Acceptance of pandemic (H1N1) 2009 influenza vaccination by the Australian public

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ABSTRACT

Objective: To investigate the Australian public's expectations, concerns and willingness to accept vaccination with the pandemic (H1N1) 2009 influenza vaccine.

Design, setting and participants: A computer-assisted telephone interview survey was conducted between 20 August and 11 September 2009 by trained professional interviewers to study issues relating to vaccine uptake and perceived safety. The sample comprised 1155 randomly selected representative adults who had participated in a 2007 national study exploring knowledge and perceptions of pandemic influenza.

Main outcome measures: Likely acceptance of pandemic (H1N1) 2009 vaccination, factors associated with acceptance, and respondents' willingness to share Australian vaccine with neighbouring developing countries.

Results: Of 1155 possible participants, 830 (72%) were successfully interviewed. Twenty per cent of the study group (169/830) reported that they had developed influenza-like symptoms during the 2009 pandemic period. Most respondents (645/830, 78%) considered pandemic (H1N1) 2009 to be a mild disease, and 211/830 (25%) regarded themselves as being at increased risk of infection. Willingness to accept pandemic (H1N1) 2009 vaccination was high (556/830, 67%) but was significantly lower than when pandemic vaccination uptake was investigated in 2007 (88%; $P < 0.0001$). Respondents who had already been vaccinated against seasonal influenza and those who perceived pandemic (H1N1) 2009 to be severe were significantly more willing to accept vaccination. Most respondents (793/822, 96%) were willing to share surplus vaccine with developing countries in our region.

Conclusion: Although two-thirds of Australian adults surveyed were willing to accept pandemic (H1N1) 2009 vaccination, and most supported sharing vaccine with developing countries, there is a need for accessible information on vaccine safety for those who are undecided about vaccination.

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Cases of the novel pandemic (H1N1) 2009 influenza strain were first identified in Australia on 7 May 2009 and soon appeared across the country.[1] Health authorities introduced various measures, initially to contain spread and later to protect those at greatest risk of severe disease, while a pandemic H1N1-specific vaccine was urgently produced. The Australian Government placed an order for 21 million doses of vaccine with CSL Limited at the beginning of the pandemic, and the first batch of two million doses was delivered on 31 August 2009. The vaccine has been registered by the Australian Therapeutic Goods Administration on the basis of local safety and immunogenicity trial results.[2]

By 13 October, 36 910 pandemic (H1N1) 2009 influenza cases had been laboratory confirmed in Australia, including 4830 hospitalisations and 185 deaths.[1] However, health officials have emphasised that affected people generally experience mild symptoms and that severe illness is uncommon, mainly occurring in individuals with an underlying chronic health condition or with risk factors, such as pregnancy.

This study aims to provide information on self-reported vaccination acceptance, collected from a representative sample of Australians, to inform planning and policy making.

METHODS

Study participants and study protocol

The study sample was obtained from participants of a previous study that investigated pandemic knowledge and perceptions in 2007. The earlier study achieved a 58% response rate and included a representative sample of 1166 Australians.[3] Briefly, a random sample was drawn from the 2007 printed telephone directories using a quota method to ensure good representation from across Australia. People aged 18 years or older who provided verbal consent and could converse in English were eligible to participate in the survey. When interviewed in 2007, 1155 of the 1166 participants (99%) gave consent to be contacted again for further research.

During the current study, an introductory letter was sent to all 1155 households a week before telephone contact was made. Experienced, trained telephone interviewers made calls between 09:00 and 20:00 local time, on weekdays and weekends between 20 August and 11 September 2009, with up to 10 contact attempts made for each person on the database, according to the study protocol.

Scope

Interviewers conducted a computer-assisted telephone interview that included questions relating to respondents' recent experience of the H1N1 influenza pandemic, which covered knowledge, anxiety, personal impact, behaviour, compliance, vaccination and communications. In this report, we concentrate on issues that relate to vaccination, including expectations of being offered the vaccine, willingness to accept vaccination, concerns regarding vaccine safety and side effects, convenience of clinic locations, and willingness to share Australia's vaccine with neighbouring developing countries. The exact questionnaire wording is reported in italics.

Interview procedure

Participants were initially asked if they understood the term "swine influenza" to check that they could reasonably respond to the remaining questions. All respondents reported being aware of this term and the interview continued with 40 questions, 13 of which related specifically to vaccine issues. The interview took an average of 14 minutes to complete.

