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## Original Research

# Influenza control can be achieved in a custodial setting: Pandemic (H1N1) 2009 and 2011 in an Australian prison

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## SUMMARY

**Objectives:** Information on the effectiveness of interventions regarding control in closed institutional settings, including prisons, is limited. This study gathered evidence relating to influenza control in an Australian prison.

**Study design:** This study built on a 2009 H1N1 outbreak investigation at the Alexander Maconochie Centre (AMC) in the Australian Capital Territory (ACT).

**Methods:** Influenza surveillance data, ACT 2010 Inmate Health Survey data, New South Wales 2001 and 2009 Inmate Health Survey data, ACT Department of Corrective Services administrative data, and ACT Health clinical data were analysed.

**Results:** In 2011, the AMC was exposed to influenza virus, resulting in a single case. Public health activities included exclusion of symptomatic cases from the health facility, isolation of cases, and quarantine of contacts. Contact between prisoners and the ACT community was maintained; the AMC detainee visitor rate was one visitor per prisoner every 10 days.

**Conclusions:** The rehabilitative benefits of human contact for AMC detainees were not compromised during the surveillance period, despite the potential that a higher visitor rate may suggest. This highlights some features of the AMC which make its operational context different from many other correctional settings, but gives some indication of how good public health practice supports human rights.

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## Introduction

Pandemic (H1N1) influenza 09 is a highly infectious disease that caused a range of illnesses throughout the world, particularly in the southern hemisphere.<sup>1</sup> The main risk factor for H1N1 infection in the community is age, with older groups at lower risk due to prior immunity.<sup>2</sup>

Information on the effectiveness of pharmaceutical and non-pharmaceutical interventions is limited regarding its control in closed institutional settings. In June 2009, the World Health Organization raised the alert level to 'Phase 6', indicating a global pandemic; it was no longer possible to contain the virus in a particular geographic area.<sup>3</sup> During the early phase of pandemic influenza, those considered to be

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particularly vulnerable included pregnant women, persons with morbid obesity and chronic illness, and Aboriginal and Torres Strait Islander peoples<sup>4</sup>, the latter being over-represented in the Australian justice system.<sup>5</sup> The US Centers for Disease Control and Prevention provided interim guidance in May 2009 specific to correctional facilities on general preventive measures and risk reduction of the introduction of influenza, rapid detection of persons with influenza-like illness (ILI), and management and isolation of identified cases. These guidelines sought to ensure continuation of essential public services and protection of the health and safety of prisoners, staff and visitors.<sup>6</sup> There are currently no nationally-agreed infection control guidelines for Australian prisons; it has been suggested that a weak surveillance system may be contributing to some credible risks for the transmission of infectious diseases in prisons.<sup>7</sup>

In custodial settings, additional risk factors include overcrowding and poor ventilation, which contribute to the spread of respiratory infections in closed settings, including prisons. This has potential consequences for the particular site and community in which the prison is located. Outbreaks within closed institutional settings such as aged care facilities, schools, hospitals and prisons are reported during each influenza season, but community-based surveillance is likely to underestimate the true burden of such outbreaks.<sup>8</sup> It is thought that an initial focus of the 1918–20 influenza pandemic was an epidemic in San Quentin prison (California, USA) in 1918.<sup>9</sup> In an influenza outbreak in a New South Wales (NSW, Australia) prison in 2002, in-prison transmission was only documented for one generation, with no further prison or community transmission, presumably because that outbreak occurred during the summer. The causative strain, however, was the predominant strain circulating during the following winter influenza seasons in the northern hemisphere and Australia.<sup>10</sup> In a varicella outbreak in an Australian prison in 2006, amplification and community transmission of an airborne virus was clearly documented,<sup>11</sup> suggesting potential spread in prison-based influenza outbreaks.

Responding to the lack of evidence about good public health policy and practice in the custodial environment, the authors implemented an active real-time surveillance system linked to laboratory-based typing of influenza strains. The imperative for the research was underpinned by a call in June 2009 by the National Health and Medical Research Council (NHMRC) for public health research proposals to inform and advance Australian strategies to prevent, prepare for and respond to a potential H1N1 influenza pandemic, and inform development of public policy<sup>15</sup>; and an outbreak investigation of pandemic H1N1 2009 at the AMC which was contained to a single case.<sup>16</sup>

It was hypothesized that:

- Infection control can be achieved and maintained in a custodial setting by instituting the following policies: (i) examination of ILI suspects and proven cases in accommodation areas, not within the health facility; (ii) isolation of cases and suspects; (iii) quarantining asymptomatic detainees in their cells; and (iv) exclusion of symptomatic staff and visitors.

