Australian Government

Department of Health and Ageing

REVIEW OF

Australia's Health Sector Response to Pandemic (H1N1) 2009

LESSONS IDENTIFIED

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Print ISBN: 978-1-74241-551-2

Online ISBN: 978-1-74241-552-9

Publications approval number: D0485

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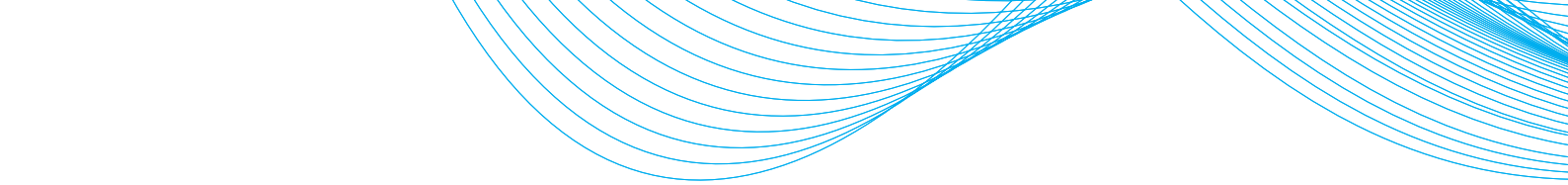


Contents

Executive Summary

There are many lessons for health officials and governments to learn from the experience of the 2009 pandemic. While Australia's response showed that being well prepared was important, success depends on a multi-stakeholder cooperative approach, with key elements being effective communications, robust science-based decision making and a flexible public health response system able to respond rapidly to a crisis.

Governance and decision making

Australia was in a good position to respond rapidly to the emerging threat from pandemic (H1N1) 2009 influenza virus in 2009, and moved quickly to implement an appropriate health response. Australian governments had spent considerable time since 1999 developing and regularly updating a series of connected pandemic action plans – health and whole of government; national and jurisdictional – to guide a coordinated response to an influenza pandemic. These plans had been exercised.

The Australian response to the 2009 pandemic was guided by the *Australian Health Management Plan for Pandemic Influenza 2008* (AHMPPI), which provides the health sector with a nationally agreed strategic framework to guide preparedness and response activities for an influenza pandemic. Coordination between the Commonwealth and the state and territory governments occurred through the Australian Health Protection Committee (AHPC), the peak health sector decision-making body for national health emergencies. There was strong commitment from all public health officials to support teamwork across governments and a consistent national response. Relationships already established between all levels of government in creating and maintaining the AHMPPI allowed for an ongoing cooperative effort when it became necessary to modify the AHMPPI to reflect the response actions needed for the moderate pandemic (H1N1) 2009 influenza virus. The rapid development of a new Australian pandemic phase – PROTECT – demonstrated that Australia has a flexible public health response system.

One of the most important lessons learned was that Australia's planning must be flexible to accommodate the biological variations in the clinical picture and the potential uniqueness of each pandemic scenario, to enable resources to be effectively directed to achieve optimal outcomes. One of the biggest challenges to decision making and coordination was the variation in timing of stages of the outbreaks across the country, highlighting that Australia's pandemic plans and governance arrangements need to incorporate responses adaptable to the severity of the disease, disease patterns and geographical differences. While the geographical spread was not inconsistent with seasonal influenza patterns, in the pandemic context this variation made in-unison phase changes, and the subsequent application of consistent public health actions, difficult. While Australia's pandemic phasing system was useful to guide public communication, aligning the pandemic phases to the operational response nationally did not always work as well, particularly when jurisdictions were disproportionately affected, requiring locally tailored responses. The fundamental purpose of the Australian pandemic phases and the actions that they drive needs to be further considered.

Multi-stakeholder advisory mechanisms provided valuable expert and operational advice during the pandemic. For the future, well-structured expert advice should be developed from well-functioning advisory committees in preference to establishing new or separate pandemic advisory structures. For example, the Australian Technical Advisory Group on Immunisation (ATAGI) was a valuable source of expert advice on the pandemic (H1N1) 2009 vaccine, and its role needs to be included in pandemic planning.

The vital role of the clinical sector in providing early warning of disease severity seen within Australia's hospitals, in particular in intensive care units (ICU), was not documented in the AHMPPI. Early recognition of this clinical link was established with a clinical expert group. Also, the moderate nature of the 2009 pandemic virus resulted in a larger role for general practitioners (GPs) than had been considered in the planning for a more severe pandemic. The establishment of a General Practice Roundtable (GPRT) was an important initiative to improve communication with the primary health care sector and to

enable the government and representatives of the front-line clinicians to work together in a highly effective manner to ensure that policies were realistic, effective and efficient. To rectify an apparent disconnection between the scientific and operational advice provided during the response, meetings of jurisdictional Chief Health Officers (CHO) and key experts were convened at critical decision-making points. There is a need to formalise these processes and groups within the AHMPPI.

Optimal communication between national, state and territory governments, peak bodies, local bodies and primary health care professionals needs to be further addressed in future planning. It is important to enhance communication with the clinical and primary care sectors in planning and during a pandemic, in particular to communicate the role of AHPC and public health objectives in a pandemic. This could include formalising networks and considering ways of enhancing the intersection and integration between the Commonwealth, jurisdictional governments and local networks of peak bodies.

It is also important to ensure broader stakeholder engagement during pre-pandemic planning and early stages of a response on key aspects of the AHMPPI, to allow for discussion of risks and benefits of all actions in a pandemic. Pandemic plans should reflect the rationale for decisions on pandemic activities. Consensus discussions prior to and during a pandemic and clear documentation of outcomes will enable better management of media commentary to key public health objectives during the pandemic.

Due to the moderate severity of this pandemic, more stringent and restrictive actions were not required, and a move from 'health' issues to 'whole-of-government' issues for decision making was not widely tested. However, there was one opportunity for national governance of a non-health intervention: school interventions. There was tension between the public health recommendation of early school closures to control the spread of infection, and the political and social realities of implementation. The response highlighted the difficulties that will be encountered by all governments in a more severe pandemic to contain the spread of the pandemic by implementing and continuing more extensive and potentially disruptive social distancing measures.

Decision making in a complex environment could be enhanced with the provision of a decision support document to guide decision makers in identifying all the public health actions available in a pandemic and their risks and benefits.

Early and accurate information to guide decision making is important. While urgent research grants were tendered and awarded rapidly, the time frame for the studies generally did not provide research outcomes to guide the real-time public health response. Consideration should be given to developing a set of key research questions in advance of a future pandemic.

Communications

More can always be learned about effective communication in an environment of national threat, rapid change and multiple players, particularly with respect to the need to convey factual, up-to-date information both to the public and to healthcare professionals.

A national public information campaign was important, complemented by jurisdictional public communications activities, for the community to develop an understanding of the importance of hygiene in reducing transmission of influenza. While there were clear messages about which groups were at high risk of severe outcomes and about the promotion of self-identification, there was a need for more targeted communication with vulnerable groups. The 24-hour news cycle emphasises the importance of shared and coordinated messaging across jurisdictions. To enhance national coordination and timeliness of message delivery, consideration should be given to implementing an appropriate process to enable early sharing of materials across jurisdictions.

Communication resources were stretched in ensuring that current information was available to government, the media and the public. The intense media demand was difficult to manage when the spokespeople on health issues at both the national and jurisdictional levels were also involved with managing the pandemic response at the most senior levels. A media strategy for pandemic influenza that includes principles and protocols of media engagement is necessary to manage expectations and workloads. Also, clear guidelines identifying Commonwealth and jurisdictional functions and responsibilities, including agreed spokespeople and the objectives, actions and target audiences for various stages of an influenza pandemic, should be developed for the health sector.

Surveillance

Accurate and rapid pandemic surveillance data are of paramount importance in understanding the nature of the disease and ensuring an appropriate response. While all levels of government in Australia worked well together to ensure that a national surveillance picture was readily available to inform decision makers and to keep the public informed, an early thorough and systematic study of the initial cases of disease, and investigation of their contacts, could be further optimised to aid the decision-making process. Epidemiological modelling in pandemic planning provided valuable insights into the effectiveness of response measures such as home isolation (for people who are unwell) and quarantine (for individuals who may have had contact with people who are unwell). High priority should be placed on the early identification and documentation of the true clinical picture, including Australian and overseas data and including identification of the vulnerable, to inform an appropriate health response.

The collection and reporting of data are resource-intensive exercises, and more consideration needs to be given to cessation of some elements once they are no longer needed to inform decision making. The draw on resources to report the number of cases each day affected the capacity to analyse the data to produce a synthesis of the situation. Also, the information needed to inform public health policy is not necessarily the information needed to inform the public about the impacts of the disease. Communication with the public needs to include a synthesis of the situation, acknowledgement of what remains uncertain about the outbreak, and plans for what will be undertaken next.

Completion of a surveillance plan for the collection, analysis and reporting of data at national level would enhance national capability. Also, continued development of routine seasonal influenza surveillance to include standard indicators of severity, including emergency department presentations, hospitalisations, ICU admissions and deaths, would enable easy escalation during a pandemic.

Border measures

While border measures were rapidly implemented in Australia's international airports and seaports, the effectiveness of various border measures to delay entry of the virus into Australia is difficult to measure, and their public health benefits are not clear. Border measures continued beyond the establishment of local transmission in Australia, which varied by jurisdiction.[1] There were no restrictions on domestic travel, and state border closures were not considered in Australia. Maintaining border measures was resource intensive with considerable opportunity costs that should be understood when reviewing the effectiveness of border measures. Their effectiveness also needs to be considered relative to the rationale outlined in the AHMPPI, being a short period of delay in the entry of the disease and the raising of awareness among the travelling public. It is likely that the intensive containment measures employed beyond the borders of Australia had a much greater impact in terms of delaying the establishment of the virus in the community than border measures, particularly arrival screening.

The management of cruise ships during the early stages of the pandemic was an issue that was not foreseen. During the response, a *National Protocol for Pandemic (H1N1) 2009 on Cruise Ships* was rapidly developed through consultation with the Australian Quarantine and Inspection Service, state and territory health agencies and the cruise ship industry. At the peak of concern, successful contact tracing was undertaken across Australia for one entire cruise complement of thousands of passengers, but this extensive level of contact tracing would not be possible for the large volume of international air arrivals. Contact-tracing activities related to international flights placed a heavy burden on national and jurisdictional public health resources.

Public health measures

Pandemic responses include a range of measures that can be implemented as severity increases, balancing effectiveness with societal cost and disruption. For example, measures may range from infection control measures, symptomatic

1. Note that the virus gained momentum in Victoria before other states of Australia. Bishop, JF, Murnane, MP, & Owen, R (2009), 'Australia's winter with the 2009 pandemic influenza A (H1N1) virus', *New England Journal of Medicine*, 361(27), 2591–2594.

treatment and home isolation, to widespread antiviral prophylaxis, school closures and cancellation of mass gatherings.

Comprehensive laboratory testing is important early in a pandemic to describe the disease, but is very resource intensive. There is a need to change to a clinical definition once the virus circulation has been established and there is a clearer clinical picture. Consideration could be given to methods of collecting case data based on clinical diagnosis. The frequent and rapid changes to the case definition as the disease outbreak evolved was challenging and resource intensive, with flow-on effects on laboratory testing capacity. A new process for the development of case definitions during a pandemic response needs to be explored to enable more robust definitions that can avoid too-frequent changes. Consideration needs to be given to whether a clear objective of the definition, including describing and communicating the public health rationale, would assist in the development and acceptance of case definitions.

Quarantine is inconvenient for individuals and difficult to enforce as a public health measure. The purpose of voluntary quarantine was not well understood by the community during 2009. The challenge is to educate the community about what individuals can do after they have been exposed to a case, in terms of social expectations and protecting vulnerable members of the community. The relevance of voluntary quarantine in general needs further consideration once community spread has occurred, including its role in protecting vulnerable population groups such as schools for students with disabilities, remote communities and other groups.

The disruptive nature of school closures was significant. School exclusions, whereby children who had travelled to areas identified in the case definition were requested to voluntarily quarantine themselves, were far less disruptive than whole-of-school or class closures but were sensitive as they suggested bias against particular regions of Australia. Evidence of the effectiveness of school interventions in delaying the spread of a pandemic needs to be further defined.

Infection control is an important control measure in a pandemic. The principles of infection control developed in the health sector can be applied to a range of environments; therefore, consideration should be given to the development of generic infection control messages that cover a multitude of settings, through emphasis of the principles of infection control rather than specific actions and equipment.

The use of antiviral medications was limited in Australia. Areas for future work include understanding the benefits of early versus late use and extensive versus limited-population use, in particular the use of antiviral medication for high-risk contacts such as Aboriginal and Torres Strait Islander peoples and other vulnerable groups when no prophylaxis is provided generally for the well population, and policy for prescribing. The planned provision of antiviral prophylaxis for healthcare workers was not implemented in 2009, and remains an unresolved issue.

Health sector capacity

The 2009 pandemic clearly highlighted the need to develop guidance on strategies that could be employed during a pandemic to enhance the health sector workforce capacity. While the public health workforce and the hospital system were stretched during the 2009 response, it should be taken into consideration that 'business as usual' generally continued in both public and clinical healthcare settings during the pandemic.

A pandemic places particular demands on the public health workforce. Contact tracing, support for border measures, coordination of support for quarantined individuals and surveillance reporting all placed additional demands on the public health workforce. Further planning for surge capacity in these areas is necessary for a sustained response.

In the hospital system, ICUs were the most significantly affected, experiencing surges of patients requiring ventilation for pandemic influenza. The demand for extra-corporeal membrane oxygenation (ECMO) was unforeseen, but was managed well. This highlighted the requirement for ECMO as a new capability and the need for trained intensive-care staff. Any future surge capacity strategy should address the need to sustain surge capacity in the hospital system for long periods of time.

Laboratory capacity

Australia has a well-established and prepared network of diagnostic laboratories that was able to respond flexibly and quickly to support the public health response. Public health laboratory capacity was stretched during the response, and private laboratories played an important role in supporting the public health response. To

maximise laboratory capacity in a pandemic, there is a need to clearly define the roles of the various laboratories and reference centres and the Public Health Laboratory Network.

There is a need to improve the communication before and during a pandemic between public health decision-making bodies, front-line clinicians and diagnostic laboratories to ensure that the rationale behind laboratory testing as the pandemic progresses is clear and that resources are used efficiently.

Current laboratory information management systems serve the needs of hospitalised patients and individual clinicians. These systems are not easily adapted to other purposes. There is a need to consider mechanisms to improve the reporting of laboratory results, including negative tests, to enable rapid and easy access by public health units and other local laboratories as well as clinicians.

National Medical Stockpile deployment

While Australia's National Medical Stockpile (NMS) met the demands of the 2009 pandemic, the moderate nature of the pandemic led to limited demands on the NMS overall. It would be expected that demands would be much higher with a severe pandemic. It would be prudent to review the range and quality of stockpiled goods for an influenza pandemic.

Mechanisms in place for the distribution of NMS supplies to jurisdictional receiving facilities were successful, and holding stocks in various Australian Government storage facilities reduced distribution response time.

While a clear principle of use of the NMS is that no jurisdiction will be disadvantaged because of its own stockpiling, there was a lack of clarity with respect to the policy and timing of the transition from jurisdictional stockpiles to the national stockpile, and of responsibility for the provision of personal protective equipment (PPE) for use by GPs. There is a need to better communicate the role of stockpiles and to facilitate better understanding of when and how stockpile items are made available.

Vaccination

Australia's national response plans are premised on delaying the establishment and spread of the disease for as long as possible to allow the production of a pandemic vaccine. The national Pandemic (H1N1) Vaccination Program commenced on 30 September 2009 and concluded on 31 December 2010 when remaining stockpiled vaccine expired. This national program was the biggest vaccination program undertaken in Australian history, contributing to the substantially lower-than-expected levels of circulating pandemic influenza virus during Australia's 2010 influenza season and the low impact of influenza on the Australian population in 2010.

While pre-established contracts with vaccine manufacturers aided the early availability of a pandemic vaccine in Australia, the production of a customised vaccine using current technology takes time and one is unlikely to be available during the first wave of an influenza epidemic. This emphasises the importance of implementing other mechanisms for slowing disease transmission in the early stages of a pandemic. An area for future exploration is in medical technology, in particular innovation in vaccine technologies which could potentially deliver vaccine to Australians even more rapidly than occurred in 2009.

Pandemic planning needs to cover a range of vaccination program scenarios based on disease virulence. A GP-based vaccination program was an appropriate response in 2009 based on the severity of the disease. The need for clinical trials and registration of the vaccine should be considered when planning the objectives of a pandemic vaccination program.

Communication about the purpose of a pandemic vaccination program could be strengthened. Engagement with the primary healthcare sector through the GPRT and Indigenous Flu Network (IFN) worked well to ensure open dialogue between governments and the primary healthcare sector.

While indirect measures of vaccination provided some indication of uptake in the community, comprehensive data on vaccine uptake or wastage were not collected nationally. The national collection of vaccine data during a pandemic needs further consideration.

Aboriginal and Torres Strait Islander peoples

Indigenous Australians were identified early as being vulnerable to severe effects of the disease. Information on indigenous populations of other parts of the world and early recognition of this threat to Indigenous Australians aided Australia's response. To meet the challenges of the 2009

pandemic, an appendix to the PROTECT Annex specifically focusing on Indigenous Australians was developed, in collaboration with the Indigenous health sector, which clearly outlined issues specific to Indigenous Australians who had underlying medical conditions or who lived in remote communities.

The IFN proved to be a useful mechanism to arrange a nationally coordinated response for Indigenous Australians. Consideration should be given to maintaining or establishing a similar forum to inform future planning and response.

Conclusion

Australia's response to this new threat was proportionate to the threat, appropriate and measured. Australia did not implement all the measures contained in the AHMPPI; rather, it developed a new response approach as understanding of the biology and clinical picture of the pandemic (H1N1) 2009 influenza virus evolved. While lessons from the 2009 pandemic will be critical to further informing health and whole-of-government responses into the future, it is important that future planning not be based solely on the last pandemic. Pandemics are unpredictable and therefore there is a need to remain flexible and adaptable to respond to all levels of threat to the health of Australia's population.

Recommendations

Governance and decision making

1. Consider ways of incorporating greater flexibility in pandemic influenza planning to enable responses adaptable to the severity of the disease, disease patterns and geographical differences in spread. This could include reviewing the purpose of Australian phases and assessing the issues on which national consistency is required.
2. Develop a decision support document. This could include identifying all the public health control measures available in a pandemic, the objective of each measure (considering severity), the risks and benefits, the resources required, communication processes and relevant legislation.
3. Review the number and composition of health advisory groups on pandemic influenza, both in terms of how they operate in the pre-pandemic period and during the response, and how public health recommendations feed into whole-of-government processes.
4. Develop a research plan to ensure that rapid investigations meet the immediate needs of a public health response to an influenza pandemic. This could include defining additional studies needed to supplement surveillance data early in a pandemic, processes to rapidly fund investigations of issues of concern and a protocol for learning from early cases in Australia and overseas.

Communications

5. Develop principles for a pandemic communications plan for the health sector that identify Commonwealth and jurisdictional functions and responsibilities as well as objectives, actions and target audiences for various stages of an influenza pandemic.
6. Consider developing a communications forum similar to the National Health Emergency Media Response Network (NHEMRN) to coordinate public information campaigns for an influenza pandemic, including developing a rapid process to approve and clear public communications materials.
7. Consider developing a media-specific plan for pandemic influenza that includes principles and protocols of media engagement.

Surveillance

8. Complete a surveillance plan for the collection, analysis and reporting of data at national level.

Border measures

9. Review the policy, operational protocols and communication of border measures (airports and seaports) for pandemic influenza.

Public health measures

10. Identify ways of simplifying case and contact definitions and their use, including how better to communicate to and educate the healthcare workforce about the role of and rationale for case definitions.
11. Review the range of infection control guidelines to identify inconsistencies and gaps. Consider the feasibility of developing 'principles of infection control', with examples, to avoid the duplication of advice for different sectors.
12. Review the policy on access to and use of antiviral medications.

13. Review the policy on quarantine and isolation, including management, support systems and communication.
14. Review the policy on school and childcare centre closure, including consideration of the relationship between disease severity and closure recommendations.

Health sector capacity

15. Identify and formalise mechanisms to enhance communication with the clinical sector before and during a pandemic, in particular to communicate the role of AHPC and public health aims in a pandemic. This could include formalising networks and considering ways of enhancing the intersection and integration of Commonwealth and jurisdictional governments and local networks of peak bodies.
16. Develop a health sector surge capacity strategy to address the anticipated increase in demand for health services during a pandemic and the need to sustain provision for long periods of time.

Laboratory capacity

17. Identify ways of improving the communication before and during a pandemic between public health decision-making bodies, front-line clinicians and diagnostic laboratories to ensure that the rationale behind laboratory testing during each phase of a pandemic is clear and that resources are used efficiently.
18. Identify ways of improving the reporting of laboratory results, including negative tests, to ensure rapid and easy access by public health units, other local laboratories and clinicians. This may include implementing an automated information system to enable two-way electronic communication.
19. Clearly define the roles of the Public Health Laboratory Network, the WHO Collaborating Centre for Reference and Research on Influenza in Melbourne, National Influenza Centres in Australia, and diagnostic public and private laboratories.

National Medical Stockpile deployment

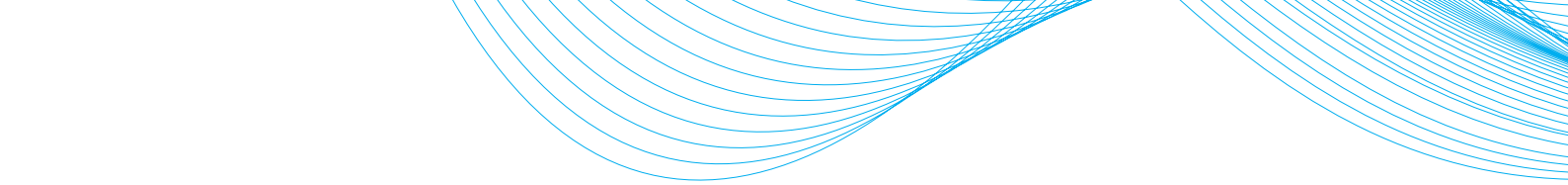
20. Refine and clarify the eligibility policies and logistic procedures for the national and jurisdictional stockpiles for pandemic influenza. Work with healthcare providers to better communicate the role of stockpiles and to facilitate better understanding of when and how stockpile items are made available.
21. Review the types and quantities of stockpiled goods in the National Medical Stockpile for an influenza pandemic.

Vaccination

22. Identify and understand the risks posed to the success of a pandemic vaccination program and develop strategies to mitigate these risks. This could include defining when it may be appropriate to use an unregistered vaccine, and examining other barriers affecting vaccine uptake.
23. Ensure that planning for the delivery of a pandemic vaccination program encompasses both mass vaccination scenarios and more routinely delivered models of care.
24. Determine the need for detailed data about vaccine uptake during a pandemic and consider an integrated data collection system to capture the distribution and administration of a vaccine.

Aboriginal and Torres Strait Islander peoples

25. Further develop and incorporate Indigenous Health Services and the cultural, social and environmental values of Indigenous Australians into pandemic planning at national, state and territory levels.



Introduction

Aim and Scope

This review examines the Australian health sector's response to pandemic (H1N1) 2009 (the 2009 pandemic) in the context of what was planned for and what occurred during the response. The review identifies what worked well, as well as issues that require further consideration to strengthen the planning, management and operational aspects of pandemic health response arrangements in Australia. The recommendations included in this review accordingly focus on the issues identified. This review does not attempt to resolve these issues; an implementation process will be developed jointly with state and territory health officials through the Australian Health Protection Committee (AHPC).

Methodology

Under the governance of the AHPC, the Office of Health Protection (OHP) within the Australian Government Department of Health and Ageing (DoHA) gathered and collated information and opinions from key stakeholders, including health committees, the clinical sector, Australian Government agencies and statutory bodies, and the private sector. The information was generally collected under the three broad headings of what worked well, what did not work well, and recommendations for improvement. The following broad topics were captured: governance structures, public health measures, border measures, hospital and laboratory capacity, surveillance systems, communications, the vaccination program, and the National Medical Stockpile (NMS). Issues identified through the information collection process inform the specific recommendations contained in this review.

Debriefing sessions were conducted in the form of workshops, teleconferences and external reports. Some agencies, committees, individual jurisdictions and industry organisations have provided outcomes from their own evaluation processes to inform this review. A list of key stakeholders consulted during the review process is included as Appendix A to this review. Formal feedback has been received from broader stakeholders, including critical infrastructure sector groups, indicating the desire for closer industry interaction with all levels of government. These issues are not covered in this review but are being worked through by means of other formal processes.

Emerging Threat

On 24 April 2009, the World Health Organization (WHO) notified the DoHA of outbreaks of an influenza-like illness in the United States and in Mexico, where in particular it appeared that a virus was causing high mortality in relatively young people. On 25 April 2009, on the advice of the Emergency Committee called under the rules of the *International Health Regulations 2005*, the Director-General of WHO declared this event a 'public health emergency of international concern'. By the time WHO declared a pandemic on 11 June 2009, a total of 74 countries and territories, including Australia, had reported laboratory-confirmed infections[2] of the new 'pandemic (H1N1) 2009 influenza' virus. Its sudden appearance and rapid international spread – it spread more in just six weeks than other pandemic viruses in six months[3] – demanded an immediate and coordinated international and national health response.

Three major concerns emerged early which required prompt analysis and decision making. Firstly, the age demographic of those affected was typical of pandemics and different from the pattern typically seen in seasonal influenza (that is, the virus was causing severe illness and death in young people). Secondly, the virus was successfully spreading during a time of year outside the normal influenza season in the northern hemisphere. Finally, there were early indications of severe outcomes in Mexico and there were high numbers of admissions to intensive care units (ICUs) in developing countries.

2 World Health Organization (2010), 'What is the pandemic (H1N1) 2009 virus?', available from www.who.int/csr/disease/swineflu/frequently_asked_questions/about_disease/en.

3 World Health Organization (2011), 'Pandemic (H1N1) 2009', available from www.who.int/csr/disease/swineflu/en.

While there were some signs indicating that the illness was moderate overall, Australia could not be complacent about the impact of the disease around the world and in Australia. This was a new virus, a new problem, and therefore initially, before we knew the clinical picture, we did not know what this new virus would do.

Australian governments had spent considerable time since 1999 developing and regularly updating a series of connected pandemic action plans – health and whole-of-government; national and jurisdictional – to guide a coordinated response to an influenza pandemic. These plans had also been exercised.

The Australian response to the 2009 pandemic was guided by the *Australian Health Management Plan for Pandemic Influenza 2008* (AHMPPI), which provides the health sector with a nationally agreed strategic framework to guide preparedness and response activities for an influenza pandemic. This plan is always activated and Australia had been in the pandemic ALERT phase since 2005 with the emergence of the avian H5N1 influenza infection in humans. The AHMPPI is supported by the *National Action Plan for Human Influenza Pandemic* (NAP) that has been in place since 2006.

In this context, Australia was in a good position to respond rapidly to the emerging threat, and moved quickly to implement an appropriate health response.

Australia's Response

The Australian national response moved to the pandemic DELAY phase on 28 April 2009, which continued for three weeks to 21 May 2009. Consistent with the main objective of delaying entry of the pandemic (H1N1) 2009 influenza virus into Australia, the focus of the DELAY phase in 2009 was the early identification and management of cases and contacts. During this period Australia declared the new virus a quarantinable disease under the *Quarantine Act 1908*; implemented border measures, such as thermal scanners and Health Declaration Cards (HDC), from 29 April 2009 at Australia's international airports; commenced intensive case and contact management activities, including providing antiviral medication for both treatment and prevention (prophylaxis); provided personal protective equipment from the NMS to GPs to maintain an important workforce; and began issuing public messages to advise people with influenza-like illness to remain at home and maintain good hygiene practices to help reduce the spread of the disease.

WHO moved to pandemic phase 5 (human-to-human spread of the virus into at least two countries in one WHO region) on 29 April 2009. The first case to arrive in Australia was identified on 8 May 2009. Australia moved to the pandemic CONTAIN phase on 22 May 2009 when it was clear there were clusters of cases indicating community transmission occurring within Australia. The rationale for the CONTAIN phase is to reduce the spread in the community, limit the number of cases and support the health system while waiting for a pandemic vaccine to be available. Individuals most vulnerable to poor outcomes were identified early as including pregnant women, those with underlying medical conditions, and Aboriginal and Torres Strait Islander peoples. Individuals with rapidly deteriorating influenza with respiratory distress were specifically targeted nationally for early antiviral treatment and for careful follow-up by primary-care physicians and hospitals.

On 3 June 2009, Victoria moved to a MODIFIED SUSTAIN phase as the overwhelming number of cases in Victoria had strained the capacity of the public health responses outlined in the CONTAIN phase and the SUSTAIN phase response, outlined in the AHMPPI, was viewed as disproportionate to the moderate severity of the disease.

WHO declared a pandemic (pandemic phase 6) on 11 June 2009. By this time WHO described pandemic (H1N1) 2009 as being mild in most but severe in some and moderate overall. Australia developed and implemented a new pandemic phase known as the PROTECT phase on 17 June 2009, in recognition of the fact that while the pandemic influenza virus was mild in most people, with most of those infected making a rapid and full recovery, a greater focus was needed on treating and caring for those people more vulnerable to severe outcomes. The PROTECT phase included the rollout of the largest vaccination program in Australia, the national Pandemic (H1N1) Vaccination Program, on 30 September 2009 (see Figure 1).

In addition to the need for a new annex to define the PROTECT phase, an appendix to this specific to Aboriginal and Torres Strait Islander people was needed to meet the challenges of the 2009 pandemic. This appendix was developed in conjunction with the Indigenous health sector.