Media reports

The survey period coincided with considerable media activity relating to pandemic (H1N1) 2009 influenza. There were two

principal media stories that may have influenced responses. On 20 August, the federal government announced that two million doses of the swine influenza vaccine would be available in the following fortnight in multidose formulation; this drew a response from the "country's top infectious diseases body" that the vaccine strategy was risky and the vaccine was being distributed too hastily.[4] On 28 August, there were media reports that some insurance companies may refuse to cover general practitioners administering the vaccine until it was fully registered.[5]

Statistical analysis

Univariate analysis was conducted using base SAS and SAS/STAT components of SAS 9.13 statistical software (SAS Institute Inc, Cary, NC, USA). Multivariate analysis was conducted using Stata/IC 10 (StataCorp, College Station, Tex, USA). Odds ratios (ORs) and χ^2 tests were used to test for significant associations with willingness to accept the pandemic (H1N1) 2009 vaccine. Sex, age group, perception of severity and receipt of seasonal influenza vaccine in 2009 were explored for association with willingness to accept pandemic (H1N1) 2009 vaccine in a multivariate analysis, with *P* values and ORs reported as appropriate.

Ethics approval

Ethics approval was obtained from the University of Newcastle's Human Research Ethics Committee (approval number H-2009-0288).

RESULTS

From the study sample of 1155 people, 830 successful interviews (72%) were conducted. There were 85 refusals; a further 43 were out of scope because they had died, were unable to communicate or had moved; and 197 could not be contacted.

The estimated resident Australian population for June 2008 was used to assess the representativeness of the study sample.[6] There were more women (517/830, 62%) than men, and older age groups were moderately over-represented, but geographically the sample reflected the Australian population distribution. As the 2007 study sample had included adults from 18 years of age, participants in this study were now at least 20 years old. By comparing previously collected information, the sample closely matched census data.[7] A detailed description of the sample demographics can be obtained from the report of the earlier study.[3]

Experiences and perceptions

We provided respondents with a description of influenza symptoms and asked about influenza-like illness affecting themselves and their close acquaintances since May 2009. Twenty per cent of respondents (169/830) reported that they had personally experienced fever, cough and tiredness. Of these, 67 (8% of total sample) reported an influenza diagnosis by their doctor, but only two (0.2%) had this confirmed through laboratory testing. Thirty-nine per cent of respondents (327/830) reported that a family member had experienced influenza symptoms. Overall, 584 respondents (70%) had either been ill themselves or had a family member, close friend or acquaintance with symptoms.

Most respondents (645/830, 78%) reported that they considered swine influenza to be always a mild disease or only occasionally severe, whereas 168 (20%) considered it to be mostly or always severe, and 17 (2%) did not know. Only 44 of the 830 respondents (5%) were extremely concerned that they or a member of their family may contract swine influenza, while 140 (17%) were quite concerned, and 646 (78%) were only a little or not concerned. The main reasons reported by respondents who expressed concern were: someone close could get sick, even though that person had no specific risk factors (61/184, 33%); fear of serious personal health risk, including death (45/184, 24%); having a close family member or friend in a high-risk group (31/184, 17%); having an underlying illness (26/184, 14%); being employed in a position with high levels of public contact (5/184, 3%); being elderly (3/184, 2%); being the family breadwinner and unable to afford time off work (3/184, 2%); being pregnant (1/184, 1%); being a carer for a young child (2/184, 1%); or other reasons (7/184, 4%).

Respondents with risk factors

The Australian Government initially indicated that the pandemic (H1N1) 2009 vaccine would be provided to people in high-risk groups first.[8] We asked participants if they considered themselves to be at increased risk of infection and to describe the general nature of this risk. Overall, 211 of the 830 respondents (25%) considered themselves to be at increased risk of infection, with most of these reporting the reason as having an underlying disease (110/211, 52%) or being elderly (69/211, 33%). Other risk factors reported included: being employed in a position with high levels of public contact (28/211, 13%); caring for or having contact with a person in a high-risk group (21/211, 10%); being a smoker (5/211, 2%); Indigenous status (3/211, 1%); obesity (3/211, 1%); pregnancy (3/211, 1%); and others/not specified (10/211, 5%). Some respondents reported more than one risk factor.

