NCIRS
National Centre for Immunisation Research and Surveillance

A survey of pharmacist vaccination reporting to the Australian Immunisation Register

Final report – Part C

30 June 2021

Authors

Cyra Patel[1]

Lauren Dalton[1]

Aditi Dey[1,2]

Kaitlyn Vette[1]

Peter McIntyre[1,2,3]

Kristine Macartney[1,2]

Frank Beard[1,2]

1. National Centre for Immunisation Research and Surveillance

The Children's Hospital at Westmead

Locked Bag 4001

Westmead, NSW 2145

2. The University of Sydney

Camperdown, NSW 2006

3. The University of Otago

Otago, New Zealand

Corresponding author: Frank Beard, National Centre for Immunisation Research and Surveillance, The Children's Hospital at Westmead, Locked Bag 4001, Westmead NSW 2145.
Telephone: +61 2 9845 1433. Email: frank.beard@health.nsw.gov.au

The National Centre for Immunisation Research and Surveillance is supported by the Australian Government Department of Health, the NSW Ministry of Health and The Sydney Children's Hospitals Network. The opinions expressed in this report are those of the authors, and do not necessarily represent the views of these agencies.

Contents

List of tables

List of figures

Acknowledgements

The project team would like to acknowledge the contribution of the following groups that provided assistance with various aspects of the study, including distribution of the survey, recruitment of survey participants and provision of data:

- Jurisdictional Immunisation Coordinators
- Australian Government Department of Health
- Services Australia
- Pharmacy Guild of Australia
- Pharmaceutical Society of Australia
- TerryWhite Chemmart
- Chemist Warehouse
- Priceline
- Pharmacy 777
- Primary Health Networks (PHNs), particularly Capital Health Network (ACT), Central and Eastern Sydney PHN (NSW), Gippsland PHN (VIC), Primary Health Tasmania (TAS), Sydney North Health Network (NSW), Western NSW PHN (NSW), and Western Sydney PHN (NSW)

The project team would also like to acknowledge the contribution of the following individuals who provided input at various stages of the study:

- Catherine Tran (NCIRS) – face validity of the survey questionnaire and piloting the survey
- Jeff Wang (NCIRS) – face validity of the survey questionnaire and piloting the survey
- Deepika Jindal (NCIRS) – editorial review
- Madeleine Smith (NCIRS) – distribution of the survey
- Salema Barrett (NCIRS) – distribution of the survey
- Mimi Campbell (Central and Eastern Sydney PHN Immunisation Program) – face validity of the survey questionnaire and piloting the survey

Finally, the project team would like to acknowledge the pharmacists who participated in this survey.

Abbreviations and glossary

ACIR	Australian Childhood Immunisation Register
ACT	Australian Capital Territory
AIR	Australian Immunisation Register
aQIV	adjuvanted quadrivalent inactivated (influenza) vaccine
CI	confidence interval
The Council	Australian Pharmacy Council
COVID-19	coronavirus disease 2019
dTpa	diphtheria-tetanus-acellular pertussis vaccine
GP	general practitioner
The Guild	Pharmacy Guild of Australia
Health	Australian Government Department of Health
HPOS	Health Professional Online Services
IPV	inactivated polio vaccine
JIC	Jurisdictional Immunisation Coordinator
MenACWY	quadrivalent meningococcal conjugate vaccine
MMR	measles-mumps-rubella vaccine
NCIRS	National Centre for Immunisation Research and Surveillance
NIP	National Immunisation Program
NSW	New South Wales
NT	Northern Territory
PHN	Primary Health Network
PRODA	Provider Digital Access
PSA	Pharmaceutical Society of Australia
QIV	quadrivalent inactivated (influenza) vaccine
QLD	Queensland
SA	South Australia
TAS	Tasmania
VIC	Victoria
WA	Western Australia

Executive summary

Background

Since the first jurisdictional pharmacist-administered vaccination program in 2014 in Australia, all jurisdictions now allow pharmacists to administer certain vaccines. However, there are no data on how pharmacist-delivered vaccines are recorded and reported, or on the completeness of reporting of data to the Australian Immunisation Register (AIR).

Methods

The target population for our survey was all community pharmacists who currently administer vaccinations: in 2019, of the 2,099 community pharmacies, 975 (46.5%) offered vaccination services. We distributed an online survey to pharmacists via SurveyMonkey® between 5 June 2020 and 13 July 2020. The survey covered questions on vaccine administration practices, record-keeping practices, reporting practices, vaccinations by independent non-pharmacist providers in pharmacies, the impact of the COVID-19 pandemic on vaccination in pharmacies and data on the number of vaccines administered. We requested data from Services Australia for vaccines reported to AIR by the survey respondents in April and May 2020.

Key findings

Age and gender distribution among the 243 eligible survey participants was similar to that for community pharmacists nationwide, but New South Wales (NSW), Queensland (QLD) and Western Australia (WA) were underrepresented. Most survey respondents were pharmacists from banner groups and more were from regional areas than major cities compared with the national data. Almost all respondents (99%) administered influenza vaccines, and 76% administered at least one other type of vaccine. Vaccines funded on the National Immunisation Program (NIP) were available in 40% of pharmacies, noting that in NSW and QLD, NIP-funded vaccinations are not available to pharmacists.

Most respondents (93%) used pharmacy software but several used more than one method of recording vaccinations, with 68% using paper-based records and 40% patient-held records. All survey respondents indicated that they were aware of AIR before the survey, with 62% using it regularly. The majority (71%) of respondents reported data on vaccination encounters to AIR via automated uploads from pharmacy software, while 41% manually entered data on the AIR site; 13.5% used both methods.

We estimated that 82% of vaccinations administered by the 121 pharmacies for which respondents reported data (72,045 of 87,665 vaccinations administered) were reported to AIR. This may underestimate the true completeness of pharmacist vaccination reporting because of potential selection biases (respondents who provided data on the number of vaccines administered may have had a higher use of electronic methods of recording data on vaccination encounters and automated reporting to AIR via software compared with non-respondents and community pharmacies in general). The completeness of reporting to AIR was higher among those who

administered NIP-funded vaccines (89% versus 77%); recorded the patient's Medicare card number (87% among those who always record it, 65% among those who sometimes record it and 6% among those who do not record it); used AIR to check the patient's vaccination history (90% versus 79%); and used automated reporting methods compared with manual entry to AIR (85% versus 68%). Among those who used both automated uploads and manual entry to the AIR site, 97% of vaccination encounters were reported, likely indicating that these respondents checked whether the data transmitted automatically had been accurately recorded in AIR.

Respondents indicated that the ability to use automated reporting of vaccination encounters directly from pharmacy software to AIR was the most important factor enabling reporting to AIR. Difficulty accessing and using the AIR site was a substantial barrier to reporting, with many respondents indicating that registering to access AIR was a long and complicated process with a heavy administrative burden and inadequate support to resolve problems.

Pharmacists' reporting of vaccination encounter data to AIR is likely to be improved through increased adoption of electronic methods of recording and automated reporting processes. Use of software that automatically integrates with AIR is likely to improve both the quantity and quality of data reported to AIR. Although recording of Medicare card number was strongly linked to completeness of reporting, a fifth of survey respondents indicated that they do not always or ever record their patients' Medicare card details. In the time period covered by our survey, pharmacists had the highest proportion of vaccination encounters recorded as 'pend' files in AIR of all provider types, with the vast majority (92%) categorised as 'individual not identified (80)', indicating that the patient's identifying information could not be automatically matched to an existing Medicare record. Work with software vendors to make this field mandatory could improve recording of this information and consequently reporting to AIR.

Conclusions

This is the first study that provides evidence of pharmacists' practices for providing immunisation services; recording and reporting of vaccinations to AIR; and enablers of and barriers to providing immunisation services, including recording and reporting of vaccinations to AIR.

In the coming years, demand for pharmacist-administered vaccinations is likely to increase, particularly in the context of the COVID-19 vaccination program. The legislation on mandatory reporting to AIR should be accompanied by other systems-level changes to improve and increase access to AIR and adoption of electronic and automated means of recording and reporting data to AIR. Ongoing education of and support to pharmacists will also increase awareness of their responsibilities regarding reporting to AIR.

Recommendations

1. Increase electronic recording of vaccinations and automated transmission to AIR

The Australian Government Department of Health (Health) and Services Australia should strongly encourage and support pharmacists to use software that integrates with AIR. They should collaborate with pharmacists, pharmacy stakeholders and software providers to increase electronic recording and reporting of administered vaccines by:

- increasing pharmacists' uptake of software that integrates with AIR
- expanding the range of pharmacy software vendors supplying systems which enable electronic reporting through integration with AIR
- encouraging software providers to accelerate transfer to a web services platform to allow feedback from AIR regarding the success of transmission and viewing of AIR records.