It clearly outlined issues specific to Indigenous Australians who had underlying medical conditions or who lived in remote communities.

Epidemiology

Following the April 2009 emergence of a novel strain of influenza overseas, Australia's first case of confirmed pandemic (H1N1) 2009 was identified in May 2009. By the end of 2009, there had been more than 37,000 laboratory-confirmed cases, including almost 5000 hospitalisations and nearly 200 deaths.

At national level, the main wave of the pandemic lasted about 18 weeks, from mid-May to late September, peaking at the end of July 2009. There was substantial variation in the incidence rates and peak times of the epidemic among jurisdictions.

Although laboratory testing of people presenting with influenza-like illness to primary care varied throughout the phases of the pandemic, it is clear that the pandemic affected a much younger age group than usually seen in seasonal influenza patterns. The age distribution of pandemic notifications tended to occur in people aged less than 55 years, with substantially higher rates observed in people aged less than 30 years, compared to older age groups, whereas seasonal influenza notifications tend to occur mostly in the very young and elderly.

The median age of notifications increased as the severity of the disease increased, from 21 years for all laboratory-confirmed cases to 31 years for hospitalised cases, 44 years for ICU cases and 53 years for deaths.

The pandemic had a substantial impact on hospitals and ICUs, particularly during July 2009, when there was a peak in pandemic-associated hospitalisations of more than 600 people in one week.

Hospitalisations represented 13 per cent of all laboratory-confirmed cases, equating to a crude rate of 22.8 per 100,000 population. The highest rate of hospitalisations was in children aged less than 5 years, with the median age of cases being 31 years. Indigenous Australians represented 20 per cent of all hospitalisations where Indigenous status was recorded, which was in 81 per cent of cases. Pregnant and postpartum women were also severely affected, with 287 hospitalised.

Fourteen per cent of hospitalised cases required admission to ICUs, with almost 75 per cent of these admissions belonging to vulnerable groups, including pregnant women, Indigenous Australians and/or people having an underlying co-morbidity, including cancer, diabetes mellitus and/or morbid obesity. Treatment with extra-corporeal membrane oxygenation (ECMO), a highly specialised treatment, is estimated to have been required in more than 8 per cent of patients admitted to ICU, with a quarter of these aged 35 to 39 years.

During 2009 there were 191 pandemic (H1N1) 2009–related deaths reported, giving a crude population mortality rate of 0.9 per 100,000 population. Of these deaths, 13 per cent were recorded as being Indigenous Australians, and overall almost two-thirds were recorded as being people from vulnerable populations or with underlying co-morbidities. The median age of all people who died with proven pandemic infection in 2009 was 53 years, which is considerably lower compared with 83 years in previous influenza seasons.

Timeline of Events

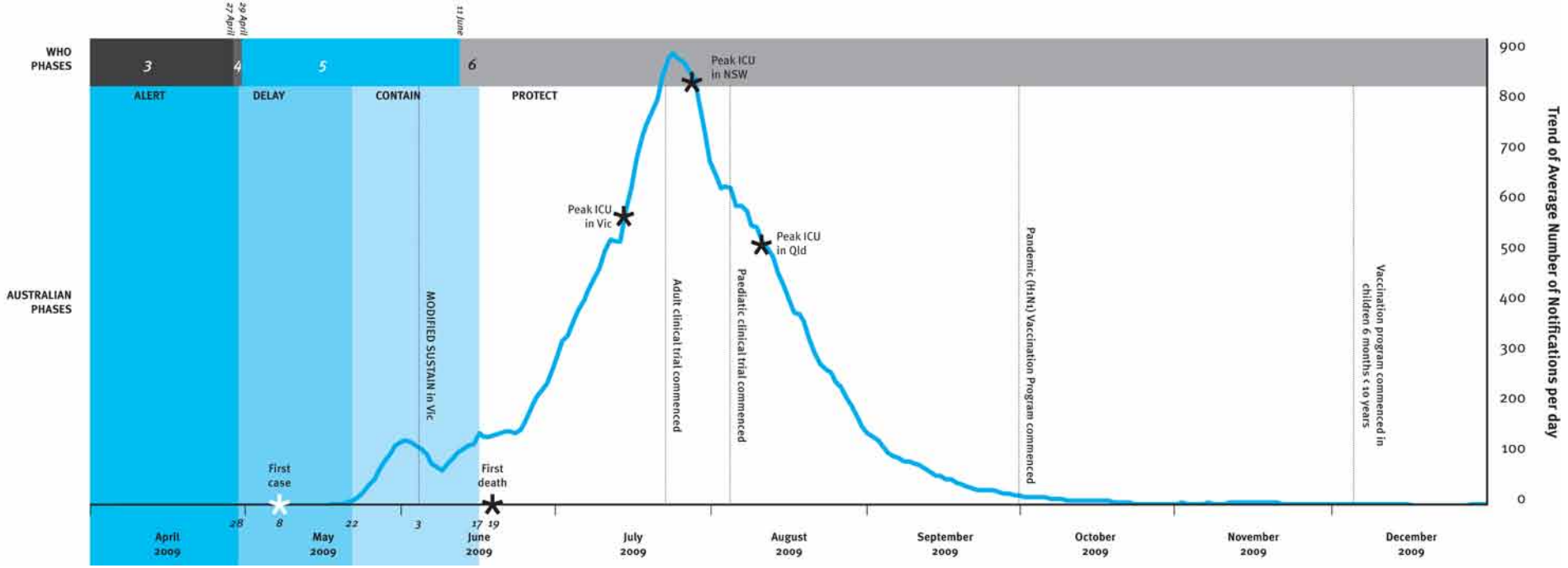
17 April 2009	A small number of human cases of a novel influenza virus (swine influenza A/H1N1) are reported by the US government in mid–late April 2009. At the same time, the Mexican government reports three incidents of influenza-like illness (ILI) throughout the country.
24 April 2009	The World Health Organization (WHO) announces an outbreak of novel H1N1 human influenza virus in Mexico and the US.
25 April 2009	WHO declares a "public health emergency of international concern" under the *International Health Regulations 2005*. The Australian Government Department of Health and Ageing (DoHA) activates its National Incident Room. The Australian Health Protection Committee (AHPC) first meets.
27 April 2009	WHO moves to pandemic phase 4 – sustained human-to-human transmission of a pandemic potential virus. In-flight announcements commence on all aircraft coming to Australia from countries in North, Central and South America.
28 April 2009	Australia moves from the standing pandemic phase ALERT to pandemic phase DELAY – novel virus has emerged overseas but not arrived in Australia. The National Pandemic Emergency Committee (NPEC) first meets. 'Human swine influenza of pandemic potential' is declared a quarantinable disease in Australia under the *Quarantine Act 1908*.
29 April 2009	WHO moves to pandemic phase 5 – sustained community transmission in two or more countries in one WHO region. Staged implementation of border measures commences in Australia at international airports as planned under phase DELAY, including in-flight announcements on all incoming aircraft, thermal scanners, border nurses.
30 April 2009	The Australian Government Minister for Health and Ageing declares the implementation of emergency quarantine measures under subsection 12A(1) of the *Quarantine Act 1908*.
6 May 2009	Presentation of an Australian Health Declaration Card (HDC) at Customs becomes mandatory.
8 May 2009	Australia's first pandemic (H1N1) 2009 influenza case is reported in Queensland. The case is identified at the border through HDC.
Mid–late May 2009	Discussions are held with vaccine manufacturers regarding availability and production time frames.
22 May 2009	Australia moves from DELAY to CONTAIN phase.
26 May 2009	The Home Quarantine Support System is activated and remains in operation until 2 June 2009.
27 May 2009	A national television, radio and print communication campaign commences to inform Australians of the government's actions to reduce the spread of 'swine flu', including implementing measures at Australia's borders, raising awareness of the symptoms of influenza and educating people about the measures they can take to reduce the spread of influenza.
28 May 2009	The Australian Government announces that it will place an order for vaccine from CSL Limited for "about 10 million people". The Chief Medical Officer approves the first release of antivirals from the National Medical Stockpile.

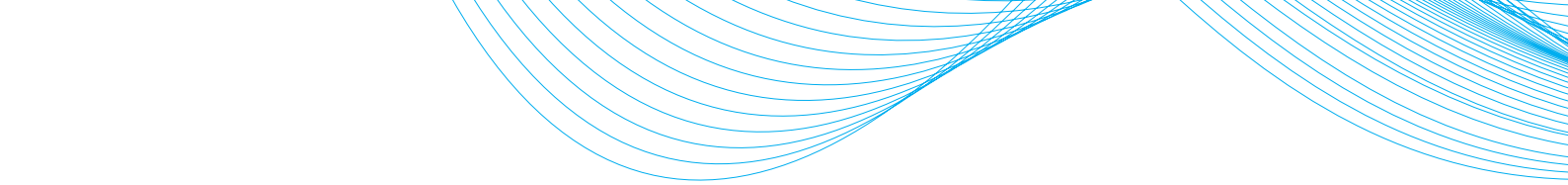
29 May 2009	The National Health and Medical Research Council (NHMRC), principal funder of public health and medical research in Australia, calls for public health and medical research proposals.
1 June 2009	Pandemic (H1N1) 2009 influenza now in all states and territories of Australia.
3 June 2009	Victoria moves to MODIFIED SUSTAIN.
5 June 2009	Discussions commence on vaccine allocation and priority groups.
11 June 2009	WHO moves to pandemic phase 6 – start of new pandemic, sustained community transmission in two or more WHO regions.
17 June 2009	Australia moves to pandemic phase PROTECT – recognition that pandemic virus is mild in most cases but severe in some and moderate overall.
19 June 2009	First Australian death from pandemic influenza.
22 June 2009	Border measures are wound back following the move to the PROTECT phase.
8 July 2009	Funding is provided to 41 Australian medical research projects. Research commissioned includes understanding why some people get more severe influenza; strategies for containment in rural, remote and Indigenous communities; improving detection of the virus; and the best strategies for antiviral use.
22 July 2009	First dose is administered in CSL Limited's Australian adult clinical trial.
3 August 2009	First dose is administered in CSL Limited's Australian children clinical trial.
7 August 2009	Cruise ship protocol developed.
31 August 2009	Pre-positioning of vaccine into states and territories commences.
3 September 2009	First-dose adult clinical trial report delivered by CSL Limited.
10 September 2009	Clarification is obtained that only one dose of vaccine will be required for people over 10 years of age.
18 September 2009	The Therapeutic Goods Administration (TGA) approves registration of the vaccine for use in people 10 years and older. The Australian Government Minister for Health and Ageing announces that the national Pandemic (H1N1) Vaccination Program will commence on 30 September 2009. The Prime Minister and the Minister for Health and Ageing announce that Australia will commit up to 10 per cent of its vaccine to WHO for use in developing countries in our region. The Australian Technical Advisory Group on Immunisation (ATAGI) endorses guidelines for the administration of the vaccine from multi-dose vials, developed in consultation with the Royal Australian College of General Practitioners (RACGP).
24 September 2009	Delivery of the vaccine and associated materials to immunisation providers commences in all Australian states and territories. ATAGI issues a statement on the use of multi-dose vials in vaccination programs globally and in Australia.
30 September 2009	The Pandemic (H1N1) Vaccination Program commences. A second-round public communication campaign commences through radio, television and newspapers to advertise the free vaccination program for people 10 years and over.

8 October 2009	ATAGI issues a statement of advice regarding influenza, influenza vaccines and Guillain-Barré Syndrome.
9 October 2009	ATAGI issues a statement of guidance on the use of latex-containing one millilitre syringes from pandemic vaccination packs.
October 2009	National serosurveillance study commences to provide a more accurate assessment of the overall infection rate of pandemic (H1N1) 2009 influenza in the community, including people who may have had the infection without showing symptoms, as well as the impact of the vaccination program.
19 October 2009	Australian children clinical trial report delivered by CSL Limited.
19 November 2009	ATAGI releases a statement on the use of seasonal vaccine as second dose in children.
3 December 2009	TGA approves registration of vaccine for use in children aged six months to under ten years.
4 December 2009	Vaccination program for children aged six months to under ten years commences. A third-round public communication campaign commences through national print media promoting the pandemic vaccine for children and encouraging parents to immunise their children.
9 December 2009	CSL Limited commences distribution of Panvax® Junior pre-filled syringes to immunisation providers for use in children aged six months to under three years.
22 December 2009	ATAGI issues a statement on the recommended clinical protocol for administration of pandemic (H1N1) 2009 influenza vaccine from multi-dose vials for children aged six months to under three years, and for all people over three years of age.
30 January 2010	Production of all 21 million doses of the vaccine completed and available for use.
March 2010	A fourth-round public communication campaign, 'Facts about swine flu', commences through national radio and print media to promote the vaccination program. The campaign demonstrates that this is no ordinary flu and that it affects young, healthy people.
10 August 2010	WHO announces that the world is no longer in phase 6 of influenza alert and is now moving into a post-pandemic period.
26 August 2010	The shelf life of Panvax® Junior in pre-filled syringes is reduced from 12 months to six months, due to a decline in potency.
1 December 2010	Australia moves to pandemic ALERT phase.
31 December 2010	Australia's national Pandemic (H1N1) Vaccination Program is concluded.

Figure 1: H1N1 Epicurve Timeline and Key Decision Points in 2009

April 2009	May 2009	June 2009	July 2009	August 2009	September 2009	October 2009	November 2009	December 2009
24 April WHO announced an outbreak of novel H1N1 human influenza virus in Mexico and the USA	**8 May** Australia's first H1N1 case reported	**1 June** Reporting by ANZICS of all influenza A ICU admissions commenced	**6 July** Peak of ICU admissions in Victoria	**3 August** Clinical trial of CSL vaccine for *children* commenced in Australia	**3 September** First dose *adult* clinical trial report delivered by CSL Limited	National serosurveillance study commenced	**Late November** Preliminary results of clinical trial for *children* delivered by CSL Limited	**3 December** TGA approved the registration of the vaccine for use in children aged 6 months to under 10 years
25 April WHO declared public health emergency of international concern	**Mid May** Discussions with vaccine manufacturers commenced	**19 June** First death in Australia attributed to H1N1	**22 July** Clinical trial of CSL vaccine for adults commenced in Australia	**10 August** Peak of ICU admissions in Queensland	**10 September** Confirmation that only one dose of vaccine would be required for Australians 10 years of age and older			**4 December** Vaccination of children in Australia of children aged 3 months to under 10 years commenced
28 April Australia declares pandemic (H1N1) 2009 a quarantineable disease under the Quarantine Act 1908	**28 May** Announcement that Australia would place an order for pandemic vaccine with CSL Limited		**27 July** Peak of ICU admissions in New South Wales	**31 August** ANZICS data for three months shows a 10-fold increase compared with 2008 data	**18 September** TGA approved the vaccine for registration for use in children 10 years and older and adults			
29 April Border measures implementation commenced					**30 September** Pandemic (H1N1) Vaccination Program commenced for Australians 10 years and older			





Chapter 1

Governance and Decision Making

Key Findings

- Australia was in a good position to respond rapidly to the emerging threat from pandemic (H1N1) 2009 influenza.
- There was strong commitment from all public health officials to support teamwork across governments.
- The pandemic advisory committee structures should be reviewed.
- The fundamental purpose of the Australian pandemic phases and the actions they drive needs further consideration.
- A decision support document to identify possible public health actions during a pandemic and their risks and benefits could enhance decision making.
- A streamlined process to facilitate availability of research outcomes to guide the real-time public health response should be developed.

Text box 1: Governance and decision making guidance from AHMPPI 2008

Objective

- Operational objective 1: Communicate the best available information to decision makers, health professionals and the public.
- Operational objective 4: Work in partnership across government.

Purpose

- Ensure that decision making is effective, timely and transparent.
- Ensure that accurate health advice is provided and that interdependencies are identified and addressed.

Governance

- A number of decisions made in a pandemic are the responsibility of health sector decision makers.
- Health decision makers provide advice to whole of government on some matters where health imperatives are weighed against broader concerns such as the social and economic implications.

1.1 Pandemic Planning

1.1.1 Plans and legislation

Over the past decade, international concern over the potential for an influenza pandemic has encouraged countries, including Australia, to raise their level of preparedness for a significant emergency response. Detailed planning has been undertaken in all sectors of government to prepare Australia to respond to an influenza pandemic. Australia has a series of connected pandemic action plans – health and whole-of-government; national and jurisdictional – to guide a coordinated response to an influenza pandemic. These plans are intended to provide a 'menu' of options rather than strictly defined actions to be exactly followed. This allows a degree of flexibility in adapting plans as understanding of the behaviour of the disease develops, and re-targeting of efforts and resources as better information becomes available about the epidemiology and pathology of the disease.

1.1.1.1 Health sector

Since 2005, Australia has had in place a national health pandemic influenza plan – the *Australian Health Management Plan for Pandemic Influenza* (AHMPPI) – that has been regularly reviewed and revised to incorporate the latest scientific and policy developments. The AHMPPI 2008 provided

the health sector with a nationally agreed strategic framework to guide preparedness and response activities for an influenza pandemic, outlining the health sector's responsibilities as part of a broader whole-of-government response. It is based on planning to have the capacity, capability and flexibility to respond to a severe pandemic.

Each state and territory has a pandemic health response plan that integrates with the national plan.

1.1.1.2 Whole of government

The AHMPPI is supported by the *National Action Plan for Human Influenza Pandemic* (NAP), a Council of Australian Governments (COAG) document that is managed by the Department of the Prime Minister and Cabinet and has been in place since 2006. The NAP outlines the roles and responsibilities of each level of government in Australia, with a focus on addressing the broader socioeconomic effects of a pandemic, including establishment of a National Pandemic Emergency Committee (NPEC) during a pandemic to provide strategic policy advice to leaders on issues that require a nationally consistent approach, such as communications. This plan was revised in 2010 to reflect experience in response to pandemic (H1N1) 2009.

All states and territories have their own whole-of-government pandemic action plans that complement the NAP.

1.1.1.3 Legislation

Australia is a signatory of the *International Health Regulations 2005* (IHR). Under the IHR, Australia has agreed to report incidents and maintain good surveillance and response capacity to prevent the international spread of disease, while avoiding unnecessary interference with international traffic and trade. Australia has designated the Australian Government Department of Health and Ageing's National Incident Room (NIR) as Australia's National Focal Point (NFP). The NFP is responsible for notifying and reporting public health events of international significance to the World Health Organization (WHO) within 24 hours of assessment of the event, and for responding to national public health risks and national public health emergencies. In the event of a pandemic, the NFP would receive and distribute information critical to decision makers in Australia and internationally.

The *Quarantine Act 1908* provides very broad powers including the examination, exclusion, detention, observation, segregation, isolation, protection, treatment and regulation of vessels, installations, humans, animals, plants and other goods or things; and the prevention or control of the introduction, establishment or spread of disease that could cause significant damage to humans, animals, plants, other aspects of the environment or economic activities.

The National Health Security Agreement[4] under the *National Health Security Act 2007* establishes a national coordination framework for rapid decision making and health sector response to public health emergencies. This includes the sharing of information between the Australian Government and the states and territories in relation to communicable diseases, in order to enhance understanding of epidemiology threats and the ability within Australia to respond to those diseases.

The states and territories also have a broad range of public health and emergency response powers which provide the legislative framework to support actions that may be required at jurisdictional level to respond to a pandemic.

1.1.2 Decision making

The AHMPPI details the health sector decision-making structures for pandemic planning and response purposes. Coordination of national health sector preparedness and response is managed through a series of committees that fall into three broad functional categories: strategic decision-making committees, expert advisory committees and operational committees.

The Australian Health Protection Committee (AHPC), the primary strategic decision-making committee for health-related emergencies, is pivotal to the inter-governmental coordination of the health sector response to a pandemic. The AHPC is convened and chaired at deputy secretary level within the Australian Government Department of Health and Ageing (DoHA). The Australian Government Chief Medical Officer (CMO) and the Chief Health Officers (CHOs) of each state and territory constitute the core membership of the AHPC. This high-level representation enables rapid communication of health response issues and the formulation of national response strategies. The AHPC reports to the Australian

4 Available from www.health.gov.au/internet/main/publishing.nsf/Content/ohp-nhs-agreement.htm

Health Ministers' Advisory Council (AHMAC) and through it to the Australian Health Ministers' Conference (AHMC).[5]

The AHPC meets as often as necessary. During an influenza pandemic its role is to oversee the public health response, disseminate information, undertake national coordination of resource transfers between jurisdictions, and assure consistency of health messages to the public across Australia. These arrangements mean that all states and territories can benefit from the capacity of the national health system.

The AHPC is supported by a number of sub-committees and working groups, incorporating experts who perform both advisory and operational functions. These committees include the Communicable Diseases Network Australia (CDNA) and the Public Health Laboratory Network (PHLN). Each committee meets regularly during a pandemic to review the public health implications of the unfolding event and report to the AHPC when appropriate.

According to the AHMPPI 2008, the Pandemic Control Network (PCN) was to convene during a pandemic response to provide streamlined operational and expert advice to the AHPC, in order to assist with its strategic decision making. It was anticipated that the PCN may be required to coordinate specific operational elements of the national response and constitute selected members from the CDNA, PHLN, Chief Health Quarantine Officers (CHQO), Inter-jurisdictional Pandemic Planners Working Group (IPPWG) of the AHPC, and AHPC National Immunisation Committee Pandemic Vaccine Working Group (AHPCNIC), in the interests of efficiency.

Expert advisory committees provide technical and scientific advice to the CMO on a range of areas including influenza virology, epidemiology, public health, clinical management and influenza research. The Scientific Influenza Advisory Group (SIAG) provides medical, scientific and evidence-based advice to the CMO regarding pandemic planning. The Vaccine Advisory Group (VAG) provides advice to the CMO on aspects of vaccines that could be used to control a pandemic. These committees operated during the pre-pandemic planning (preparedness) stage. It was planned that they would combine during a pandemic response, as the Scientific Pandemic Advisory Group (SPAG), to act as the primary expert technical committee and to streamline decision making. In addition, the Expert Advisory Group on Pandemic Influenza (EAG) would convene during a pandemic to provide advice to the CMO on determining the Australian pandemic phase in accordance with the AHMPPI and other advice as requested. In practice, however, the roles and responsibilities of these groups differed from what was planned (see section 1.2).

The AHMPPI outlines that decisions to implement control measures that are outside the health sector and could have a major impact on the economy or society would be made at a whole-of-government level. Such measures may include: international aid to avert a pandemic; border interventions; the repatriation of Australians from overseas; and support for actions within Australia to slow a pandemic, such as social distancing measures or school and childcare centre closures. In these situations the health sector would contribute advice on the most effective strategies from a health perspective and the most effective timing for implementation.

1.1.3 Pandemic phases

Australia's pandemic planning has been based on the assumption of a severe influenza pandemic (like the 1918 pandemic) and that an emerging pandemic would move sequentially through a number of phases as the virus becomes more adept at infecting humans, spreads around the globe and throughout Australia. Australia's phasing system in the AHMPPI describes whether the emerging virus is in countries overseas or in Australia. Having an Australian phasing system allows actions to be taken in Australia independent of the global pandemic phases as declared by WHO. Response strategies for each phase outline a different set of actions designed to guide decision making with respect to the most appropriate actions to be taken, enabling succinct communications to the Australian health sector and the public. While the AHMPPI acknowledges that during any phase different response strategies may be used simultaneously in different parts of Australia due to variations in the local stage of a pandemic, how this would be implemented is not described.

The AHMPPI also outlines the steps for determining and implementing pandemic phase changes in Australia.

5 Current when this report was drafted.

1.2 Response Implemented

1.2.1 Decision making

On 24 April 2009, WHO notified the NIR (as the NFP) of an outbreak of a novel influenza virus strain in Mexico and the United States. The NIR was activated to respond to the emerging incident and informed other Australian Government agencies, and the state and territory public health agencies, of the need to consider activating their pandemic plans.

The AHPC first met on 25 April 2009. It then commenced frequent teleconferences that continued to January 2010, and convened face to face twice during June and July 2009. The supporting expert advisory committees also met often as required during this period.

In 2009, the role of and level of representation on NPEC differed from what was planned in the NAP. The NPEC met to coordinate activities with respect to the phase changes to MODIFIED SUSTAIN and to PROTECT, in particular to discuss the implications of public health recommendations with a view to ensuring nationally consistent communication regarding phase changes and implementation of the national Pandemic (H1N1) Vaccination Program. Given the nature of the unfolding pandemic and its relatively low impact at societal level, a group of senior officials convened regularly during the early stages of the response. This group was identified as NPEC Officials. It first met on 28 April 2009 and, while it was primarily an information-sharing forum rather than a formal whole-of-government decision-making body, it developed principles to guide the implementation of school exclusion recommendations.

Health ministers held teleconferences to work through key issues at the time, with a particular focus on the national Pandemic (H1N1) Vaccination Program. Advice was provided by health departments when requested.

A range of expert groups met throughout the response, providing valuable scientific and expert advice to inform decision making. While SPAG and the EAG convened as planned, their roles and responsibilities differed during the pandemic.

The CMO convened and chaired meetings of the jurisdictional CHOs and relevant key experts at critical decision-making points, for example, to address the scientific evidence and its impact on the operational aspects of the Pandemic (H1N1) 2009 Vaccination Program.

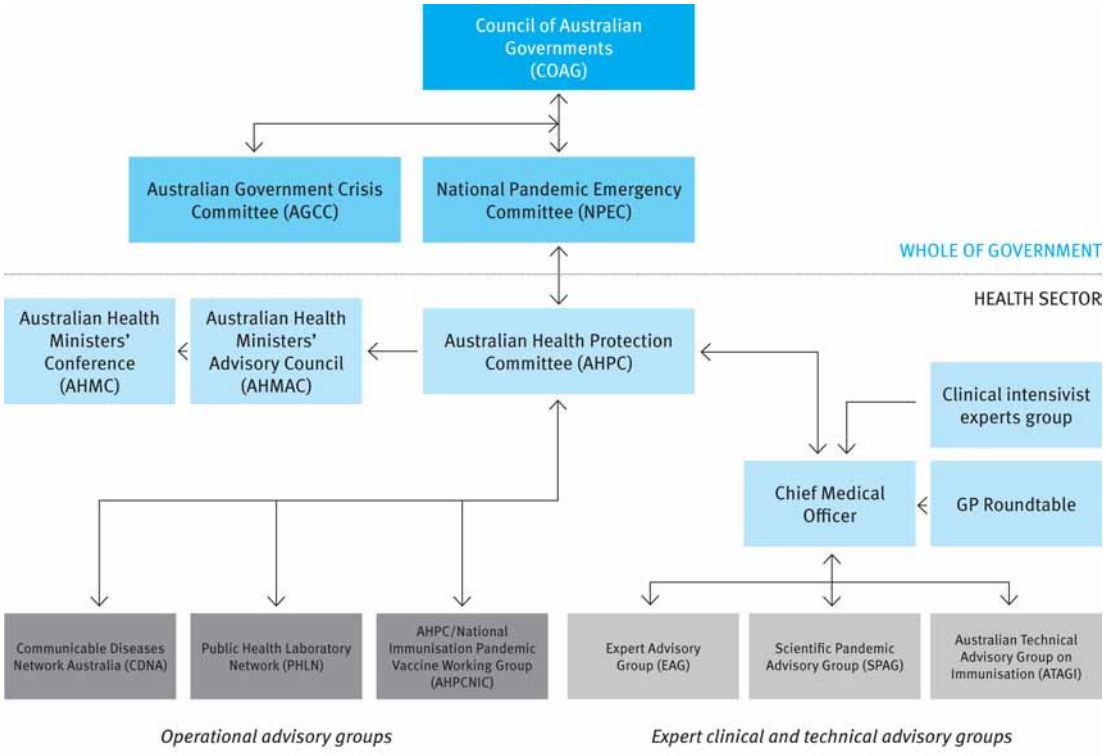
The pre-existing and well-established Australian Technical Advisory Group on Immunisation (ATAGI) had not been included in pandemic planning, as it had been planned that pandemic vaccine experts would provide advice through the pandemic advisory committee structures. However, ATAGI's vital role in providing evidence-based advice to the CMO and the AHPC regarding the pandemic vaccination program and related issues as they arose was widely acknowledged as important (see section 1.3).

In addition, the following two groups were established during the response to advise on clinical aspects of the response.

- The General Practice Roundtable (GPRT), chaired by the CMO, provided a two-way communication forum between the Australian Government and peak bodies representing Australian general practitioners (GPs) and primary care providers, to assist with disseminating Australian Government information, resources, advice and support to general practice, and to communicate issues and provide feedback to the Australian Government from GPs. The peak bodies represented were the Australian General Practice Network (AGPN), the Royal Australian College of General Practitioners (RACGP), the Australian College of Rural and Remote Medicine (ACRRM), the Rural Doctors' Association of Australia (RDAA), the Australian Medical Association (AMA) and the Australian Practice Nurses' Association (APNA).
- A clinical intensivist experts group was established in parallel with the GPRT, and met in June 2009 to develop a clinical resource to provide guidance to clinicians on the clinical management of patients with presumptive or confirmed infection with pandemic (H1N1) 2009 influenza. Its membership comprised representatives from appropriate specialist groups including the Thoracic Society of Australia and New Zealand, Emergency Medicine and Intensive Care and jurisdictional chief health officers, and it was chaired by the CMO.

See Figure 2 for the governance and decision-making structures used during the pandemic (H1N1) 2009 response.