- Visits to detainees need not be restricted beyond the above principles.
- Human rights principles do not have a negative effect on or increase the risk of influenza transmission, and may, in fact, potentially decrease risk of transmission.

## Methods

### Setting

The Alexander Maconochie Centre (AMC) in the Australian Capital Territory (ACT) was commissioned in March 2009. A 300-bed custodial facility catering for male and female adults ( $\geq 18$  years of age) at all security levels, it is designed and operated in accordance with the ACT Human Rights Act 2004,<sup>12</sup> focussing on detainee welfare and rehabilitation, and incorporating principles of the 'Healthy Prison'.<sup>13</sup> It is an open campus-style design with accommodation units around a central facilities area. Accommodation includes cell blocks, domestic style cottages, a medical centre and crisis support unit, a 14-bed management unit and a transitional release centre. It incorporates a health building, an education and programmes building, an admissions building and a visitors centre. Approximately 50% of the accommodation is in self-contained five-bedroom cottages for lower security prisoners, designed to enable them to develop and practice living skills.<sup>14</sup> Fig. 1 provides an aerial overview.

### Recruitment of study participants

During the 2009 and 2010 influenza seasons (1 July–30 September), all AMC detainees and staff who were exhibiting ILI symptoms were actively encouraged to report to ACT Corrections Health staff at symptom onset. Potential participants were recruited by an ACT Corrections Health staff member and given an information sheet describing the study's aims and procedures, emphasizing that participation was voluntary and not linked to medical or custodial care (for detainees), or employment status (for staff), and of their right to withdraw at any time without disadvantage. Consent was also sought for collection of relevant medical and custodial information after initial medical treatment, when participants were no longer acutely unwell.



**Fig. 1 – Alexander Maconochie Centre. Source: Australian Capital Territory Corrective services.**

## Data collection and analysis

The authors analysed differences in transmission factors between custodial settings in the ACT and NSW, based on different control measures and living conditions in the two jurisdictions. The ACT only has one prison (the AMC), whereas the NSW criminal justice system comprises some 30 prison facilities, each different in its historical legacy, design, architecture, built environment and management approach.

### ILI data

An ACT Corrections Health staff member entered detainees' ILI data into a Microsoft Excel spreadsheet. Where records were incomplete, information was obtained through a follow-up clinical interview using the ACT Patient Administration System (ACTPAS) identification number. It was anticipated that ACTPAS numbers could be used to link ACT pathology test results with medical records data in order to calculate weekly incidence, attack rates and proportion of severe disease, and to calculate transmission parameters such as effective reproductive number and serial interval.

### Inmate health survey data

The ACT Inmate Health Survey (IHS) – described elsewhere<sup>17</sup> – had a 67% response rate. ACT IHS variables were based on those of the NSW 2001<sup>18</sup> and 2009<sup>19</sup> IHSs.

A data release application was submitted to the ACT Health Epidemiology Branch in March 2011 seeking permission to access relevant risk factor variables to triangulate those data with the influenza surveillance data. These were analysed using Statistical Package for the Social Sciences<sup>20</sup> to quantify associations between selected risk factors, severity of disease and body mass indices, and compared with national<sup>5</sup> and NSW<sup>19</sup> prisoner data.

The ACT IHS asked, 'In the past fortnight, how many visits have you had?'. The 2009 NSW IHS asked, 'In the last 4 weeks, how often have you had family and/or friends visit you at the prison?'. Responses to these questions enabled calculation of average daily number of visitors per detainee and a comparison between jurisdictions.

### ACT detention and custodial movement data

A request was made to ACT Corrective Services for data for the period 1 July 2009–30 June 2010 detailing occupancy by detainee's age and gender distribution; average daily occupancy of detainees by gender and Indigenous status, by calendar month; and average length of stay by gender and Indigenous status, by calendar month.

Length of detention and custodial movement data were obtained through the ACT-JOIST<sup>e</sup> database. These data were entered into an Epi-Info<sup>21</sup> database using identifiers common to the medical records and JOIST.

