

Parental attitudes, beliefs, behaviours and concerns towards childhood vaccinations in Australia: A national online survey

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Background and objectives

Vaccine hesitancy is a public health concern. The objectives of this article were to describe Australian parents' attitudes, behaviours and concerns about vaccination, determine the factors associated with vaccination non-compliance, and provide sources of vaccination information for general practitioners (GPs).

Methods

We conducted a nationally representative online survey of Australian parents in 2012. We determined associations between demographic and vaccination attitudes and behaviour.

Results

The 452 respondents were parents of children aged <18 years. Despite 92% reporting their child as up to date with vaccination, 52% had concerns. Factors associated with non-compliance included 'disagreeing that vaccines are safe' (odds ratio [OR]: 2.79; 95% confidence interval [CI]: 1.00–7.76) and 'obtaining information from alternative health practitioners' (OR: 6.54; 95% CI: 1.71–25.00). The vast majority (83%) obtained vaccination information from their GPs.

Discussion

GPs have pivotal roles in addressing concerns regarding vaccination. Education and communication with parents will improve their knowledge and trust in vaccination, thereby improving vaccination compliance.

Vaccine hesitancy is an issue of global concern in developed and developing countries.¹ MacDonald et al characterise vaccine hesitancy as the degree of parents' concerns regarding vaccines and vaccination, and place this on a continuum.² The most recent estimate for the proportion of children affected in Australia by active vaccine refusal was 3.3%.³ However, these families are likely to represent only a portion of vaccine-hesitant parents, with many continuing to vaccinate according to the National Immunisation Program Schedule (NIPS) despite having milder hesitancy than the more extreme case of refusing all vaccines. The success of vaccination programs means that vaccine-preventable diseases have been less frequently seen in the past few decades. However, as outbreaks in a number of countries attest, population immunity will be threatened if more children do not comply with vaccination schedules.⁴

At present in Australia, there is high coverage for recommended childhood vaccines. In 2012, the year that this survey was conducted, children aged 24 months had approximately 92.6% coverage and 1.5% of children were affected by registered parental 'conscientious objection'.⁵ Despite this, any vaccine program is vulnerable to falls in coverage, particularly when a vaccine safety scare arises. For example, in the UK, the unsubstantiated measles, mumps and rubella (MMR) autism scare led to a decline in MMR vaccination rates.⁶

The most recent national vaccine attitudes survey conducted in 2001 found that the majority of parents with incompletely immunised children (70%) were concerned about vaccine side effects.⁷ This was particularly evident after the suspension of CSL Fluvax because of a higher rate of febrile convulsions in children. Our primary source of information regarding vaccination uptake – the Australian Childhood Immunisation Register (ACIR) – maintains the vaccination history of children up to seven years of age. However, ACIR does not quantify the attitudes, beliefs and concerns of individuals that underlie vaccination uptake and objection.

Therefore, the aims of this study were to identify Australian parents' or caregivers' (hereafter called 'parents'):

- levels of support for the NIPS
- the proportion of parents with concerns about vaccination
- use and influence of sources of information
- associations between vaccination attitudes and compliance with NIPS.

Methods

Study design

This study was a nationally representative cross-sectional online survey of the Australian general population aged ≥ 18 years. The survey was a collaboration between the National Centre for Immunisation Research and Surveillance (NCIRS) and a documentary production company, Genepool Productions. In this study, we analysed data from parents of children aged < 18 years only.

Development of questionnaire

We developed a questionnaire based on the following standardised national and international surveys: New South Wales Child Health Survey, New South Wales Health Adult Health Survey, Queensland Health Survey, US National Immunization Healthstyles and UK Wave Survey. We were also informed by qualitative and quantitative research previously undertaken by the authors of this study.^{8,9} Respondents were asked if they were a parent, along with other demographic questions. We then identified:

- support levels for adult and childhood vaccination
- concerns about vaccine-preventable diseases
- perceptions about vaccine safety
- experiences in adverse events following immunisation (AEFI)
- influenza vaccination status
- vaccination information sources and their degree of influence on vaccination decisions
- basic demographics.