Figure 2: Governance and decision-making structures during the pandemic (H1H1) 2009 response

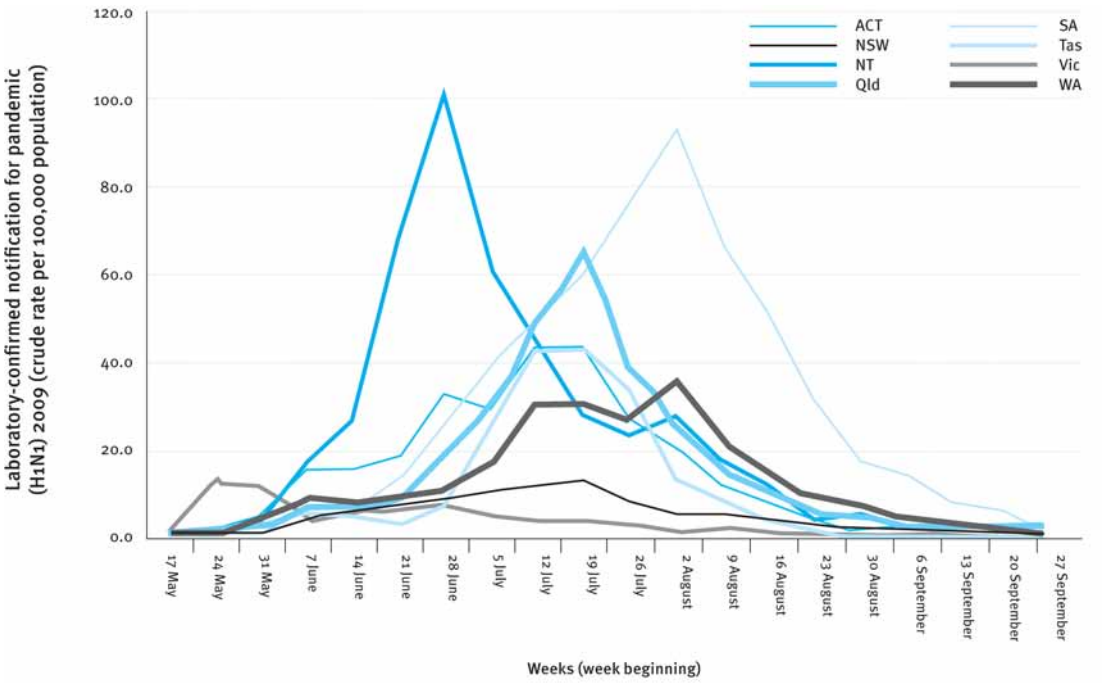


1.2.2 Pandemic phases

One of the biggest challenges to decision making and coordination was the variation in the timing of outbreaks across the country. In the early stages almost all of the activity was in Victoria, as shown in Figure 3. The epidemic curve also indicates that the number of notifications in Victoria had fallen at the same time as they were starting to increase in other states and territories. This reflects the fact that the amount of testing was reduced when Victoria moved to the MODIFIED SUSTAIN phase, with a focus on testing vulnerable individuals rather than more widespread testing. It also indicates the variable rate of notifications between jurisdictions over time.

While Australia moved nationally to the DELAY and CONTAIN phases, the overwhelming number of cases in Victoria had strained the capacity of the public health responses outlined in the CONTAIN phase, and the SUSTAIN phase response was disproportionate to the moderate severity of the disease being experienced in Victoria. As a result, on 2 June 2009 Victoria proposed to the AHPC that the state move from the CONTAIN phase to a modified version of the SUSTAIN phase named MODIFIED SUSTAIN.

Figure 3: Crude rates of laboratory-confirmed cases of pandemic (H1N1) 2009 influenza, by jurisdiction, to 2 October 2009



1.2.2.1 MODIFIED SUSTAIN

The members of AHPC agreed that Victoria was facing a different situation from other states and recommended to NPEC on 2 June 2009 that Victoria move to a MODIFIED SUSTAIN phase. NPEC requested more information from the CMO and the AHPC regarding this proposal; however, Victoria implemented the phase change due to the burden on its public health capacity. This resulted in media announcements of the change in phase occurring before public information was able to be disseminated to explain what the phase change meant in relation to the disease and the associated response actions. The implications of this are discussed in section 1.3.2.

1.2.2.2 PROTECT

On 17 June 2009 Australia moved to the new pandemic phase of PROTECT, which was developed and implemented in recognition that the pandemic (H1N1) 2009 virus was mild in most, severe in some and moderate overall. The focus of this phase was on treating and caring for those most vulnerable to severe outcomes. The announcement of the new phase was supported by a new publicly available PROTECT Annex to the AHMPPI that described the meaning of the phase and the associated response actions.

1.2.3 Science and research

During the response, the Australian Government worked with scientists, clinicians and epidemiologists to model and analyse a number of complex questions regarding severity, hospitalisation rates, use of antiviral medication and personal protective equipment (PPE), vaccine distribution and various social distancing measures.

On 29 May 2009 the National Health and Medical Research Council (NHMRC), principal funder of public health and medical research in Australia, called for research proposal expressions of interest. A robust international peer review of applications for medical research grants can typically take many months to identify those critical projects that would contribute to areas including pandemic virus virology and clinical and public health issues. In this case the peer review process was completed in little more than a week as a result of the involvement of highly experienced researchers in Australia and other countries including Singapore, New Zealand

and the United States. Funding announcements were made on 8 July 2009, approximately two months after the onset of the pandemic in Australia. More than $7 million was provided to 41 Australian medical research projects. The research commissioned included understanding why some people get more severe influenza; strategies for containment in rural, remote and Indigenous communities; improving the detection of the pandemic (H1N1) 2009 virus; and the best strategies for antiviral use.

1.3 Key Issues and Lessons Identified

1.3.1 Pandemic plans and phases

The existence of an exercised pandemic plan meant that Australia was in a good position to implement actions rapidly to respond to the emerging threat of pandemic 2009. The AHPC used the AHMPPI to guide the implementation of actions that were adapted as the scientific and international understanding of the disease evolved. Development of the new PROTECT phase showed that Australia has a flexible public health response system. Relationships already established between all levels of government that allowed for an ongoing cooperative effort were important when it became necessary to modify the AHMPPI to reflect the response actions needed for the 2009 pandemic.

The fundamental purpose of the Australian pandemic phases and the actions that they drive needs further consideration. The phases were intended both to define a consistent national operational response and to be a useful communication tool. However, jurisdictions were affected differently at different times and the application of consistent public health actions was difficult and not always appropriate. While the AHMPPI indicates potential implementation of different control interventions in different parts of the country at the same time, it does not clearly articulate the aim or the process. While there was a strong and legitimate desire to maintain common phasing nationally, the purpose of uniformity was not clear, and communicating different actions through phase-change announcements was problematic. Jurisdictions sought the flexibility to implement tailored public health actions at a local level, such as school exclusion policies.

The key issue, then, is how to manage the inevitable geographical differences. Areas for further consideration include whether phases and the resulting public health interventions can or should differ between jurisdictions; whether travel restrictions between jurisdictions should be considered; and the implications for community transmission in other jurisdictions if one jurisdiction relaxes containment measures. For example, the 2009 State of Origin rugby league match was held in Victoria and attended by a significant number of supporters from New South Wales and Queensland. The match was held during the peak of Victoria's pandemic activity and, while cancellation of the match would have had minimal impact on Victorian case numbers, this mass gathering of interstate visitors presented a significant opportunity to enable seeding or to enhance the spread of the pandemic virus in other Australian areas not yet or minimally affected. Had the virus been more severe or infectious, the cancellation of mass gathering events such as this could have been a critical opportunity to impede the spread of the pandemic across the country.

Other countries, such as the United States and Canada, have proposed developing a 'severity index' to assist in scaling a pandemic response and to enable responses to be tailored to the pandemic's severity and disease pattern. Defining severity is a complex process and the full spectrum of a disease may not be apparent until the virus is more widespread; it may also change over time.

Alternative phases had not been envisaged in the planning for a severe pandemic. Victoria's proposal of a MODIFIED SUSTAIN phase was new ground. The development of new phases in 2009 highlighted that rapid decision making and coordination of public messaging are vital. The experience of a sudden move to a new phase, unsupported by developed communications, led to confusion as it gave the appearance that Australia was stepping up its pandemic response (at least one country modified its travel advisory to include specific reference to Victoria and consideration of screening and quarantine of arrivals from Victoria), and using the term 'SUSTAIN' for this situation implied that other containment strategies were no longer required or effective. Lessons learned with respect to the MODIFIED SUSTAIN phase were applied to the new PROTECT phase. The move to PROTECT was accompanied by a new PROTECT Annex to the AHMPPI describing the phase and an agreed set of public messages, which resulted in a smooth and welcomed process.

The process of changing pandemic phases in 2009 did not follow the procedure detailed in the

AHMPPI. Rather, the Prime Minister was advised of the proposed phase changes, which were announced by the Australian Government Minister for Health and Ageing as the primary impact was on the health sector. The process of changing phases needs reconsideration and streamlining, including clarification of the roles of the CMO, the expert advisory groups and the AHPC in phase determination.

Recommendation 1:

Consider ways of incorporating greater flexibility in pandemic influenza planning to enable responses adaptable to the severity of the disease, disease patterns and geographical differences in spread. This could include reviewing the purpose of Australian phases and the issues on which national consistency is required.

1.3.2 Decision making

There was strong commitment from all public health officials to support teamwork across governments through the leadership of the AHPC. The AHPC was supported by a number of multi-stakeholder advisory mechanisms that provided valuable expert and operational advice on different aspects of the response.

To ensure that the AHPC's strategic function was not subsumed by a focus on operational matters, detailed consideration of some issues was undertaken 'offline' to develop recommended policy positions that were then considered by the AHPC for decision. Nevertheless, more strategic discussions at critical points could have occurred to allow for cross-committee information sharing. To support decision making and effective communications, consideration should be given to developing a decision support document that identifies the public health actions available during a pandemic, including policy objectives, consequences (risk and benefits) and powers to act, to guide the AHPC's consideration of options in the context of new information available, rather than rediscussing policy during the response.

The current pandemic committee structure encourages the separation of the scientific and operational streams of expert advice. This separation is important in order to work through the variety of complex issues. Some stakeholders have questioned the need for expert advisory groups reporting directly to the CMO, considering that there was a disconnection between these groups and jurisdictional representational groups, and a need for more transparent and timely information sharing. The CMO's convening of meetings of CHOs and relevant key experts at critical decision-making points in order to rectify this apparent disconnection was a successful approach. There is a need to formalise this process.

The number of committees supporting the AHPC and the CMO meant that accountability for decisions made was sometimes unclear. There is a need to clarify, consolidate and communicate the roles and responsibilities of advisory and decision-making committees.

Existing well-functioning expert advisory committees should be used in future in preference to separate pandemic advisory structures. It would be valuable to formally include ATAGI in the AHMPPI, as the quality and timeliness of advice developed through the ATAGI H1N1 Working Group established in 2009 was widely acknowledged as authoritative and proved to be vital to the success of the pandemic vaccination program.

The planned PCN did not convene as described in the AHMPPI due to resource limitations, and the need for this group should be reconsidered. Rather, in order to make the best use of limited resources, it was recognised that experts could only devote time to subject matter directly related to their expertise, therefore meeting on an as-needed basis under the individual advisory group's governance structure.

Some proponents consider that Australia's response to the 2009 pandemic may have been improved by having an independent body, similar to the US Centers for Disease Control and Prevention (CDC) model, to improve the process for the development of robust, independent and nationally consistent advice for national decision makers. The pandemic experience indicates that it is now timely to review the priorities and gaps identified since pandemic preparedness activities commenced, in order to identify efficiencies across policy areas, for example, similar to a One Health[6] approach.

The vital role of the clinical sector in obtaining early warning of the severity seen within Australia's hospitals, particularly in intensive care units (ICUs), was not documented in the

6 The One Health approach ensures that experts in animal, human and environmental health work together to ensure a holistic, mulit-sectoral approach to the prevention, early detection and management of zoonotic diseases in humans and animals.

AHMPPI. Early recognition of this clinical link was established with the formation of a clinical intensivist experts group. In addition, the GPRT was an important initiative to enable the government and representatives of front-line clinicians to work together in a highly effective manner to improve communication and to ensure that policies were realistic, effective and efficient. Both networks served the public health response well during the pandemic. There is a need to formalise these processes as it is important to enhance communication with the clinical and primary care sectors in planning and during a pandemic, in particular to communicate the role of the AHPC and public health objectives. Optimal communication between national, state and territory governments, peak bodies and primary healthcare professionals needs to be further addressed. This could include formalising networks and considering ways of enhancing the intersection and integration of all governments and local networks of peak bodies.

It is important to ensure broader stakeholder engagement during planning and the early stages of a response on key aspects of the AHMPPI, to allow for discussion of risks and benefits of all actions that can be taken during a pandemic. Pandemic plans should reflect the rationale for decisions on pandemic activities. Consensus discussions prior to and during a pandemic and clear documentation of outcomes enable better management of media commentary on key public health objectives during the pandemic.

A move from consideration of 'health' issues to 'whole-of-government' issues for decision making was not widely tested. A process to enable early recognition of the point at which broader whole-of-government considerations are necessary needs further development. This would ensure that the AHPC is able to provide timely and robust public health advice to the NPEC to inform public health intervention with wider social and economic implications.

School closures and exclusions was one area that resulted in tension between the public health recommendation of early school closures to control the spread of infection and the political and social realities of implementation. This highlighted the difficulties that will be encountered by all governments in a more severe pandemic to contain spread by implementing and continuing more extensive and potentially disruptive measures. The NPEC needed more time to absorb and appreciate any potential benefits of school interventions and to weigh these against broader issues, including the costs of school closures. An important lesson learned is that a stretched health sector will be limited in its capacity to provide resources to support the NPEC, particularly in a more severe pandemic. The NPEC requested more input from the health sector, but the health sector was fully engaged with health issues and recommendations were based on the best information available at the time, which will always be limited during unfolding outbreaks of an emerging disease. Further research is needed to weigh the evidence on effectiveness and timing of implementation, taking into account the clinical severity and the period before a vaccine will become available.

Recommendation 2:

Develop a decision support document. This could include identifying all the public health control measures available in a pandemic, the objective of each measure (considering severity), the risks and benefits, the resources required, communication processes and relevant legislation.

Recommendation 3:

Review the number and composition of health advisory groups on pandemic influenza, both in terms of how they operate in the pre-pandemic period and during the response, and how public health recommendations feed into whole-of-government processes.

1.3.3 Science and research

While it is recognised that the NHMRC urgent research grants were tendered and awarded rapidly, there were limited linkages with appropriate decision-making and expert bodies (for example, the AHPC and the CDNA) with respect to the research required to fill critical information gaps to support decision making. The sharing of results was also not timely enough to inform the public health response. For example, the critical early data on the epidemiology of the disease that were outlined in the AHMPPI were not available, and no funding was provided through the NHMRC to support seroprevalence studies which were widely recognised as necessary

to inform public health actions. These were ultimately separately funded by the Australian Government and most jurisdictions. Jurisdictions reported a lack of engagement with research outcomes and, while CHOs participated in a forum on study results, these were not available to other committees until publication.

Consideration should be given to developing a set of key research questions in advance of a future pandemic and a process to enable commissioning of research with tight time frames, including contract provisions to allow governments to have access to results before they are published by the researchers.

Recommendation 4:

Develop a research plan to ensure that rapid investigations meet the immediate needs of a public health response to an influenza pandemic. This could include defining additional studies needed to supplement surveillance data early in a pandemic, processes to rapidly fund investigations of issues of concern and a protocol for learning from early cases in Australia and overseas.

Recommendations

1. Consider ways of incorporating greater flexibility in pandemic influenza planning to enable responses adaptable to the severity of the disease, disease patterns and geographical differences in spread. This could include reviewing the purpose of Australian phases and assessing the issues on which national consistency is required.
2. Develop a decision support document. This could include identifying all the public health control measures available in a pandemic, the objective of each measure (considering severity), the risks and benefits, the resources required, communication processes and relevant legislation.
3. Review the number and composition of health advisory groups on pandemic influenza, both in terms of how they operate in the pre-pandemic period and during the response, and how public health recommendations feed into whole-of-government processes.
4. Develop a research plan to ensure that rapid investigations meet the immediate needs of a public health response to an influenza pandemic. This could include defining additional studies needed to supplement surveillance data early in a pandemic, processes to rapidly fund investigations of issues of concern and a protocol for learning from early cases in Australia and overseas.

Chapter 2

Communications

Key Findings

- A national public information campaign, complemented by jurisdictional public communications activities, was important for the Australian community to develop an understanding of the role of hygiene in reducing the transmission of influenza.
- Improved communication strategies would enhance future responses.
- Targeted communication with high-risk groups could be improved.
- Media interest in this health emergency was unprecedented. The National Health Emergency Media Response Network (NHEMRN) was invaluable in supporting coordinated national and jurisdictional media responses.
- There is a need to consider a complementary public communications network to coordinate national and jurisdictional public communication campaigns.
- Government websites and telephone hotlines were important information tools. There were challenges in keeping them up to date with current and consistent information.
- The roles of the CMO and CHOs were vital in providing the public with highly credible spokespeople on health issues. Planning for a deputy spokesperson for each of these roles would relieve the pressure on these senior managers.

Text box 2: Public communications guidance from AHMPPI 2008

Objective

- Operational objective 1: Communicate the best available information to decision makers, health professionals and the public.
  - Information collection and analysis
  - Information distribution

Purpose

- Accurate and timely information is required in order to protect the community and individuals.
- The public is a valuable source of information during a pandemic, as they report illness to health professionals and communicate perceptions to decision makers through qualitative and quantitative research, media reports and blogs.

Governance

- The Australian Government, state and territory and local governments work together on communication strategies and plans.

2.1 Pandemic Planning

The AHMPPI 2008 highlighted the importance of timely communication of the best available information to decision makers, health professionals and the public during a pandemic. The *Australian Health Pandemic Influenza Communications Strategy* was published in May 2006, outlining an approach to informing and advising the general public, businesses and key stakeholders during a pandemic. This communications strategy was being updated to reflect changes in the AHMPPI 2008 when the 2009 pandemic was declared.

A whole-of-government public communications strategy was developed through the Council of Australian Governments (COAG) to complement the health sector's public communication strategy. The *National Influenza Pandemic Public Communications Guidelines*, managed by the Australian Government Department of the Prime Minister and Cabinet, provide an overarching framework for all levels of government to facilitate a whole-of-government approach to managing public communications in preparing for, responding to and recovering from an influenza pandemic.

The Australian Government Department of Health and Ageing (DoHA) coordinates the National Health Emergency Media Response Network (NHEMRN), which comprises media liaison managers in the Australian Government, state and territory agencies, medical colleges and professional associations. The role of this network is to keep the public and the media informed during national health emergencies by providing consistent and coordinated media and public responses. The NHEMRN, which works closely with similar public health, emergency services and national security media liaison groups, meets regularly and holds exercises and workshops to continually refine coordinated public and media responses to new and emerging health crises.

In 2006 the Australian Government undertook a tender process to engage communications agencies to provide specialist services in the case of a pandemic. Templates, information and advertising materials were developed for a potential avian (H5N1) influenza pandemic.

The Australian Government established two pandemic-related websites that were in place prior to the pandemic. PanComm was developed as a secure whole-of-government website where talking points, advertisements, media monitoring and transcripts could be posted for sharing within a confidential environment during a pandemic. The Pandemic Influenza website (www.flupandemic.gov.au), launched on 5 December 2008, provides important information about preparing for a pandemic, including Australian Government actions and what individuals, businesses, communities and healthcare professionals can do to prepare for and respond to an influenza pandemic. This website contains links to other Australian Government and state and territory information and resources.

The Australian Government also has a dedicated Health Emergency website (www.healthemergency.gov.au). Pandemic (H1N1) 2009 was the first emergency supported on this platform.

2.2 Response Implemented

2.2.1 Public communications

2.2.1.1 Public communication campaign

The Australian Government developed a national public communication campaign during the 2009 pandemic based on the following four main drivers, and delivered it in four rounds.

1. To ensure the wide dissemination of the key messages that good hygiene practices and maintaining distance from people who are unwell are the most effective methods of reducing the spread of disease. (Delivered in May 2009)
2. To advise Australians about the pandemic (H1N1) 2009 vaccine, its availability and the importance of being vaccinated. (Delivered in September 2009)
3. To advise parents that the vaccine was available for use in children aged from six months to under ten years years, with a key message of encouraging parents to vaccinate themselves and their children. (Delivered in December 2009)
4. To challenge any perceptions or myths that may have limited uptake of the vaccine. (Delivered in March 2010).

Qualitative research was undertaken prior to commencement to test the concepts in print and radio advertising, and to evaluate the effectiveness of 'swine flu' information and personal protection messages. Research was also undertaken to understand the effectiveness of these campaigns. Details on the national campaigns and research outcomes are provided as Appendix B to this review.

In addition, the states and territories ran strong communication campaigns based on their seasonal influenza messages encouraging good personal hygiene practices that were in the process of being rolled out when the pandemic commenced.

To ensure that messages were adapted and communicated appropriately for Indigenous Australians, the Australian Government, with the support of a specialist communications agency that developed community information materials specifically for Indigenous Australians, including a fact sheet, questions and answers and radio and print advertisements. Key messages included information on good hygiene practices, identifying people vulnerable to severe outcomes and encouraging people to get medical help early. These messages were disseminated through Indigenous print and radio media, with radio advertisements translated into seven Indigenous languages. Communications materials were also made available through a specific information portal for Indigenous Australians on the Health Emergency website. During the vaccination phase, new radio and print advertisements

were developed and supported by vaccination posters and fact sheets in the format of questions and answers for distribution in Indigenous communities. Several states and territories also developed specific communications materials and advertisements targeted to Indigenous Australians.

2.2.1.2 Websites

The Health Emergency website was activated to respond to the public health emergency, and was established as the main source of information for the public and for healthcare professionals. The site allowed for two million users per day, ten million hits per day, and two million hits per hour. It registered more than 28 million hits between May 2009 and September 2010, with an average of approximately 58,000 hits per day. The peak number of hits occurred during June 2009, averaging approximately 200,000 hits per day. The Pandemic Influenza website was not specifically designed to withstand heavy traffic during an emergency response.

The Health Emergency website content was reviewed daily and updated as required. Information about identified cases from all states and territories, including number of deaths, was posted on the site twice daily for the first few months, changing to once daily in the later part of the response.

Information regarding the prevention, protection and treatment of influenza was available for download and use by the general public, medical practitioners, businesses and community groups. States and territories also provided locally tailored information on their health department websites. In an effort to ensure accuracy and avoid duplication, the Australian Government website contained links to all state and territory health department websites and to other relevant Australian Government websites containing information and advice.

Widgets/web badges were developed for schools and other relevant organisations to place on their websites to encourage parents to vaccinate their children against pandemic influenza.

2.2.1.3 Telephone hotlines

On 27 April 2009, the Australian Government established a national H1N1 Influenza Hotline (180 2007). The purpose of the hotline was to provide a scripted response to callers who had questions about the pandemic, to advise callers where further information was available and, later in the response, to provided scripted information on the national Pandemic (H1N1) 2009 Vaccination Program. Jurisdictional public health units also managed hotlines to provide tailored local information.

During the initial response, calls to the national hotline peaked at about 2,000 per day. The highest number of calls experienced per day was 4,713 in early June 2009. By early September 2009, calls had dropped to about 15 per day. Another peak coincided with the announcement of the Pandemic (H1N1) 2009 Vaccination Program in late September 2009, with 952 call per day the highest number received at that time, dropping to an average of 400 calls per day during October 2009. From November to December 2009 the average number of calls per day was 71. As at the end of August 2010, the average number of calls per day for 2010 was 21.

2.2.2 Media

Media interest in this health emergency was unprecedented. There was high demand from Australian and international media for interviews, with foreign correspondents particularly focused on the Australian response. Images were sought by media, including footage on thermal scanning in airports, 'flu clinics' and incident response rooms, as well as patients in intensive care units on extra-corporeal membrane oxygenation (ECMO), which facilitated greater understanding of the real impacts of the disease.

Throughout the response, the NHEMRN met regularly. This group provided advice to the AHPC and coordinated the public communications response with a view to ensuring consistency of messages.

At national level, during the response 311 situation reports were provided, 350 sets of national talking points developed, more than 50 press conferences held, 119 media releases developed and more than 200 daily case number updates provided. Media monitoring summaries of what was being reported nationally and internationally were released initially three times per day to all jurisdictional media units, the AHPC and a range of medical organisation stakeholders.

The DoHA developed national health talking points for each situation report based on current health issues in the media. While these talking points were primarily for the Prime Minister and other ministers, they were distributed widely to assist stakeholders, such as medical associations,

to provide informed comment to the media. The talking points were also supported by a set of questions and answers for use by all Australian governments and other stakeholders. Whole-of-government talking points were also prepared by the Australian Government Attorney General's Department. These regular talking points ensured that governments were able to provide consistent messages and the latest information to the public on a range of issues as required.

There was high demand for the CMO and state and territory CHOs to participate in regular media conferences and updates, radio interviews, radio talkback programs and international media. The Australian Government held more than 50 media conferences, which were attended by the Australian Government Minister for Health and Ageing and/or the CMO.

Throughout the pandemic response a multitude of media releases was produced by all Australian governments, academics, medical stakeholders and other interested members of the community.

2.3 Key Issues and Lessons Identified

2.3.1 Public communications

2.3.1.1 Public information campaign

The communications strategy developed during the pandemic was successful in conveying accurate and timely information both to the public and to health professionals. Qualitative research indicated that while there was some complacency given the nature of the pandemic, the public information campaign decreased anxiety and increased understanding and compliance with public health measures. The research will be used to inform future response communication strategies.

It is important to finalise a revised national health pandemic communications strategy that incorporates key lessons identified during the 2009 pandemic and includes identification of responsibilities and objectives, actions and audiences throughout a pandemic. It would be beneficial to plan a robust evaluation process to provide timely feedback on message clarity and impact during delivery of a public information campaign to understand and address issues as they arise, such as confusion regarding eligibility for vaccination when the first messages focused on priority groups but availability was quickly extended to the whole population when only one dose was found to be needed.

While there was a national media network (NHEMRN) in place to coordinate media messaging and engagement, there was not a complementary public communications network, which could have assisted in the development and coordination of messages and timing of the release of advertising. The clearance process for communication material was time-consuming. Improving synergies between national and jurisdictional public advertising campaigns could enhance the impact of public messages.

It was useful to have at the national level a Deed of Standing Offer in place with the various contractors (such as research and advertising agencies), so that communication materials could be developed quickly. However, some of the pre-pandemic work undertaken by these agencies focused on avian (H5N1) influenza and were of limited relevance to this response. A key improvement would be to have simple health emergency templates in place and high-level materials with immediate prevention messages available that can be tailored at the time.

While there were clear messages about which groups were at high risk of severe outcomes, communication with high-risk groups could have been improved. In particular, it has been identified that earlier engagement with Indigenous Australian audiences is needed. There is also a need for consistent approaches to engaging with high-risk communities – such as Indigenous people or people from non-English-speaking backgrounds – where unsupported mass media has not been shown to be effective.

The business sector expressed concerns that there was limited opportunity to engage with, and provide input into, relevant government pandemic planning and decision-making processes. While the nature of the 2009 pandemic led to limited impact on the business sector, separation of the business sector from the general public in future pandemic planning may be considered in order to enhance effective communication with these stakeholders.

2.3.1.2 Websites

The Health Emergency website provided access to up-to-date information and plans during the pandemic. Initially there were delays in this website becoming fully functional, due in part to the need to create a user-friendly site relating

to the pandemic. As it was a new site, it was not known by the general public as the source of official information on the pandemic in Australia, unlike in the case of the well-established Centers for Disease Control and Prevention (CDC) website in the United States. Initially there was also duplication and confusion between the respective purposes of the Health Emergency and Pandemic Influenza websites.

The Health Emergency website was supported by state and territory government websites which provided more local information. However, there were some issues with synergies between jurisdictional and other health organisation websites. Given the rapidly evolving situation, websites were sometimes behind media reporting. A more centralised, consistent, current and accessible government information resource, such as a whole-of-government website, designed to provide relevant Commonwealth and state and territory government information to the public would have been beneficial.

2.2.1.3 Telephone hotlines

It was important to have a national telephone hotline available throughout the pandemic response. This hotline was well used by the public early in the pandemic; however, overall use declined as the pandemic progressed, and operating hours could have been reduced in line with decreasing demand. The use of a number with fewer digits than a standard 1800 number (the hotline number was 180 2007) did cause some confusion.

In the context of rapidly changing information during a pandemic, further consideration should be given to the best use of hotlines as it is important to ensure that information provided via national and jurisdictional hotlines is current and consistent.

2.2.1.4 Social networking

New media was not used at national level in 2009. The use of social networking tools, such as Facebook, Twitter and blogs, should be considered as a means of delivering key messages in a timely manner.

Recommendation 5:

Develop principles for a pandemic communications plan for the health sector that identify Commonwealth and jurisdictional functions and responsibilities as well as objectives, actions and target audiences for various stages of an influenza pandemic.

Recommendation 6:

Consider developing a communications forum similar to the National Health Emergency Media Response Network (NHEMRN) to coordinate public information campaigns for an influenza pandemic, including developing a rapid process to approve and clear public communications materials.

2.3.2 Media

The National Health Emergency Media Response Network (NHEMRN) was invaluable in supporting coordinated national and jurisdictional media responses.

In most instances media reporting was balanced and fair, particularly during the early stages when the media played a critical role in promoting hygiene messages. The Australian Government situation reports and talking points provided effective bases for consistent messaging.