2. Enhance systems by which data are transmitted to AIR to improve data quality

Health and Services Australia should collaborate with pharmacists, pharmacy stakeholders and software providers to streamline the process of recording and reporting vaccinations by integrating various software components (e.g. booking platform, dispensing software, pharmacy professional services software) into a single package to reduce administrative burden on pharmacies and data entry errors.

Health and Services Australia should collaborate and work with the vendors of software that do not currently transmit data automatically to AIR to better integrate their software with AIR. The large volume of encounters that currently cannot be automatically matched to existing Medicare records (pend files) could be substantially reduced by working with pharmacy software vendors to make completion of the field for the patient's Medicare card number compulsory. This will also prompt providers to check a patient's immunisation history on the AIR site and to transmit vaccination encounters to AIR at the time of administration.

Work between existing integrated AIR software vendors and Services Australia is needed to facilitate two-way communication between pharmacy software and AIR to ensure pharmacists are notified if encounters they report are not matched with an existing Medicare record or are received as a pend file. Recording and reporting could be further streamlined with the use of electronic booking systems that capture patient data and are integrated with pharmacy software.

3. Improve pharmacists' access to AIR and experience of using the AIR site

Health, in partnership with Services Australia and state and territory health departments, should review and streamline the processes required for health professionals to become recognised vaccination providers and access the AIR site, with clear instructions available to immunisation providers. Communication materials and resources specifically for pharmacists should be developed by Services Australia to assist them in registering for Provider Digital Access (PRODA) and accessing Health Professional Online Services (HPOS) and AIR. Services Australia could also develop a short video on how to navigate the AIR site. All communication materials developed should be widely distributed through relevant stakeholders. Consideration should also be given to

enhancing the ability and capacity of staff at Services Australia to support providers and resolve issues in registering for and accessing AIR.

4. **Implement legislation to mandate reporting to AIR**

Health has introduced legislation mandating reporting to AIR in 2021 (for all influenza and COVID-19 vaccines from 1 March, and all NIP-supplied vaccines from 1 July). This legislation should be accompanied by education of and support to immunisation providers to optimise compliance. Wide dissemination of information about requirements under this legislation is recommended, working with pharmacy peak bodies and professional stakeholders, such as the Pharmaceutical Society of Australia (PSA) and the Pharmacy Guild of Australia, to allow adequate time to implement any required changes in processes.

5. **Explore ways to improve pharmacist education and training, including enhancing training programs and continuous education opportunities, to increase reporting to AIR**

Health, Services Australia and organisations involved in training pharmacists in vaccine administration should collaborate to develop new and to enhance existing education and training materials to address gaps in support for pharmacists to increase the accuracy of recording and reporting of immunisation encounters to AIR.

A mandatory annual immunisation update is one possible means to ensure vaccinating pharmacists are up to date with the latest clinical advice. Such an update could also provide information about AIR and reporting of adverse events following immunisation, new vaccine information, eligibility for NIP-funded vaccines, addressing vaccine hesitancy and other current topics.

6. **Deliver regular communication to pharmacists regarding immunisation**

Regular communication with pharmacists by Health and jurisdictional health departments about upcoming changes to immunisation recommendations; processes for accessing and reporting to AIR; and reminders about reporting requirements would be valuable. Linkages could be explored with peak and professional bodies, who could also potentially deliver these communications.

7. **Enhance AHPRA register to identify all vaccinating providers, including pharmacists and pharmacies**

Enhancing the Australian Health Practitioner Regulation Agency (AHPRA) register to include all immunisation providers nationally, including pharmacists and pharmacies administering vaccines, would facilitate identification and enumeration of and communication with specific immunisation provider groups.

An enhanced register could be used to track how many immunisation providers are available in the workforce, how many are offering vaccination services and which of those are reporting (or neglecting to report) data on vaccination encounters to AIR. A register containing this information could also assist in identifying pharmacists and other providers who could deliver COVID-19 vaccines.

Health should consult with APHRA and the Jurisdictional Immunisation Coordinators (JICs) to enhance the existing register and determine whether trained immunisation providers can have this information specified on their registration and made publicly available.

8. Future studies

Health should liaise with relevant stakeholders, including state and territory health departments, Services Australia and pharmacy peak bodies, to consider the value and feasibility of random quality assurance audits to assess the proportion of vaccines administered in pharmacies that are reported to AIR. Consideration of such an audit program could be informed by a recent NSW Health random audit of pharmacist compliance with the NSW Pharmacist Vaccination Standards.

Introduction

Background to study

The Australian Immunisation Register (AIR) is a national register that records vaccines given to people of all ages in Australia.[1] As an official record of vaccinations, AIR is used to:

- assist in clinical decision-making
- identify parts of the country at risk during disease outbreaks
- monitor the effectiveness of vaccines and vaccination programs
- inform immunisation policy and research
- determine eligibility for Family Tax Benefit and Child Care Subsidy payments'
- provide proof of vaccination for entry to child care, school and employment purposes
- monitor vaccination coverage across Australia.[2,3]

Following extensive advocacy and policy change, all jurisdictions have introduced legislation since 2014 to allow adequately trained pharmacists to administer certain vaccines. Legislation for pharmacist vaccination, including requirements for reporting to AIR, differ in each jurisdiction (refer to Appendices 1 and 2 for details).[4] Peak bodies, including the Pharmacy Guild of Australia (the Guild) and the Pharmaceutical Society of Australia (PSA), continue to advocate for expansion of pharmacists' scope of practice in administering vaccines to include additional vaccine types, age groups and greater access to National Immunisation Program (NIP) vaccines.[4,5]

Pharmacists have an emerging role in contributing to vaccination coverage in Australia, particularly in the context of the COVID-19 vaccination program. An increasing number of vaccines are being delivered in Australia by pharmacists: from 14,464 encounters reported to AIR in 2017 to 449,719 encounters reported in 2019.[6] Evaluations of pharmacist vaccination programs and pilots have taken place in Tasmania (TAS), the Northern Territory (NT), Victoria (VIC), Western Australia (WA) and Queensland (QLD), showing that between 94% and 100% of vaccine recipients have been satisfied with the experience.[7-11] Between 14% and 33% of those being vaccinated reported they were receiving an influenza vaccination for the first time or would not have been vaccinated if the service was not available in a pharmacy.[7-11] As such, pharmacists are increasing access to, and uptake of, vaccination services in Australia and may have a particularly important role in regional and remote areas.[12]

To date, there have been no published studies investigating how pharmacist vaccinations are recorded and reported to AIR and the completeness of pharmacist vaccination data in AIR. This study has been conducted under the funding agreement between NCIRS and the Australian Government Department of Health (Health), and builds on previous work undertaken by NCIRS to review the transfer of data into AIR.[13] In particular, this report follows on directly from a previous published NCIRS report examining vaccination encounters by pharmacists recorded in AIR (Part A) and describing the landscape of the pharmacy industry, including the existing processes for pharmacies to record and report pharmacist vaccinations to AIR (Part B).[6]

Highlights from Parts A and B report[6]

As at June 2019, just under half of all community pharmacies in Australia were known to be offering vaccination services (n=975/2,099; 46.5%). Between 2016 and 2019, there were 576,780 pharmacist vaccinations recorded in AIR, with the majority (449,719; 78.0%) given in 2019, almost all (545,928; 94.7%) influenza vaccines. The highest number of pharmacist vaccinations was reported in VIC (147,757) and the highest rate in WA (5,182 per 100,000 population).

Pharmacies largely use professional services software or paper-based systems to store vaccination records. Most report to AIR directly via the AIR site (343,453 encounters [59.5%] from 2016 to 2019) or automatically* through professional services software (232,576 encounters [40.3%]). Automated reporting increased substantially between 2018 and 2019 (232,363 encounters in 2019 [51.2%] compared with 212 in 2018 [0.19%]), but is still substantially lower than the proportion of encounters reported via automated software by general practitioners (GPs) (94.9% in 2019 [12,668,258/13,347,826]).† GuildCare NG and MedAdvisor are the two most widely used software providers by pharmacists, and the only programs with established integration with AIR at the time of this study (implemented in August 2018 and March 2019, respectively).

Gaps in current knowledge

The previous report from this study found likely under-reporting of pharmacist vaccinations to AIR,[6] but did not include information about the completeness of the data and barriers to and enablers of reporting. Without these data, it is impossible to accurately determine numbers of vaccines given by pharmacists, the level of underreporting and how to improve completeness of reporting.

