proven co-infection	6 (6)	4 (7)
Rhabdomyolysis	5 (5)	-
* Pericarditis/myocarditis	2 (2)	1 (2)
DIC	1 (1)	1 (2)
Acute Renal failure	2 (2)	1 (2)

Lab proven co-infection: mycoplasma, Staph Aureus, Strep pneumoniae,

Treatment Oseltamivir: 2009=63/100 (63%)
2008=4/59 (7%)

P<0.05

Underlying Chronic Conditions

Chronic illness	2009 N (%)	2008 N (%)
<i>Any Chronic Illness</i>	45 (45)	17(29)
Asthma	14 (14)	5 (8)
Neuromuscular	7 (7)	2 (3)
Chronic Heart Disease	3 (3)	1 (2)
Chronic Lung Disease	3 (3)	1 (2)
Other	22 (22)	8 (14)
Chronic illness and vaccinated	5 (11)	2 (12)

55 no underlying chronic illness

1 child had travelled overseas

2 children had contact with farm animals (chickens and horses)



ICU Admission by underlying chronic illness 2009

Chronic illness 19/45 (42%)

NS

No Chronic illness 19/55 (35%)

Outcome

PICU Admissions:

2009	2008	
38/100 (38%)	17/58 (29%)	NS

Outcome	2009	2008	
LOS Hospital	4 (1-53)	6 (1-93)	
LOS ICU	6.5 (2-51)	4.5 (1-12)	P<0.5
Discharged Alive	87(97%)	58 (98%)	
Still hospitalized	6 (6%)	-	
Died	7 (7%)	1 (2%)	

Deaths

7 children died; 4 Male 3 Female

All Flu A – 5 H1N1 2009

-1 Flu A not H1N1 2009

-1 Flu A not further sub-typed

4 admitted to ICU

2 ventilated

3 treated with Oseltamivir

Deaths

6 had underlying chronic conditions:

- 1 Immunocompromised (treated for malignancy)
- 1 Premature neonate born to mum with proven H1N1 2009
- 1 Developmental disability with speech and motor dyspraxia
- 1 Panhypopituitarism
- 2 neuromuscular disorder

1 Previously healthy: 12 yo; Fever, cough, headache, malaise, sore throat, myalgia; Not tested for influenza (H1N1 2009 confirmed on autopsy); No Oseltamivir, Discharged home after 2 days, developed pneumonia and died at home. Coroner's investigation.

Limitations

- Incomplete case ascertainment
- Limited information - incomplete
- Follow-up information difficult to chase

BUT

Good information about the severe end of the illness spectrum

Ability to compare with historical data

Conclusions

- Seasonal influenza infection had serious consequences
- Pandemic H1N1 2009 caused more ICU admissions and deaths compared with 2008
- 55% of children with serious complications did not have underlying chronic conditions; one of these children died
- Only 11% of those with chronic conditions vaccinated
- 63% treated with Oseltamivir – more awareness, public health messages during the Pandemic

Conclusions

In preparation for possible second wave need for:

- Early detection
- Treatment with antivirals within 48 hrs
- Vaccination

Ongoing surveillance to monitor the effectiveness of any prevention and intervention strategies

This study supported by Department of Health and Ageing

***Many thanks to all APSU
clinicians reporting
cases***

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from swine flu



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21 January 2010: EU disease monitor scales down crisis response