2.3.2.1 Spokespeople

The Commonwealth and jurisdictional communication strategies were predicated on a reliable and trusted spokesperson. The roles of the CMO and jurisdictional CHOs were shown to be vital in providing highly credible spokespeople on health matters. They were credible, apolitical, authoritative figures, which were required in communicating with the general public and complemented the messages being delivered by the Australian Government and state and territory health ministers. Even in this moderate pandemic, the intense media demand was difficult to handle when the spokespeople were also charged with managing the pandemic response at the most senior levels. A deputy spokesperson who could be seen publicly alongside the senior spokesperson to engender public trust through recognition would relieve the workload pressure. A second spokesperson who is recognised and trusted by the public would be particularly important in a severe pandemic when the senior spokesperson may be less available for the media.

Recommendation 7:

Consider developing a media-specific plan for pandemic influenza that includes principles and protocols of media engagement.

2.3.2.2 Coordination

There were multiple government plans associated with communications during an influenza pandemic and a lack of clarity with respect to how each plan would interact with the others. In some cases plans were not activated as they were intended to be.

Consideration should be given to implementing an appropriate mechanism to enable early sharing of information in confidence to improve national coordination and timeliness of message delivery. While coordination between governments generally worked well and continued to improve as the pandemic progressed, there were some aspects that raised concerns. For example, some jurisdictions reported that they were informed of some major announcements regarding the Pandemic (H1N1) Vaccination Program via press release at the same time as the public and media. This was improved for the rollout of the paediatric vaccination program, which allowed jurisdictions to plan complementary communication activities. It is acknowledged that communications in general improved as the pandemic progressed.

While communications networks are described in plans to provide coordination of national communications, guidelines for individual networks are not clear. For example, the whole-of-government public communications network was not used. The value of a team working exclusively on national information sharing, especially informing premiers and chief ministers and other federal government departments, cannot be underestimated. Although the Department of the Prime Minister and Cabinet activated its national PanComm website, the Commonwealth and jurisdictional health departments were consumed with attending to their own websites and did not have the experience or expertise available to contribute to another website.

Recommendations

5. Develop principles for a pandemic communications plan for the health sector that identify Commonwealth and jurisdictional functions and responsibilities as well as objectives, actions and target audiences for various stages of an influenza pandemic.
6. Consider developing a communications forum similar to the National Health Emergency Media Response Network (NHEMRN) to coordinate public information campaigns for an influenza pandemic, including developing a rapid process to approve and clear public communications materials.
7. Consider developing a media-specific plan for pandemic influenza that includes principles and protocols of media engagement.

Chapter 3

Surveillance

Key Findings

- The Australian Government and state and territory governments worked well together to ensure that a national surveillance picture was available to inform decision makers and to keep the public informed.
- High priority should be placed on early identification and documentation of the true clinical picture to inform an appropriate health response.
- The clinical sector has a vital role in providing early warning of severity.
- The information needed to inform public health policy is not necessarily the information needed to inform the public about the disease.
- Collection and reporting of data is resource intensive and consideration needs to be given to ceasing some elements once they are no longer needed to inform decision making.
- Continued development of routine seasonal influenza surveillance would enable easy escalation during a pandemic.

Text box 3: Surveillance guidance from AHMPPI 2008

Objective

- Operational objective 1: Communicate the best available information to decision makers, health professionals and the public.

Purpose

- The collection and analysis of information is critical to guide effective, timely and transparent decision making and to inform the public.

Governance

- Surveillance measures are a health sector decision.

3.1 Pandemic Planning

The World Health Organization (WHO) defines surveillance as "the systematic ongoing collection, collation and analysis of data for public health purposes and the timely dissemination of public health information for assessment and public health response as necessary".[7] Surveillance has a fundamental role during public health emergencies to provide accurate and relevant information to guide decision making. The AHMPPI recognises the need for international and domestic surveillance.

A draft surveillance annex to the AHMPPI was being considered by the Scientific Influenza Advisory Group (SIAG) and the AHPC Inter-jurisdictional Pandemic Planners Working Group (IPPWG) when the pandemic emerged. It drew from improvements in routine surveillance for influenza that were being developed by the Seasonal Influenza Surveillance Strategy Working Group (SISSWG) and the standing National Surveillance Committee,[8] both under the governance of the Communicable Diseases Network Australia (CDNA). The document included different surveillance objectives for each phase, outlining what information would be required, what data would be collected to provide that information, how the data would be collected and by whom. Early in a pandemic it is important to accurately enumerate the number of cases and confirm the virus by laboratory testing of cases; later in a pandemic less detail is required about each case. The document also outlined the

7 World Health Organization (2005), *International Health Regulations* (2nd ed.), Geneva, Switzerland.

8 This group has now been renamed the National Surveillance Working Group.

proposed reporting of surveillance data to inform policy and interventions during a pandemic.

The AHMPPI acknowledges that there may be a need to reassess the planning assumptions when a pandemic emerges. This would require more information than routine surveillance systems could provide and would need to be informed by field, scientific and epidemiological studies at the time of a pandemic. Studies could include serosurveillance studies as well as household studies such as modelling of virus transmission. How these studies would be undertaken and by whom was still under discussion when the pandemic emerged.

An internet-based national reporting system for disease outbreaks, NetEpi, had been developed and used during multi-jurisdictional outbreaks prior to the pandemic in 2009. NetEpi was developed to provide more detail during an outbreak, including a pandemic, than is usually provided nationally for other notifiable diseases under the National Notifiable Diseases Surveillance System (NNDSS). The recording of standardised information through NetEpi for each case would be facilitated by means of a data collection form (electronic and printable). An interface between NetEpi and each jurisdictional system had commenced development but was not completed before the 2009 pandemic.

3.1.1 Routine influenza surveillance

Influenza surveillance is complex. A full summary of Australia's routine surveillance systems for influenza is provided elsewhere.[9] It is impossible to identify and count every case of influenza. Few of the routine surveillance systems include any indication of disease severity. In seasonal influenza outbreaks, it is not critical to identify every case but only to identify enough to be aware of the burden on the community and the impact on health resources. Indicators of the number of cases in the community are usually used. For example, these data may be collected through sentinel surveillance systems for influenza-like illness (ILI) that use a sample of doctors in an area, as is done through the Australian Sentinel Practices Research Network (ASPREN) system. This can give an indication of the number of people with influenza in a wider area who consult a doctor within a given time period, such as one week. However, many factors may affect the representativeness of these data. Both laboratory staff and doctors notify cases of influenza to public health authorities. It had been planned, but not implemented prior to the pandemic, that sentinel laboratories would report the number of tests requested (indicating community ILI) in addition to the number of tests that are positive for influenza.

3.2 Response Implemented

The surveillance response was overseen by the Communicable Disease Network Australia (CDNA). The CDNA discussed changes to testing protocols, case definitions and reporting requirements. It met frequently, particularly in the early stages when there was a need for daily reporting of suspected cases.

The draft surveillance annex guided implementation of surveillance activities, with new surveillance approaches devised during the response as required.

Existing sentinel and syndromic surveillance systems were used to monitor trends in influenza-like illness in Australia. Influenza cases were reported nationally through NetEpi or the NNDSS. Laboratory data were collected from sentinel laboratories and the WHO Collaborating Centre for Reference and Research on Influenza (WHO CC) in Melbourne, which also provided valuable information on the subtypes of the virus. Additional laboratory capacity to test and report on patients presenting to GPs with ILI was implemented to help understand the burden of disease in the community. Laboratory-confirmed case data were used to inform phase changes.

Case data and data on hospitalisations, ICU admissions and deaths were collected throughout the early months of the pandemic by state and territory health departments. Most were initially reported nationally in NetEpi. New sources of data were also used, including ICU admission data from the Australian and New Zealand Intensive Care Society (ANZICS), hospitalisation data from the Queensland EpiLog system, and limited hospitalisation data from newly implemented sentinel system FluCAN (Influenza Complications Alert Network).

The NetEpi outbreak management system enabled the effective collection and analysis of more than 37,000 cases nationally, providing

9 Kaczmarek, M, Owen, R & Barr, IG (2010), 'Annual report of the National Influenza Surveillance Scheme, 2008', *CDI*, 34(1), available from www.health.gov.au/internet/main/publishing.nsf/content/cda-cdi3401-pdf-cnt.htm/$FILE/cdi3401b.pdf.

a comprehensive enhanced data set for public health considerations. Progressive implementation of an interface between NetEpi and jurisdictional systems occurred at different stages throughout the pandemic to overcome labour-intensive double data entry.

Critical information was also provided by networks of clinicians. This was initially an informal process, but these networks helped to develop collection systems quickly. It was through these systems that the unforeseen demand for extra-corporeal membrane oxygenation (ECMO) was identified.

A national serosurveillance study was commenced in October 2009 (see Chapter 9: Vaccination).

The global pandemic situation was monitored through official health websites as well as through media reporting and other websites. Situation reports, which included the latest surveillance data from Australia and other countries, were issued up to three times per day from 29 April 2009 until the end of June 2009, then once daily until 31 October 2009. Weekly Australian Influenza Surveillance Reports, which provided detailed analysis of the Australian situation, were issued once per week from 29 May 2009. Under the *International Health Regulations 2005* (IHR) guidelines, regular reporting of data to WHO was required throughout the pandemic. In order to manage competing demands on limited resources, the weekly epidemiology report was provided to WHO.

Additional staff, including epidemiologists from the Australian Government Department of Agriculture, Fisheries and Forestry (DAFF) and from the Australian National University's Master of Applied Epidemiology program, assisted the DoHA to meet the surge capacity in all areas of public health surveillance, analysis and reporting.

3.3 Key Issues and Lessons Identified

Accurate and rapidly available pandemic surveillance data is of paramount importance in understanding the nature of the disease, its clinical picture and its burden in the community. The challenge is to balance the level of detail needed to inform decision makers and for public information purposes, and the expectations of public health officials, ministers, the media and the public. More work is needed in order to agree on expectations about the level and sustainability of data collection from the outset of a pandemic response. There is a need to balance the tension between public information needs, or interests, and the associated opportunity costs of diverting limited public health resources, as well as the impact of this on the timeliness of reporting and analysis of surveillance data. The information needed to inform public health policy is not necessarily the information needed to inform the public about the disease.

The collection and reporting of data is very resource intensive. Skilled epidemiologists are a limited resource needed for the analysis and interpretation of data, especially in the early stages of a pandemic. In 2009, epidemiologists were engaged in routine reporting driven by the need for frequent updates of numbers for the Situation Reports and the required reporting to WHO, which affected their capacity to analyse Australian data as required for the development of the first Australian Influenza Surveillance Summary Report. Planning needs to emphasise the importance of early analysis, interpretation and reporting of detailed data, and of a skilled workforce to support this work. Analysed data provide evidence for decision makers on disease transmission and severity to inform policy, such as when to relax public health measures at a time when vulnerable people have not been vaccinated.

Communication to the public needs to include a summary of the situation, acknowledgement of what remains uncertain about the outbreak, and plans for what will be undertaken next. Ministers were under pressure to report the latest numbers, and the need for frequent and resource-intensive updating of case, hospitalisation, ICU and death counts (three times per day in the first months) to meet public expectations proved a strain on surveillance systems and staffing resources. This also affected the capacity to analyse further the available surveillance data.

The collection and reporting of all requested data continued throughout the pandemic rather than changing with the phases as anticipated. Standards on data collection need to be agreed on, including guidelines on when to de-escalate or cease surveillance activities once they are no longer needed to inform decision making. The burden on Commonwealth and jurisdictional resources resulted in some jurisdictions independently making decisions to stop collecting and reporting certain data. This affected the completeness and reliability of the national data. An earlier, coordinated cessation of enhanced data collection would have resulted in a smaller but

higher-quality data set. In some instances where ongoing data were required, sentinel systems or data from sentinel states or territories could have sufficed. Consideration could also be given to other areas that might provide ongoing evidence, such as pharmacy records of antiviral medications dispensed, ambulance 000 records or case data, and school absenteeism rates.

Maintaining NetEpi required enormous effort and over time became difficult as the number of cases increased. Double handling of some data was required as some jurisdictions were also required to enter cases into local systems. As a result of this added burden, some states made independent decisions to stop using NetEpi, in particular once virus transmission was widespread. The routine automated NNDSS reporting process or jurisdiction-based systems were then used. This resulted in a loss of information nationally, since NNDSS is capable of receiving only core data on cases and not the enhanced data that were being collected during the 2009 pandemic. Earlier implementation of interfaces between NetEpi and jurisdictional systems could have resulted in the collected data being more complete and in the process of extraction and analysis at national level being much less complex. While it may be difficult to combine information from various databases, each can contribute to building a clinical and epidemiological picture.

Jurisdictional reports of the number of people hospitalised per day and the proportion of those requiring additional care (high dependent or intensive care) proved to be a very useful severity marker. These data are extremely difficult to access or interpret, as jurisdictional surveillance systems rely on hospitalisation and death data which are collected for purposes other than surveillance. Few states are able to collect these data effectively and within the time frame needed for surveillance, so most had to rely on resource-intensive, manual follow-up and reporting of hospitalisations and deaths. It is important to continue the work that commenced in the years before the pandemic to move towards automated extracts from hospital surveillance systems.

There is no national system in Australia to collect real-time death data during a public health emergency.[10] While jurisdictions had been working towards achieving this prior to the pandemic, New South Wales was the only jurisdiction that had an almost real-time system available. Although these data represented only one state, they provided very useful information indicating that the number of deaths from pandemic (H1N1) 2009 was not high. Manual collection of mortality data was resource intensive and added significant strain on public health capacity.

Adapting systems and collection mechanisms as case definitions changed over time proved to be difficult. Robust data dictionaries are critical to the uniform understanding of data fields and protocols, such as those for cross-border notifications. The ASPREN system and state-based ILI presentations to healthcare providers were good indicators of ILI in the community, but there were limitations with the representativeness of the ASPREN network. ASPREN was augmented to incorporate sentinel laboratory testing, and the implementation of this system should continue.

Continued development of routine seasonal influenza surveillance to include standard indicators of severity, including emergency department (ED) presentations, hospitalisations, ICU presentations, use of ECMO and deaths, would enable easy escalation during a pandemic.

While all levels of government in Australia worked collaboratively to ensure that a national surveillance picture was available to decision makers and to keep the public informed, completion of a surveillance plan for the collection, analysis and reporting of data at national level would enhance national capability. Protocols for sharing jurisdictional surveillance data with researchers and modellers need to be agreed on, as these data were not readily available and the potential benefits of disease modelling were not realised. In addition, while the NHMRC assisted by providing funds for urgent research, the research was not able to be implemented in time, or made available, to assist in reviewing the assumptions about the pandemic virus to inform the public health response.

Recommendation 8:

Complete a surveillance plan for the collection, analysis and reporting of data at national level.

10 Collecting mortality data can be delayed by coronial investigations, delays in clerical coding of the cause of death, and legislative constraints to accessing the records.

Chapter 4

Border Measures

Key Findings

- Border measures were rapidly implemented at Australia's international airports.
- Management of cruise ship arrivals was an early issue addressed quickly through development of a protocol by governments in cooperation with the cruise ship industry.
- Measures continued beyond the establishment of local transmission in Australia. It was not clear when to discontinue border interventions.
- Maintaining border measures and undertaking consequent contact-tracing activities placed a heavy burden on jurisdictional public health resources.
- The effectiveness and rationale for border measures generally need further consideration.
- Research indicates that border measures were seen by travellers as a proactive and important part of protecting the health of the Australian community.

Text box 4: Border measures guidance from AHMPPI 2008

Objective

- Operational objective 2: Minimise transmission
  - 2.2 Border measures

Purpose

- Border measures could delay entry of the virus for a short period of time if implemented early and if used in conjunction with other control measures.
- Border measures could help raise awareness among the travelling public and deter those with infection from travelling.

Governance

- Border measures are a whole-of-government decision. The health sector's role is to provide advice to government regarding the effectiveness and timing of measures, and to assist with implementation.

4.1 Pandemic Planning

The aim of border measures in the AHMPPI is to delay entry and minimise the spread of a novel influenza virus in Australia until a pandemic vaccine becomes available. Border measures would be implemented in the DELAY phase and their ongoing need would be evaluated when Australia moves to the CONTAIN phase. Border measures are broadly described as comprising both pre-border actions, such as reducing the number of travellers from high-risk areas entering Australia or advising against travel to affected countries, and at-border actions, such as screening to detect infected or high-risk travellers. The AHMPPI acknowledges that border measures will not keep a pandemic out of Australia indefinitely but could, if used in conjunction with other measures, slow its introduction. Furthermore, border measures may help to raise awareness in the travelling public and deter those with infection from travelling.

The *Quarantine Act 1908* and state and territory public health and emergency response laws provide wide-ranging powers for actions that may be required in a pandemic.[11]

The Australian Government, through the Department of Health and Ageing, the Australian Customs and Border Protection Service, the Australian Quarantine and Inspection Service, the Australian Federal Police and the Department

11 See Chapter 1: Governance and Decision Making.

of Immigration and Citizenship, coordinates the implementation of border measures, which include non-automatic pratique[12] on arriving international flights, thermal scanners and Health Declaration Cards (HDCs). State and territory health departments are responsible for case management and contact tracing, and for the deployment of border nurses to provide secondary assessment and appropriate management of passengers identified as symptomatic at the border.

The Australian Government has developed the *National Pandemic Influenza Airport Border Operations Plan*[13] (Fluborderplan), which is an operational plan that supports and is consistent with the health response outlined in the AHMPPI. It describes how Commonwealth border agencies, state and territory government bodies and the airline sector will work together in a coordinated national response to protect and respond to the threat of an influenza pandemic. It also outlines the processes to deploy and operate border health measures at designated Australian international airports. The Fluborderplan has been evaluated through a series of exercises at national and jurisdictional levels. Supporting documents have been developed to assist the implementation of border health measures, including the Australian Border Health Measures Guide,[14] border agency procedures and work instructions, and state and territory pandemic influenza plans. In addition, training has been provided to border agency personnel on implementing Fluborderplan actions.

4.2 Response Implemented

After declaring a public health emergency of international concern under the *International Health Regulations 2005* (IHR), the World Health Organization (WHO) advised against imposing restrictions on regular travel or closure of borders, recommending instead that people who were unwell should consider delaying international travel and that people who developed symptoms following international travel should seek medical attention according to guidance from national authorities. Many countries, including Australia, implemented a range of activities at different times to screen incoming and/or departing[15] travellers in an attempt to delay the spread of pandemic influenza.

From 27 April 2009, with commencement of the DELAY phase, Australia began rapidly implementing a program of complementary border health measures at Australia's major international airports (see Table 4.1 and Appendix C). The border measures continued into the CONTAIN phase and were scaled back on 22 June 2009 at commencement of the PROTECT phase.

On 30 April 2009, the Minister for Health and Ageing authorised implementation of emergency quarantine measures under subsection 12A(1) of the *Quarantine Act 1908*, which authorised airports and airlines to be directed to implement enhanced border measures to minimise the public health risk from potentially infected incoming international travellers. This power was not invoked, as the airports and airlines voluntarily complied with government activities.

On 8 May 2009, the first confirmed pandemic (H1N1) 2009 influenza case was detected at a Queensland airport in a passenger returning from the United States.

12 The aircraft must report its status in terms of health: that is, it is mandatory to report whether or not there are unwell passengers onboard.

13 Available from www.flupandemic.gov.au/internet/panflu/publishing.nsf/Content/fluborderplan.

14 The *Australian Border Health Measures Guide* provides an overview table to inform decision makers of available actions and detailed supporting information so that actions can be implemented quickly, consistently and accurately both during normal business and during an emergency.

15 Exit screening of travellers is a required capacity under IHR 2005; but was not employed in Australia's pandemic response.

Table 4.1 Commencement and termination dates of border health measures for 2009 pandemic

Date	Border health measure
27 April 2009	In-flight announcements on all incoming aircraft originating from countries in North, Central and South America
27–29 April 2009	Automatic pratique withdrawn from all incoming aircraft originating from countries in North, Central and South America
28 April 2009 – ongoing	'Human swine influenza with pandemic potential' proclaimed a quarantinable disease
29 April – 22 June 2009	Automatic pratique withdrawn from all incoming aircraft Health declaration cards (HDCs) deployed Thermal scanners at all international airports Health assessment by nurses at all international airports
29 April – 12 October 2009	In-flight announcements on all incoming flights
29 April 2009 – ongoing	Public communications at airports
30 April 2009	Emergency quarantine measures enabled under subsection 12A(1) of the *Quarantine Act 1908*
6 May – 22 June 2009	Mandatory presentation of HDC to the Australian Customs and Border Protection Service primary line
Early June – 22 June 2009	Information for the public distributed in business card format
7 August 2009 – ongoing	Cruise ship protocol implemented

Initial border measures targeted flights from the Americas and travellers from countries with reported outbreaks. This select approach was quickly replaced, with automatic pratique being withdrawn from all incoming aircraft.

A decision was made at the start of the border measures response that border nurses would take nose and throat swabs from symptomatic passengers and supply antiviral medication on-site, which was an additional requirement that was not included in pre-pandemic training and necessitated the use of nurses with higher levels of clinical skills.

Thermal scanners[16] were rapidly deployed as a result of good planning and training undertaken prior to the pandemic.

4.2.1 Identifying unwell travellers at Australia's international airports

On average, more than 28,500[17] passengers arrive daily at Australia's eight major international airports (see further detail in Appendix C). From 28 April 2009 to 1 June 2009, nationally a total of 15,457 travellers were identified as unwell. This represents approximately 13 per cent of all international air arrivals for this period.

Unwell travellers were identified through information provided on Health Declaration Cards (HDCs) (84 per cent), airline notification (13 per cent), 'other means' (2.5 per cent) and thermal scanners (0.5 per cent) (see Table 4.2). Note that these figures refer to all unwell people identified at the border, not only those with pandemic (H1N1) 2009 influenza. Of these, a very small number (154 or 0.1 per cent) were managed as if they had a case of pandemic (H1N1) 2009 influenza and

16 Of the 56 countries that provided information to the WHO on what border measures were used, 88 per cent used thermal scanners WHO, (2010), 'Public health measures taken at international borders during early stages of pandemic influenza A (H1N1) 2009: preliminary results', *Weekly Epidemiological Record* 85(21): 186–195.

17 An average of 28,685 arrived daily for the period 1 May 2009 to 1 June 2009.

were either advised to stay in home quarantine or hospitalised. For example, in Queensland, of the 780 incoming passengers identified as unwell through border measures who were then screened by public health border nurses, 52 people met the case definition, were tested and were referred to public health units for follow-up. Of these, only four (or 1 per cent of those identified as unwell) tested positive for pandemic (H1N1) 2009 influenza.

Contact tracing occurred for some passengers on early flights; however, this could not be sustained. Millions of international air travellers entered Australia during the pandemic, and with the relative mildness of the disease many, even symptomatic, infected travellers could not have been identified.

4.2.2 Management of international travellers arriving by cruise ship

The arrival of international travellers by sea had not been addressed in the Fluborderplan. Cruise ships had been assessed as a low risk to Australia due to the relatively small number of (largely Australian) travellers during the Australian influenza season, the existing pre-embarkation passenger screening used by cruise ships to minimise onboard health issues, the onboard medical personnel and facilities and disinfection protocols, and the pre-arrival requirements for all ships entering Australia. However, the 2009 pandemic experience has shown that, when an international influenza outbreak is occurring, cruise ships pose a risk that needs to be managed. If infection and spread has occurred onboard, there is potential for the introduction of many cases of disease into Australia at one time if disinfection and other controls have not proved effective.

On 23 and 25 May 2009, respectively, two cruise ships arrived in Sydney carrying travellers exhibiting symptoms of influenza-like illness (ILI). The first ship, *Dawn Princess*, was cleared of pandemic (H1N1) 2009 but on its subsequent voyage (departing Sydney on 25 May 2009) had five passengers with ILI symptoms. The ship was refused entry to New Caledonia and returned to Sydney. The second ship, *Pacific Dawn*, had 172 passengers with ILI symptoms identified through HDCs. These passengers were released to home isolation and provided with antivirals to reduce secondary transmission to close contacts and for treatment. The Home Quarantine Support System (HQSS) provided telephone advice to these passengers. Of these passengers, 77 were subsequently confirmed as having pandemic (H1N1) 2009. On the ship's next voyage, departing Sydney 26 May 2009, seven crew members had ILI symptoms. They were treated with antiviral medication and placed in isolation. Three were confirmed as having pandemic (H1N1) 2009. New South Wales Health provided a doctor and 25 public health nurses to travel to Brisbane to join the ship and screen all passengers, none of whom tested positive to the virus.

To manage unforeseen issues with international arrivals by cruise vessel, a *National Protocol for Pandemic (H1N1) 2009 on Cruise Ships* was rapidly developed in consultation with cruise ship operators, state and territory Chief Human Quarantine Officers and Commonwealth border agencies. The protocol's aim was to ensure clarity of intent, responsibility and action in responding to the presence of pandemic (H1N1) 2009 on cruise ships. The protocol drew on the normal practice of cruise ship operators, who have a strong commercial incentive to minimise infectious disease outbreaks onboard, and clarified the responsibilities of border agencies and states and territories in responding to pandemic influenza on cruise ships.

Table 4.2 Identification of unwell passengers by method of detection, 28 April 2009 to 1 June 2009

Method of identifying ill passengers	Number of passengers	Percentage
Health Declaration Card	12,958	84
Airline notification	2,011	13
Other	408	2.5
Thermal scanner	80	0.5
Total	**15,457**	**100**

Measures implemented included rapid deployment of HDCs to arriving cruise ships to assist passengers to self-identify symptoms of ILI and to facilitate contact tracing should that be required, deployment of public health teams to assist with assessment and testing of potentially infected travellers, management of disembarkation by border and health staff, and collaboration by all Australian governments to rapidly investigate and control the potential transmission from infected cruise ship passengers. At the peak of concern, successful contact tracing was undertaken across Australia for one entire cruise ship complement of thousands of passengers.

4.3 Key Issues and Lessons Identified

4.3.1 Implementation

Airport exercises and training undertaken in the pandemic planning stages enabled rapid implementation of border measures, guided by the Fluborderplan. Border agency officers were flexible and responsive, and airports and airlines were cooperative, which allowed for significant (Commonwealth, jurisdictional and commercial) resources to be activated at short notice.

Developing a formal communication process between Australian Government agencies and between these agencies and the airlines and airports, including establishing a database of key contacts, would enhance timely information sharing in emergencies. Human resource implications for operational personnel also need further consideration. For example, the need to develop consistent cross-agency advice during the response on associated occupational health and safety matters, including addressing deployment and use of PPE by the various types of border personnel, contributed to a delay in disseminating final instructions to operational personnel.

While the Fluborderplan guided the implementation of measures, it was not formally activated during the response. There is a need for future planning to better incorporate strategies and operational arrangements to address logistical issues, such as availability and distribution of HDCs; to counter the public communication challenges, such as ensuring rapid and early availability of professional, large-format advertising; and to establish arrangements for the design, collection and systems used for digital data recognition of HDCs.

Airlines reported significant logistical issues due to the number of different declaration cards required for the various countries they enter. This requirement could have been streamlined if Australia and other countries had chosen to use the universally available WHO Passenger Locator Card. However, while this card contained adequate information to enable contact tracing, it did not contain questions to identify travellers who are unwell. Australian HDCs were found to be useful for contact tracing and raising public awareness, which led to self-reporting of symptoms. As part of future reviews of border measures, Australia should continue to monitor developments with the WHO Passenger Locator Card.

Future pandemic planning, including the Fluborderplan, should incorporate appropriate response measures to address influenza management for ships. This needs to incorporate appropriate communication arrangements with cruise ship operators, methods for management of influenza cases onboard, and reception arrangements for reported cases on arrival into Australia.

4.3.2 Effectiveness

While public health personnel at borders were successful in supporting the implementation of border measures, there are significant opportunity costs involved with implementing and maintaining border measures that require careful consideration. Inherent in the planned range of border measures is the need for appropriately trained public health staff to assess travellers and to undertake the consequent contact tracing where necessary, which particularly placed a heavy burden on public health resources in 2009. The public health resources required for both these functions are drawn from the same finite pool of jurisdictional resources that is also responsible for other routine public health functions and other pandemic response requirements. As a result, there are competing tensions regarding the most effective use of these limited resources.

The policy approach to implementing border measures affects staffing requirements, for example, targeting particular flights versus all flights, and varying temperature settings on thermal scanners. Continuation of border measures through the CONTAIN phase, and uncertainty over the length of time that border measures would be needed, increased pressure on resources and may have affected their

effectiveness. For example, the extensive level of contact tracing undertaken on early flights and for cruise ship arrivals could not be sustained for all arriving air travellers. Triggers for discontinuing border measures need to be well defined and communicated. In this context there is a need to understand the effectiveness of border measures, individually and in general, relative to the level of human resources required. Assessing how best to deploy limited resources for the most effective outcome can only be determined at the time; however, it needs to be decided early.

The rapid international spread of the pandemic shows that there is still a lack of understanding about the extent to which border measures slow the spread of the disease. Understanding and measuring whether border measures were effective in delaying local transmission in Australia is difficult. Detecting early cases of disease at the border, or soon after arrival, still allows entry of the disease into the country. The DELAY attained does not refer to the entry of the disease but to the control of the disease, whereby cases are identified and quarantined (or other measures instituted) to prevent transmission and establishment of the disease. However, it is likely that the intensive containment measures employed beyond the border in Australia had a greater impact on delaying establishment of the virus in the community than border measures, particularly arrival screening. Emphasis should be placed on reviewing the evidence basis for border measure options, and quantifying the opportunity costs, when reviewing policy and operational protocols.

The period between the commencement of border measures and acknowledgement of widespread community transmission in Australia – effectively with the move to the CONTAIN phase on 22 May 2009 – was 24 days. Analysis of international experience also concluded that border screening during the 2009 pandemic was associated with a postponement of community transmission of seven to 12 days, with a range from no delay to 20 to 30 days' delay, noting a possible overestimate of the impact of border measures where countries had also implemented extensive domestic containment and mitigation measures.[18] There are now significant data available about the types of measures implemented, the resources needed and the impact these had in different countries. Further international research is needed to identify the most effective and realistic measures that might be available.