Aims

Part C of this study aims to:

- describe pharmacists' level of awareness and knowledge of AIR
- understand how pharmacists record and report vaccination encounters to AIR
- identify the enablers of and barriers to reporting to and recording vaccinations in AIR
- estimate the proportion of pharmacist vaccination encounters that are reported to AIR
- identify factors associated with reporting of vaccination encounters to AIR.

With the likely involvement of pharmacists in the roll out of the COVID-19 vaccination program and implementation of legislation mandating reporting of vaccination encounters to AIR by all immunisation providers,[14] this study aims to inform measures to optimise the completeness and quality of vaccination data reported by pharmacists to AIR.

* Automated transmission of data to AIR via professional services software requires the person entering the data to click a button within the software to send the data to AIR. Data may be transmitted for each record individually or batch reported, depending on the capabilities of the software and the processes of the pharmacy.

† Data on the number and proportion of vaccination encounters reported to AIR by GPs are based on unpublished analysis of data reported to AIR conducted by NCIRS.

Methods

Development of the survey tool

The survey was developed by NCIRS in consultation with Health, Services Australia, pharmacy peak bodies, individual pharmacists and states and territories (specifically Jurisdictional Immunisation Coordinators [JICs]).

The survey components covered:

- demographic variables
- vaccine administration practices
- vaccination record-keeping practices
- vaccination reporting practices
- vaccinations by independent non-pharmacist providers in pharmacies
- impact of the COVID-19 pandemic on vaccination in pharmacies
- data on the number of vaccines administered (refer to Appendix 3).

Drafts of the survey questionnaire were circulated to these key stakeholder groups to assess the content covered relevant information gaps and that the language and format was appropriate. The draft survey was piloted with five pharmacists, who provided the study team with feedback on the survey questions and the subject matter included to ensure the face and content validity of the survey. Feedback from the pilot was incorporated into the final survey.

Study population and sample size

The target population of our study was community pharmacists who currently offer vaccination services in Australia. Pharmacists who did not own or work in a community pharmacy that offered vaccination services were excluded, regardless of whether they were qualified as an immunisation provider. There is no national register of vaccinating pharmacists in Australia, and some states (NSW, QLD and WA) do not have a register of pharmacies providing vaccination services. There was a total of 2,099 community pharmacies in Australia in 2019, of which 975 (46.5%) offered vaccination services.[6]

The required sample size for this study was calculated using the Australian Bureau of Statistics National Statistical Service sample size calculator. Sample size for 80% power was calculated at 95% confidence interval (CI) and 0.05 precision for an estimated AIR reporting rate of 10.5% among pharmacy-based vaccination encounters. This proportion is based on the number of influenza vaccine doses recorded in AIR in 2018 (105,028 doses) and the number of influenza vaccines reported by the PSA to have been delivered by pharmacists in 2018 (over 1 million).[15] The required sample size was calculated to be 145 vaccination encounters to obtain evidence of a 10.5% reporting rate (i.e. the proportion of vaccinations administered that are reported in AIR) in pharmacies (based on the 105,028 influenza vaccinations reported to AIR by pharmacists in 2018, and 1 million doses reported to have been administered by the PSA).

Inclusion and exclusion criteria

For analysis of the survey responses, we included responses from all community pharmacists offering vaccination services at the time of survey completion. Responses were excluded if:

- the respondent did not work in or own a community pharmacy
- vaccination services were not offered in the respondent's pharmacy
- the respondent was not a pharmacist or pharmacy trainee (i.e. had sufficient training to allow them to administer vaccinations)
- the respondent discontinued the survey without answering all questions assessing eligibility or any questions related to their use of AIR (i.e. only answered eligibility questions).

The comparison of the number of vaccines administered by pharmacies with those recorded in AIR was limited to those who provided both a valid immunisation provider number and the exact number of vaccinations administered in that pharmacy. Respondents who provided a range of possible numbers or an estimate (e.g. "around 1,000" or "500 to 600") were excluded.

Distribution of survey

The survey was distributed to pharmacists electronically and available to complete online via SurveyMonkey®.[16] The survey was open to responses between 5 June 2020 and 13 July 2020, following the usual period of peak influenza vaccinations (the majority of vaccinations given by pharmacists) in April and May, and allowing pharmacists sufficient time to enter in data on vaccines administered in those months. A single reminder was sent to pharmacists during the week of 22 June 2020.

The survey was distributed via multiple channels, including through jurisdictional lists of vaccinating pharmacies where they existed (JICs for TAS and VIC distributed surveys to their lists, while NCIRS distributed the survey to pharmacies in the NT and SA using contact lists supplied to us by the jurisdictions), the PSA, the Guild, banner pharmacy groups (including Chemist Warehouse, Terry White and Pharmacy 777; Priceline was contacted but did not confirm distribution) and some PHNs. We received confirmation of distribution from the Capital Health Network (the ACT), Central and Eastern Sydney PHN (NSW), Gippsland PHN (VIC), Primary Health Tasmania (TAS), Sydney North Health Network (NSW), Western NSW PHN (NSW) and Western Sydney PHN (NSW). We were unable to precisely track when and to whom the survey was sent (apart from the emails sent by NCIRS to lists of vaccinating pharmacies in the NT and SA).

Calculation of a response rate was not possible as the true number of community pharmacies offering vaccination services in Australia is unknown. Furthermore, some vaccinating pharmacists may not have received the survey via our distribution channels.

AIR data

We requested, and received, data from Services Australia to compare how many vaccines were administered in pharmacies as reported by survey respondents relative to how many vaccination encounters were recorded in AIR for those pharmacies. This included the number of vaccinations

by the pharmacy immunisation provider numbers in April and May 2020, the number of pharmacies registered with AIR and the number who submitted data to AIR, by year between 2016 and 2020, and the number of 'pend' encounters. A pend encounter is an immunisation encounter that has been submitted to AIR but has not yet been accepted as a valid encounter due to an error, and is manually reviewed. We requested and received data on the number of pend encounters in April and May 2020 that were:

1. transmitted by any provider, by provider type
2. transmitted by pharmacists, by jurisdiction
3. transmitted by pharmacists, by the type of error resulting in an encounter that has been received as a pend encounter (i.e. 'pend category').

The data on pend encounters represent the numbers of original pends, that is, the state of the record when it first entered the system. Pend categories are mutually exclusive, that is, a single pend encounter can only be classified under one error category.

All data from Services Australia were extracted on 18 October 2020.

Statistical analysis

We calculated actual (crude) and weighted proportions with 95% CI for responses to the survey items. Actual proportions are reported here, with weighted proportions mentioned only where they were substantially different. We applied weights to adjust for imbalances in our survey sample by jurisdiction compared with the distribution of pharmacists nationally. The analysis was not weighted by age group or gender; weighting by small area (i.e. geographic region within a jurisdiction) was not possible due to these data being absent. Chi-square tests were conducted to examine the difference in proportions between groups of variables (e.g. whether self-reported use of AIR varied by jurisdiction).

Qualitative responses to survey questions where free-text responses were permitted were analysed using thematic analysis. The responses were reviewed and categorised by the predominant themes or concepts. We also cross-checked responses against multiple-choice survey items based on qualitative responses; for example, for a respondent who provided the response "We changed from paper based to both paper-based and electronic records" to the question on how they changed their methods of recording data on vaccinations administered in pharmacy, we checked that they had marked the options for electronic and paper-based methods in the multiple-choice question regarding how they record these data.

The proportion of vaccination encounters reported to AIR was calculated by dividing the number of encounters recorded in AIR for pharmacies included in the study (data provided by Services Australia) by the number of vaccinations reported by pharmacists in the survey. Only actual proportions with 95% CI were calculated. For some respondents, the number of vaccination encounters in AIR for the relevant pharmacy was greater than the number reported by the pharmacist. We adjusted the number of vaccination encounters reported in AIR down to match the number of encounters reported by the pharmacist for these cases, that is, the proportion reported was assumed to be 100%. Students T-tests and simple linear regression was used to test the

significance of differences in the proportion of vaccinations reported to AIR between groups (e.g. by jurisdiction or administration of NIP-funded vaccines).

P-values less than 0.05 were considered statistically significant. All analyses were performed using Stata 14 and Microsoft Excel.

Ethical considerations

Ethical approval for this study was sought and granted by the Sydney Children's Hospital Network's Human Research Ethics Committee, protocol 2019/ETH13380. Implied consent to participate was assumed by completion of the voluntary survey.