<sup>e</sup> JOIST is an acronym for Department of Corrections Justice and Offender Information Systems of Tasmania, an electronic system that has been adopted by ACT Corrective Services to manage offenders and study crime trends and recidivism.

## Results

### Reported cases of ILI and H1N1

#### 2009 influenza season

Circumstances surrounding the single confirmed H1N1 case at the AMC during the 2009 influenza season have been described elsewhere.<sup>16</sup> No other suspected or confirmed cases of H1N1 or ILI at the AMC were reported during that influenza season.

#### 2010 influenza season

There were four reported cases of ILI at the AMC during the 2010 influenza season, of which one was confirmed through laboratory testing as influenza A.

#### 2011 influenza season

In the 2011 influenza season, there were two reported cases of ILI. Each was confirmed through laboratory testing as influenza A.

### Inmate health survey risk factor analysis

Seventy-six percent of ACT IHS respondents had ever received an influenza vaccination, of whom 67% had received it while in prison. Only 35% of respondents were within a healthy weight range. Comparable with NSW findings from prison populations,<sup>19</sup> the remainder were either underweight (3%), overweight (45%) or obese (17%).

Other self-reported chronic disease risk factors were comparable with NSW findings, except for systolic blood pressure which, at 8%, was twice that of NSW prisoners, and self-reported chest pain which, at 15%, contrasted markedly with NSW prisoners 0.5%.

Smoking among AMC respondents is extremely high (82%), which was consistent with NSW and general prisoner populations. Two of the female ACT IHS respondents were pregnant at the time of the IHS. These results are shown in Table 1.

### ACT detention and custodial movements

ACT Department of Justice and Community Safety figures showed that average daily occupancy at the AMC from June to September 2009 was 163 persons; for the period June to September 2010, it was 214 persons, indicating a 31% higher occupancy level during the 2010 season.

From 1 July 2009 to 30 June 2010, there were 444 entrants into the AMC (18% Indigenous, 82% non-Indigenous) and 212 releases (23% Indigenous, 65% non-Indigenous). These numbers represent numbers of movements, not individuals. This indicates a 47% turnover between the AMC and the community during this period. These results are shown in Table 2, together with the net difference during the period.

### Visits to detainees

At 0.1 visitors per detainee per day at the AMC, this equates to one visitor every 10 days. This rate is three times

**Table 1 – Inmate Health Survey H1N1 and influenza risk factor analysis.**

	Australian Capital Territory <sup>18</sup> % n	New South Wales <sup>20</sup>	National <sup>5</sup>
Indigenous status			
Indigenous	17% (23)	31%	26%
Non-indigenous	83% (112)	69%	73%
Average no. of visitors per day per respondent	0.109524 <sup>a</sup>	0.0394869 <sup>b</sup>	Not available
Influenza vaccination status			
Ever received?	76% (102)	Not available	Not available
Received in prison?	67% (90)	Not available	Not available
Self-reported chronic disease status			
Diabetes	1.5% (2)	4%	3%
Asthma	31% (42)	29%	16%
Kidney problems	1.5% (2)	Not available	Not available
High blood pressure	12% (16)	14%	Not available
Systolic blood pressure >140 mmHg	8% (11)	4%	Not available
Hepatitis C positive	34% (45)	32%	Not available <sup>c</sup>
Body mass index			
Underweight (<18.5)	3% (4)	44%	Not available
Healthy weight (18.5–24.9)	35% (47)	37%	Not available
Overweight (25.0–29.9)	45% (61)	19%	Not available
Obese (≥30)	17% (23)	Not available	Not available
Smoking status			
Current smoker	82% (110)	80%	81%
Daily	79% (106)	95%	74%
Weekly	2% (3)	4.4%	4%
Irregular	<1% (1)	1%	3%
Shares cell with a smoker	61% (83)	55%	Not available
Currently pregnant	18% (2)	4%	235 <sup>d</sup>
a Calculation based on 191 visits/14 days/135 respondents. <sup>17</sup>			
b Calculation based on 1099 visits/28 days/994 respondents. <sup>19</sup>			
c However, prisoner health studies estimate the overall prevalence of hepatitis C infection among all Australia's prisoners to be between 23% and 45%, and even higher for females at between 50% and 70%. <sup>5</sup>			
d In 2007–2008. <sup>5</sup>			

greater than that enjoyed by NSW detainees, which at 0.03 visitors per detainee per day equates to one visitor every 33 days.