In reviewing the need for border measures, consideration needs to be given to the public's perception of the importance of the disease if Australia does not institute visible border controls while neighbouring countries do so. Research conducted for the Australian Government in June 2009[19] indicates that travellers responded positively to border measures, as they believed these indicated that the Australian Government was proactively protecting the health of the Australian community. Approximately two thirds of the travellers surveyed in Australia indicated that information provided about border measures had made them think of pandemic influenza since returning home. Travellers identified HDCs as having the highest impact (33 per cent), followed by in-flight announcements (22 per cent), thermal scanners (17 per cent) and posters in airports (14 per cent).[20] Most notable is the public's perception of the use and benefit of thermal scanners compared with their limited effectiveness in detecting possible cases of illness (0.5 per cent of cases identified in Australia). The relative value of thermal scanners needs to be further considered, both within the context of the wider impacts on resources and against their effectiveness as a public awareness tool.

Recommendation 9:

Review the policy, operational protocols and communication of border measures (airports and seaports) for pandemic influenza.

18 Cowling, BJ, Lau, LL, Wu, P, Wong, HW, Fang, VJ, Riley, S, et al. (2010), 'Entry screening to delay local transmission of 2009 pandemic influenza A (H1N1)', *BMC Infectious Diseases*, 10(82).

19 Parr, V, Gagg, K, et al. (2009), *Research on effectiveness of the current border control measures: qualitative and quantitative market research report*, GfK bluemoon.

20 The remainder comprises two per cent for in-airport announcements and 12 per cent for 'other'.

Chapter 5

Public Health Measures

Key Findings

- Rapid development of the new pandemic phase PROTECT showed that Australia has a flexible public health response system.
- Changes of case definitions were challenging and resource intensive. The content and rationale for changes could be better communicated to clinicians and laboratories.
- Antiviral medications were an effective public health measure for the protection of the vulnerable and the treatment of severe cases.
- Communication of infection control messages to the public is important in reducing the risk of infection during all pandemic phases, with the basic messages not changing with the different phases.
- Development of generic infection control advice or guidelines for a pandemic to cover all settings should be considered.
- Quarantine (home isolation, school closures) as a public health measure is a challenge.
- The role of 'flu clinics' during pandemics of differing severity needs to be clearly defined.

Text box 5: Public health measures guidance from AHMPPI 2008

Objective

- Operational objective 2: Minimise transmission.
  - 2.3 Slow the spread in the community.

Purpose

- The primary objective of these countermeasures is to reduce transmission, and therefore to reduce the overall number of cases and deaths.
- Secondary objectives are to flatten the epidemic peak; to reduce the peak burden on the healthcare system; to permit the completion of final preparations; and to develop and begin production of pandemic vaccine.

Governance

- The health sector's role is to provide advice to government with respect to effectiveness and timing of measures.

5.1 Pandemic Planning

The AHMPPI outlines a range of public health actions that may be implemented during the different phases of a pandemic. They include actions focusing on both individual and community levels. A key principle early in a pandemic is the identification, separation and management of potentially infectious people in order to reduce transmission of the virus, which involves voluntary home isolation and quarantine at individual level and a range of social distancing measures at community level.

During the DELAY phase, the emphasis is on the early detection of cases arriving in Australia through international borders, hence a range of complementary border health measures would be implemented to detect cases and identify contacts. During the CONTAIN phase, the emphasis is on containing the establishment of the pandemic virus in Australia and ensuring that the health system is able to cope. During the SUSTAIN phase, the public health response is continued (sustained) while awaiting the availability of a customised vaccine, the most effective countermeasure being an immune population.

The AHMPPI foreshadowed the potential for closure of schools and childcare centres to minimise transmission of a pandemic virus, recognising that children shed influenza virus more readily than adults, have poorer hygiene practices and may shed influenza virus without becoming obviously unwell. Other social

distancing measures could be considered, such as cancellation of mass gatherings and changing of public transport arrangements to limit opportunities for the virus to spread. Implementation of such measures would be supported by appropriate public information campaigns encouraging Australians to maintain good hygiene practices, including cough etiquette and hand washing, at all times.

It was planned that jurisdictions would establish 'flu clinics' and influenza-specific services to help prevent the spread of infection by keeping potentially infectious patients separate from other patients being seen in general practices and hospitals. It was considered that the role of GPs would be to maintain essential primary healthcare services in the community, with assessment of suspected pandemic influenza patients to occur in specialised influenza clinics or in general practices that had declared themselves influenza-specific practices. Other benefits of these measures could include assisting in managing a larger patient load; providing an earlier triage before a hospital emergency department (ED); using staff familiar with infectious diseases; efficient use of limited PPE supplies; and providing sites for supply of antiviral medication and vaccine.

The AHMPPI described a flexible policy for the use of antiviral medication, recognising that this medication may be necessary for treatment of cases as well as for pre- and post-exposure prophylaxis. How it would be used would depend on a number of factors, such as the severity of the pandemic, the availability of vaccine and the effectiveness of the antiviral medication, including any evidence of resistance. It was planned to prioritise at-risk (front-line) healthcare workforce personnel with antiviral prophylaxis in recognition of the importance of maintaining a skilled healthcare workforce during a pandemic.

5.2 Response Implemented

Australia's public health response, and implementation of associated public health measures, was guided by the AHMPPI 2008 and based on the Australian phasing system (see Table 5.1). The phasing system was amended to include a new phase, PROTECT, as an appropriate response to the nature of the pandemic (H1N1) 2009 virus.

WHO announced on 10 August 2010 that the world had moved into the post-pandemic period but that localised outbreaks of various magnitudes were likely to continue. At that time it was considered appropriate that Australia remain in the PROTECT phase, as Australia was still in its influenza season and a late upsurge in pandemic (H1N1) influenza 2009 cases was possible. During the 2010 influenza season Australia experienced a particularly late peak, with levels of influenza cases similar to those reported in 2007 and 2008 and significantly lower than those observed during 2009. The CMO, together with his expert advisory groups, assessed Australia's pandemic phase status and recommended the change of phase from PROTECT to ALERT from 1 December 2010, the key element of which is heightened vigilance for a new influenza virus or any change in a currently circulating influenza virus which may be of concern.

Table 5.1 **Phase changes and duration**

Phase	Date commenced	Date changed	Duration
DELAY	28 April 2009	21 May 2009	3 weeks
CONTAIN	22 May 2009	17 June 2009	4 weeks
MODIFIED SUSTAIN (Victoria only)	3 June 2009	17 June 2009	2 weeks
PROTECT	17 June 2009	1 December 2010	76 weeks
ALERT	1 December 2010	ongoing	ongoing

5.2.1 Identification and classification

5.2.1.1 Case definitions

The Communicable Diseases Network Australia (CDNA) was responsible for developing and reviewing case definitions that described the degree of certainty of infection with pandemic (H1N1) 2009 virus. Case definitions guided the clinical management of cases, disease surveillance, testing protocols and subsequent public health decisions (see Table 5.2).

Cases and contacts were identified at the Australian border during the DELAY and early CONTAIN phases, and in the community during the late DELAY phase and during the CONTAIN and PROTECT phases.

During the DELAY and CONTAIN phases, considerable effort was made to actively identify cases and their contacts. All people meeting the definition for a suspected case were assessed urgently and local public health units (PHUs) were notified. Extensive contact tracing, laboratory testing and treatment or prophylaxis with antiviral medication were undertaken. The management of all cases was the same, as suspected and confirmed cases were all encouraged to quarantine or isolate themselves for a period of seven days (see section 5.2.4 Isolation and quarantine). Media advertisements advised symptomatic people who had potentially been exposed to the virus to seek early medical assistance and to make initial contact by telephone. Information was circulated to GPs and EDs in hospitals regarding the clinical and epidemiological recognition of pandemic (H1N1) 2009 influenza. Doctors were instructed to contact their local PHUs if a suspected case presented.

During the PROTECT phase, the focus was on identifying people vulnerable to developing severe complications of influenza rather than on identifying and managing every case, with a more targeted use of antiviral medication as treatment or prophylaxis where appropriate. This was an appropriate response to the 'mild in most, moderate overall' nature of the pandemic. Close contacts who were members of a recognised vulnerable group were advised to present early to a healthcare provider if they developed acute respiratory illness, to enable timely treatment.

5.2.2 Infection control

5.2.2.1 Personal hygiene messages

Common to all phases was public messaging about personal infection control measures. Hand washing and cough and sneeze etiquette were promoted as the most effective ways for the public to reduce their risk of being infected or of spreading the virus to others, including minimising the potential to infect people vulnerable to severe outcomes from the disease. The messages about these techniques of personal infection control did not change with the different phases.

5.2.2.2 Advice and guidelines

Tailored infection control advice was developed during the response for specific groups and workplaces, including airlines, cruise ships, schools, public transport drivers, government employers and business groups.

5.2.3 Antiviral medication

During the DELAY and CONTAIN phases, antiviral medication was provided to cases for treatment if less than 48 hours since the onset of illness and after this time if clinically indicated, and to household contacts for prophylaxis. This proved to be effective in prevention and in limiting disease duration. During the PROTECT phase, treatment was recommended for those vulnerable to severe outcomes from influenza and for those suffering moderate to severe disease. Vulnerable

Table 5.2 **Case definitions – degree of certainty of infection with pandemic (H1N1) 2009**

Case	Definition
Suspect	People who were suspected of having the illness but did not yet have test results
Influenza A-positive suspect	People who were known to be infected with influenza A but whose test results for the subtype of influenza were as yet unknown
Confirmed	People whose illness was laboratory confirmed as infection with pandemic (H1N1) 2009

contacts of suspected cases were considered for antiviral prophylaxis. Antiviral prophylaxis was provided to control outbreaks in high-risk institutional settings such as schools for students with disabilities and aged-care facilities.

5.2.4 Isolation and quarantine

During all phases, people who were unwell with influenza or with influenza-like illness (ILI) were encouraged to stay at home in isolation.

During the DELAY and CONTAIN phases, people who may have been exposed to the virus and their close contacts, once identified, were asked to voluntarily quarantine themselves at home (or in their hotel room, for non-residents), for a period of seven days – that is, until the infectious period had passed or the diagnosis had been excluded – in order to help control the spread of the disease. This quarantine period was based on an understanding of seasonal influenza viruses.

During these phases, cases were advised that while in isolation, if feasible, they should wear a surgical mask when in the same room as other household members and should stay at least one metre from others. Contacts were instructed to notify PHU staff immediately if they developed symptoms of the illness. With the move to PROTECT, quarantine was no longer recommended for household contacts.

Support for contacts identified in the community was provided by local public health authorities and governments.

A separate system of support was provided for contacts identified at the border, as planning had identified that there may have been a requirement for contact tracing and quarantining of large numbers of people after arrival in Australia. The Home Quarantine Support System (HQSS), which included an automated outbound telephone calling system, was activated from 26 May 2009 to 2 June 2009 following specific international flights that had transported a confirmed case of pandemic (H1N1) 2009 influenza. The HQSS supported people in home quarantine through provision of information to raise awareness of symptoms, direction to contact their GP if they were feeling unwell, and provision of 'home quarantine support packs'. A total of 4713 calls were made during that time, with 1102 individuals contacted.

5.2.4.1 School exclusions and closures

Early in the 2009 pandemic, reports emerged from overseas that outbreaks had spread rapidly in schools, with high infection rates among students.[21] Outbreaks in childcare centres were not reported. The school outbreaks were thought to have seeded wider transmission of the disease in the community, in particular in cities in Japan and in New York City, which is consistent with current knowledge about seasonal influenza outbreaks and the recognition that children may shed influenza virus without becoming obviously unwell.

From the commencement of the CONTAIN phase, Australia introduced a seven-day period of exclusion from school for those students who had recently travelled to areas where there was a high prevalence of the pandemic (H1N1) 2009 virus, including areas overseas and within Australia. School exclusion had not been included in the AHMPPI but was adopted in 2009. The rationale was that a seven-day period of exclusion from attending school after travel to affected areas would reduce the potential to introduce the virus to a school community, thus averting a school outbreak and a possible school closure, and thereby assist in slowing the spread of disease to a community. School exclusion was implemented on a voluntary basis, at the discretion of school principals and local authorities, and was only recommended for primary and secondary schools.

State and territory governments also had the flexibility to close individual schools or classrooms following the identification of a confirmed case or where outbreaks were apparent and if this was considered a useful measure to prevent further outbreak in the school. Decisions to close individual schools or classrooms were made by the states and territories on a case-by-case basis. Closure of childcare centres was not recommended in 2009.

During the PROTECT phase, closure of schools and childcare centres was not considered a

21 'New influenza A (H1N1) virus infections: global surveillance summary, May 2009' (2009), *Weekly Epidemiological Record*, 84(20), 173–179.

'Swine-origin influenza A (H1N1) virus infections in a school – New York City, April 2009' (2009), *Morbidity and Mortality Weekly Report*, 58(17), 470–472.

Health Protection Agency and Health Protection Scotland New Influenza A(H1N1) Investigation Teams (2009), 'Epidemiology of new influenza A(H1N1) in the United Kingdom, April – May 2009', *Eurosurveillance*, 14(19).

proportionate or appropriate intervention, and under these circumstances was, in general, not recommended. Considerations with respect to boarding or residential schools were different, and these were dealt with by the states and territories on a case-by-case basis.

5.2.4.2 Wider community interventions

Wide-scale community-level social distancing measures, such as restricting or cancelling mass gatherings and limiting public transport arrangements, were not considered proportionate to the nature of the pandemic and were not implemented in 2009.

5.2.5 Influenza services

During the 2009 response, many jurisdictions set up influenza-specific services to minimise presentations to hospitals, health services, general practitioners and community health agencies. Implementation varied according to a range of different service provision models and according to evolving jurisdictional need. Services provided included assessment, diagnosis and, as necessary, use of antiviral medication based on the case definition.

5.3 Key Issues and Lessons Identified

By the time community-level transmission was established in Australia, public health officials had recognised the limitation of the pandemic phases outlined in the AHMPPI to guide the response through a pandemic of moderate severity. The rapid development of a new phase is evidence of the flexibility of Australia's public health leaders to respond to a crisis. It also provides an example of the strong commitment from all public health officials to support teamwork across governments and a consistent national response.

5.3.1 Development and implementation of case definitions

An important lesson learned from 2009 is that the development and communication of case definitions can be challenging. A new process for the development of case definitions during a pandemic response needs to be explored. This could enable more robust definitions to be developed that avoid the need for frequent changes, which in 2009 led to confusion among some users. Consideration could be given to methods of collecting case data based on clinical diagnosis. The purpose of case definitions – whether screening, surveillance or clinical – also needs to be clearly described. The intersection between the development of case definitions for public health purposes and for clinical need should be better communicated. The initial extensive testing regime, which was intended to capture all potential cases for extensive laboratory testing in the early stages, created an apparent expectation that ongoing testing to confirm individuals' infection status was desirable. This was at a time when more targeted testing for public health purposes was limiting the number of suspected cases that needed laboratory tests.

Recommendation 10:

Identify ways of simplifying case and contact definitions and their use, including how better to communicate to and educate the healthcare workforce about the role of and rationale for case definitions.

5.3.2 Infection control messages and advice

In a survey of more than 800 people across Australia, 99.4 per cent knew that "hand washing and using a tissue to cover your mouth when coughing are practical ways of reducing the spread of flu".[22] Approximately half of respondents reported they "paid more attention to covering coughs and sneezes" and had increased their own frequency of hand washing. In a vaccination survey, hygiene was the most reported strategy for protecting oneself and family from influenza,[23] with one third of people perceiving hand washing as the most important. This evidence demonstrates that the messages promoted by national, state and territory and local governments about the importance of hygiene made an impact on the community.

Developing multiple-sector tailored infection control advice was a drain on public health

22 Eastwood, K, Durrheim, DN, Butler, M & Jones, A (2010), 'Responses to Pandemic (H1N1) 2009, Australia', *Emerging Infectious Diseases*, 16(8), 1211–1216.

23 Miller, K & Tuffin, A (2010), 'Pandemic (H1N1) 2009 (Swine Flu) Vaccine Campaign Evaluation', report for the Department of Health and Ageing by GfKBlueMoon.

resources. It is worth considering whether the accepted infection control precautions used in the health sector can be used to develop generic infection control messages to cover a multitude of settings, emphasising the principles of infection control rather than specific actions and equipment.

There is a view that more consistent infection control advice for healthcare workers and GPs was needed early in the pandemic. Better formal engagement with state and territory infection control committees would be beneficial to establish an authoritative source when determining national advice.

Recommendation 11:

Review the range of infection control guidelines to identify inconsistencies and gaps. Consider the feasibility of developing 'principles of infection control', with examples to avoid the duplication of advice for different sectors.

5.3.3 Antiviral medication

Although the use of antiviral medication was limited in 2009, antiviral medication remains an important protective measure for pandemic management and would need to be more widely used in a more severe pandemic. Antiviral medication was found to be life-saving for those who were more severely affected in hospitals, including ICUs. An area for future work would be to understand the benefits of early versus late use and extensive versus limited-population use, in particular the use of antiviral medication for high-risk contacts such as Indigenous Australians and other vulnerable groups when no prophylaxis is provided generally for the well population. The planned provision of antiviral prophylaxis for healthcare workers was not implemented in 2009.

The medication is most effective if taken within the first 48 hours of the onset of illness. The current logistical system would have difficulties in ensuring extensive access to antiviral medication within the required time frames. There is a need to ensure timely access to antivirals for cases and contacts in the community, including a review of the policy for prescribing antivirals. The models which were identified in the pre-planning phase were not used in the pandemic response. Further work is needed to develop supporting documentation in this area.

Recommendation 12:

Review the policy on access to and use of antiviral medications.

5.3.4 Quarantine

The purpose of voluntary quarantine was not well understood by the community in 2009. Quarantine is inconvenient for individuals and difficult to enforce as a public health measure. The challenge is to communicate, facilitate and encourage the message to 'stay away from others' without invoking the concerns associated with the idea of 'quarantine'. People who did not comply with voluntarily quarantine were identified as mostly being motivated by the financial losses that would be incurred from staying home for the seven-day quarantine period. Educating the community and building social expectations about what individuals can do after they have been exposed to the disease is important.

Policy and operational plans for managing people in quarantine had not been finalised, both at state/territory and national level, when the pandemic emerged. Accommodation for non-residents identified at the border and requested to quarantine themselves was an issue, as many hotels refused to provide accommodation to individuals under quarantine. The roles and responsibilities of all governments for the management of people in quarantine, both at home and in other accommodation, during a pandemic should be clarified. A set of nationally consistent principles could form the basis for jurisdictions to develop operating guidelines, including plans for accommodating potentially infected people in future pandemics and better systems to support people in quarantine. It is the view of some stakeholders that quarantine of contacts should only be undertaken for severe pandemics.

There were also reports that insufficient and conflicting information was provided to quarantined individuals. The HQSS was slow to be implemented, which resulted in late commencement of calls to individuals in quarantine and did not allow for the timely delivery of 'home quarantine support packs' from the National Medical Stockpile intended to support individuals in quarantine. The effectiveness of the HQSS needs further consideration.

Recommendation 13:

Review the policy on quarantine and isolation, including management, support systems and communication.

5.3.5 School exclusions and closures

The disruptive nature of school closures is paramount. In 2009, school exclusions were far less disruptive than school closures. It is important that the severity of disease that warrants the level of disruption caused by school closures be incorporated in future plans to enable public health authorities to make informed recommendations. School closures in some areas had a substantial impact on the available health workforce, predominantly nurses.

Despite school closures being identified as a potential countermeasure in the AHMPPI, which was rehearsed in simulation exercises and discussed in public health settings, the suggestion to close schools appeared to surprise newcomers to the pandemic response, including other government departments.

There were also tensions with implementing the school exclusion policy, in particular sensitivities with identifying 'areas of prevalence' within Australia when jurisdictions were experiencing different stages of disease spread.

A body of evidence is available following the 2009 experience of school closures in Australia and internationally. This needs to be systematically reviewed to provide the evidence base for future policy in the AHMPPI. There is some evidence that school closures can be effective if implemented early, but there are considerable social costs associated with their implementation. Also, the behaviour of children during closure is key to minimising spread of infection within a community. Research shows that compliance beyond non-attendance at school was poor, for example, children continued to meet socially and at sporting fixtures, and ways of improving voluntary compliance should be explored. Any review of school closure policies should also include childcare centres, as it is known that pre–school-aged children are even greater transmitters of influenza virus than school-aged children, because in this age group the virus is shed for longer and hygiene is poor.

Recommendation 14:

Review the policy on school and childcare centre closure, including consideration of the relationship between disease severity and closure recommendations.

5.3.6 Influenza services

The role of 'flu clinics' during pandemics of differing severity needs to be clearly defined. There was limited use of such clinics in 2009, given the moderate nature of the pandemic and the lesser need to reduce transmission. Whether such clinics can attain their objective of separating infectious patients in a severe pandemic is not known.

Flu clinic plans varied across jurisdictions, which caused confusion and was particularly problematic at borders. GPs reported being unclear about when, where and how clinics would operate; how they would be staffed; how to refer patients to them; and the interface of the clinics with general practice. GPs also expressed concerns about whether flu clinics were an appropriate model for triaging patients with pandemic influenza, as they duplicated the work of general practice. However, where GP services were unable to be accessed, including in non-metropolitan areas, hospital EDs were being attended instead. This limited the ability of EDs to maintain their core business. The flu clinic model would thus be useful in assisting EDs to maintain capacity.

In a communicable disease outbreak, indirect patient care may reduce the risk of transmission to GPs and staff, making telephone consultations prudent. The UK recognised that face-to-face assessment of each patient at the peak of a severe pandemic would not be feasible,[24] and developed a National Pandemic Flu Service to assess the clinical condition of callers. A process of telephone consultation during a pandemic, including how to remunerate GPs for time spent indirectly triaging and caring for patients, is worth further consideration in the Australian context.

24 Hine, Dame Deirdre. (July 2010), *The 2009 Influenza Pandemic: An independent review of the UK response to the 2009 influenza pandemic*, p. 96.

Recommendations

10. Identify ways of simplifying case and contact definitions and their use, including how better to communicate to and educate the healthcare workforce about the role of and rationale for case definitions.
11. Review the range of infection control guidelines to identify inconsistencies and gaps. Consider the feasibility of developing 'principles of infection control', with examples to avoid the duplication of advice for different sectors.
12. Review the policy on access to and use of antiviral medications.
13. Review the policy on quarantine and isolation, including management, support systems and communication.
14. Review the policy on school and childcare centre closure, including consideration of the relationship between disease severity and closure recommendations.

Chapter 6

Health Sector Capacity

Key Findings

- Considerable resources are required to sustain a public health emergency response over several months, even during a less severe pandemic.
- 'Business as usual' was generally continued in both the public and clinical healthcare settings.
- Public health unit support for border screening, contact tracing, surveillance reporting and quarantine management was resource intensive.
- The early strain on hospital system capacity is likely to occur in another pandemic while severity is unknown.
- A major limitation to surge capacity in hospital intensive care units was lack of availability of trained intensive care staff with infectious diseases experience.
- General practice had a larger role than had been considered in planning.
- There is a need to develop guidance on strategies that could be employed during a pandemic to enhance the finite health sector workforce capacity and maintain it for long periods of time.

Text box 6: Health sector capacity guidance from AHMPPI 2008

Objective

- Operational objective 3: Optimise the health system to reduce morbidity and mortality.

Purpose

- Minimise transmission of the pandemic virus by:
  - undertaking initial assessment of suspected cases and isolation of the sick
  - ensuring rapid referral of people to 'flu clinics'
  - working with relevant state, territory and local government agencies to facilitate contact tracing and quarantining of exposed individuals
  - assisting with antiviral medication and vaccine administration.
- Ensure that health services are optimised by:
  - maintaining primary care services for patients
  - assisting at 'flu clinics'
  - providing home care (if practical) for suspected cases.

Governance

- Health workforce arrangements are a health sector decision.

6.1 Pandemic Planning

6.1.1 Public health planning

In 2008, the Australian Health Protection Committee (AHPC) agreed that there was a need for a health workforce enhancement strategy. State and territory health departments considered in pandemic planning how surge capacity within the healthcare workforce would meet the anticipated increase in demand for health care during a severe pandemic. This included ensuring availability of health professionals with the appropriate levels of training.

The AHPC undertakes regular audits of the health sector capacity to respond to emergencies.[25] These include assessment of intensive care unit

25 The current audit details are available from www.health.gov.au/internet/main/publishing.nsf/Content/ohp-hlth-disaster-mngment-cap-audit-2008.

(ICU) beds and surge capacity. Hospital capacity to respond to a pandemic is also continually reviewed under state and territory response plans. In addition, some jurisdictions had commenced development of plans for the ethical prioritisation of life-saving services in health emergencies.

The AHMPPI identifies that some health services may need to be temporarily reorganised during a pandemic. This could include, for example, cancellation of elective surgery and temporary suspension of other non–life-saving services for a period. Plans also highlight that normal and serious health conditions will continue to need attention, even in a pandemic, and therefore some general practices would need to focus on maintaining routine health care. There may be a need to designate some general practices and hospitals as non-influenza services to ensure maintenance of life-saving services.

To optimise the availability of both public health and clinical services, a range of strategies are outlined in the AHMPPI to specifically manage or support influenza cases. These include the establishment of 'flu clinics' in the community or in existing hospitals, to be managed by individual jurisdictions, and may include nomination of some general practices as influenza practices. As planning for flu clinics was the responsibility of jurisdictions, they were planned differently in each state and territory. It was anticipated that these clinics would help to ensure that general practices and hospitals did not become overloaded, thus maintaining the provision of life-saving non-influenza health services. They would also provide rapid access to trained health professionals for anyone who was concerned that they may have pandemic influenza.

It was anticipated that the majority of people with pandemic influenza would be able to remain at home during their illness and would not require hospital care. State and territory health departments would provide specialist influenza in-patient healthcare services, which might include reorganising some hospital services and working with the private sector to manage hospital surge capacity needs. The AHPC would collaborate on sharing critical-care resources across the country.

6.1.2 Primary care planning

Planning is premised on supporting general practice to provide mainstream primary healthcare services and, where possible, to assist in meeting the additional burden of care needed for patients with pandemic-related illness. The draft primary care annex to the AHMPPI, *Guidelines for the Management of Pandemic Influenza in Primary Care Settings*, was the subject of ongoing discussions with the primary care sector when the 2009 pandemic emerged.

General practices have been encouraged through a variety of forums to prepare, in advance, for a pandemic with business continuity plans, protocols for infection control and good hygiene, and a range of other measures. General practices were encouraged also to consider, in advance, what their role might be during a pandemic. It was considered that some practices may elect not to receive cases of pandemic influenza, particularly if personal protective equipment (PPE) and antiviral medications were scarce. Other practices could work with local health departments to become influenza-specific practices. The Australian Government and many jurisdictions have actively and extensively engaged with general practices in these preparations.

To assist general practices to plan for a pandemic, a Pandemic Flu Kit was developed by the Royal Australasian College of General Practitioners (RACGP), funded by the Australian Government Department of Health and Ageing. The kit was developed to support the education and training of all practice staff, including information on government planning, business continuity, infection control, communication and clinical management. The kit had been distributed prior to the pandemic.

6.2 Response Implemented

6.2.1 Supporting healthcare professionals

Forums were established during the pandemic to enhance communication between public health authorities and front-line clinicians. The Australian Health Protection Committee (AHPC) recognised the importance of quickly engaging more broadly with the clinicians who would be responsible for sustaining the Australian response. A new General Practice Roundtable (GPRT) was quickly established to provide this vital link, allowing concerns of GPs to be considered in decisions about key issues such as the supply of personal protective equipment to general practices.

During the response, a dedicated webpage for health professionals was created on the Health Emergency website. The CMO also regularly provided GPs with written information about the

progress of the pandemic and advice on diagnostic testing, the use of antiviral medication and the vaccination program. Specific communications and updates were also provided to other areas of the health sector, such as community pharmacies, aged care services, private laboratory and pathology services and private hospitals, either directly to service providers or through other forums and networks.

The Australian General Practice Network (AGPN), working in partnership with the Royal Australian College of General Practitioners (RACGP), was contracted to deliver education, training and reminders to general practice staff on infection control, appropriate diagnostic testing and the effective use and safe disposal of personal protective equipment.

6.3 Key Issues and Lessons Identified

One of the key lessons learned was that considerable resources are required to sustain a public health emergency response over several months, even during a less severe pandemic. While there is a general view that the public health workforce was stretched during the 2009 response, it should be taken into consideration that 'business as usual' generally continued in both the public and clinical healthcare settings during the 2009 pandemic.

6.3.1 Surveillance reporting

There were high demands on jurisdictional public health units (PHU) and hospital staff to report and communicate data for media and health services purposes. Requirements for hospital staff to report data compounded the stress of an additional workload in emergency departments (EDs).[26]

6.3.2 Border measures

Many PHUs established clinics at international terminals to triage and assess passengers recently returned from countries affected by pandemic (H1N1) 2009 influenza. These clinics were often staffed by nurses from area health services, with support from PHUs. These health personnel came from a finite pool of skilled workers, and some jurisdictions reported shortages in the workforce for clinical management. The opportunity cost of maintaining healthcare professionals at the border is discussed in Chapter 4: Border Measures.

6.3.3 Contact tracing

Pandemic planning had identified that the burden of contact tracing on the public health workforce would be considerable, and work on establishing surge capacity had been undertaken. However, the capacity of public health staff to undertake extensive contact tracing was quickly exceeded by the demand in 2009. Consideration needs to be given to less specific and more manageable definitions of close contacts, and possibly to only undertaking contact tracing in a severe pandemic.

