# Airport arrivals screening during pandemic (H1N1) 2009 influenza in New South Wales, Australia

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## Abstract

**Objective:** To examine the effectiveness of airport screening in New South Wales during pandemic (H1N1) 2009 influenza.

**Design, setting and participants:** Analysis of data collected at clinics held at Sydney Airport, and of all notified cases of influenza A(H1N1)pdm09, between 28 April 2009 and 18 June 2009.

**Main outcome measures:** Case detection rate per 100 000 passengers screened, sensitivity, positive predictive value and specificity of airport screening. The proportion of all cases in the period detected at airport clinics was compared with the proportion detected in emergency departments and general practice.

**Results:** Of an estimated 625 147 passenger arrivals at Sydney Airport during the period, 5845 (0.93%) were identified as being symptomatic or febrile, and three of 5845 were subsequently confirmed to have influenza A(H1N1)pdm09, resulting in a detection rate of 0.05 per 10 000 screened (95% CI, 0.02–1.14 per 10 000). Forty-five patients with overseas-acquired influenza A(H1N1)pdm09 in NSW would have probably passed through the airport during this time, giving airport screening a sensitivity of 6.67% (95% CI, 1.40%–18.27%). Positive predictive value was 0.05% (95% CI, 0.02%–0.15%) and specificity 99.10% (95% CI, 99.00%–100.00%). Of the 557 confirmed cases across NSW during the period, 290 (52.1%) were detected at emergency departments and 135 (24.2%) at general practices, compared with three (0.5%) detected at the airport.

**Conclusions:** Airport screening was ineffective in detecting cases of influenza A(H1N1)pdm09 in NSW. Its future use should be carefully considered against potentially more effective interventions, such as contact tracing in the community.

During the DELAY and CONTAIN phases of pandemic (H1N1) 2009 influenza, New South Wales Health conducted, at the request of the Australian Government, screening of passengers at Sydney Airport. The aim was to delay entry and minimise spread of the pandemic in Australia.[1,2] In this study, we examined the effectiveness of this intervention, in order to inform its future use at the state and national level.

On 27 April 2009, two clinics were established at Sydney Airport, staffed by nurses from the local area health service, with public health support from the NSW Ministry of Health. On-board announcements were made before landing, and all incoming international passengers were asked to declare any symptoms or possible contact with a person with influenza A(H1N1)pdm09 by completing a health declaration card. Additionally, thermal imaging scanners with a set point of 38°C ± 2°C were used to detect febrile passengers.[3,4]

Public health staff triaged and assessed passengers who self-reported symptoms or were detected by thermal scanners according to the case definition current at the time (Box 1). Passengers who met the case definition answered a questionnaire, underwent a brief clinical assessment and had nose and throat swabs taken, which were sent to a pathology laboratory for testing. All demographic, exposure and health assessment data collected at the airport clinics were entered in real time into NetEpi, a national web-based public health data collection system.[3,4] NetEpi was also used to collect data for all patients and contacts presenting anywhere with an influenza-like illness, and to assign case status when known.[3]

As airport clinics were being operationalised, media warnings were issued to the general public asking people with symptoms to call their local doctor and, if required, to go to an emergency department for assessment.[3]

## Methods

Data from airport clinics and on all cases of influenza A(H1N1)pdm09 collected between 28 April 2009 and 18 June 2009 and stored in NetEpi had previously been imported into Microsoft Excel. The number screened was estimated on a pro rata basis as the total number of international passengers arriving at Sydney Airport between 28 April 2009 and 18 June 2009, using monthly data from the Bureau of Infrastructure, Transport and Regional Economics.[5]

The case detection rate of airport screening was calculated as the number of confirmed cases of influenza A(H1N1)pdm09 detected at the airport per 10 000 passengers screened. Sensitivity was calculated as the number of confirmed cases detected at the airport as a proportion of the total number of overseas-acquired cases in the period. Positive predictive value was calculated as the proportion of symptomatic or febrile passengers who tested positive for A(H1N1)pdm09, and specificity as a proportion of the total number of passengers minus the number of those with known overseas-acquired influenza A(H1N1)pdm09 who were identified as not being symptomatic or febrile. Negative predictive value could not reliably be calculated; as it is possible some passengers not identified as symptomatic or febrile at screening later developed influenza, but did not seek clinical care or testing and so never became confirmed cases. The number of cases detected at the airport was calculated as a proportion of all cases identified between 28 April and 18 June 2009, and compared with the proportion of cases over the same period who were detected at emergency departments and in general practice.

Analysis was performed using Excel (Microsoft) and Stata version 10 (StataCorp).

Ethics approval was not sought as the study used data collected under the *Public Health Act 1991* (NSW).

## Results

Results of the analysis are presented in Box 2. There were an estimated 625 147 passenger arrivals at Sydney

**1 Definitions for suspected cases of influenza A(H1N1)pdm09, DELAY and CONTAIN phases[3]**

| Phase | Case definition |
|---|---|
| DELAY (24 April 2009 to 21 May 2009) | A person with acute febrile respiratory illness, with onset within 7 days of close contact with a person who is a confirmed or an influenza A-positive suspect case of pandemic (H1N1) 2009 influenza virus infection; or onset since 15 April 2009 and within 7 days of travel to Mexico, the United States or Canada. |
| CONTAIN (22 May 2009 to 16 June 2009) | As above but expanded to include contacts of a confirmed case with more minor symptoms. Japan and Panama were added to the list of affected regions on 23 May, and Chile, Argentina and greater metropolitan Melbourne were added on 15 June. ◆ |

Airport during the period, of whom 5845 or 0.93% were identified as being symptomatic or febrile. Of these 5845, three subsequently were confirmed as having influenza A(H1N1)pdm09, resulting in a detection rate of 0.05 per 10 000 (95% CI, 0.02–1.14 per 10 000). There were 45 people with overseas-acquired influenza A(H1N1)pdm09 in NSW who would have probably passed through the airport during this time, giving airport screening a sensitivity of 6.67% (95% CI, 1.40%–18.27%). Positive predictive value was 0.05% (95% CI, 0.02%–0.15%), and specificity was 99.10% (95% CI, 99.00%–100.00%).