Respondents who were current parents of children aged < 18 years answered extra

questions about vaccination attitudes, vaccination decisions for their child, their child's compliance to the NIPS and influenza vaccination status.

Sampling and data collection

An external research company, Australia Online Research, recruited participants and collected data. The sample was based on an online panel of 100,000 people out of a total of 5.3 million people who responded to a national Australia Post survey distributed to all Australian households.

The company sent unique invitation emails to 9854 people using stratified sampling methods to match the Australian census data so that the demographic distribution of invitees was comparable to that of the Australian population. Each respondent received \$2 for a completed survey and an opportunity to enter a \$5000 cash prize draw.

Australia Online Research is a member of the Australian Market and Social Research Society, and is required to abide by the Code of Professional Behaviour (Code).¹⁰ Similarly to the Human Research Ethics Committee, the Code requires the company to have informed consent; to state that the study is entirely voluntary and participants can withdraw from the study at any time; that the data collected are non-identifiable; and that the data are stored appropriately.

Data analysis

We used SPSS 18 to analyse the data. We generated descriptive statistics and conducted chi-square tests of associations between demographics and vaccination attitudes, and between vaccination support and compliance with the NIPS. Variables with P values < 0.25 were put into a multivariate logistic regression model to determine the factors associated with vaccination support and compliance with the NIPS.

Results

The cross-sectional online survey was conducted between 18 and 26 April 2012. In total, 1324 out of 9854 people completed the survey (13.4%), of whom, 452 (34%)

were parents with children < 18 years of age. Forty-four per cent of respondents were aged between 35 and 44 years; 43% had a university degree; 392 (87%) were primary caregivers; and 51% were female. Table 1 shows the demographics of the respondents and those of the Australian population. The demographics of the parent respondents were not significantly different from those in the Australian population.

According to parental reports for their youngest child, 92% were fully immunised according to the NIPS, 6% were under-immunised or unimmunised and 2% were unsure. For the influenza vaccine, 23% indicated that their child received the vaccine in 2011 and 13% of parents recalled having a family member or a friend who previously reported an AEFI (any type of vaccine).

The vast majority of parents were supportive of vaccination in children: 68% strongly support, 26% generally support, 2% neutral, 2% generally oppose and 2% strongly oppose. When asked about vaccination decisions for their youngest child, 48% allowed their child to receive all recommended vaccines with no concerns; 38% allowed for all vaccines but with few concerns; 6% allowed for all vaccines but with several concerns; 6% allowed some vaccines only or to delay some; and 2% did not allow their child to have any vaccines.

Parents' perceptions towards vaccine-preventable diseases varied. More than half were very (26%) or fairly (27%) concerned, 35% were somewhat concerned and 12% were not concerned. Perceptions towards vaccine-preventable diseases did not differ across primary and non-primary caregivers ($P: 0.49$), nor across respondent age, gender or education levels. Table 2 shows parental attitudes towards vaccination. While 90% of parents agreed that vaccinations were safe for children, 23% were concerned that vaccines were not tested enough for safety, 21% believed that vaccines could cause autism and 22% were also concerned that their child's immune system could be weakened by vaccinations.

The vast majority of parents obtained information from their general practitioner

(GP; 83%); followed by government or health authorities (28%) and the internet (27%; Figure 1). Mean influential score was the highest for GPs (score 8.37 out of 10; n = 375), followed by other medical professionals (7.89; n = 38), then alternative

health practitioners (7.81; n = 16). GPs were found to be significantly more influential than nurses (8.27 versus 7.85; $P = 0.002$; n = 67), government or health authorities (8.55 versus 7.74; $P < 0.001$; n = 106) and the internet (8.19 versus 6.23; $P < 0.001$;

n = 99). Respondents who were not confident with the information provided by their healthcare provider were significantly more likely to obtain information from the internet (52% versus 24%; $P < 0.001$).

Factors that were found to be associated with non-compliance with the NIPS included disagreeing that vaccines are safe (OR: 2.79; 95% CI: 1.00–7.76; $P = 0.049$) and obtaining vaccination information from alternative health practitioners (OR: 6.54; 95% CI: 1.71–25.00; $P = 0.006$; Table 3).