6.3.4 Laboratories

Laboratory staff surge capacity was limited due to difficulty in identifying appropriately trained staff. The changed policy and revised testing recommendations associated with the CONTAIN phase were not well communicated to the clinical sector, and did not reduce the testing demand as expected. There was an apparent expectation that individuals could continue to be tested to confirm whether they had pandemic (H1N1) 2009 influenza, and extensive testing continued beyond the need to inform public health decision making or to focus clinical attention on vulnerable individuals. This had a substantial impact on laboratory workloads over an extended period of time, and extra administrative staff were required to deal with the ongoing number of inquiries and the manual preparation of reports. Private laboratories provided support in some jurisdictions.

6.3.5 The hospital system

Hospital resources in Australia were managed in line with planned strategies, such as deferral of elective surgery, and more extensive use of some high-dependency units. Some state and territory health departments worked with private hospitals to manage hospital capacity, specifically intensive care unit (ICU) resources, although private capacity was not fully used.

Hospitals reported full capacity and lack of beds. Some of the strain in the early weeks arose from patients being admitted with mild symptoms. This is likely to occur in another pandemic because there will be early efforts to contain the disease

26 FitzGerald, GJ et al. (2010), 'Pandemic (H1N1) 2009 influenza outbreak in Australia: impact on emergency departments', Queensland University of Technology. Research project funded by the Australian Government National Health and Medical Research Council.

until the severity is known. Isolating hospitalised patients with pandemic (H1N1) 2009 influenza was challenging. Isolation rooms are limited and the effort required to isolate those not unwell enough to need hospitalisation was a burden.

It has been suggested that a 'live' hospital audit system, similar to that used in the UK where their hospital audit was updated three times a day during the response,[27] could enhance the Australian health sector's capability to assess hospital system capacity in real time during a pandemic.

Staffing arrangements for 'flu clinics' differed across jurisdictions. Hospital-based clinics were generally staffed by hospital employees, while other clinics were staffed by personnel engaged on fixed-term contracts. Unfortunately, in a system already stretched, additional staffing for flu clinics was not readily available and staff were often drawn from already busy EDs. Further work is required on flu clinic models to determine the most appropriate setting for such clinics, examining a range of pandemic severity scenarios.

6.3.6 ICU capacity

Although there is some ICU surge capacity in all states and territories, jurisdictions identified that a major limitation to surge capacity was lack of availability of trained intensive care staff. The UK developed a strategy to double its critical-care capacity[28] that included upgrading and conversion of facilities in other clinical areas to critical-care levels, cancellation of all non-urgent surgery, cancellation of leave for medical and nursing staff, deployment of reserve-trained critical-care nursing and medical staff, and changes to the ratios of critical-care–trained nurses to patients if necessary. A similar strategy could be considered in the Australian context (see section 6.3.10).

6.3.7 Specialised intensive care

Extra-corporeal membrane oxygenation (ECMO) had not been considered in the planning phase by Australia or other countries, and Australia's experience with this response informed planners in the northern hemisphere of the anticipated demand in their subsequent winter. One of the biggest issues with the use of ECMO identified during this response was that ECMO could not be used during medical retrieval of patients. The available ECMO equipment was not designed for out-of-hospital use and therefore did not meet aviation or road transport standards. Rationing the use of ECMO may have been required if the peak of the 2009 pandemic had been higher.

6.3.8 Primary care

The moderate nature of the pandemic resulted in a larger role in public health actions for general practice than had been considered in planning. However, capacity was reported as not being exceeded in 2009.

6.3.8.1 Supporting healthcare professionals

The structures that were in place to liaise with, support and provide information to GPs were not well developed. There are opposing views about the most appropriate channels to communicate with clinicians. Communication with GPs was seen by some as inadequate in volume, content and timeliness. For example, early, consolidated clinical advice was needed about antiviral medications and their use. Some GPs reported that they received information through the general media rather than directly. Others felt that the information provided to clinicians was overwhelming and therefore difficult to prioritise and action.

The CMO wrote to the clinical sector at key points, such as at phase changes and to provide advice on the pandemic vaccination program, and this communication mechanism was welcomed. However, given that similar communications by state and territory CHOs duplicated messages, nationally consistent communication jointly from the CMO and CHOs should be considered. While the GP Roundtable group was a successful initiative to improve communication with the primary healthcare sector, there were still communication issues between governments, peak bodies and GPs on the ground. There is a need to enhance the intersection and integration of the Commonwealth, state and territory governments and local networks of peak bodies.

27 Report of the Swine Flu Critical Care Clinical Group and Key Learning Points for Future Surge Planning, on behalf of the clinical group by Dr Judith Hulf CBE.

28 Department of Health, United Kingdom (2009), 'Critical care strategy: managing the H1N1 flu pandemic September 2009', available from www.dh.gov.uk/prod_consum_dh/groups/dh_digitalassets/documents/digitalasset/dh_104973.pdf.

Recommendation 15:

Identify and formalise mechanisms to enhance communication with the clinical sector before and during a pandemic, in particular to communicate the role of AHPC and public health aims in a pandemic. This could include formalising networks and considering ways of enhancing the intersection and integration of Commonwealth and jurisdictional governments and local networks of peak bodies.

6.3.9 Other workforce considerations

Remote community settings have a limited trained health workforce, and therefore little surge capacity. Planning needs to ensure the availability of critical-care surge support, including early planning for critical-care remote airlift capacity.

An important area identified where further work is needed is to collaborate with the Aboriginal Community Controlled Health Services (ACCHS) to ensure appropriate planning, communication and training for a pandemic response.

6.3.10 Future pandemic surge capacity planning

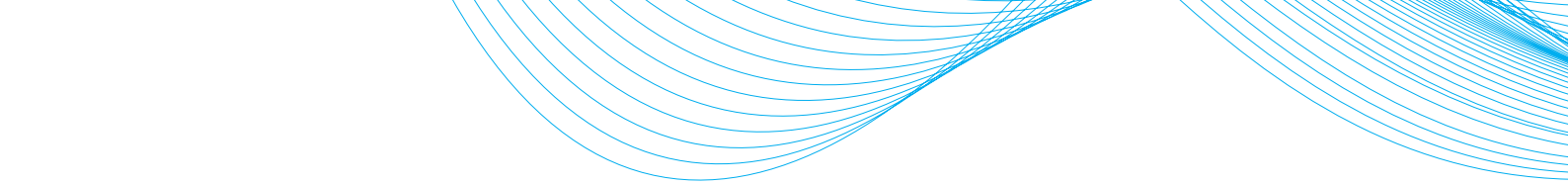
The 2009 pandemic clearly highlighted the need to develop guidance on strategies that could be employed during a pandemic to enhance the finite health sector workforce capacity and to address the need to sustain surge capacity for long periods of time, noting that the hospitals system and health workforce are adept at escalating to surge capacity when needed but that this capacity is difficult to maintain. While such guidance would focus on health workforce issues related to influenza pandemics, it is anticipated that this guidance would have broad application to all events where demand for health care could exceed surge capacity, particularly over an extended period of time. The guidance could cover strategies to maximise critical-care capacity in a pandemic, including flexible use of cross-professional skill sets and finite treatment modalities such as ECMO, as well as maximising the traditional health workforce through return-to-work policies, use of retired staff and appropriate use of volunteers or partially trained staff. Guidance could also address patient assessment and prioritisation in line with an agreed ethical framework, and ensuring that health services are optimised, including considering a range of service delivery models in pandemics of different severities (such as GPs, influenza-specific services, 'flu clinics' and telephone consultations).

Recommendation 16:

Develop a health sector surge capacity strategy to address the anticipated increase in demand for health services during a pandemic and the need to sustain provision for long periods of time.

Recommendations

15. Identify and formalise mechanisms to enhance communication with the clinical sector before and during a pandemic, in particular to communicate the role of AHPC and public health aims in a pandemic. This could include formalising networks and considering ways of enhancing the intersection and integration of Commonwealth and jurisdictional governments and local networks of peak bodies.
16. Develop a health sector surge capacity strategy to address the anticipated increase in demand for health services during a pandemic and the need to sustain provision for long periods of time.



Chapter 7

Laboratory Capacity

Key Findings

- Australia has a well-established and well-prepared network of diagnostic laboratories that was able to respond flexibly and quickly to support the public health response.
- Public health laboratory capacity was stretched, and private laboratories played an important role in supporting the public health response.
- Communicating the public health policy rationale for laboratory testing at different stages of a pandemic to front-line clinicians and laboratories could be improved.
- Mechanisms to improve timely reporting of results, including of negative tests, should be considered.
- Large quantities of testing reagents were used. Additional equipment to meet the surge in testing was difficult to source.

Text box 7: Laboratory capacity guidance from AHMPPI 2008

Objectives

- Operational objective 1: Communicate the best available information to decision makers, health professionals and the public.
- Operational objective 2: Minimise transmission.
  - 2.3 - Slow the spread in the community.

Purpose

Laboratory measures as outlined in the AHMPPI have two important functions:

- a surveillance role to support early identification of novel virus and changes in the virus
- a diagnostic role to inform clinical management of cases and contacts.

Governance

- Laboratory measures are a health sector decision.

7.1 Pandemic Planning

The AHMPPI highlights the importance of laboratory diagnosis for individuals infected with a new pandemic strain, and the significant role of laboratories in a pandemic. In particular, the plan emphasises the need for a rapid and sustainable early response, and acknowledges a change of focus during the later stages of a pandemic.[29]

Australia has a well-established and well-prepared network of diagnostic laboratories to support a public health response through the Public Health Laboratory Network (PHLN). The PHLN laboratories and other major laboratories have established a substantial capacity for polymerase chain reaction (PCR)–based influenza testing, including the ability to safely and effectively test for a new pandemic strain. In addition, a number of initiatives had been undertaken by the Australian Government prior to 2009 to prepare laboratory capacity for a pandemic, including:

- providing equipment and H5N1 test kits and in-laboratory training to South Australia, the Northern Territory, the Australian Capital Territory and Tasmania, to ensure that every jurisdiction could test for pandemic influenza
- meeting with the Australian Association of Pathology Practices to develop plans for communicating with public and private

29 "... it may not be possible or necessary to have a laboratory confirmation of every case of pandemic influenza. It is likely that, for the majority of patients, the diagnosis will be clear on clinical grounds alone. Laboratory services will focus on reassessment of assumptions, monitoring any drift in the virus and assessing effectiveness of antivirals and vaccines". *Australian Health Management Plan for Pandemic Influenza*. (Australian Government Department of Health and Ageing (2008), AustHMPek p. 131.

laboratories and for the collection, transport and testing of specimens.

Some jurisdictions, including Queensland, had established a stockpile of reagents and consumables as part of its pandemic planning. This was not the case in all jurisdictions.

Australia also benefits from the expertise and testing provided by the WHO Collaborating Centre (WHO CC) for Reference and Research on Influenza in Melbourne. This is one of five WHO influenza collaborating centres in the world and is part of the WHO Global Influenza Surveillance Network (GISN). The GISN performs laboratory analysis of both seasonal and novel influenza strains collected from more than 90 countries around the world. The WHO CC in Melbourne has a particular focus on influenza viruses in the Asia–Pacific region, and supports the countries in this region with early detection and laboratory analysis.

7.2 Response Implemented

The PHLN met regularly during the pandemic response to discuss the situation across the country and provide information on any changes to the virus or to testing protocols. The PHLN provided expert advice to the AHPC.

The expertise within PHLN laboratories for the development and application of new PCR tests enabled pandemic (H1N1) 2009 influenza test kits to be developed early in the response. This was also facilitated by early access to information on the new virus, timely dissemination of matrix kits in early April by the US Centers for Disease Control and Prevention (CDC), and access to positive control material (ribonucleic acid from pandemic (H1N1) 2009 virus isolates collected from the earliest New Zealand cases). Rapid dissemination of material to Australian laboratories by the WHO CC allowed some limited test evaluation and inter-laboratory sensitivity comparisons prior to the entry of the pandemic strain into Australia.

In the early stages of the pandemic response, the PHLN laboratories provided all isolates to the WHO CC for further typing and characterisation. In the later stages of the pandemic, only representative samples of specimens were provided.

Large private pathology practices played an important role during the response and were used to varying degrees in each jurisdiction. These practices had the ability to collect specimens through established couriers, had an existing information and communication network with GPs and were able to provide advice and education to the primary care and private hospital sectors.

In contrast to other jurisdictions, the private sector in Queensland was able to provide a large amount of diagnostic testing due to its pre-existing PCR testing capacity. The ability to redirect this PCR capacity to influenza testing was assisted by a Memorandum of Understanding (MOU) between Queensland Health and the providers of influenza testing that enabled the stockpiling of molecular testing reagents and rapid antigen test kits.

The need for additional automated influenza testing capacity became apparent during the 2009 pandemic as laboratories struggled to meet the ongoing demand. The Australian Government and some states and territories provided funding for the purchase of additional automated influenza testing equipment. However, in most cases this equipment was not provided to the laboratories until the peak demand for testing was over, due to delays in approval and procurement processes.

7.3 Key Issues and Lessons Identified

Pandemic planning processes over the past five years have provided a good framework for laboratory response design and procedures. Infrastructure and expertise already in place in PHLN laboratories allowed the PHLN to be flexible and quickly respond to the pandemic. Nonetheless, important issues and areas of improvement were identified.

7.3.1 Communication and information sharing

Doctors and nurses at the front-line sometimes received contradictory advice about the need for laboratory testing from a variety of sources including government and professional bodies, which caused confusion among health professionals. In any emerging infectious disease outbreak, test results may be required for public health purposes as well as for individual patient management, regardless of the phase.

During the 2009 pandemic, communication to clinicians about the public health aims of testing was poor. Hence, when policies changed relating to the management of patients, and therefore the priorities for testing, the testing recommendations were slow to be implemented at clinical request level. Even if communicated quickly, the rationale behind the changes was unclear. This had a substantial impact on laboratory workloads.

There needs to be better understanding of clinical demand for testing as well as better communication of policies and their rationale.

There was also a lack of communication between public health decision-making bodies (the AHPC and its subcommittees and the states and territories) and the laboratories undertaking the testing. National health policies had an impact on the testing load and the sustainability of laboratory services. Laboratory capacity for routine testing for other conditions was stretched, and this should be considered when evaluating diagnosis policies.

Recommendation 17:

Identify ways of improving the communication before and during a pandemic between public health decision-making bodies, front-line clinicians and diagnostic laboratories to ensure that the rationale behind laboratory testing during each phase of a pandemic is clear and that resources are used efficiently.

In the early stages of the pandemic, communication between laboratories and the public health units that implemented the interventions was generally very good. However, the method used was inefficient, and better use of existing automated electronic communication should be explored. There were reports in some areas of slowness in communicating negative results, which are important for public health management, delaying the cessation of public health countermeasures. This may in part have been due to a lack of understanding of the importance of negative results (for example, quarantine could be lifted when negative results were received), but more often it was because reporting systems had been set up to communicate only positive results to public health units as required for disease notification. These reporting systems proved difficult to adapt to enable rapid communication of negative results or, as was required in some jurisdictions, rapid notification of individuals who were being tested prior to their results being available. A clear process for urgent communications from laboratories to public health units is required.

Laboratories, both public and private, play a major role in diagnosing infections of public health importance, including influenza. As this information is integral in a pandemic, a need to improve information sharing both between laboratories and with public health units and clinicians has been identified. In general, information systems in public health laboratories do not have direct links with public health units. Current laboratory information management systems serve the needs of hospitalised patients and individual clinicians, but are not easily adapted to other purposes. There is no interface that allows laboratories, even within a single jurisdiction, to readily exchange information with one another electronically. This leads to inefficiencies and duplications in entering and reporting data.

Recommendation 18:

Identify ways of improving the reporting of laboratory results, including negative tests, to ensure rapid and easy access by public health units, other local laboratories and clinicians. This may include implementing an automated information system to enable two-way electronic communication.

7.3.2 Pandemic diagnostic ability

7.3.2.1 Development of and access to tests

There was rapid development of pandemic (H1N1) 2009 testing methods soon after the virus emerged, facilitated by access to positive control material. Throughout the pandemic, access to testing was appropriate in all jurisdictions.

7.3.2.2 Surge capacity

The ability of laboratories to meet the demand for a large number of tests applies to every aspect of laboratory service, including specimen collection, specimen transport, administrative processing, technical testing and reporting of results. Many laboratories were able to meet the demand for most of the pandemic period and adjusted their systems to deal with increased pressures. However, public health laboratory capacity within Australia was stretched during the 2009 pandemic. Private laboratories played an important role in supporting the public health response. Although involvement differed by jurisdiction, private laboratories provide an important pandemic diagnostic surge capacity.

Laboratories were acutely aware that sustained pressure would 'burn out' staff. Some laboratories had to develop their own criteria for rationing testing to protect the workforce once capacity was exceeded. The phase change to PROTECT

temporarily alleviated the pressure because diagnostic testing was then directed only towards people with more severe illness or with underlying vulnerability. However, demand did not decline as anticipated. There was still an expectation that testing would be provided for non-critical clinical cases.

There were duplicated processes in the triaging of specimens and matching of request forms and samples. More administrative staff was required to deal with large numbers of telephone inquiries and manually prepare the reports needed for public health units.

In addition, large numbers of testing reagents were needed and most jurisdictions did not have adequate stockpiles of these. Additional equipment was required for the surge in testing and was difficult to access during the 2009 pandemic. Future planning should take into account limited availability of essential supplies during a pandemic and review barriers to the rapid meeting of unforeseen equipment needs.

7.3.2.3 Quality assurance

Laboratories must ensure that their diagnostic results are correct and consistent. Laboratories in Australia are accredited to perform tests by the National Association of Testing Authorities Australia (NATA)/Royal College of Pathologists of Australasia (RCPA) Medical Testing Accreditation Program to standard ISO15189. Ensuring ongoing quality of test results arises from participation in proficiency-testing schemes such as RCPA Quality Assurance Programs. While there are traditional methods of diagnosis for influenza, tests that directly detect the vital genetic material (nucleic acid testing (NAT), including PCR) are useful because they are very sensitive and specific, providing a rapid diagnosis. These were widely used in the 2009 pandemic response. There is currently a proficiency-testing scheme for nucleic acid amplification assays for influenza in Australia, conducted by the Serology Quality Assurance Program of the RCPA; however, this is limited and not adequately resourced for rapid response to newly emerging threats. There is scope to enhance this capacity. Another rudimentary system is provided through the WHO National Influenza Centre in Hong Kong, which needs to be upgraded to be rapidly responsive to the emergence of new pathogens.

7.3.3 Routine influenza diagnostic ability

Aspects of routine influenza testing have been identified that may be able to assist in improving the information available during a pandemic response. Routine reporting of the proportion of influenza tests that are positive gives public health authorities an understanding of the amount of respiratory disease in the community and of the proportion due to influenza which may be controlled by public health action. Consideration could be given to appropriate mechanisms to encourage the wider implementation of routine PCR-based testing for influenza and other respiratory viruses, recognising both individual diagnostic needs and public health requirements. Furthermore, the routine capacity to identify and report influenza A subtypes would enhance the early detection of new pandemic subtypes. Surveillance systems should incorporate laboratory data to enable this analysis.

Recommendation 19:

Clearly define the roles of the Public Health Laboratory Network, the WHO Collaborating Centre for Reference and Research on Influenza in Melbourne, National Influenza Centres in Australia, and diagnostic public and private laboratories.

Recommendations

17. Identify ways of improving the communication before and during a pandemic between public health decision-making bodies, front-line clinicians and diagnostic laboratories to ensure that the rationale behind laboratory testing during each phase of a pandemic is clear and that resources are used efficiently.
18. Identify ways of improving the reporting of laboratory results, including negative tests, to ensure rapid and easy access by public health units, other local laboratories and clinicians. This may include implementing an automated information system to enable two-way electronic communication.
19. Clearly define the roles of the Public Health Laboratory Network, the WHO Collaborating Centre for Reference and Research on Influenza in Melbourne, National Influenza Centres in Australia, and diagnostic public and private laboratories.

Chapter 8

National Medical Stockpile Deployment

Key Findings

- The National Medical Stockpile met the demands of the 2009 pandemic, although overall demand was limited.
- There is a need to better communicate the role of stockpiles and to clarify the policy regarding and timing of the transition from jurisdictional stockpiles to the national stockpile.
- Distribution, tracking and reporting mechanisms could be enhanced.
- Responsibility for providing personal protective equipment to general practitioners should be clearly defined.

Text box 8: National Medical Stockpile guidance from AHMPPI 2008

Objective

- Operational objective 2: Minimise transmission.

Purpose

- Actions will be taken to reduce the spread of the pandemic virus to minimise the number of people affected by the disease.
- The function of the National Medical Stockpile is to maintain a stock of pharmaceuticals, personal protective equipment and medical equipment to enable the Australian Government to respond to a range of public health threats.

Governance

- The use of the National Medical Stockpile to respond to a pandemic is an Australian Government Department of Health and Ageing decision undertaken in consultation with the Australian Health Protection Committee.

8.1 Pandemic Planning

The National Medical Stockpile (NMS) was established by the Australian Government in 2002. It is a national strategic reserve of essential vaccines, antibiotics, antiviral drugs, chemical and radiological antidotes and personal protective equipment (PPE). The NMS is designed to supplement existing medical stocks held in the Australian hospital system and by states and territories, to ensure that medical supplies do not run low in response to a health emergency in Australia. Specific details of its contents are not publicly released for security reasons. The NMS is a Commonwealth resource, held in several strategic locations around Australia to ensure that distribution throughout Australia is rapid.

A significant proportion of the NMS is a reserve of PPE, antiviral medication and medical supplies for vaccination (such as syringes, needles, sharps containers and alcohol swabs) for use in an influenza pandemic. Such items are stockpiled to ensure Australia's self-sufficiency during a time of high global demand and insufficient manufacturing and distribution capacity.

8.1.1 Pandemic supplies

The NMS held 8.7 million courses of antiviral medications, named oseltamivir (Tamiflu®) and zanamivir (Relenza®), prior to the pandemic, including both adult and paediatric preparations and oseltamivir in bulk powder form that could be processed into a solution.

The PPE in the NMS included protective P2 masks (P2 respirator), surgical masks, goggles, gowns, gloves and alcohol rubs to protect individuals from infection. Access to this reserve of PPE is based on risk of exposure and availability of supplies, which are limited.

The NMS also contained a small stock of pre-pandemic, or 'candidate', vaccines based on the avian H5N1 influenza virus. The AHMPPI outlines that candidate vaccines are held because they may provide partial protection against a virus if it emerges as a pandemic strain. As planning for

the administration of a pandemic vaccine was originally based on mass vaccination clinics, the NMS also included enough ancillary medical supplies (consumables), such as alcohol swabs, hand rubs, needles and syringes, to assist with the administration of the vaccine. When packaged together, these are known as PanFlu VacPacks.

Specific stocks in the NMS were allocated to support border staff and healthcare workers involved in screening and assessing passengers at the Australian border, and arriving international passengers and aircrew in quarantine. These planned supplies of PPE equipment were pre-packed and stored ready for rapid distribution.

8.1.2 Policies for use of the NMS

The AHMPPI outlines the broad policy for priority access to PPE and antiviral medications from the NMS. Decisions regarding the use of NMS stockpiled items are made on the advice of the AHPC based on the risk of exposure, the availability of supply and the most effective approach to mitigating the risk of pandemic influenza in the community. Planning for the use of antiviral medications from the NMS is based on the recognition that these medicines need to be used strategically because stocks are finite and replenishment during a pandemic may not be possible due to worldwide demand and production limitations.

Planning assumes that, in the early stages of a pandemic while case numbers remain small, general practices would remain responsible for sourcing and storing their own PPE and any other equipment for office staff, as normally occurs for seasonal influenza.

8.1.3 Deployment of the NMS

To ensure rapid and effective distribution of the NMS, the DoHA has held Memoranda of Understanding (MOUs) with each state and territory since 2006. These MOUs set out responsibilities for the receipt, storage and deployment of NMS items. The Australian Government would distribute stocks to predetermined receiving sites in the states and territories, and each state and territory would be responsible for distributing stocks as needed. As international borders are an Australian Government responsibility, deployment of stockpile items required for border workers and quarantine would be an Australian Government responsibility.

The approval process to release supplies from the NMS requires a jurisdictional Chief Health Officer (CHO) to request items from the NMS in writing. Each request would be approved by both a Deputy Secretary of the Department of Health and Ageing and the Chief Medical Officer (CMO). Once approved, the stock would be deployed from NMS supplies and delivered to the nominated jurisdictional receiving site.

8.2 Response Implemented

The first deployment of items to the states and territories from the NMS occurred on 30 April 2009 and the last, for managing cases of illness, occurred on 17 November 2009.

Early in the response, the Australian Government positioned NMS stocks of antiviral medications and PPE in warehouses in all Australian capital cities to prime the supply system. Border agencies regularly requested PPE stocks from the NMS, which were sent directly from NMS warehouses to airports and agencies. PPE supplies to assist international travellers in quarantine were sent to individuals from the NMS.

Arrangements for health sector access to PPE and antiviral medications, including provision to GPs, differed across states and territories. Some jurisdictions set up 'flu clinics' where NMS items were distributed, some used community pharmacies to aid distribution, and others used the resources in public health units for distribution. Generally, antiviral medications were initially distributed from individual state and territory stockpiles and, later, jurisdictions sought supplies from the NMS to meet their needs. Similarly, early supplies of PPE were distributed from state and territory stockpiles and private practice supplies and then from the NMS. The Australian Government contracted the Australian General Practice Network (AGPN) to distribute PPE to general practices in Victoria when the demand there was high.

Requests from jurisdictions for supplies were considered at the time they were made. To minimise delays in approving requests due to the high volume received, a streamlined approach was implemented during the reponse in order to standardise requests from jurisdictions on a pro forma; to pre-approve requests from border agencies up to an agreed percentage of allocated supplies; and so that only one approver was required. A notional allocation policy was

developed during the response to ensure ongoing availability of supplies to jurisdictions.

With the increased role of GPs in administering pandemic (H1N1) 2009 vaccine, the contents of the pre-planned PanFlu VacPacks were restructured, in consultation with the AHPC National Immunisation Committee Pandemic Vaccine Working Group (AHPCNIC), to include syringes and needles only. The delivery mechanism was also changed from the planned distribution to jurisdictional receiving facilities in that the Australian Government arranged with the vaccine manufacturer, CSL Limited, to distribute the PanFlu VacPacks with the vaccine directly to immunisation providers. This process meant that the vaccine could be administered immediately. The manufacturer provided this service at no cost for the first two months of the vaccine rollout. After that time, individual states and territories negotiated with the manufacturer directly for this service.

8.3 Key Issues and Lessons Identified

Australia's NMS met the demands of the 2009 pandemic; however, the moderate nature of the pandemic led to limited demands on the NMS overall. Demands would be expected to be much higher in a severe pandemic.

8.3.1 Distribution arrangements

There was a strong collaborative working relationship between the DoHA and NMS logistics and product suppliers, built over time during the planning stage. Planned arrangements, including transport, for the distribution of NMS supplies from the Australian Government to jurisdictional receiving facilities generally were effective and enabled timely movement of consignments. Holding stock in various Australian Government storage facilities across Australia and pre-positioning them in jurisdictional warehouses was also effective in reducing distribution response time, particularly for the large volumes of PPE items. Tracking stocks for reporting to key stakeholders could be improved. Consideration should be given to predetermining data requirements.

There were some issues with ensuring appropriate storage at all sites. Delivery of PPE to border agencies at airports was challenging due to limited storage capacity, which resulted in frequent requests for small quantities. Delivery of medication requiring cold-chain storage was problematic for facilities in rural and remote locations, which sometimes affected the timeliness of delivery. This issue needs further consideration in planning.

The distribution mechanisms to move items from the jurisdictional receiving facilities to the front line were not well established. New systems were developed in some jurisdictions which provide lessons and models for the future. These include distribution of antiviral medication through community pharmacies and provision of stockpiled PPE through the AGPN, as occurred in Victoria.

Although there was significant awareness and agreement from jurisdictional policymakers on distribution arrangements, this was not always well communicated to the operational and logistics teams in the jurisdictions. The MOUs should be renewed to clarify and reinforce deployment and distribution arrangements.

8.3.2 Access policies

Some states and territories held more substantial stockpiles than others. While a clear principle of use of the NMS was that no jurisdiction would be disadvantaged because of its own stockpiling, there was a lack of clarity with respect to the policy regarding the timing of the transition from jurisdictional stockpiles to the national stockpile. Agreements between national and jurisdictional policymakers on the rationale, contents, allocation and release of stockpiled items were not well communicated. There was some discontent regarding eligibility, within the context that jurisdictions affected first were receiving supplies from the NMS and other jurisdictions were concerned about the ongoing availability of sufficient supplies. An area for further policy consideration is whether it would be desirable to develop a detailed allocation policy prior to another pandemic. This could be based on a per capita share, for example, or on an agreement to allocate as much as required where and when first needed during a pandemic given the inevitability that all jurisdictions would be affected, or on guiding principles clearly defining the goal of using NMS supplies.