Vaccination acceptance

Forty-five per cent of respondents (370/830) reported having been vaccinated for seasonal influenza in 2009, compared with 38% of respondents in 2007 ($P = 0.002$).[3] Of these, 4% (13/370) said that they had been vaccinated *because of the threat of swine flu* or that this was *one of the reasons for vaccination.*

While 293 of the 830 respondents (35%) expected to be offered the pandemic (H1N1) 2009 vaccine when it became available, 126 (15%) did not know if it would be offered to them. Of the 211 respondents who considered themselves to be at higher risk of infection, 134 (64%) expected to be offered the vaccine. Reasons given by respondents for believing they were eligible to receive the vaccine when it became available were: having a medical condition that placed them at higher risk (100/293, 34%); being elderly (66/293, 23%); being a health care worker (49/293, 17%); holding a belief that all Australians should be offered the vaccine (42/293, 14%); having occupational exposure due to working in areas where contact with people was common, such as schools or public transport (21/293, 7%); or other reasons (15/293, 5%).

Although 372 of the 830 respondents (45%) reported that they would not be concerned if they were not offered the vaccine, 334 (40%) said they would be a little concerned, 91 (11%) would be quite concerned, 29 (4%) would be extremely concerned, and four (0.5%) reported not knowing how they felt. Thirty-one per cent of the group who reported risk factors (66/211) said they would be quite concerned or extremely concerned if they were not offered the vaccine.

If offered the vaccine, 556 of the 830 respondents (67%) indicated a willingness to be vaccinated, while 110 (13%) said that they would wait to see if there were any adverse events before agreeing. Seventeen per cent (142/830) reported that they would not be vaccinated, and 3% (22/830) were undecided. The main reasons given for out-

Reported willingness of survey participants to accept pandemic (H1N1) 2009 vaccination, by sex, age group, previous acceptance of seasonal influenza vaccination, and perception of pandemic (H1N1) 2009 severity

	Stated acceptance of pandemic (H1N1) 2009 vaccine			
	Yes ($n = 556$)	No/will wait/unsure ($n = 274$)	Univariate analysis P	Multivariate analysis P
Sex			0.0002	
Men ($n = 313$)	234 (74.8%)	79 (25.2%)		< 0.0001
Women ($n = 517$)	322 (62.3%)	195 (37.7%)		
Age group*			0.1371	
20–40 years ($n = 127$)	82 (64.6%)	45 (35.4%)		0.0492
41–60 years ($n = 358$)	230 (64.2%)	128 (35.8%)		0.0954
> 60 years ($n = 344$)	244 (70.9%)	100 (29.1%)		
Received seasonal influenza vaccine in 2009			< 0.0001	
Yes ($n = 370$)	309 (83.5%)	61 (16.5%)		< 0.0001
No ($n = 460$)	247 (53.7%)	213 (46.3%)		
Perception of pandemic (H1N1) 2009 severity†			0.0081	
Severe ($n = 168$)	127 (75.6%)	41 (24.4%)		0.0045
Mild ($n = 645$)	418 (64.8%)	227 (35.2%)		

* Age was not reported for one participant. † Severe = mostly or always severe. Mild = always mild or mostly mild but occasionally severe. "Do not know" responses ($n = 17$) were excluded. ◆

right refusal were a perception that the vaccine was unnecessary (55/142, 39%), concerns about vaccine safety (37/142, 26%), or the respondents did not believe in vaccination (24/142, 17%). The remaining 18% (26/142) gave various other reasons for refusal, including having a medical condition, having had the seasonal influenza vaccination, not liking needles, "flu vaccine causes flu", and because they had already been infected with swine influenza.

Although the issue of vaccine safety was raised by the media several times during the interview period, the proportion of respondents reporting a willingness to be vaccinated did not change significantly between the three 1-week periods in which interviews were conducted: 64.4% (95% CI, 59.1%–69.7%) for those interviewed in Week 1 (20–29 August), 68.6% (95% CI, 63.5%–73.7%) in Week 2 (30 August – 5 September), and 68.3% (95% CI, 61.9%–74.7%) in Week 3 (6–11 September) ($P = 0.47$).

Of respondents who stated that they would accept the pandemic (H1N1) 2009 vaccine immediately or at a later date, or were unsure, 97% (668/686) reported that they would commit to two doses should this be necessary. When asked about the location of vaccination, 11% (74/688) indicated that they would no longer be willing to be vaccinated if it were to take place in a community hall rather than through their GP. Most individuals who would or may accept vaccination (555/688, 81%) indicated that they would check safety information before receiving the vaccine, while 13% (86/688) thought it unlikely that they would check. Only 6% (40/688) stated they would definitely not seek this information, and 1% (7/688) were unsure.