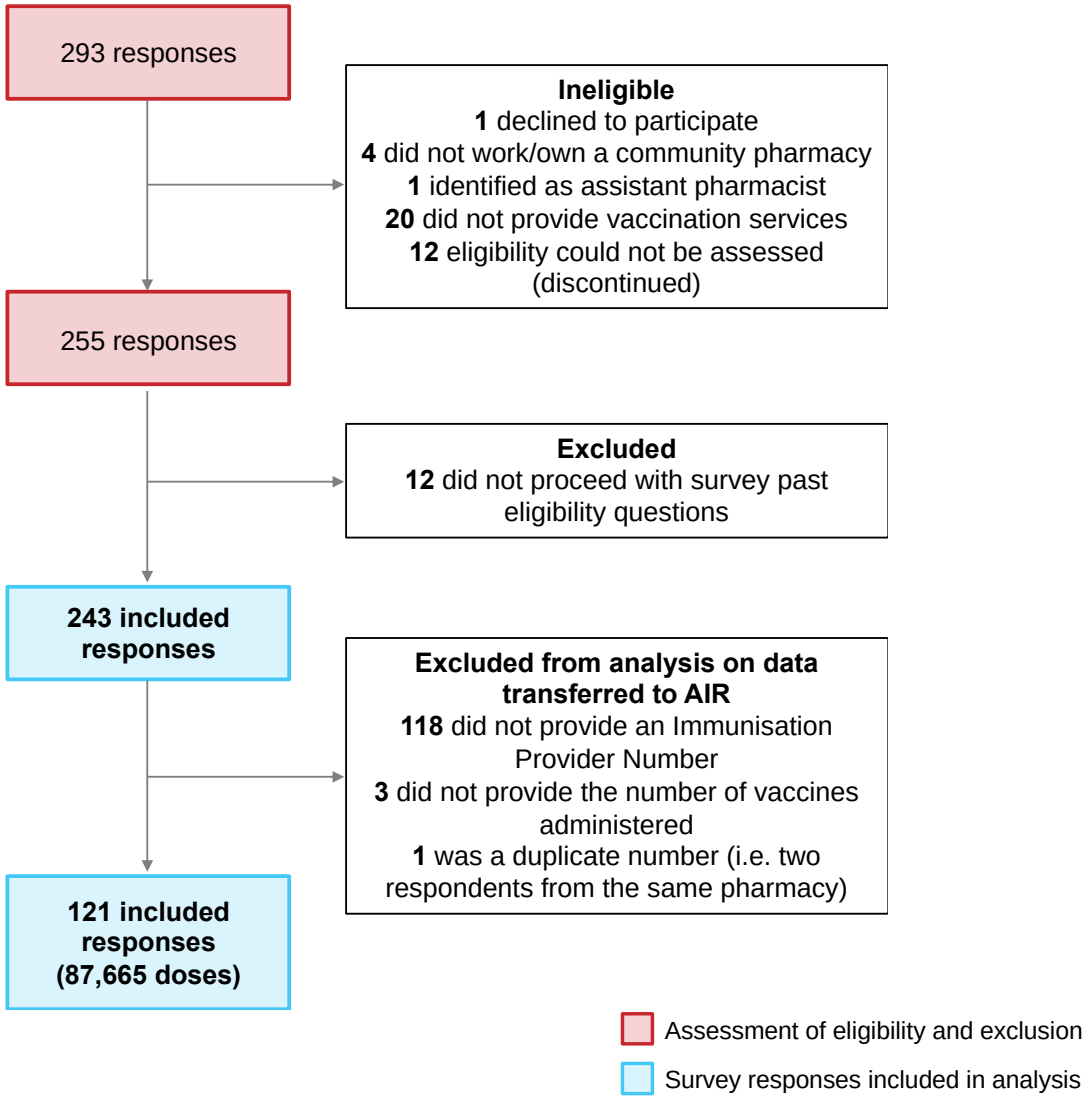
Results

Findings from the survey of pharmacists

From 5 June 2020 to 13 July 2020, we received 293 survey responses. Of these we included 243 responses in the analysis. Refer to Figure 1 for reasons for excluding 50 responses.

Of 20 respondents who were ineligible, as they did not provide vaccination services in their pharmacies, 14 (70%) had undertaken training to administer vaccinations in their own jurisdictions and 1 in another jurisdiction; 2 had no immunisation-specific training; and 4 worked in a pharmacy where someone else had received training.

Figure 1: Flowchart of pharmacists' inclusion and exclusion in the study



Boxes in red show the number of initial responses and reasons for exclusion from the analysis. The blue boxes show the number of subjects included in the analysis.

Participant characteristics

The age and gender distribution of our survey respondents (refer to Table 1; comparison with pharmacist population nationally is shown in Appendix 4) was similar to that of pharmacists nationwide (based on data from the Pharmacy Board of Australia as at March 2020).[17] However, certain jurisdictions were overrepresented, specifically TAS (2.5% of pharmacists nationally versus 15.6% of survey respondents, i.e. more than 6 times the actual population) and VIC (25.8% nationally versus 37.0% of respondents), while others, especially NSW (30.0% nationally versus 22.2% of respondents), QLD (20.2% nationally versus 10.7% of respondents) and WA (10.8% nationally versus 6.2% of respondents), were underrepresented. These differences likely reflect our survey distribution methods, notably that there were more responses from states where JICs directly distributed the survey using a state-held register of vaccinating pharmacists.

The majority of our survey sample (93.8%) owned the pharmacy, likely due to the way the survey was distributed and knowledge of the information being asked in the survey. Similarly, the majority of respondents (75.3%) were from banner groups, with most of the remaining respondents from independent pharmacies (16.9%). Pharmacists from regional areas were overrepresented in our study sample (21.4% nationally versus 44.9% of respondents) relative to major cities (77.4% nationally versus 50.2% of respondents), which may reflect the greater role of pharmacists in providing vaccination services in regional and remote areas.

Almost all respondents indicated that they administer influenza vaccines in their pharmacies (99.2%), with most (76%) also administering at least one other type of vaccine. NIP-funded vaccines were available in 39.9% of respondents' pharmacies (97/243 of all respondents; 100% [1/1] in the ACT, 81.1% [73/90] in VIC and 73.3% [11/15] in WA); however, this included three respondents from NSW (5.6%) and two from Queensland (7.7%), where NIP-funded vaccinations are not available to pharmacists, and seven respondents from TAS (18.4%) where state-funded measles-mumps-rubella (MMR) vaccines only is provided, so the question may have been misinterpreted by some respondents. Of those administering NIP vaccines, almost all respondents (98.9% [91/92]) administered influenza vaccines; other vaccines they administered included diphtheria-tetanus-acellular pertussis (dTpa) vaccines (62.0% [57/92]), MMR vaccines (35.9% [33/92]) and quadrivalent meningococcal (MenACWY) vaccines (9.8% [9/92]).

Table 1. Characteristics of respondents included in the study (n=243)

Characteristic	n	%
Gender		
Male	103	42
Female	140	58
Age group		
18–29 years	52	21
30–39 years	76	31
40–49 years	53	22
50–59 years	40	16
60 years or older	22	9
State/territory		
ACT	1	0.4
NSW	54	22
NT	1	0.4
QLD	26	11
SA	18	7
TAS	38	16
VIC	90	37
WA	15	6
Geographical location		
Major city	122	50
Regional	109	45
Remote	12	5
Affiliation*		
Banner group	183	75
Buying group	16	7
Friendly society	2	1
Independently owned	41	17
Other	1	0

Characteristic	n	%
Ownership status		
Owner	94	39
Employee	15	6
Both	134	55
Number of pharmacies owned (n=109)		
1	74	68
2–4	33	30
5–9	2	2
Type of vaccine administered		
Influenza (any)	241	99
QIV	232	95
Adjuvanted QIV	111	46
MMR	136	56
dTpa (any)	179	74
dTpa only	176	72
dTpa-IPV	30	12
MenACWY	40	16
Other (pneumococcal)	1	0
Administers NIP-funded vaccines		
Yes	97	40
No	131	54
Unsure	15	6
Has independent providers who administer vaccinations†		
Yes	34	15
No	195	85

dTpa=diphtheria-tetanus-acellular pertussis (vaccine); IPV=inactivated polio vaccine; MenACWY=quadrivalent meningococcal (vaccine); MMR=measles-mumps-rubella (vaccine); NIP=National Immunisation Program; QIV=quadrivalent influenza vaccine

* Banner groups are large pharmacy franchised groups (e.g. Chemist Warehouse, Priceline, TerryWhite, Pharmacy 777); buying groups are a collection of independent pharmacies that work together to collectively purchase products and obtain more competitive pricing; friendly societies are not-for-profit mutual organisations that function on a cooperative principle.