The 2009 pandemic experience has demonstrated that healthcare providers expect PPE resources to be readily available when required. Policy regarding responsibility for providing PPE to GPs was not understood at the start of the pandemic, which caused ill will among some GPs and

inconsistencies across the country. This emerged as a significant issue. Whether it is feasible for general practices to procure and store their own PPE for a pandemic needs to be reconsidered. Such private purchase and storage seems to have been limited. If GPs are not able to provide their own PPE, the efficient use of government resources comes into consideration. The place of assessment of influenza patients (for example, at GP practices or at 'flu clinics') is crucial to consideration of the magnitude and delivery of the stockpile items, and affects who requires PPE and who is responsible for the provision of that PPE (whether the practitioner, the jurisdiction or the NMS). This issue needs substantial clarification and communication before another pandemic. For example, in a general practice, one P2 mask may be needed to protect a staff member assessing a single patient before the mask needs to be discarded, while in a flu clinic, one P2 mask may be used to protect a staff member assessing multiple patients. However, a counterpoint to this is that even if flu clinics are established, patients may continue to visit GPs, since within Australia's normal health system individuals have a choice about whom to consult if they are unwell, so attendance at general practices may be unavoidable.

Another area for further policy consideration relates to the timing of termination of access to the NMS.

Recommendation 20:

Refine and clarify the eligibility policies and logistic procedures for the national and jurisdictional stockpiles for pandemic influenza. Work with healthcare providers to better communicate the role of stockpiles and to facilitate better understanding of when and how stockpile items are made available.

8.3.3 NMS contents

While the PanFlu VacPacks were considered useful, there were a number of issues that needed to be addressed during the response. The size of the packs developed for mass vaccination clinics was problematic for both storage and transport, and did not meet the needs of GPs. While a one-off transportation to rural Queensland and Tasmania via air freight was required to meet vaccination commencement deadlines, it was not possible to transport the packs containing alcohol hand rub by regional airlines to regional and remote areas. However, as items for PanFlu VacPacks are stored in bulk, creation of packs without alcohol rub was feasible and some PanFlu VacPacks were quickly modified to enable air transport to remote areas.

There were concerns raised about the quality of some of the items in the PanFlu VacPacks. The products included in the packs were not the same brand normally ordered by GPs, which added to the perceived inferiority of the products provided. In particular, concerns were raised that the sharps containers did not meet Australian standards, that the needles were of poor quality, that the large gauge of the needle provided for drawing up vaccine from the multi-dose vials (MDVs) repeatedly piercing the bung could compromise the integrity of the bung. Other concerns included the presence of latex in the syringe plungers. There was no pre-planned strategy to rapidly supply alternative types of items while awaiting appropriate testing of materials. There is a need to engage with healthcare professionals to inform future specifications of certain stockpile items.

Some concerns have been raised regarding access to paediatric formulations of antiviral medication. Most supplies of oseltamivir paediatric suspension were deployed quickly due to the relatively high incidence of pandemic (H1N1) 2009 infection in children. To maintain paediatric formulations, paediatric oseltamivir capsules were purchased by the Australian Government; however, these were not available until towards the end of the pandemic peak. While some were deployed, most were held in reserve. Consideration of the types and amounts of paediatric antiviral formulations held in the NMS should be given further consideration. Also, containers of oseltamivir bulk powder were supplied to some jurisdictions to be made into solution by local hospital pharmacies (negating the need for cold-chain transportation). Due to regulatory requirements, the solution could not be distributed widely from the hospital pharmacies, which meant that rural pharmacies were required to fulfil this obligation. The Australian Government engaged a licensed pharmaceutical manufacturer to produce oseltamivir solution on a large scale so that bulk supplies could be delivered to state and territory health authorities. Implementation of this arrangement was delayed due to contractual and legal issues.

Although P2 masks are an important piece of equipment for the protection of healthcare workers from respiratory infections, they require training

to ensure correct use and fit. Their utility in a national stockpile should be reconsidered.

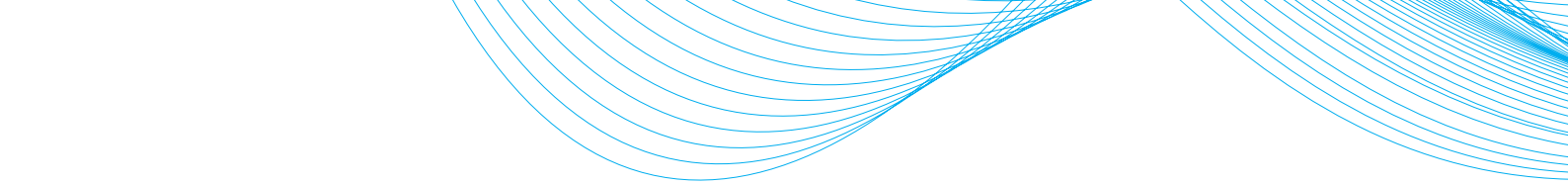
There is a need to review the need for pre-packaged equipment, in particular those for use by border staff, given that the prepared (pre-planned) packs were either not deployed or not available early enough during the response. A review would include consideration of the reasons that packs were not requested, whether pre-deployment would raise awareness, and the storage issues and potential costs involved. Also, the delivery of home quarantine support packs through the Home Quarantine Support System to individuals was not always timely and therefore their effectiveness as a resource was limited.

Recommendation 21:

Review the types and quantities of stockpiled goods in the National Medical Stockpile for an influenza pandemic.

Recommendations

20. Refine and clarify the eligibility policies and logistic procedures for the national and jurisdictional stockpiles for pandemic influenza. Work with healthcare providers to better communicate the role of stockpiles and to facilitate better understanding of when and how stockpile items are made available.
21. Review the types and quantities of stockpiled goods in the National Medical Stockpile for an influenza pandemic.



Chapter 9
Vaccination

Key Findings

- Pre-established contracts with vaccine manufacturers aided the early availability of a pandemic vaccine in Australia.
- A customised pandemic vaccine using current technology is unlikely to be available during the first wave of an influenza epidemic.
- The national vaccination program contributed to the substantially lower than expected levels of circulating pandemic influenza virus during Australia's 2010 influenza season and the low impact of influenza on the Australian population in 2010.
- A primarily GP-based vaccination program was an appropriate response in 2009.
- Pandemic planning needs to cover a range of vaccination program scenarios based on disease virulence. Communicating the rationale of a vaccination program is a key component to its success.
- The value of accurate records of vaccination during a pandemic needs further consideration.

Text box 9: Vaccination guidance from AHMPPI 2008

Objective

- Operational objective 2: Minimise transmission.
  - 2.4 Vaccination

Purpose

- A candidate vaccine may reduce the severity of illness in those who become infected, or prevent infection in some people, but not to the extent of a customised pandemic vaccine.
- A customised pandemic vaccine is an important tool in responding to an influenza pandemic to protect the vulnerable and prevent or control spread of the virus.

Governance

- Prioritising initial doses of pandemic vaccine is a whole-of-government decision to be made at the time.

9.1 Pandemic Planning

In 2004 the DoHA tendered for, and executed, Influenza Deeds of Agreement with CSL Limited and Sanofi Pasteur for the supply of seasonal and pandemic influenza vaccines. The deeds secured Australia with priority access to supplies of pre-pandemic (candidate) and pandemic (customised) influenza vaccine.

Australia's national response plans are premised on delaying the establishment and spread of the disease in Australia for as long as possible to allow the production of a vaccine specific to the pandemic strain. WHO advises that "influenza vaccines are one of the most effective ways to protect people from contracting illness during influenza epidemics and pandemics".[30] Production of a customised pandemic vaccine can only begin after the pandemic virus has emerged, and the AHMPPI outlines that it would be several months before the first doses became available.

Australia's pandemic planning included the procurement and stockpiling of a small amount of candidate H5N1 vaccines, as that influenza strain was thought to have the highest pandemic potential. The advantage of these vaccines is that they can be made and stockpiled ahead of time and would therefore be available some months before a customised pandemic vaccine would be available. The AHMPPI acknowledges

30 WHO. *Vaccines for pandemic (H1N1) 2009*. www.who.int/csr/disease/swineflu/vaccines/en/index.html.

that candidate vaccines are only effective if the pandemic strain belongs to the same influenza subtype.

It was planned that a customised pandemic vaccine would be produced in multi-dose vials (MDVs), as doing so significantly reduces the time it takes for the manufacturer to fill and finish the vaccine compared to single doses. This would also allow more vaccine to be available for use in a shorter period of time and take up less room in storage facilities and immunisation providers' fridges.

Planning assumed that the pandemic vaccine may need to be released prior to its registration by the Therapeutic Goods Administration (TGA). In a severe pandemic, to hasten the vaccination of the population, the vaccine distribution could occur through certification under section 18A (2b) of the *Therapeutic Goods Act 1989*, which allows for goods to be made available urgently in Australia to deal with an actual threat to public health due to an emergency. This approach reflected expectations that a pandemic would be likely to have severe health consequences and so achieving the earliest possible release of a pandemic vaccine would be important. In this context, a pandemic influenza vaccine patient consent form was planned.

Planning for distribution and administration of the vaccine was undertaken in partnership with the states and territories. Because a more severe pandemic was assumed, it was thought that vaccination delivery would largely be executed through mass vaccination clinics conducted in public venues. To assist in the administration of pandemic vaccines in these clinics, the Australian Government stockpiled sufficient vaccination equipment, including syringes, needles for drawing up vaccine and administration, sharps containers and alcohol wipes, to support the vaccination of the entire population.

During the pandemic planning stage, the AHPC National Immunisation Committee Pandemic Vaccine Working Group (AHPCNIC) discussed operational matters with respect to pandemic vaccination planning. It was planned that an operation group, the Pandemic Control Network (PCN), would form during a pandemic (see Chapter 1: Governance and Decision Making) that would include the AHPCNIC membership. Also, the CMO's Scientific Pandemic Advisory Group (SPAG) would form to provide expert technical advice on matters relating to pandemic influenza vaccines.

9.2 Response Implemented

9.2.1 Committees

The CMO's Vaccine Advisory Group (VAG) provided advice on the recommended quantity of vaccinations required to protect the vulnerable and reduce transmission in the community. The CMO's Scientific Pandemic Advisory Group (SPAG) convened to provide advice on priority groups and vaccine formulation. Immunisation advice was also sought from the CMO's GPRT.

The AHPCNIC operated as the key logistical coordinators for the rollout of the Pandemic (H1N1) Vaccination Program. Membership included at least one representative from each state and territory, and largely comprised the same membership as the standing Jurisdictional Immunisation Coordinators (JIC) group of immunisation program managers who are responsible for the logistics of the routine National Immunisation Program.

The Australian Technical Advisory Group on Immunisation (ATAGI) provided technical advice on the use of multi-dose vials and other vaccine administration issues when required. This role was not envisaged during planning and became of key importance during the response.

9.2.2 Purchase of a customised pandemic (H1N1) 2009 vaccine

The Australian Government held discussions early in the response with the two contracted influenza vaccine manufacturers, CSL Limited and Sanofi Pasteur. CSL Limited was selected to supply the pandemic vaccine, as it had the capacity to supply the vaccine in a timely manner at a reasonable price. Separate discussions were also held with six vaccine manufacturers, including CSL Limited, to establish capacity to supply additional pandemic vaccine if further doses were required. The need for further supplies did not eventuate.

The Australian Government purchased 21 million doses of pandemic vaccine, which ensured vaccine supply for Australia. The order was placed in May 2009 (see Figure 4 for a timeline of vaccine availability). Australia's order was based on expert advice in Australia and internationally that two doses of vaccine would most likely be needed to achieve a good level of immunity. The initial order was intended to provide enough vaccine to meet the two objectives of reducing transmission and protecting the vulnerable. The aim was to cover those most at risk of severe outcomes from influenza (approximately 3.35 million people,

including Indigenous Australians, those with compromised immunity, pregnant women and older Australians) and a sufficient number of the population to control the spread of infection (33 per cent of the population or 7 million people) – a total of 10.5 million courses. Clinical trials provided a clear indication in September 2009 that adults would only require one dose. This enabled the vaccine to be offered to all Australians as part of the national Pandemic (H1N1) Vaccination Program.

The majority of the vaccine was supplied in MDVs as planned. The Royal Australian College of General Practitioners (RACGP) developed guidelines, in consultation with ATAGI, on the safe administration of vaccine from MDVs. This information was disseminated to GPs and other immunisation providers at the commencement of the vaccination program, and was included with every vaccine order. Single-dose preservative (thiomersal)–free pre-filled syringes (PFSs) were purchased for use in children aged from six months to under three years. PFSs made it easier to administer the smaller dose required in this age group, and also provided parents with the choice of obtaining thiomersal-free product for their young children should they desire. Concern about the safety of thiomersal had been linked to MDVs. ATAGI was commissioned to review the clinical evidence, and advice was provided to reassure clinicians and the public of its safety.

9.2.3 Testing and registration

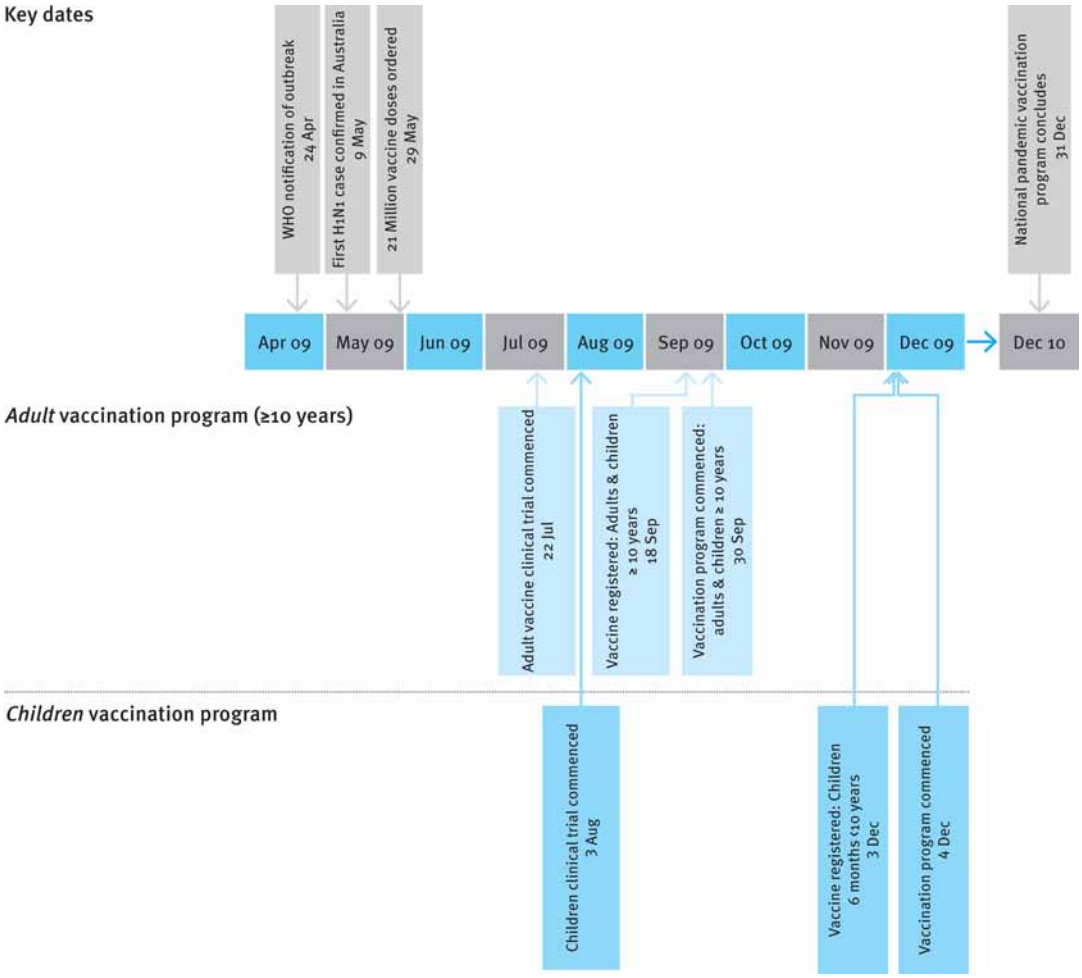
Clinical trials are not normally conducted in the southern hemisphere for changes in strains in seasonal influenza vaccine. To ensure timely availability of seasonal influenza vaccine in Australia each year, the Therapeutic Goods Administration (TGA) processes applications for registration of such vaccines as a strain change rather than as a new product where there are no changes to the manufacturing process other than the virus strain. However, the pandemic (H1N1) 2009 virus was a novel virus and a monovalent vaccine was to be manufactured. The TGA therefore requested clinical trials prior to registration.

The Australian Government funded adult and paediatric clinical trials to assess the safety and efficacy of the pandemic (H1N1) 2009 vaccine and to determine the number of doses required to produce an effective immune response. The adult trial commenced on 22 July 2009, with interim results available in early September 2009 that confirmed that the vaccine was effective and provided clarification that only one dose was required for adults and children over 10 years of age.[31] The paediatric trial commenced on 3 August 2009, with preliminary results in November 2009 indicating that one dose achieved a good level of immunity but a second dose was recommended to ensure a sustained response. The results of the US paediatric clinical trials were also used to inform the range of paediatric dosage in Australia.

The vaccine, Panvax® H1N1, was not released until it had been registered by the TGA. The TGA approved registration for use in adults and children 10 years and older on 18 September 2009, and in children aged six months to under ten years on 3 December 2009. The national Pandemic (H1N1) Vaccination Program commenced on 30 September 2009 for people aged 10 years and over and on 4 December 2009 for children aged six months to under 10 years. It concluded on 31 December 2010 when the remaining stockpiled vaccine expired.

31 Interim results of the adult clinical trial were published online in the *New England Journal of Medicine* on 10 September 2009.

Figure 4: Timeline of vaccine availability



9.2.4 Vaccination program rollout

The objective of the Pandemic (H1N1) 2009 Vaccination Program was to prevent further spread of the current wave of pandemic (H1N1) 2009 influenza in the Australian community and protect the Australian community against possible future waves of a similar or more severe variant of the pandemic virus. During program rollout planning it was agreed that the vaccine would initially be offered as a priority to certain groups at higher risk of exposure (such as healthcare workers) and those vulnerable to more severe outcomes (including pregnant women, Indigenous Australians and people with underlying medical conditions). Confirmation that a single dose was sufficient resulted in enough vaccine being available to offer free of charge to all Australians from the commencement of the program.

Pandemic vaccine distribution reflected the National Immunisation Program arrangements. In all the states, CSL Limited managed the distribution of vaccine from jurisdictional repositories to immunisation providers. The Australian Capital Territory and the Northern Territory managed their own distribution requirements. The quantity of vaccine distributed was driven by demand from immunisation providers.

In addition, CSL Limited agreed to distribute patient consent forms, information sheets and MDV guidelines with the vaccine, as well as the vaccination equipment packs (PanFlu VacPacks).

The vaccine was primarily administered through GP surgeries and not mass vaccination clinics as had been anticipated in pandemic planning. Vaccination was also administered in hospitals (mainly for healthcare workers) and through Aboriginal Medical Services, state-run clinics and aged-care services. Some jurisdictions also operated clinics at school premises on weekends,

at festivals and through vaccination programs in schools for students with disabilities and outreach clinics to remote Indigenous communities, to facilitate availability of the vaccine to the community.

9.2.5 Vaccine uptake

Vaccinations were recorded by providers for each individual. Systematic collection of these records was not implemented. Four of the eight jurisdictions provided estimated vaccine uptake figures based on the number of doses of vaccine distributed to immunisation providers, changes in immunity detected in routine blood collections, and individual self-reporting of vaccination collected by telephone surveys.

9.2.5.1 Adult Vaccination Survey

The Adult Vaccination Survey (AVS) is routinely conducted by Computer Assisted Telephone Interview (CATI) through the Australian Institute of Health and Welfare (AIHW). A question regarding the pandemic (H1N1) 2009 vaccine was added to the 2009 Adult Vaccination Survey.

Interviews were conducted between 20 November 2009 and 23 December 2009, after the national Pandemic (H1N1) Vaccination Program had commenced. The survey was administered to 10,231 randomly selected households across Australia. Questions were included about awareness of the vaccine and actual vaccination. Results have been extrapolated as a representation of the Australian population.[32] An estimated 15.9 million adult Australians had heard of the 'swine flu' vaccine (representing 96 per cent of the 16.6 million adults in scope for the survey). Of these, 19 per cent, or an estimated three million adults, had received the vaccine.

A second survey involving adults and children, the Pandemic Vaccination Survey, was conducted by the AIHW in January and February 2010. The results of this survey[33] indicate that approximately 3.9 million Australians, or approximately 18 per cent of Australians of all ages, had been vaccinated against the pandemic (H1N1) 2009 virus by the end of February 2010 (which is prior to the commencement of the 2010 influenza season), including 21 per cent of adults. The percentage varied across jurisdictions.

9.2.5.2 Serosurveillance

While serosurveillance studies were conducted to gain an understanding of immunity to pandemic influenza in the community, they can also provide a measure of immunity due to vaccination.

A National Serosurveillance Study was carried out using blood collected from Red Cross donors aged 18 and over from seven cities in Australia. Donors are typically healthy adults. Comparisons were made with 500 samples collected in Cairns and Townsville in May 2009; that is, before the pandemic had emerged in Australia. In these baseline blood samples, the proportion of blood from donors that showed immunity to the pandemic (H1N1) 2009 virus was 12 per cent (range 5–15 per cent).

In October 2009 to November 2009, after the initial stage of infection in Australia, the seropositivity in 779 blood samples from major city centres across Australia was 22 per cent (range 20–30 per cent). This suggests that exposure to the novel pandemic (H1N1) 2009 strain during the 2009 winter was relatively uncommon among the healthy adult population, in the order of 10 per cent.

In March 2010 to April 2010, following distribution of the pandemic (H1N1) 2009 vaccine, seropositivity in 986 blood samples collected from major city centres across Australia was 43 per cent (range 40–50 per cent). This rise was observed across all age groups and jurisdictions.

The increase in the seropositive proportion observed between October 2009 and April 2010 is likely attributable to vaccination, given the absence of observed outbreaks and very few notified cases of pandemic (H1N1) 2009 over the period. This level of immunity would be anticipated to constrain transmission of the pandemic strain of influenza in the community among members of the adult population.

9.2.6 Adverse events

Recording of any adverse events is important after a vaccine is administered. Rare reactions to vaccines may only be apparent after a large number of people have been immunised. These need to be identified to determine preventative measures and ensure ongoing safety of the vaccination program.

32 Australian Institute of Health and Welfare (2011). *2009 Adult Vaccination Survey: summary results,* cat. no. PHE135, available from www.aihw.gov.au/publication-detail/?id=10737418409

33 AIHW (2010). *2010 Pandemic Vaccination Survey: summary results,* cat. no. PHE128, available from www.aihw.gov.au/WorkArea/DownloadAsset.aspx?id=6442460016

Adverse events for the pandemic (H1N1) 2009 vaccine were collected by the TGA through the existing mechanisms used for the National Immunisation Program. This is a passive surveillance reporting system that relies on immunisation providers and consumers reporting reactions to the vaccine. Reports can be made to state and territory health departments, to the vaccine manufacturer or directly to the TGA. Expert committees examine these reports and compile and respond appropriately to the adverse event data.

9.2.7 Donation of vaccine to WHO

The Australian Government made two separate donations of vaccine to assist the WHO initiative to provide pandemic (H1N1) 2009 vaccine to developing countries in need that faced difficulty in accessing limited global supplies of the vaccine. The first donation, of 2.1 million doses, was provided to the Comoros, the Cook Islands, East Timor, Fiji, Kiribati, Laos, Nauru, Niue, Papua New Guinea, Samoa, the Solomon Islands, Sri Lanka, Tokelau, Tonga, Tuvalu and Vanuatu. Recipient countries of the second donation, of 1.7 million doses, were Equatorial Guinea, Samoa, Somalia and Sri Lanka.

As Australia's pandemic planning did not incorporate processes for donating vaccine to WHO, these arrangements were established during the pandemic response.

9.3 Key Issues and Lessons Identified

The national Pandemic (H1N1) Vaccination Program was the biggest vaccination program undertaken in Australian history, and contributed to the substantially lower than expected levels of circulating pandemic influenza virus during Australia's 2010 influenza season and the low impact of influenza on the Australian population in 2010.

9.3.1 Committees

The committees responsible for providing advice on pandemic vaccine and vaccination need to be streamlined and their functions made clear. Concerns have been raised regarding the number of committees supporting the CMO and the need for greater transparency and accountability of these groups. The input from committees that routinely advise on vaccination and procedures for immunisation, in particular ATAGI, was valued and these committees should be used in the future rather than new or separate pandemic structures. There was some concern regarding having two national operational immunisation committees with the same jurisdictional members operating at the same time (the AHPCNIC and the JIC).

The forums that were established during the response to engage with the primary care sector were also valuable. The GP Roundtable and the Indigenous Flu Network worked well to ensure an open dialogue between governments and the primary care sector.

Pandemic committee structures are discussed in Chapter 1: Governance and Decision Making.

9.3.2 Vaccine availability

A customised pandemic vaccine using current egg-based vaccine manufacturing technology is unlikely to be available during the first wave of an influenza epidemic. This was recognised in the AHMPPI. While activating pre-established contracts with the vaccine manufacturers guaranteed Australia priority access to pandemic vaccine and aided the speed of availability of the vaccine within five months of the pandemic emerging, the vaccine was not available until there had been a significant decline in the number of cases. A range of factors affect the timeline for vaccine availability, including strain approval processes, reassortment strain production, production of reagents for vaccine standardisation, and establishment of clinical trials and assessment and use of early data. While there is some potential for improvement, it is unlikely that this timeline could be significantly shortened, emphasising the importance of implementing other mechanisms for slowing disease transmission in the early stages of a pandemic. In a severe pandemic, some time may be gained by use of a vaccine yet to be registered by the TGA. This needs further and careful consideration.

9.3.3 Testing and registration

The need for clinical trials of a pandemic influenza vaccine had not been foreseen in pandemic planning. This was an additional step. The clinical trials for children started long after the pandemic had emerged because initial safety signals from adult trials are needed before commencing the paediatric study, and because of difficulties in recruiting children for trials. This discrepancy between the timing of vaccine

availability for children and for adults needs to be considered when planning the objectives of a pandemic vaccination strategy.

The registration of the pandemic (H1N1) 2009 vaccine was critical in 2009. In the context of the moderate overall nature of the pandemic, where public fear and concern was low, immunisation providers were reluctant to administer an unregistered vaccine. Concerns were raised about insurance indemnities associated with the proposed Pandemic (H1N1) Vaccination Program if the vaccine was not registered by the TGA by the time the vaccination program commenced. These issues were resolved through a process of working with medical indemnity insurers to ensure that they had a more detailed understanding of the vaccine and of the vaccination program processes. However, in a severe pandemic there could be great pressure to release a vaccine prior to registration. Triggers for use of an unregistered vaccine need to be planned. Further work is also needed with medical indemnity insurers to establish processes to indemnify providers in the event of the rollout of an unregistered vaccine.

Recommendation 22:

Identify and understand the risks posed to the success of a pandemic vaccination program and develop strategies to mitigate these risks. This could include defining when it may be appropriate to use an unregistered vaccine, and examining other barriers affecting vaccine uptake.

9.3.4 Vaccination program rollout

Communicating the rationale of a vaccination program is a key component of its success. While development of communication materials for the vaccination program was extensive and they were generally well received, there is a tension between wide consultation and timeliness, and streamlining of the development and approval processes is required. The provision of a consent form caused some confusion for clinicians and patients, since there is no national consent form for seasonal influenza vaccination. However, as planned, consent forms would be crucial if the vaccine to be administered was not TGA approved.

There was a need to better explain the concept of at-risk groups and why they were at greater risk, and also the importance of those in contact with high-risk groups to be vaccinated to protect others. The rapidly changing knowledge about the severity of the pandemic and the dosage requirements of the available vaccine led to uncertainty and some confusion about who should receive the vaccine. There is a need to clearly communicate changing priorities to immunisation providers and the public.

Rollout planning was successfully undertaken in an environment where there was uncertainty about timelines for regulatory requirements, dates for vaccine release, delivery time frames, program start dates and resources for administering the vaccination program. The distribution of vaccine across the country within a short period of time, using the regular processes for seasonal influenza vaccines, worked well.

A GP-based vaccination program was an appropriate response in 2009. While using GPs as the primary providers of the pandemic (H1N1) 2009 vaccine involved some logistical challenges, these were managed as they arose. Arrangements were made during the response to remunerate GPs administering vaccinations outside their usual clinics, such as in aged-care facilities.

However, GP and primary care capacity to administer a national vaccination program is finite and limited by GPs' need to provide normal health care. GPs would not be able to deliver all vaccinations in a timely manner. Plans for mass vaccination, including plans for remote areas, are still required for a more severe pandemic. Clear understanding about the resources and funding required to facilitate this is needed. More discussion is required about the best models for quickly vaccinating a community where a pandemic is more severe.

While the use of multi-dose vials (MDVs) in a general practice setting maximises storage capacity, it may have resulted in high levels of wastage. It is reported that some GPs declined to provide opportunistic or individual vaccination in favour of requesting that patients return for a dedicated vaccination clinic, because they did not want to waste vaccine.

Recommendation 23:

Ensure that planning for the delivery of a pandemic vaccination program encompasses both mass vaccination scenarios and more routinely delivered models of care.

There was considerable concern about the risk of transmission of infection with the use of MBVs, if not used correctly. The guidelines developed by

ATAGI and the RACGP on safe administration of vaccine from MDVs were widely disseminated and provided with each vaccine order to immunisation providers. MDVs are likely to be required in any pandemic, as they provide a vaccine substantially earlier than single-dose vials or pre-filled syringes. This was not well understood by all stakeholders. Pandemic plans should reflect the rationale for decisions made regarding planned vaccination policies.

The shorter than anticipated vaccine shelf life after opening a vial (set at 24 hours by the TGA based on data provided by the manufacturer) raised questions about the need for the preservative thiomersal, and may have resulted in greater waste. This shelf life differed from those set by regulators in other countries. Some of the packaging of the vaccine also caused concerns. The first packages of MDVs to become available contained 900 doses (50 vials containing 18 doses each) and were too large to be used in most GP clinics. Subsequently 100-dose packs (10 vials containing 10 doses each) were manufactured. Labelling of the packaging was also considered confusing as it differed between box sizes, and the packaging of Panvax® Junior and Fluvax® Junior was considered too similar.