Table 1. Demographics of survey respondents

| | All respondents (n = 1324) | Parents/ caregivers only (n = 452) | Australian population (n = 2.2 million) |
|------------------------------|-------------------------------|--|---|
| Age (years)* | % | % | % |
| 18–24 | 13 | 2 | 13 |
| 25–34 | 19 | 24 | 18 |
| 35–44 | 18 | 44 | 18 |
| 45–54 | 18 | 24 | 18 |
| 55–64 | 15 | 4 | 15 |
| 65–74 | 9 | 1 | 10 |
| >75 | 8 | 1 | 8 |
| Gender* | % | % | % |
| Male | 49 | 49 | 50 |
| Female | 51 | 51 | 50 |
| Country of birth* | % | % | % |
| Australia | 75 | 77 | 73 |
| Other countries | 25 | 24 | 27 |
| Education level† | % | % | % |
| Year 12 or below | 27 | 25 | 28 |
| TAFE/trade certificate | 29 | 31 | 33 |
| Tertiary degree | 43 | 43 | 38 |
| Other | 1 | 1 | 1 |
| State of residence‡ | % | % | % |
| New South Wales | 34 | 36 | 32 |
| Australian Capital Territory | 2 | 1 | 2 |
| Victoria | 26 | 26 | 25 |
| Queensland | 18 | 14 | 20 |
| Western Australia | 10 | 11 | 11 |
| South Australia | 9 | 8 | 7 |
| Northern Territory | 1 | 0 | 1 |
| Tasmania | 3 | 3 | 2 |

*Data for Australian population as of 2011

(www.abs.gov.au/websitedbs/d3310114.nsf/home/Population%20Pyramid%20-%20Australia)

†Data for Australian population as of May 2012 (Persons aged 15–64 years enrolled in a study for qualification; www.abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/6227.0May%202012?OpenDocument)

‡Data for Australian population as of end of March 2012 (www.abs.gov.au/ausstats/abs@.nsf/Latest-products/3235.0Main%20Features32011?opendocument&tabname=Summary&prodno=3235.0&issue=2011&num=&view=)

Percentages may not add up to 100% due to rounding

Discussion

This study has a number of significant findings. The vast majority of parents were supportive of childhood vaccination, although a considerable proportion expressed concerns related to the safety of vaccines. GPs were still the main source of vaccination information and found to be the most influential. The strongest associations with NIPS non-compliance were viewing vaccines as unsafe and obtaining information from alternative health practitioners.

The proportion of NIPS-compliant children in our study is similar to that in ACIR for children aged 24 months, as well as another Australian national survey of vaccine coverage conducted in 2011 (92%).^{11,12} Vaccination decisions of parents in Australia are also comparable to those in the US, which has a 2% parental refusal rate for childhood vaccines.¹³ Despite having no impact on vaccine compliance, more than one-fifth of our study respondents were concerned that vaccines caused autism in healthy children, which was comparable to a US national survey (25%).¹⁴

While only 2% reported having refused all vaccines for their youngest child, 6% described delaying or not having certain recommended vaccines. This finding is of concern given that people who are on alternative vaccination schedules, where some vaccines are delayed or omitted, have an increased risk of contracting vaccine-preventable diseases.^{13,15} A study conducted in South Australia found that parents whose children had experienced a suspected AEFI were significantly more likely to report greater concerns about vaccine safety.¹⁶

Table 2. Parental concerns, attitudes and behaviour towards vaccination

| N = 452 | Strongly agreed or agreed with statement (%) |
|---|--|
| I vaccinate my child to protect him/her | 92 |
| I believe that vaccinations are safe for children in general | 90 |
| I am confident in information provided by healthcare professional | 89 |
| I am satisfied with amount of information provided by healthcare professional | 85 |
| I vaccinate my child to help protect the wider community | 79 |
| I am concerned about the distress to children of the injection itself | 31 |
| I am concerned about the increasing number of vaccines recommended for children | 25 |
| I am concerned that vaccines are not tested enough for safety | 23 |
| I am concerned that children get too many vaccines during the first two years of life | 22 |
| I am concerned that a child's immune system could be weakened by vaccinations | 22 |
| I am concerned that vaccines can cause autism in healthy children | 21 |
| I am concerned that vaccines are given to children to prevent diseases that they are not likely to get | 19 |
| I prefer children to get natural immunity from the diseases rather than immunity from the vaccines | 16 |
| I am concerned that vaccines are given to children to prevent diseases that are not serious | 14 |
| Vaccination is not needed because others have vaccinated their children and diseases have been controlled | 7 |