† Independent providers include nurse immunisers, general practitioners, nurse practitioners and/or pharmacists who do not otherwise work at the pharmacy.

Pharmacists' use of AIR before vaccine administration

The vast majority of pharmacists reported checking the patient's vaccination history before administering a vaccine, with only 19 of 243 (7.8%) indicating that they do not check the patient's history (refer to Table 2). However, of these 19, 13 indicated that they check vaccination history by asking the patient, leaving only 6 (2.5%) who do not use any method to check vaccination history. Only a quarter of all respondents (26.3% [64/230]) reported checking the patient's vaccine history in AIR, while the majority (94.7% [230/243]) asked the patient for this information and almost a third (30.9% [75/243]) checked the electronic records held by the pharmacy.

> *Depending on what the vaccination is – i.e. influenza – I trust the patient to remember this year's annual vaccine (unless they were unsure and may exhibit or be known to us to have memory issues). But pertussis, if unsure I would check AIR. Adults have only had AIR records for 4 years so if it is longer than that I am assuming it has not been done. Have also contacted GP clinic to check where required.*

Eight per cent (19/243) of respondents reported not checking vaccination history before administering a vaccine, with the most common reasons being that it is too time consuming, it is not part of their pharmacy vaccination protocol or they don't have access to or have difficulties accessing AIR.

> *The current process to access AIR in pharmacies is so cumbersome that it is not worth it.*

> *The AIR is not a very user friendly system. It only logs in on one of our computers which is not in the dispensary.*

Ten respondents indicated in their comments that they did not believe it was necessary to check the patient's vaccination history in AIR, most commonly because they largely or exclusively administered influenza vaccine, while seven indicated it depended on the vaccine being administered:

> *Flu vaccines are seasonal, so most patients should hopefully remember if they've had a vaccine within the last few months.*

> *For flu, don't see it [as] important to check history for each patient. 95% of our vaccines are annual flu.*

> *It's a variable answer – for flu vaccines its not really necessary to check for history in the current season. For Boostrix/Adacel and MMR I'll check AIR.*

> *Again, it depends on the vaccination they are receiving. We will always check AIR for any vaccination other than flu vaccination. We always check for previous flu vaccination on the patients consent form to check if they had any adverse reaction.*

Two respondents indicated they believed that there is no issue with administering repeat vaccinations.

> *I am aware that you cannot over immunise (with the vaccines that we administer!)*

There is no harm to the patient receiving repeat vax.

Most respondents (77.8% [189/243]) said that they always record the patient's Medicare card number; 21.0% (51/243) said they record it sometimes and 1.2% (3/243) said they do not record it before administering a vaccine.

Table 2. Pharmacists' practices of checking vaccination history before administering a vaccination (n=243)

Characteristic	n	% (95% CI)
Method of checking vaccination history (n=243)		
Ask the patient	230	94.7 (91.0–96.9)
Check paper-based records	41	16.9 (12.6–22.2)
Check software records	75	30.9 (25.3–37.0)
Check AIR	64	26.3 (21.1–32.3)
Check My Health Record	18	7.4 (4.7–11.5)
Other*	2	0.8 (0.2–3.3)
Does not check	19	7.8 (5.0–12.0)
Reasons for not checking vaccination history (n=224)		
Too time consuming	41	18.3 (13.7–24.0)
Not part of my pharmacy's vaccination protocol	36	16.1 (11.8–21.5)
Not important to check history	2	0.9 (0.2–3.5)
Don't have access to AIR	24	10.7 (7.3–15.5)
Don't know how to	13	5.8 (3.4–9.8)
Not a legislated requirement	13	5.8 (3.4–9.8)
I always check vaccination history	125	55.8 (49.2–62.2)
Other†	32	14.3 (10.3–19.6)

* Responses to 'Other' could not be categorised into one of the existing categories as it was unclear whether respondents checked vaccination history; one respondent stated they only administered influenza vaccines, and the other indicated difficulties accessing AIR and MyHealthRecords.

† Responses to 'Other' relate to difficulties using the AIR site (n=12), that checking history depends on the vaccine being administered (n=7), that it is not necessary (particularly for administration of influenza vaccines) (n=10), that it is not harmful to give repeat vaccinations (n=2), or various descriptions of how they check vaccination history, for example, "will check if patient is unsure" (n=7).

Pharmacists' vaccination record-keeping practices

All respondents reported keeping records of vaccinations given in their pharmacies (refer to Table 3). The vast majority of respondents (93.4% [227/243]) use pharmacy software. However, several (73.3% [178/243]) used more than one method of recording vaccinations, with 67.9% [165/243] using paper-based records and 39.9% [97/243] using patient-held records.

All vaccinations [are] now recorded on MedAdvisor software, to easily achieve updating of AIR and provision of immunisation statement (if requested by patient). Record is also kept on

dispensing software to facilitate charging & stock control and as this is where patient medical history is checked for dispensing of other prescriptions.

Respondents indicated a preference for recording data on vaccinations administered electronically and that they have streamlined processes by switching to electronic methods:

We are required to keep a paper record of the prescription for the influenza vaccine administered by the pharmacist. However, it would be preferential for the entire process to be electronic, both with processing and storage/archiving requirements.

Pre-vaccination checklist changed from paper-based to electronic record, patient fills the checklist just prior to vaccination online which can be easily checked on our system prior to the appointment.

In our study, 32.9% (74/225) of respondents who use electronic recording methods use GuildCare NG, while 44.0% (99/225) use MedAdvisor. Almost three quarters of respondents (72.4% [163/225]) indicated using dispensing software to record data on vaccinations administered, with many indicating they use more than one electronic method of recording vaccinations. Of those reporting use of "other software", 11 use the Chemist Warehouse branded software and 4 use HBF (Pharmacy 777), while 2 reported recording directly on the AIR site.

Three out of five (59.8% [144/241]) respondents reported having a computer in the consultation room where vaccinations occur, with 94.4% (134/142) of those having software that vaccinations can be recorded on to. Of the 11 who indicated having an alternative to a computer in the consultation room, 7 have another device they can record on such as a tablet, iPad or laptop.

While 69.1% of respondents (163/236) reported no recent changes to their method of recording, 18.6% (44/236) reported changing from paper-based recording to electronic.

Table 3: Pharmacists' practices of recording vaccination encounters

Characteristic	N	% (95% CI)
Method of recording vaccination encounters (n=243)		
Pharmacy software	227	93.4 (89.5–95.9)
Paper-based records	165	67.9 (61.7–73.5)
Patient-held records	97	39.9 (33.9–46.2)
Other*	13	5.3 (3.1–9.0)
Number of methods used to record vaccination encounters (n=243)		
1	65	26.7 (21.5 – 32.7)
2	104	42.8 (36.7 – 49.1)
3	67	27.6 (22.3 – 33.6)
4	7	2.9 (1.4 – 5.9)
Pharmacy software type used (n=225)		
GuildCare NG	74	32.9 (27.0–39.3)
MedAdvisor	99	44.0 (37.6–50.6)

Characteristic	N	% (95% CI)
Dispensing software	163	72.4 (66.2–77.9)
Other†	29	12.9 (9.1–18.0)
Computer in consultation room (n=241)		
Yes	144	59.8 (53.4–65.8)
With professional services software (n=142)	*134*	94.4 (89.1–97.2)
Without software (n=142)	*7*	4.9 (2.3–10.1)
Unsure (n=142)	*1*	0.7 (0.1–4.9)
No	86	35.7 (29.8–42.0)
Other‡	11	4.6 (2.5–8.1)
Changes to method of recording vaccination encounters (n=236)		
Changed software platforms	20	8.5 (5.5–12.8)
Changed from paper based to electronic record keeping	44	18.6 (14.1–24.2)
Changed from electronic record keeping to paper based	1	0.4 (0.1–3.0)
No change	163	69.1 (62.8–74.7)
Other#	8	3.4 (1.7–6.7)

* Among responses to 'Other', 8 indicated they recorded encounters in AIR (but did not indicate if/whether they had records held in the pharmacy), 2 used a booking system, 2 provided a patient with a record on request and 1 offered to send records to the GP (in addition to uploading to AIR).

† Among responses to 'Other', 11 used the Chemist Warehouse branded software, 4 used HBF (Pharmacy 777), 4 used a booking system (e.g. GoBookings), 2 reported recording directly onto AIR, and 10 reported using other systems or platforms (e.g. JotForm, LOTS, MyScript, Dropbox, MyWeb, 'internal software').

‡ Among responses to 'Other', 7 had another device they could record to such as a tablet, iPad or laptop, 2 recorded data in other ways (e.g. at time of dispensing), and 2 did not have a device.