Of the 1296 passengers identified as requiring further assessment, the large majority (1144 passengers or 88.27%) were detected through health declaration cards. Only 11 of these 1296 passengers (0.85%) were detected by the thermal scanners. For the remaining passengers (35 passengers or 2.70%), the identification method was either unknown or through other mechanisms, such as referral to the airport clinic by the Australian Quarantine and Inspection Service officers.

Across NSW, there was a total of 557 patients with confirmed cases who had samples collected and sent for laboratory testing between 28 April and 18 June 2009. Samples were obtained from patients seen at the airport clinic, emergency departments, general practices and other settings. Of these, 290 (52.1%) were detected at emergency departments and 135 (24.2%) at general practices, compared with three (0.5%) at the airport.

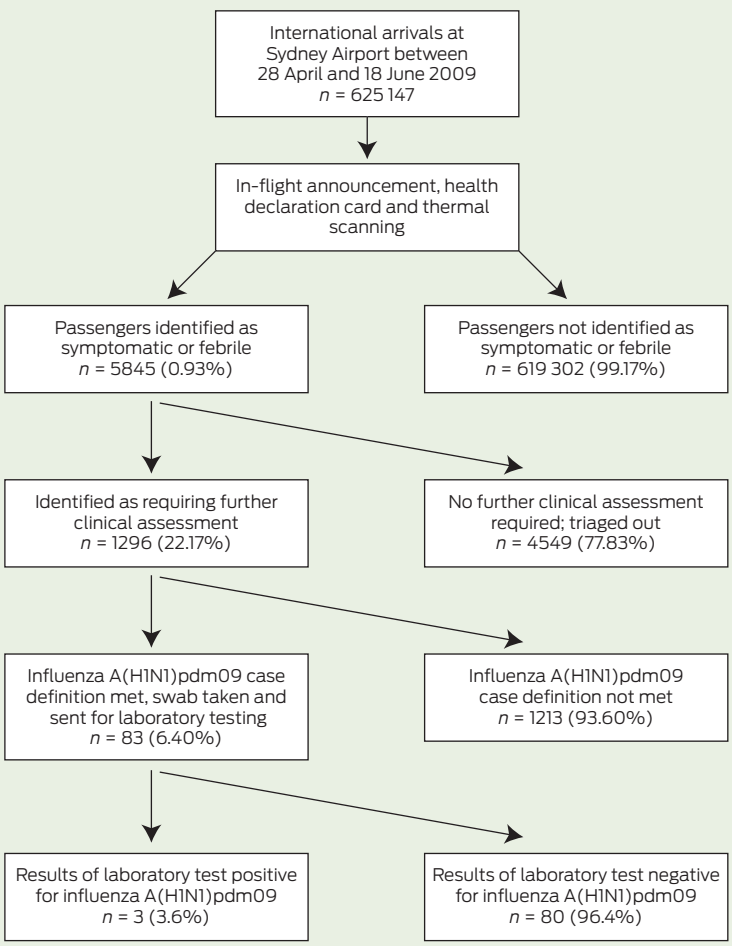
## Discussion

Our analysis shows that airport screening in NSW during pandemic (H1N1) 2009 influenza had low sensitivity, detecting far fewer cases during the DELAY and CONTAIN phases compared with emergency departments or general practitioners. The case detection rate of 0.05 per 10 000 passengers screened reflects figures in reviews of airport screening in other Australian jurisdictions and other countries.[6-10] The small number of passengers detected by thermal scanners is also consistent with published estimates of the sensitivity of non-contact infrared thermal image scanners, and the high proportion of influenza infections that are likely to be asymptomatic.[11,12]

Limitations of the study include possible underestimation of the number of overseas-acquired cases, as milder cases of illness may not have been notified. Also, case definitions used during the DELAY and CONTAIN phases largely sought to detect imported cases and may have underestimated the number of cases acquired in the community. Both factors are likely to further reduce rather than increase the sensitivity of airport screening.

Border screening, including the identification of ill passengers and the use of thermal scanners, was identified in pre-2009 planning as one of a number of control measures that might delay entry of a pandemic into Australia.[2] This planning and initial assessment of the likely severity of the pandemic after the emergence of influenza A(H1N1)pdm09 in Mexico led to commencement of airport screening in May 2009. Research also showed that the public were supportive of screening and perceived measures such

**2 Screening for influenza A(H1N1pdm09) at Sydney Airport, 28 April 2009 to 18 June 2009**



as thermal scanners to be useful in detecting ill passengers.[2]

The cost of staffing airport clinics in NSW has been estimated at about $50 000 per case detected (NSW Ministry of Health, unpublished data, 2012). Measures such as in-flight announcements and providing health information at airports may be still be useful mechanisms for raising awareness among incoming passengers during future pandemics. However, given the costs associated with staffing airport clinics, careful consideration should be given to deploying resources to airports for largely ineffective screening measures, compared with other activities such as contact tracing in the community.

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