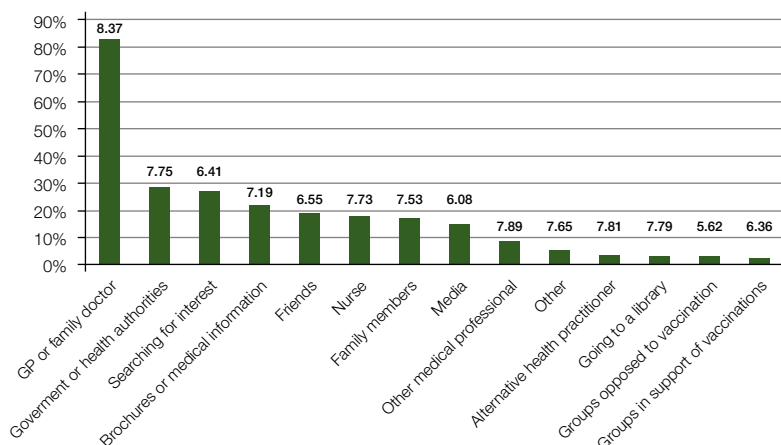


Figure 1. Sources of vaccination information and its influence among parents
The bars represent the proportion of parents using the source. Multiple options could be selected, so the total percentage is >100%. The figures above the bars represent the influential scores (0 = Not influential to 10 = Extremely influential)

However, our study did not find AEFI to be related to vaccine non-compliance.

This study demonstrates the important role GPs have in educating parents about the risks and benefits of vaccination. Interestingly, <20% of parents obtained vaccination information from a nurse and, together with government and health authorities, they were significantly less influential than GPs. Communication frameworks have been developed to assist healthcare providers to better communicate with vaccine-hesitant parents.^{17,18} In medical communication more broadly, effective communication strategies depend on the rapport and trust between GPs and patients/parents. In addition, studies have found that a recommendation to vaccinate from a paediatric provider is highly associated with uptake.¹⁹ However, for parents who are not having their children vaccinated, or hesitating to have them vaccinated, strategies should be of a guiding style to enable them to elicit their own motivations to vaccinate, rather than using a directing or debating format.^{17,18}

GPs are increasingly likely to find parents presenting with concerns that have been amplified by internet searches. In this study, internet use featured as the third most common source for vaccination information after 'government or health authorities'. Having the internet as a source of information was associated with a lack of confidence in information provided by a healthcare provider. The quality and reliability of vaccination information on the internet can be highly variable, with easy access to anti-vaccination websites.²⁰ A 2012 study of US parents found those who sought vaccine information on the internet were more likely to have lower perceptions of vaccine safety and have a non-medical exemption to vaccination.²¹ Thus, GPs have an important role to play in augmenting the impact of online information.

In our study, non-compliance with the NIPS was significantly associated with obtaining information from alternative health practitioners. Previous research has also found that alternative health practitioners were less likely to support vaccination,^{22,23}

Table 3. Factors associated with non-compliance with the Australian National Immunisation Program Schedule