Among responses to 'Other', 8 changed to electronic pharmacy records or software, 6 used more than 1 method, 5 changed software types, 4 previoulsy manually entered to AIR, 2 indicated intention to change to electronic record keeping next year, 1 now records directly to AIR, and 1 shared paper-based records with the GP to upload to AIR .

Pharmacists' vaccination reporting to AIR practices

All survey respondents indicated that they were aware of AIR before the survey (refer to Table 4). Most (61.7% [148/240]) indicated using AIR regularly, while 22.5% (54/240) use it occasionally and 15.8% (38/240) never use it. The vast majority (95.0% [227/239]) indicated that they report vaccinations to AIR. The fact that some pharmacists indicated they have never used AIR but still report to AIR could reflect that many are reporting via automated methods and so do not interact directly with the AIR site.

There was no significant difference in respondents' reporting practices whether they report to AIR by jurisdictions where reporting is a legislated requirement (i.e. in the ACT and NSW, at the time of the survey) or whether the pharmacy administers NIP-funded vaccines. Among respondents who said they report vaccination encounters to AIR, 88.2% (195/221) indicated that they report all vaccinations administered, with only 0.9% (2/221) indicating they report 'some'.

Among those who indicated that they report data on vaccinations administered to AIR, 71.0% (159/224) report via automated uploads from pharmacy software, while 41.1% (92/224) manually enter data on the AIR site. Fifteen per cent of respondents reported using more than one method to report to AIR (34/223); 57.8% (126/223) report via automatic uploads from software only, 27.8% (62/223) manually enter data only and 13.5% (30/223) use both methods. Only 2 respondents (0.9%) reported using neither of those methods.

Among those who enter data manually on the AIR site (n=62), the vast majority (90.3% [56/62]) use the patient's Medicare card number to identify the patient, with 61.3% (38/62), 54.8% (34/62) and 16.1% (10/62) using the patient's name, date of birth or address, respectively.

Most respondents indicated that the pharmacist who administers the vaccine reports data to AIR (68.5% [152/222]), but in many cases another pharmacist (26.6% [59/222]), the dispensing technician (15.8% [35/222]) or the pharmacy assistant (9.9% [22/222]) may report to AIR. Two thirds of respondents (67.9% [150/221]) indicated that they report vaccines to AIR at the time of or shortly after administering vaccines, with less than a third (28.1% [62/221]) reporting vaccination encounters in batches. Among those who batch report, 41.9% (26/62) indicated they report encounters once a day, 27.4% (17/62) once a week and 9.7% (6/62) once a month. Comments from respondents who indicated "other" for the reporting time-frame (21.0% [13/62]) indicated that the frequency of reporting depends on how many vaccinations are given, with reporting occuring more regularly during the busy influenza vaccination season. Others indicated that they report when they have time, depending on their workload, or after scheduled vaccination clinics.

Twenty-one per cent of respondents (49/230) indicated that they had increased reporting to AIR in the past year. A minority indicated they decreased reporting (1.3% [3/230]) or stopped reporting over time (0.9% [2/230]), mostly due to time restraints during the COVID-19 pandemic, lack of access to AIR or that they didn't believe it was important.

Table 4: Pharmacists' practices of reporting vaccination encounters to AIR

Characteristic	n	% (95% CI)
Familiarity with AIR (n=240)		
Regular use	148	61.7 (55.3–67.6)
Occasional use	54	22.5 (17.6–28.3)
Aware but never used	38	15.8 (11.7–21.1)
Never heard of it	0	0.0 (N/A)
Report to AIR (n=239)		
Yes	227	95.0 (91.3–97.1)
No	12	5.0 (2.9–8.7)
How many vaccines are reported (n=221)		
All of them	195	88.2 (83.2–91.9)
Most of them	24	10.9 (7.4–15.7)
Some of them	2	0.9 (0.2–3.6)

Characteristic	n	% (95% CI)
Few of them	0	0.0 (0.0–0.0)
Method of reporting to AIR (n=224)		
Automatic upload from software	159	71.0 (64.7–76.6)
Manually entered onto AIR site	92	41.1 (34.8–47.7)
Fax	1	0.4 (0.1–3.1)
Post	1	0.4 (0.1–3.1)
Sent through secure email	1	0.4 (0.1–3.1)
Provide patients with record and ask that their GP upload it	1	0.4 (0.1–3.1)
Don't know	1	0.4 (0.1–3.1)
Other*	3	1.3 (0.4–4.1)
Number of reporting methods used (n=223)		
1	189	84.8 (79.4–88.9)
2	33	14.8 (10.7–20.1)
3	1	0.4 (0.1–3.2)
Person who uploads data to AIR (n=222)		
No one, it is automated	44	19.8 (15.1–25.6)
The pharmacist who administers the vaccine	152	68.5 (62.0–74.3)
A pharmacist, but not always the administrating pharmacist	59	26.6 (21.1–32.8)
Pharmacy assistant	22	9.9 (6.6–14.6)
Dispensing technician	35	15.8 (11.5–21.2)
Don’t know	4	1.8 (0.7–4.7)
Other†	5	2.3 (0.9–5.3)
When are vaccination encounters reported (n=221)		
At the time of or immediately after administration	150	67.9 (61.4–73.7)
Batch reported	62	28.1 (22.5–34.4)
Once a day	26	41.9 (30.1–54.8)
Once a week	17	27.4 (17.5–40.1)
Once a month	6	9.7 (4.3–20.3)
Other frequency of batch reporting	13	21.0 (12.4–33.2)
Other‡	9	4.1 (2.1–7.7)
Changed reporting practices in past year (n=230)		
Increased reporting	49	21.3 (16.5–27.1)
Decreased reporting	3	1.3 (0.4–4.0)
No change	163	70.9 (64.6–76.4)

Characteristic	n	% (95% CI)
Stopped reporting over time	2	0.9 (0.2–3.4)
Never reported	8	3.5 (1.7–6.8)
Don't know	5	2.2 (0.9–5.1)

* Among responses to 'Other', 1 said they entered data manually only if data were not uploaded automatically; 1 said they gave a patient a record prior to entering data into AIR; and 1 said that automatic upload from their dispensing system was desirable.

† Among responses to 'Other' regarding who reports data to AIR, 2 said interns and students; 1 said administrative staff; 1 said trained staff members; and 1 said the pharmacy assistant.

‡ Among responses to 'Other', 2 indicated they report daily; 3 said they report when they are able to/have time to; 4 said usually daily or immediately but during busy periods can be delayed; and 1 said "prior to vaccinations".

Vaccination by independent providers

Independent providers administered vaccinations in 14.8% (34/229) of pharmacies included in this study, most commonly a nurse immuniser, nurse practitioner or another pharmacist who did not otherwise work in the pharmacy (refer to Table 5). Respondents indicated that the pharmacy kept records of vaccinations administered by independent pharmacists in the majority of cases (78.1% [25/32]), but in the remainder records were either not kept or not always kept by the pharmacy. These vaccination encounters were reported by either the independent provider (56.3% [18/32]) or the pharmacy (31.3% [10/32]).

Table 5: Vaccination encounters in pharmacies administered by independent providers

Characteristic	n	% (95% CI)
Vaccination clinics conducted by independent provider (n=229)		
Yes	34	14.8 (10.8–20.1)
No	195	85.2 (79.9–89.2)
Type of provider (n=33)		
Nurse immuniser	24	72.7 (54.3–85.7)
Nurse practitioner	8	24.2 (12.1–42.6)
General practitioner	2	6.1 (1.4–22.6)
Pharmacist who does not otherwise work in the pharmacy	7	21.2 (10.0–39.4)
Vaccinations by independent provider recorded by pharmacy (n=32)		
Yes, always	25	78.1 (59.6–89.7)
Yes, sometimes	1	3.1 (0.4–20.9)
No	2	6.3 (1.4–23.2)
Don't know	2	6.3 (1.4–23.2)
Other*	2	6.3 (1.4–23.2)
Person who reports vaccinations by independent provider to AIR (n=32)		
Independent provider	18	56.3 (38.1–72.9)

Pharmacy	10	31.3 (17.1–50.0)
Neither (i.e. not reported)	1	3.1 (0.4–20.9)
Other†	3	9.4 (2.9–26.7)

* 1 respondent stated “I think so”, and 1 respondent indicated that they kept a record of vaccinations given by an independent provider this year for the first time.

† 1 respondent said they kept a record if Medicare details were available; 1 respondent indicated the independent provider kept them but sometimes they were recorded in pharmacy; and 1 respondent did not know.