The reported willingness of respondents to accept pandemic (H1N1) 2009 vaccination was explored by sex and age group (Box). The multivariate logistic regression model indicated that men were more accepting of vaccination than women (OR, 1.86; 95% CI, 1.33–2.61). Although younger age groups were similar in their acceptance of vaccination, a greater proportion of older respondents indicated willingness to be vaccinated. However, logistic regression modelling found that the 20–40-years age group was 1.64 times (95% CI, 1.09–2.68) more likely than those over 60 years of age to accept the vaccine. Previous acceptance of seasonal influenza vaccination during 2009 was strongly associated with willingness to be vaccinated against pandemic (H1N1) 2009 (OR, 5.03; 95% CI, 3.47–7.29). Acceptance of pandemic (H1N1) 2009 vaccination was also associated with perception of pandemic severity (OR, 1.84; 95% CI, 1.22–2.77).

The study participants were asked whether they would *be supportive of surplus vaccine being given to a developing country in our region*. Most respondents (793/822, 96%) were very or moderately supportive, and this proportion remained high (637/822, 77%) when it was suggested *that only those Australians with significant risk factors would be offered the vaccine so that a large proportion of our vaccine could be sent to developing countries in the region to protect their people at high risk of developing serious disease*.

DISCUSSION

Two-thirds of respondents in this national study of adult Australians indicated a willingness to receive pandemic (H1N1) 2009 vaccination, despite 78% of respondents regarding the current influenza pandemic as only causing mild disease. The single most effective method for controlling a novel viral disease is through broad community vaccine coverage, but uptake is dependent on perceived risk of infection, disease severity and risk from the vaccine itself.[9] A quarter of survey respondents considered themselves to be at increased risk of infection, although there appeared to be some confusion in their understanding of risk groups, with many of these respondents reporting risk factors for severe seasonal influenza rather than for severe disease with the novel pandemic strain.

Reported willingness to accept pandemic vaccination was significantly less than when the study group was interviewed in 2007 (67% v 88%, $P < 0.0001$), but the pandemic scenario described for that survey was more severe and aligned with avian influenza (H5N1) or a 1918 pandemic-type virus.[3]

Our findings show that Australians require information on vaccine safety, and authorities need to actively provide data as they become available to ensure public confidence. This will only be possible if there is rigorous postmarketing surveillance to monitor for possible adverse events.[10]

It would be valuable to monitor whether vaccination uptake does occur at the high levels indicated by survey respondents, as this could help to ensure adequate protection should Australia be affected by a second pandemic wave, which may involve a more virulent drift variant of pandemic (H1N1) 2009.[11] It is likely, across the range of reproductive rates (R_0) modelled for pandemic (H1N1) 2009 influenza, that the intended vaccination uptake found in this survey would achieve the coverage required to ensure herd immunity. R_0 has been calculated for pandemic (H1N1) 2009 to be 1.4–3.5, and the herd immunity is estimated to be between 36% and 89% when a vaccine efficacy of 80%, similar to that of the seasonal vaccine, is factored in.[12-14]

Australians expressed a spirit of generosity in this study, with 96% of respondents supporting donation of surplus vaccine to neighbouring developing countries. With an acceptance rate of 67% and only a single dose required, there is a theoretical excess of almost seven million of Australia's 21 million doses. If careful attention is paid to reducing wastage, it would be entirely feasible for Australia to donate a large amount of vaccine.[15]

This study is unique because the sample was obtained from participants of a previous study that investigated pandemic knowledge and perceptions in 2007. We were able to survey a large, representative cross-section of the adult Australian public, achieving a high response rate. However, we recognise the limitations of implying that this sample is reflective of the entire population. The high participation rate likely reflects the fact that we had targeted people more willing to assist, given their previous participation, and the high level of interest in pandemic (H1N1) 2009 at the time of the interviews. The study design was based on telephone contact, so that people without a landline telephone were excluded. However, landline coverage is generally high in Australia, with studies showing 89.3% coverage in Western Australia in 2007 and 95.3% in Queensland in 2003.[16,17] People who could not communicate in English were excluded from the sample, which may have affected representation of ethnic minorities. The sample is also likely to under-represent disadvantaged groups, such as Indigenous Australians and those with low incomes, due to lower rates of telephone ownership. Australians who declined interviews or were out of scope because of language and comprehension issues are more likely to be difficult to educate with conventional health communication methods. As some of these people may have poor access to health services, this may also affect their access to vaccination.

Despite these limitations, our findings that two-thirds of respondents reported willingness to accept vaccination against pandemic (H1N1) 2009 and that most Australians were willing to share surplus vaccine with developing countries are encouraging. With 16% of respondents reporting being undecided about vaccination, our results indicate a need to provide accessible information on vaccine safety.

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COMPETING INTERESTS

None identified.

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