| Variable | Unadjusted odds ratio (95% confidence interval) | Adjusted odds ratio (95% confidence interval) | Reference |
|---|--|--|-----------------------|
| Age | | | |
| <35 years | 1.38 (0.67–2.85) | NA | ≥35 years |
| Gender | | | |
| Male | 1.23 (0.62–2.40) | NA | Female |
| Educational level | | | |
| University | 1.02 (0.51–2.07) | NA | Below university |
| Primary caregiver | | | |
| No | 1.59 (0.67–3.81) | NA | Yes |
| Country of birth | | | |
| Elsewhere | 1.43 (0.68–2.99) | NA | Australia |
| Family/friend experienced adverse events following immunisation | | | |
| Yes | 3.95 (1.86–8.40)* | 1.78 (0.66–4.83) | No |
| Level of support childhood vaccination | | | |
| Neutral or oppose | 27.61 (11.14 – 68.46)* | ‡ | Support |
| Perceived vaccines as safe | | | |
| Neutral or disagree | 10.91 (5.18–22.99)* | 2.79 (1.00–7.76)† | Agree |
| Concern about vaccine preventable diseases | | | |
| Not at all/somewhat concerned | 2.20 (1.09–4.46)* | 1.87 (0.84 – 4.17) | Fairly/very concerned |
| Confident in information provided by healthcare provider | | | |
| Neutral or disagree | 8.45 (3.98–17.91)* | 1.41 (0.42–4.76) | Agree |
| Satisfied with amount of information provided by healthcare provider | | | |
| Neutral or disagree | 7.37 (3.63–14.95)* | 2.55 (0.79–8.16) | Agree |
| Obtained information from GPs | | | |
| No | 2.94 (1.44–6.13)* | 2.03 (0.86–4.79) | Yes |
| Obtained information from nurses | | | |
| No | 1.14 (0.46–2.83) | NA | Yes |
| Obtained information from government or health authorities | | | |
| No | 1.76 (0.75–4.13) | NA | Yes |
| Obtained information from the internet | | | |
| Yes | 2.25 (1.13–4.47)* | 1.01 (0.42–2.45) | No |
| Obtained information from alternative health practitioners | | | |
| Yes | 14.03 (4.91–40.10)* | 6.54 (1.71–25.00)† | No |

**P* <0.25†*P* <0.05‡*Not in the model because of high collinearity with the variable 'perceived vaccine as safe' (correlation coefficient: 0.67)*

NA, variables were not put into the multivariate logistic regression model

and those who consulted alternative health practitioners were significantly less likely to receive recommended vaccines.²⁴ Given that this study is cross-sectional, we were not able to determine whether parents already concerned about vaccination look to alternative health practitioners to answer questions not addressed by their doctor, or whether they identify more strongly with the health model offered by alternative health practitioners.

GPs can play a role in educating parents and understanding their reasons for approaching alternative health practitioners without being judgemental. Wardle et al also suggest disciplining health practitioners and organisations through current legislative arrangements for those who promote false and misleading information about vaccination.²⁵ Financial incentives have been proven to improve childhood vaccination uptake.²⁶ However, there is insufficient quality evidence in relation to withholding these payments (monetary sanctions) as a way of improving compliance.

Limitations

Our study has some limitations. First, there was a low response rate to the initial invitation (13%) and the survey was only weighted for the whole sample group (n = 1324). Our study has a higher proportion of respondents in the 35–44 years age group than in the general population; this was expected because we only included parents of children aged <18 years. Other than the age group distribution, the demographics of the respondents were comparable with the Australian population. Second, the survey was cross-sectional; it was not possible to determine the causal relationship between the factors and dependent variables. A prospective study measuring attitudes then uptake would provide more information on the reasons underpinning parents' vaccination decisions.

Third, vaccination status was ascertained by parental report. A systematic review found that parental recall overestimated complete vaccination when compared with provider records.²⁷ Despite this, the reported full vaccination and vaccine

objection rates were similar to nationally reported rates (1.68% ACIR recorded conscientious objection versus 2% in our sample; 92.5% full compliance with the NIPS at aged 2 years on ACIR versus 92% reporting their youngest child is fully vaccinated in our study).²⁸ Ideally, we would have been able to verify individual vaccine uptake with ACIR data – a methodological recommendation for future studies to pursue.

Conclusions

The majority of parents in this study reported compliance and strong support for the NIPS. Nevertheless, over half of all parents or caregivers in this study expressed some degree of concern regarding vaccination of their child. GPs are the most used and influential source of information. They have a pivotal role in communicating with parents regarding childhood vaccinations and in providing clear, evidence-based vaccine information to help guide parents' decision-making.

Implications for general practice

Parents rely on GPs for vaccination information more than any other information sources. GPs can play an active role in discussing and clarifying parental concerns about vaccination. They can use evidence-based vaccination resources, such as fact sheets and decision aids, and communication frameworks to assist better communication with parents.

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