Impact of the COVID-19 pandemic on pharmacist vaccination

Nearly all respondents (95.6% [217/227]) reported experiencing higher demand for vaccines in 2020 than expected, likely a result of the COVID-19 pandemic. Just over a quarter of respondents (26.8% [61/228]) reported that the pandemic adversely affected their ability to administer vaccines. Refer to Table 6.

The proportion of respondents adversely affected by the pandemic was higher in regional areas (32.4% [95% CI: 24.1–42.0]) than in major cities (24.1% [95% CI: 14.7–30.1], but the difference was not statistically significant. However, this comparison reached statistical significance in the weighted analysis (34.5% [95% CI: 23.6–47.3] versus 19.8% [95% CI: 13.1–28.8], p=0.04). The proportion of respondents adversely impacted by the pandemic was also higher among those who did not use pharmacy software to record vaccinations (46.7% [95% CI: 23.3–71.5] versus 25.4% [95% CI: 19.9–31.7] who use pharmacy software, p=0.08 [not significant]). However, this was statistically significant in the weighted analysis: 57.0% [95% CI: 27.3–82.4] versus 23.8% [95% CI: 17.9–30.9], p=0.03), noting the small numbers of respondents who did not use pharmacy software (n=15, versus 213 respondents who used software).

Respondents affected by the pandemic indicated that they experienced vaccine stockouts due to higher demand, which reduced their ability to provide vaccination services. Almost half of the respondents (45.9% [28/61]) had to implement new protocols related to COVID-19 distancing, cleaning and hygiene requirements. Limited availability of personal protective equipment was reported by four respondents (6.6%). Some were restricted by reduced or limited staff available or willing to conduct vaccinations (13.1% [8/61]). Some respondents were unable to accept walk-in patients, had waiting lists (that required additional follow up) and/or had to turn patients away (18.0% [11/61]). Two respondents indicated that because of these challenges, they opted out of providing vaccination services to the public.

> *Due to COVID and extra precautions in place, we have had to run this service at a loss to the business due to reduced appointments to meet social distancing requirements. It has also meant we have had to put extra staff on to help cover this service.*
>
> *With possible risk to staff, distancing restrictions, post-vaccine waiting times, the amount of people allowed in the pharmacy etc. the pharmacy decided not to give vaccines to the public at this stage. Only the staff have been done.*
>
> *Forced to use a patient waiting list due to high demand before vaccines were available and an appointment system to manage workloads and stock availability. In previous years, influenza vaccination was done predominantly on a walk-up basis (no appointment needed).*

More screening is required before immunisation – taking temperature to rule out active fever. Also change in work flow – pre consult is conducted in general store, rather than consult room to maximise social distancing time.

Almost all respondents indicated that the COVID-19 pandemic did not affect their ability to report vaccination encounters to AIR (93.4% [213/228]).

Table 6: Impact of the COVID-19 pandemic on pharmacist vaccination

Characteristics	n	% (95% CI)
Impact of COVID-19 on expected demand for vaccines (n=227)		
Increased	217	95.6 (92.0–97.6)
Decreased	3	1.3 (0.4–4.0)
Unchanged	3	1.3 (0.4–4.0)
Not sure	4	1.8 (0.7–4.6)
Impact of COVID-19 on ability to administer vaccines (n=228)		
Yes	61	26.8 (21.4–32.9)
No	167	73.2 (67.1–78.6)
Impact of COVID-19 on ability to report vaccinations to AIR (n=228)		
Yes, increased	2	0.9 (0.2–3.5)
Yes, decreased	13	5.7 (3.3–9.6)
No change	213	93.4 (89.3–96.0)

Enablers of reporting

Use of automated reporting processes

The availability of automated reporting of vaccination encounters directly from pharmacy software to AIR was the most important factor enabling reporting to AIR (refer to Table 7). Sixty-one percent (145/224) identified this as a reason they report to AIR, with almost half (47.6% [109/229]) identifying this as a factor that would improve their reporting to AIR and a third (31.3% [15/48]) indicated they had increased reporting because of uptake of automated processes. Several respondents indicated that they would report fewer encounters, or not at all, if they had to manually enter data.

We used to manually enter into AIR. Now that software automatically uploads it is a much more efficient process.

Automatic recording process via MedAdvisor makes this a streamlined process. Previously we did not register with AIR as it was too time consuming, difficult & to no benefit for the time spent to the pharmacy.

[I] record via GuildCare seamless reporting to AIR – if I had to duplicate the record for AIR, I wouldn't bother due to time restraints.

Beliefs about the importance of reporting

Respondents' belief that it is important to report to AIR was an important factor in enabling reporting. Almost 85% (190/224) identified this as a reason for reporting, with some commenting that they had become more aware of the importance of reporting and their responsibilities regarding reporting as vaccination providers. Others indicated they believed it was good clinical practice and that it could provide evidence of the value of pharmacist-administered vaccination services.

> *I believe it's important to register with AIR as it provides regulatory authorities with data that prove the worth of pharmacy immunisation which hopefully increases our scope to vaccinate more. Means greater immunisation for us and increased viability of the pharmacy, meaning more jobs and even more professional services, further improving the health of the community.*
>
> *If this country is to provide truly comprehensive safe healthcare, preventative healthcare, then all medication records including vaccinations must be accessible by health professionals and viewable/compatible with all major dispensing software.*

Remuneration

Several respondents (43.7% [100/229]) indicated that incentive payments for reporting vaccinations would increase their level of reporting. Having to report data on vaccinations administered was viewed as "unpaid work". Many also believed that pharmacist-administered vaccination services were valuable and that pharmacists should be reimbursed for vaccination administration consultations by the government, rather than having patients pay a fee for it. Respondents particularly noted that GPs were reimbursed for providing vaccination services via a scheduled Medicare reimbursement while pharmacists were not, creating a sense that they were competing not just with other pharmacists but with other immunisation provider types.

> *I feel that pharmacists should receive a Medicare rebate equivalent to that of which GPs receive. I believe there was 2 million flu vaccinations administered in pharmacies in 2019 which means that pharmacies freed up 2 million GP appointments for the general public, taking pressure off the health care system.*
>
> *Remuneration for different providers makes no sense. (My understanding is) Medical practices (and nurse vaccinators) can charge Medicare for vaccine administration and also get paid to report to AIR. Pharmacies do not get paid for either of these tasks – forcing us to charge patients and/or complete unpaid work to update AIR.*
>
> *The distributing of flu vaccines is crazy. Doctors get vaccines free and paid by Medicare for administration. There is zero financial risk for them. Pharmacies have to estimate in November to purchase vaccines and then hope they have enough. The entire system has not worked in 4 years – running out of vaccines. Being abused by patients. Getting stuck with stock pharmacy has paid for – It's nuts. Provide the vaccine for free and give doctors/pharmacist/nurses a set fee for administering vaccine.*

Several pharmacists indicated that although they were permitted to charge patients a fee for vaccination services, this was problematic, particularly for NIP-supplied vaccines which the patient could receive at no cost from a GP:

> *We charge an administration fee for NIP vaccinations, which we are allowed to do and it is amazing the comments of how the doctors do it for "free"... if we had a Medicare reimbursement number to claim – we could also offer it for "free".*

Other enabling factors

Other factors identified by survey respondents as enabling or improving reporting to AIR included gaining access to AIR (following lengthy processes to register with AIR; refer to Barriers section) and education and training, particularly increased awareness about the importance of reporting data on vaccinations administered to AIR, what is required to be reported and who is responsible for reporting. A few respondents indicated there had been confusion over who was responsible for reporting data on vaccinations administered.

> *I now understand it is mandatory for NIP vaccines.*
>
> *There was a lot of confusion about whether it was a role at store or head office level.*
>
> *Unclear what the legislative requirements are (or if there are any). Hard to find information on how to set up AIR reporting as a pharmacist. Relies on the pharmacist being proactive in registering – already have a heavy workload.*

While requirements for mandatory reporting were a driver for some pharmacists to report these data, it did not appear to be a factor that would majorly influence reporting practices. Particularly, mandating reporting alone would not improve reporting. Although reporting to AIR was only mandated by legislation in two jurisdictions (the ACT and NSW) at the time of the survey, 62.1% (139/224) of respondents indicated that they report because of legislative requirements; a similar proportion (64.7% [145/224]) reported due to pharmacy-based requirements. Only 11.4% (26/229) said they would increase reporting if it was mandated.