9.3.5 Vaccine uptake

There are no comprehensive data available about the uptake of vaccine or about vaccine wastage during the 2009 response. The absence of an integrated electronic data collection and reporting system precluded the ability to comprehensively monitor administration of the vaccine. Jurisdictions reported that the systems used to manage data on vaccine uptake and wastage were inefficient and resource intensive, with retrieval and reporting difficult and not timely, and that resources would need to be taken away from service provision to work on data collection. Whether accurate records of vaccination are required needs further consideration. Indirect measures of vaccination, such as distribution of vaccine, serosurveys and self-reporting of vaccination, did provide a reasonable picture of the proportion of adults vaccinated in Australia.

Recommendation 24:

Determine the need for detailed data about vaccine uptake during a pandemic and consider an integrated data collection system to capture the distribution and administration of a vaccine.

9.3.6 Adverse events reporting

Adverse events following vaccination (also known as adverse events following immunisation, or AEFI) reported for the pandemic (H1N1) 2009 vaccine were largely as expected and detailed in the vaccine product information. The rate of adverse events reported was consistent with the rates reported in the clinical trials and with seasonal influenza vaccines. The use of an adverse events reporting system that was familiar to GPs contributed to its success.

Following the 2010 influenza season, the Australian Government considered that a review of the national response to reported AEFI was prudent. The primary purpose of the review was to identify improvements that could be made to the reporting arrangements, with a particular focus on transparency and communications. The review has been completed and the DoHA is in the process of implementing its recommendations.

Recommendations

22. Identify and understand the risks posed to the success of a pandemic vaccination program and develop strategies to mitigate these risks. This could include defining when it may be appropriate to use an unregistered vaccine, and examining other barriers affecting vaccine uptake.
23. Ensure that planning for the delivery of a pandemic vaccination program encompasses both mass vaccination scenarios and more routinely delivered models of care.
24. Determine the need for detailed data about vaccine uptake during a pandemic and consider an integrated data collection system to capture the distribution and administration of vaccines.

Chapter 10

Aboriginal and Torres Strait Islander Peoples

Key Findings

- Indigenous Australians were found to be more vulnerable than the general Australian population to severe outcomes from the pandemic (H1N1) 2009 virus.
- An appendix to the PROTECT Annex was developed to address issues specific to Indigenous Australians.
- Consideration should be given to maintaining an Indigenous Flu Network or similar forum to inform future planning and ensure a nationally coordinated response for Indigenous Australians.

Text box 10: Indigenous Australians guidance from AHMPPI 2008

Objectives

- Operational objective 2: Minimise transmission.
  - 2.3 Slow the spread in the community.
  - 2.4 Vaccinate the population to protect individuals and control the pandemic.
- Operational objective 3: Optimise the health system to reduce mortality and morbidity.
  - 3.2 Establish and maintain influenza-specific services.

Purpose

- Slow the spread of disease in the community and minimise the number of people affected by the disease.
- Vaccinate the population to protect individuals and control the pandemic

Governance

- The health sector is responsible for decision making on Indigenous health issues.

10.1 Pandemic Planning

The AHMPPI has an ethical framework that recognises the special needs, cultural values and religious beliefs of different members of the Australian community, especially when providing health services to high-risk groups, such as Aboriginal and Torres Strait Islander peoples and culturally and linguistically diverse groups. The AHMPPI 2008 provided the overarching framework for all Australians, integrating the national health response for Indigenous Australians into Commonwealth and state and territory planning.

Annexes to the AHMPPI were being developed prior to the pandemic in 2009 to cover arrangements for special groups by professional category or health risk, including an Aboriginal and Torres Strait Islander Health Service Annex; however, these had not been finalised.

Primary health care for Indigenous Australians is provided by private GPs as well as by more than 200 Australian Government–funded Indigenous primary health services, including 150 Aboriginal Community Controlled Health Services (ACCHSs), and by state and territory–run Indigenous-specific services. ACCHSs are funded by the Australian Government and in most instances work in collaboration with state and territory primary health and public health initiatives. The National Aboriginal Community Controlled Health Organisation (NACCHO) is the peak Aboriginal health body representing ACCHSs throughout Australia. NACCHO Affiliates are the state or territory peak Indigenous community–controlled health bodies; there are eight in Australia, one in each state and territory.

The Australian Government funds NACCHO Affiliates to employ Public Health Medical Officers

(PHMOs).[34] The role of a PHMO is to support and augment the capacity of ACCHSs to prioritise and implement public health initiatives within their jurisdiction. In addition, the DoHA, through its Office for Aboriginal and Torres Strait Islander Health (OATSIH), has strong links with many other Indigenous health organisations.

10.2 Response Implemented

Early international surveillance information suggested that Indigenous Australian populations were more likely than the general Australian population to experience severe outcomes from infection with pandemic (H1N1) 2009 influenza, and that people with underlying chronic health conditions were also at greater risk. This led Australian health authorities to consider and anticipate that the pandemic (H1N1) 2009 influenza virus might pose a high risk to Indigenous Australians.[35]

Early Australian data indicated that approximately 20 per cent of confirmed cases of pandemic (H1N1) 2009 were identified as Indigenous Australian patients, and that these patients were hospitalised at eight times the rate of non-Indigenous Australians. While there was no evidence of widespread pandemic influenza in Indigenous communities, there were some cases in many Indigenous communities across Australia. All Indigenous Australians were included as an at-risk vulnerable group for management purposes.

The Australian Government, state and territory health departments and the Indigenous health sector worked closely to ensure timely and appropriate support for case management. The Australian Health Protection Committee (AHPC) agreed that ACCHSs were to be included in the jurisdictional delivery and pre-positioning of personal protective equipment (PPE) and antiviral medications from the National Medical Stockpile (NMS). A number of ACCHSs had commenced or completed work on their own pandemic response plans, and in some jurisdictions ACCHSs and NACCHO Affiliates were included in jurisdictional-level planning processes. State and territory health departments worked with various ACCHSs to coordinate specific local responses, including supplies for case management in remote communities.

The Indigenous Flu Network (IFN) was established during the response. The IFN provided a regular communication channel to share information and discuss solutions to acute and emerging issues relating to surveillance and epidemiological trends, communication and community engagement, workforce shift and surge capacity, and access to and prepositioning of antiviral medications and PPE from the NMS. This meant that a more comprehensive response for Indigenous Australians could be implemented. The IFN comprised experienced clinicians and public health physicians, including members of the Public Health Medical Officers network, from across Australia. It included representatives of peak bodies such as NACCHO and its Affiliates and the Australian Indigenous Doctors Association, as well as the National Indigenous Immunisation Coordinator from the National Centre for Immunisation Research and Surveillance. This positioned the IFN well to optimise ACCHS preparedness and response systems. The IFN also advocated for inclusion of the Indigenous primary healthcare workforce in the training facilitated by the Royal Australian College of General Practitioners (RACGP) and the Australian General Practice Network (AGPN).

Under the PROTECT phase, Indigenous Australians were identified as one of the highest priority groups. To meet the challenges of the 2009 pandemic, an appendix to the PROTECT Annex specifically focusing on Indigenous Australians *(Guidance for Primary Health Care Workers Providing Care to Aboriginal and Torres Strait Islander People)* was developed in conjunction with the Indigenous health sector. It provided practical advice for primary healthcare workers, outlining issues specific to Indigenous Australians including those with underlying medical conditions and/or living in remote communities. Advice was consistent with national guidelines for measures such as infection control and case definitions, with context-specific advice for populations residing in remote community settings.

The appendix took practical and cultural factors in Indigenous communities into consideration for implementing public health measures such as isolation, cough etiquette and hand washing. It

34 The equivalent of one PHMO position is located in each state and territory affiliate of NACCHO (0.5 for the ACT and Tasmania).

35 Indigenous Australians have higher rates of underlying chronic disease, some of which is undiagnosed, than the general Australian population. Indigenous Australians also have a higher prevalence of risk factors for chronic disease and a higher likelihood of having at least one risk factor for chronic disease. Chronic disease also develops at a younger age in Indigenous Australians than in the general Australian population.

identified that early and rapid clinical support was important, particularly for remote communities. This included identifying sources of clinical support, planning for emergency evacuations by liaising with retrieval services and early anticipation of clinical deterioration to allow timely transfer. In recognition that testing and treatment of pandemic influenza cases may be different for Indigenous Australians living in remote communities, with limited laboratory testing capacity in some areas and less than timely results, wider use of antiviral medication provided a means of protecting communities that were not yet affected by the virus. Antiviral medication could also be used to protect the limited number of healthcare workers available in remote Indigenous communities.

A national communication strategy was developed to support the response activities outlined in the PROTECT phase, in particular its strong emphasis on recognising contacts who may be vulnerable because of their underlying health conditions, within the context of protecting family or community members. The main objectives were to increase awareness of pandemic (H1N1) 2009 influenza, its symptoms and the health risks it presented for Indigenous Australians; to promote preventative actions to minimise the risk of infection or spread; and to encourage individuals to seek medical attention early.

Communication products based on standard pandemic influenza messages had been pre-prepared for Indigenous communities. Some adaptation was required to ensure relevancy to pandemic (H1N1) 2009. Communication products are likely to require adaption for each pandemic.

Indigenous Australians were identified as a priority group in the Pandemic (H1N1) Vaccination Program. The IFN also assisted in the planning and delivery of the vaccination program, identifying and advising on issues relating to deployment, quality, safety, service provider arrangements, indemnity and Medicare rebates. The IFN assisted in ensuring timely access to the vaccination program, particularly for remote communities. The IFN communicated with jurisdictional immunisation providers so that various models of service delivery for Indigenous Australians were supported and incorporated into the vaccination communication strategy.

10.3 Key Issues and Lessons Identified

Indigenous Australians were found to be more vulnerable than the general Australian population to complications from the pandemic (H1N1) 2009 virus, with disproportionately high rates of complication and a six-fold death rate compared with non-indigenous Australians. The reasons for these more serious outcomes are likely to be multi-factorial and include social and cultural factors as well as the physical environment. Information on Indigenous populations of other parts of the world and early recognition of this threat to Indigenous Australians aided Australia's response. The disease burden for this group may have been even higher without this prioritised attention.

Another pandemic is also likely to disproportionately affect this group. Plans need to incorporate this expectation and include appropriate responses that incorporate Indigenous-specific cultural, social and environmental values. There needs to be good linkage between jurisdictional and national-level planning and implementation of a response in urban, regional and remote settings. The logistics of remote area access should feature in emergency plans, as should the need to involve members of the Indigenous health and social sectors, as well as community leaders.

There were difficulties in providing personal protective equipment, medication and vaccine to Indigenous Australians in remote areas. The solutions that were put in place during the 2009 pandemic to overcome the logistical transport challenges need to inform future plans.

There was a limited trained workforce for the pandemic response in remote community settings. Surge capacity to support the established clinical workers who were already delivering healthcare services in Indigenous communities would have been a great advantage.

Once established, the IFN proved to be a useful mechanism and communication channel to ensure a nationally coordinated response for Indigenous Australians. Consideration should be given to maintaining it or establishing a similar forum, to inform planning and response. Representation of network members on key national and jurisdictional bodies was critical. These included the Interjurisdictional Pandemic Planners Working Group (IPPWG), the GPRT, the National Immunisation Committee and the AHPC

as required. The IFN provided strategic advice and support to the Indigenous health sector and to the DoHA, which ensured that the needs of the Indigenous primary healthcare sector were incorporated into the national response. This type of network was also operational at jurisdictional level in many states and territories.

Recommendation 25:

Further develop and incorporate Indigenous Health Services and the cultural, social and environmental values of Indigenous Australians into pandemic planning at national, state and territory levels.

Appendices

Appendix A

Key Stakeholder Input

Health committees

- Australian Health Protection Committee (AHPC)
- Australian Health Protection Committee National Immunisation Committee Pandemic Vaccine Working Group (AHPCNIC)
- Australian Technical Advisory Group on Immunisation (ATAGI)
- Chief Quarantine Officers (CQOs) Network
- Chief Medical Officer (CMO) expert groups:
  - Expert Advisory Group on Pandemic Influenza (EAG)
  - Scientific Influenza Advisory Group (SIAG)
  - Scientific Pandemic Advisory Group (SPAG)
  - Vaccine Advisory Group (VAG)
- Communicable Diseases Network Australia (CDNA)
- Indigenous Flu Network (IFN)
- General Practice Roundtable (GPRT)
- National Health Emergency Media Response Network (NHEMRN)
- Public Health Laboratory Network Australia (PHLN)
- Seasonal Influenza Surveillance Strategy Working Group (SISSWG)

Clinical sector

- Australian and New Zealand Intensive Care Society (ANZICS)
- Australian College for Emergency Medicine (ACEM)
- Australian College of Rural and Remote Medicine (ACRRM)
- Australian Practice Nurses Association (APNA)
- Australian Medical Association (AMA)
- Royal Australasian College of Physicians (RACP)
- Royal Australian College of General Practitioners (RACGP)
- Royal Australian and New Zealand College of Obstetricians and Gynaecologists (RANZCOG)

Australian Government agencies and statutory bodies

- Australian Customs and Border Protection Service
- Australian Quarantine and Inspection Service (AQIS)
- Other Australian Government agencies through the Inter-departmental Committee on Pandemic Influenza Preparedness and Response
- Teams within the Department of Health and Ageing (DoHA):
  - Border Health
  - Communications
  - National Medical Stockpile (NMS)
  - Office for Aboriginal and Torres Strait Islander Health (OATSIH)
  - Surveillance
  - Vaccine
- Therapeutic Goods Administration (TGA)

State and territory jurisdictions

- Committee memberships
- Jurisdictional reports

Appendix B

Pandemic (H1N1) 2009 Public Communication Campaign

National

First round (from May 2009)

- A national television, radio and print advertising campaign informed Australians of the Australian Government's actions to reduce the spread of 'swine flu', including measures at Australia's borders, awareness of symptoms of influenza, and measures people could take to reduce the spread of influenza.
- The campaign was also used to raise the awareness that some individuals were more likely to suffer from severe disease with pandemic (H1N1) 2009 virus infection. These vulnerable groups were encouraged to be vigilant and seek medical advice if they became unwell.
- Some advertising was produced for people from non-English-speaking backgrounds, and tailored communications were developed for Aboriginal and Torres Strait Islander audiences.

Second round (from September 2009)

- A national television, radio and print advertising campaign promoted the free pandemic influenza vaccine.
- This campaign advised that 'swine flu' caused illness, hospitalisation and death and was continuing to spread throughout the community, and that the vaccine provided protection against pandemic (H1N1) 2009 virus.
- Print advertising was translated into 11 languages and placed in relevant newspapers for linguistically diverse communities. A consumer brochure and poster were also produced and translated into 11 languages, and placed on the Health Emergency website.
- This campaign also included a specific Indigenous Australian focus, with print and radio advertising developed to target this audience.

Third round (from December 2009)

- A national print campaign promoted the pandemic (H1N1) 2009 influenza vaccine for children and encouraged parents to vaccinate their children.
- A revised consumer brochure and patient information sheet were also produced and translated, which included information on the availability of the vaccine for children.

Fourth round (from March 2010)

- 'Facts about swine flu' was a national radio and print advertising campaign designed to promote the Pandemic (H1N1) Vaccination Program. This campaign demonstrated that the pandemic (H1N1) 2009 virus was no ordinary influenza virus and that it affected young, healthy people.
- Print advertising targeting Indigenous Australians and audiences from non-English-speaking backgrounds was also undertaken during this period.

Research and evaluation of the national public communication campaigns

Qualitative research was undertaken in May and June 2009 to test print and radio advertising containing 'swine flu' information and hygiene messages. One round of testing of the concepts in the campaign was undertaken in August 2009. This informed the development process. A further two rounds of research were conducted in September 2009 with special groups including GPs, practice nurses, pregnant women, people with a chronic condition, families and 'empty nesters'.[36] Two rounds of concept testing of the autumn (Round 4) campaign print and radio materials were conducted in February and March 2010 with GPs, young adults without children, parents and 'empty nesters'.

The Pandemic (H1N1) 2009 Public Communication Campaign was evaluated over two time periods: September to November 2009, and March to June 2010. Evaluation comprised a quantitative online survey of Australian adults and an online survey of Australian GPs. The adult research

36 Parents of adult children who have left home.

Table B.1: 2009 survey

Wave	Stage	Date	Number surveyed
Adults (general public)			
1	Benchmark survey	10–28 September 2009	823
2	Tracking survey (mid-campaign)	13–18 October 2009	906
3	Tracking survey (after campaign)	3–15 November 2009	858
GPs			
1	Benchmark survey	10–28 September 2009	150
2	Evaluation (end of campaign)	13–18 October 2009	150

Table B.2: 2010 survey

Wave	Stage	Date	Number surveyed
Adults (general public)			
4	Benchmark survey	11–20 March 2010	815
5	Tracking survey (after campaign)	1–10 June 2010	883
GPs			
3	Benchmark survey	1–7 February 2010	150
4	Evaluation (end of campaign)	7–14 June 2010	150

participants were recruited from an audited list of more than 150,000 members. Quotas were set that were representative of the Australian population for age, location and gender, and the data were post-weighted to the population using Australian Bureau of Statistics Census figures. A random sample of GPs, drawn from a Medical Internet Research Panel (MIRP),[37] was invited to participate. The surveys and numbers of participants are detailed in Table B.1: 2009 Survey and Table 2: 2010 Survey.

Findings from the survey in the first period (September to November 2009) were that the pandemic (H1N1) vaccination communication campaign had reached approximately two thirds (65 per cent) of the sample. Among those who had seen or heard the advertisements, the main campaign messages had been very clearly communicated. The campaign was also considered by those reached to be useful and relevant (82 per cent of those reached) and believable (87 per cent of those reached). The campaign was considered more likely to reassure (36 per cent) than increase concern (17 per cent). As well as experiencing increased awareness of the vaccine, many adults took action. By November 2009, 60 per cent of those reached had discussed the vaccine with friends or family; 30 per cent had encouraged others to get the vaccine; 29 per cent had discussed the vaccine with a doctor; and 8 per cent had visited the website.

The 2010 public information campaign did not include television, and the proportion of the population reached was, not surprisingly, lower than that reached by the previous campaign. Approximately one-third (33 per cent) of the sample surveyed had seen the campaign. It was considered by those reached to be believable (85 per cent), and useful and relevant (77 per cent), and as more likely to reassure (40 per cent) than raise concern (26 per cent). Following the 2010 campaign, 75 per cent of those reached by

37 Managed by Cegedim Strategic Data Australia.

the campaign were likely to take action as a result of having seen it; 55 per cent had discussed the vaccine with friends or family; 44 per cent had encouraged others to have the vaccine; 48 per cent had discussed the vaccine with a doctor; and 10 per cent had visited the Health Emergency website.

Appendix C

Border Measures Implemented During Pandemic (H1N1) 2009

In-flight announcements

On 27 April 2009, notice was given under subsection 74AA(1) of the *Quarantine Act 1908* for all flights originating from countries in North, Central and South America and arriving in Australia to make in-flight announcements prior to arrival to inform passengers of facts regarding pandemic (H1N1) 2009 influenza, border entry requirements and appropriate behaviour (including hygiene practices) after their arrival.

Quarantinable diseases list

On 28 April 2009, the Governor General proclaimed 'human swine influenza with pandemic potential' a quarantinable disease under the *Quarantine Act 1908*. This allowed Quarantine Officers to take action where suspected or actual cases were identified.

Border nurses

From 28 April 2009, border nurses were deployed to the eight major airports (Adelaide, Brisbane, Cairns, Coolangatta, Darwin, Melbourne, Perth and Sydney) to provide advice and check symptoms of individual travellers referred to them following identification as unwell through any of the three screening methods (non-automatic pratique, HDCs and thermal scanners).

- The nurse checked whether the person met the Communicable Diseases Network of Australia's case definition, which required taking the person's temperature and interviewing them.
- If the case definition was met, nasal swabs were taken for laboratory testing. If laboratory testing was positive, the person was contacted and requested to place themselves in voluntary quarantine at home or in their hotel.
- If the person was symptomatic:
  - if their symptoms were not severe, they were asked to place themselves in (voluntary) quarantine at home or in their hotel until test results were available, and provided with a mask (along with instructions for wearing it), their hands disinfected, advised on the use of alcohol wipes and provided with hard-copy information sheets that included details of relevant websites and telephone hotline numbers
  - if their symptoms were severe, they were hospitalised.

Non-automatic pratique

From midnight on 29 April 2009, non-automatic pratique was implemented on all international flights into Australia whereby the aircraft captains were required to report to the Australian Quarantine and Inspection Service (AQIS) on the health status of passengers and crew on the aircraft prior to landing. This was required in order to provide advance notice of any need for further screening for symptoms. This required in-flight announcements to be made advising passengers experiencing influenza-like symptoms to self-identify as unwell. Upon landing, identified passengers were assessed by an AQIS officer to determine whether medical attention was required. If the assessment indicated possible pandemic (H1N1) 2009 influenza, the person was escorted to a border nurse for further assessment.

Health Declaration Cards

From 29 April 2009, Health Declaration Cards (HDCs) were distributed to the Australian Customs and Border Protection Service at each of the eight major airports (Adelaide, Brisbane, Cairns, Coolangatta, Darwin, Melbourne, Perth and Sydney) (see Table C.1: Average number of incoming international passengers per day at Australia's major international airports for the period 1 May 2009 to 1 June 2009). The purpose of HDCs was to provide information on pandemic (H1N1) 2009 influenza to incoming passengers and crew; to provide an initial screening tool to allow further screening of incoming passengers and crew if they reported symptoms; and to allow tracing of incoming passengers and crew who had been close contacts of passengers and crew confirmed to be infected with pandemic (H1N1) 2009 influenza (known as 'contact tracing').

The HDC was a requirement in addition to the routine Incoming Passenger Card, to be handed to the Customs and Border Protection Service Officer at the primary line along with the passenger's

passport and Incoming Passenger Card. The HDC required passengers to provide their personal details and seat number, answer questions about symptoms and provide contact details of people they would be in contact with over the following seven days. If the passenger ticked 'yes' to any of the questions about symptoms, they were escorted to a border nurse for further assessment.

The completed cards were collected by the Customs and Border Protection Service and provided to information management firm Decipha, which scanned the cards and placed the information on the secure GovDex website. The information was accessed if contact tracing was needed.

The HDC also served a valuable purpose for passengers and crew, as it had a take-home section that included a health alert notice and recommended that the traveller keep the notice for 14 days after arrival to provide to their doctor for information and reporting purposes should the traveller become unwell.

Thermal scanners

From 29 April 2009, 25 thermal scanners were delivered to the eight major airports (Adelaide, Brisbane, Cairns, Coolangatta, Darwin, Melbourne, Perth and Sydney) and set up close to the primary line. The purpose of thermal scanning is to detect incoming passengers and crew with raised temperatures (higher than 38° Celsius) to allow further screening for symptoms. They were operated by AQIS personnel. Travellers passed in front of the thermal scanners and, if identified as having a raised temperature, were escorted to the border nurse for further assessment.

Emergency quarantine measures

On 30 April 2009, the Australian Government Minister for Health and Ageing authorised the implementation of emergency quarantine measures under subsection 12A(1) of the *Quarantine Act 1908*. Under this authorisation, airports and airlines could be directed to accommodate enhanced border measures to minimise the public health risk from potentially infective incoming international travellers. No directions were subsequently made by the minister as all agencies, governments and companies voluntarily complied with requests to enhance border measures.

Under the emergency provisions of the Act (Section 2B), the Governor General could declare an epidemic. This would provide the minister with extensive powers to address an emergency.

Public health messages

Signage relating to the risk of infection from pandemic (H1N1) 2009 influenza was placed around all international airports. The Customs and Border Protection Service also placed messages on their electronic signs near primary lines at all international airports. Business card–sized notices with information were also available at primary lines.

Border measures for cruise ships

Non-automatic pratique and HDCs were used. A national protocol for managing cases on cruise ships was developed during the pandemic response.

Table C.1: Average number of incoming international passengers per day at Australia's major international airports for the period 1 May 2009 to 1 June 2009

Airport	Number of passengers	Percentage (approximate)
Adelaide	593	2
Brisbane	4,956	17
Cairns	510	2
Coolangatta	766	3
Darwin	532	2
Melbourne	5,953	21
Perth	3,193	11
Sydney	12,182	42
Total	**28,685**	**100**

Glossary

ACCHS	Aboriginal Community Controlled Health Services
ACEM	Australian College for Emergency Medicine
ACRRM	Australian College of Rural and Remote Medicine
AEFI	Adverse Event Following Immunisation
AGCC	Australian Government Crisis Committee
AGPN	Australian General Practice Network
AHMAC	Australian Health Ministers' Advisory Council
AHMC	Australian Health Ministers' Conference
AHMPPI	Australian Health Management Plan for Pandemic Influenza
AHPC	Australian Health Protection Committee
AHPCNIC	Australian Health Protection Committee National Immunisation Committee Pandemic Vaccine Working Group
AIHW	Australian Institute of Health and Welfare
AMA	Australian Medical Association
ANZICS	Australian and New Zealand Intensive Care Society
APNA	Australian Practice Nurses Association
AQIS	Australian Quarantine and Inspection Service
ASPREN	Australian Sentinel Practices Research Network
ATAGI	Australian Technical Advisory Group on Immunisation
AVS	Adult Vaccination Survey
CATI	Computer assisted telephone interview
CDC	United States Centers for Disease Control and Prevention
CDNA	Communicable Diseases Network Australia
CHO	Chief Health Officer (states and territories)
CHQO	Chief Human Quarantine Officers
CMO	Chief Medical Officer (Commonwealth)
COAG	Council of Australian Governments
Commonwealth	Australian Government
CQO	Chief Human Quarantine Officer
DAFF	Department of Agriculture, Fisheries and Forestry
DoHA	Australian Government Department of Health and Ageing
EAG	Chief Medical Officer's Expert Advisory Group on Pandemic Influenza

ECMO	Extra-corporeal membrane oxygenation
ED	Emergency departments
Fluborderplan	National Pandemic Influenza Airport Border Operations Plan
FluCAN	Influenza Complications Alert Network
GISN	WHO Global Influenza Surveillance Network
GP	General Practitioner
GPRT	General Practice Roundtable
H1N1	Pandemic (H1N1) 2009 influenza virus
H5N1	Avian (H5N1) influenza virus
HDC	Health Declaration Card
HQSS	Home Qurantine Support System
ICU	Intensive care unit
IFN	Indigenous Flu Network
IHR	*International Health Regulations 2005*
ILI	Influenza-like illness
Indigenous Australians	Aboriginal and Torres Strait Islander peoples
IPPWG	Inter-jurisdictional Pandemic Planners Working Group
JIC	Jurisdictional Immunisation Coordinators
Jurisdiction	Any one of the eight states and territories in Australia: the Australian Capital Territory, New South Wales, the Northern Territory, Queensland, South Australia, Tasmania, Victoria, Western Australia
MDV	Multi-dose vial
MIRP	Medical Internet Research Panel
MOU	Memorandum of Understanding
NACCHO	National Aboriginal Community Controlled Health Organisation (the peak Aboriginal health body representing ACCHSs throughout Australia)
NACCHO Affiliates	The state or territory peak Indigenous community–controlled health bodies; there is one in each jurisdiction
NAP	National Action Plan for Human Influenza Pandemic
NAT	Nucleic acid testing
NATA	National Association of Testing Authorities
NetEpi	An internet-based national reporting system for disease outbreaks
NFP	National Focal Point
NHEMRN	National Health Emergency Media Response Network
NHMRC	National Health and Medical Research Council
NIR	National Incident Room

NMS	National Medical Stockpile
NNDSS	National Notifiable Diseases Surveillance System
NPEC	National Pandemic Emergency Committee
OATSIH	Office for Aboriginal and Torres Strait Islander Health, Australian Government Department of Health and Ageing
OHP	Office of Health Protection, Australian Government Department of Health and Ageing
Pandemic (H1N1) 2009	The pandemic (H1N1) 2009 influenza virus; also WHO terminology for the pandemic in general
Pandemic vaccine	Panvax® H1N1 Influenza Vaccine manufactured by CSL Limited and used in Australia
PanFlu VacPacks	Pandemic Influenza Vaccination Packs that include supplies to assist with the administration of the vaccine
Panvax® Junior	Panvax® H1N1 Vaccine Junior presented in pre-filled syringes
PCN	Pandemic Control Network
PCR	Polymerase chain reaction
PFS	Pre-filled syringes
PHLN	Public Health Laboratory Network
PHMO	Public Health Medical Officer
PHU	Public health units
PPE	Personal protective equipment
RACGP	Royal Australasian College of General Practitioners
RACP	Royal Australasian College of Physicians
RANZCOG	Royal Australian and New Zealand College of Obstetricians and Gynaecologists
RCPA	Royal College of Pathologists of Australasia
RDAA	Royal Doctors' Association of Australia
SIAG	Scientific Influenza Advisory Group
SISSWG	Seasonal Influenza Surveillance Strategy Working Group
SPAG	Scientific Pandemic Advisory Group
Swine flu	Pandemic A (H1N1) 2009 influenza
TGA	Therapeutic Goods Administration
VAG	Vaccine Advisory Group
WHO	World Health Organization
WHO CC	World Health Organization Collaborating Centre for Reference and Research on Influenza (located at the Victorian Infectious Diseases Reference Laboratory in Melbourne)

www.health.gov.au

All information in this publication is correct as of September 2011

D0485 September 2011