## Discussion

This study highlights some features of the AMC which make it different from some other custodial settings. Disease control procedures at the AMC, first tested in 2009,<sup>16</sup> were adapted to the evolving situation and readily implemented because of lessons from that experience. The practice of not examining symptomatic prisoners within the health centre, but rather sending health staff to visit detainees in AMC residential areas, minimized the potential for spread throughout the facility. Well-tested public health principles of isolation, quarantine and exclusion were rapidly applied with good effect. Further, at the time of this study, the AMC had been commissioned for just 2 years and had not yet achieved full occupancy. This allowed correctional authorities to exhibit flexibility in accommodating detainees during the potential influenza outbreak.

Being the sole adult custodial facility in the ACT, the AMC operational management enables restrictions of detainee

movements as well as a high level of physical stability for detainees. AMC detainees are not moved between various prison locations: rather, their movements only involve transportation between court and prison, thus decreasing the potential for transmission of infection. This contrasts with the often high levels of detainee movements in other Australian jurisdictions.

The human rights commitment of the ACT Government – and specifically of ACT Corrective Services – was tested. The potential for an influenza outbreak could have been invoked

**Table 2 – Detainee occupancy and movements at the Alexander Maconochie Centre (AMC) from 1 July 2009 to 30 June 2010.**

	Indigenous		Non-indigenous		Totals
	Male	Female	Male	Female	
Entered AMC	69	9	327	39	444
Released from AMC	63	12	103	34	212
Net difference	+6	–3	+224	+5	+232

Source: Australian Capital Territory Department of Justice and Community Safety.

to limit contact between the ACT community and detainees. This study demonstrated that this was not necessary. The rehabilitative benefits of human contact for AMC detainees, therefore, were not compromised despite the potential for an outbreak that the higher visitor rate might suggest.

The chronic disease risk factors for H1N1 and ILI of AMC detainees are consistent with those of detainees elsewhere. Eighty-two percent of ACT IHS respondents were current smokers (79% reported that they smoked daily) and 65% of AMC detainees were not of a healthy weight. There is no consistent public health strategy for smoking in Australian prisons, and few prison health services provide fully developed tobacco cessation programmes. These are, however, becoming more common.<sup>22</sup> The positive effects of exercise programmes in prisons for physical and mental health<sup>23</sup> have been demonstrated.

Given the disproportionately high levels of incarceration of Indigenous Australians (26% nationally, 16% in the ACT), as well as the poorer health generally of Indigenous prisoners,<sup>5</sup> it was hoped that a particular focus of this research would be Indigenous detainees. However, given the small numbers of affected detainees – for confidentiality reasons – this was not possible.

The overarching human rights legislation and principles<sup>12</sup> on which the AMC is established enshrine the independence and authority of the ACT Corrections Health Service to provide first-call health services to AMC detainees. In the context of protection from infectious disease transmission within a correctional environment, this can include the need to isolate and quarantine detainees. The implementation of clearly understood policies regarding infection control, together with the development of professional relationships between ACT Corrections Health Service staff and ACT Corrective Services staff – the latter being responsible for security including the physical isolation of detainees where necessary – has been paramount.

Despite the presence of these risk factors amongst AMC detainees, a low incidence of influenza and H1N1 was found. In comparison, a study of all NSW correctional settings during June to August 2009 showed that 43% of prisoners with ILI were positive for H1N1 2009 influenza, and 10% were positive for seasonal influenza A, with five cases admitted to hospital, including two to intensive care; all cases recovered. In that study, the researchers concluded that, given the relatively low numbers affected, strategies in place through the NSW correctional system to rapidly identify, isolate and treat suspect cases were effective.<sup>24</sup> The imperative for the AMC to continue working towards improved chronic health for detainees through implementation of smoking cessation and exercise programmes remains; however, this study shows that it has been possible to establish active H1N1 and ILI surveillance and to implement control measures in a correctional setting.

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## Ethical approval

Approval to implement ILI surveillance at the AMC during the 2009 and 2010 influenza seasons was received from the Human Research Ethics Committees of ACT Health and the Australian National University in August 2009. The authors were mindful of the need to conduct the investigation in a manner consistent with the NHMRC national statement on ethical conduct in human research on people in dependent or unequal relationships, particularly prisoners.

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## Competing interests

None declared.

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