Table 7: Factors that enable and/or improve reporting of vaccination encounters to AIR

Characteristics	n	% (95% CI)
Reasons for reporting vaccinations to AIR (n=224)		
Believe it is important	190	84.8 (79.5–89.0)
Legislative requirements	139	62.1 (55.5–68.2)
Pharmacy-based requirements	145	64.7 (58.2–70.8)
Automating data transfer using professional services software	136	60.7 (54.1–66.9)
Requests from patients	50	22.3 (17.3–28.3)
Other*	7	3.1 (1.5–6.4)
Reasons for increasing reporting (n=48)		
Pharmacy-based requirements	1	2.1 (0.3–14.2)
Mandatory/legislated requirement	4	8.3 (3.0–20.8)

Characteristics	n	% (95% CI)
Improved processes and training	6	12.5 (5.6–25.8)
Use of automated processes	15	31.3 (19.4–46.1)
Believe it is important/good practice	6	12.5 (5.6–25.8)
Gained access to AIR	8	16.7 (8.3–30.5)
Administering more vaccines	5	10.4 (4.3–23.3)
Didn't report before/first year vaccinating	2	4.2 (1.0–15.9)
Other†	5	10.4 (4.3–23.3)
Factors that would increase reporting (n=229)		
More information about how to report	30	13.1 (9.3–18.2)
More information about the benefits of reporting	12	5.2(3.0–9.0)
Automated reporting from pharmacy software	109	47.6(41.2–54.1)
AIR reporting being a legislated requirement	26	11.4(7.8–16.2)
Incentive for reporting	100	43.7(37.3–50.2)
Training on the use of AIR	38	16.6(12.3–22.0)
A more user-friendly AIR secure site	87	38.0(31.9–44.5)
Other‡	60	26.2 (20.9–32.3)

* Among responses to ‘Other’, 4 believed it was best practice and that other providers should be able to access these records; 1 said it reduced the burden of reporting through other methods (i.e. sending data to medical clinics); 1 used automated software; and 1 indicated the absence of software that automated reporting was a barrier to reporting.

† Among responses to ‘Other’, 1 was more aware of the necessity to report; 1 indicated more vaccinations were administered; 1 had trained more staff to report to AIR; and 2 provided vague responses.

‡ Several comments made by respondents to ’Other’ emphasised the existing survey options to improve reporting to AIR, namely remuneration or financial incentives (n=4); automating reporting (n=3); enabling easier access to and use of the AIR site (n=11); and making information about reporting more easily available (n=2). Some respondents indicated they report all vaccines with some exceptions (n=5), that reporting would improve if they had better quality data on patients (n=4), or that they cannot improve reporting as they already report all vaccination encounters (n=29). 6 said “N/A”.

Barriers to reporting

The number of responses to the survey question regarding reasons for not reporting any or all vaccination encounters to AIR (shown in Table 8) was low, as participants who indicated that they always report all vaccination encounters to AIR (n=195) skipped this question. However, qualitative responses to a number of other questions provided substantial insight into the barriers to reporting to AIR.

AIR access difficulties/challenges

One of the most important barriers to reporting to AIR was difficulty accessing and using the AIR site. In their comments, several respondents indicated that registering to access AIR was a long and complicated process with a heavy administrative burden and inadequate support to resolve

issues. Some also report losing access to the AIR site and having to apply for access again and having to frequently change passwords.

The login process for AIR is more complicated then [sic] my internet banking! Too many technical acronyms that are meaningless in every day practice. The process needs to be streamlined, quick and efficient. Set up was a prolonged and unnecessarily slow process, a mix between mail paper notices and electronic set up, and the staff over the phone sound clearly overworked, and many without a clue on the reporting pressures and administrative burdens these programs bring to health professionals who simply want to get on with doing their job.

I couldn't get a provider number this year it took me a month of paperwork back and forth.

My AIR account has been cancelled and can't be reactivated. Need to apply again which is time consuming and still haven't received any approval yet.

I was one of the first to complete the vaccination course in Queensland and was issued with a PDF certificate. When I tried to register was told I needed a certified copy of the original certificate (did not exist). Queensland Health refused to process my application any further. Had one of my more recently qualified pharmacists bring in her certificate and use it rather than having to deal with government bureaucracy.

I have failed to several times to register for PRODA and several other acronyms required by government to register for AIR.

We have experienced challenges in logging into the AIR site and AIR has not been helpful to provide solutions. They don't seem like they know AIR very well and are unable to help troubleshoot.

The AIR website needs to be fixed, you have to continually keep logging in throughout the day which makes it very cumbersome.

Stop making us change passwords all the time! The AIR is hard enough to access as it is, and changing passwords to something 'new' that we have never used before is getting more difficult to remember.

Not having to log in every six months to maintain connection to AIR. Connecting through GuildCare should be sufficient.

Difficulties using the AIR site

Using the AIR site to enter data on vaccinations administered was also identified as a barrier to reporting vaccinations. Pharmacists believed the site was not intuitive or user friendly to navigate, and entering data was a time-consuming process.

AIR needs to be simplified and streamlined. I feel like you have to be an expert to navigate the website and the submissions. I would not have been able to do them if it was not streamlined through GuildLink.

Back when we didn't have the system automated with our dispensing software we weren't writing to AIR but was sending it to the doctors to enter as pharmacies weren't given access to AIR. However even if we were given access, we might still have gotten the doctors to enter the

details simply because the AIR website is extremely difficult to use! So I am glad my software can write to it automatically.

AIR website is pretty bad, it has so many bugs and errors and each time you need to do a vax if 15 mins have passed you have to log in all over again, so bothersome and annoying.

Absence of patient data

Respondents also indicated that they tend not to report to AIR if they do not have complete details for the patient, particularly their Medicare card number, which was the most common reason for not reporting vaccination encounters to AIR (54.3% [19/35]).

If the information doesn't match and we have been unable to contact the patient to confirm then we err on the side of not reporting it, rather than possibly uploading an encounter to the wrong patient.

Knowledge about AIR

Of note, all participants had knowledge of AIR. However, there do appear to be some gaps in pharmacists' knowledge about reporting requirements and processes. Only 2 of the 35 respondents did not know they should report to AIR (5.7%); similarly two respondents (5.7%) also did not know how to report to AIR. One pharmacist from QLD was unaware of what the legislative requirements are and how to find this information; another respondent from NSW expressed they only started reporting when they found out it was a legislative requirement; and one from VIC said they reported as it was a requirement for NIP-funded vaccines. There was some confusion about what vaccinations should be reported (partly reflecting changes in immunisation reporting requirements since pharmacists first started vaccinating).

Unclear what the legislative requirements are (or if there are any). Hard to find information on how to set up AIR reporting as a pharmacist. Relies on the pharmacist being proactive in registering – I already have a heavy workload.

When I completed my vaccination training in 2016 I thought we were told that we didn't need to send flu vaccination records to AIR.

I used to report whooping cough vaccine but have never reported flu injections. I didn't know we were meant to until reading a recent article in AJP (the Australian Journal of Pharmacy).

Table 8: Participants' reasons for not reporting all or any vaccination encounters to AIR (n=35)

Reasons for not reporting vaccination encounters	n	% (95% CI)
Never heard of AIR	0	0.0 (0.0–0.0)
Too time consuming	5	14.3 (5.8–31.1)
Don't have access to AIR site	9	25.7 (13.5–43.5)
Don't see the benefit in reporting	0	0.0 (0.0–0.0)
Not part of my pharmacy's protocol	1	2.9 (0.4–19.2)

Not a legislated requirement	1	2.9 (0.4–19.2)
No remuneration	4	11.4 (4.1–27.8)
Software does not link to AIR	5	14.3 (5.8–31.1)
Don't know how to	2	5.7 (1.3–21.4)
Didn't know I should	2	5.7 (1.3–21.4)
Don't report if patient doesn't have a Medicare card	19	54.3 (37.1–70.5)
Don't report if I don't have all my patient's details	5	14.3 (5.8–31.1)
Other*	10	28.6 (15.6–46.4)

* Among responses to 'Other', 5 indicated difficulties accessing or using AIR; 3 indicated missing or inaccurate patient data; 1 had capacity constraints due to the COVID-19 pandemic; and 1 indicated that patients occasionally request that the data are not reported.

Analysis of vaccination encounters reported to AIR

Of the 243 eligible survey respondents, 124 provided a unique pharmacist provider number. Three respondents reported not having a provider number, while 16 stated they did not know the number or provided an invalid response (refer to Table 9).

Table 9: Participants' responses to the survey question requesting details of their immunisation provider number for AIR (n=243)

Survey responses regarding immunisation provider number	N	%
Unique number provided	124	51.0
Duplicate number provided	1	0.4
Number not known or invalid response	16	6.6
Stated does not have a provider number	3	1.2
No response provided	99	40.7

Of the 124 respondents who provided a unique pharmacist provider number, 3 did not report the number of vaccination encounters at the pharmacy and were excluded.

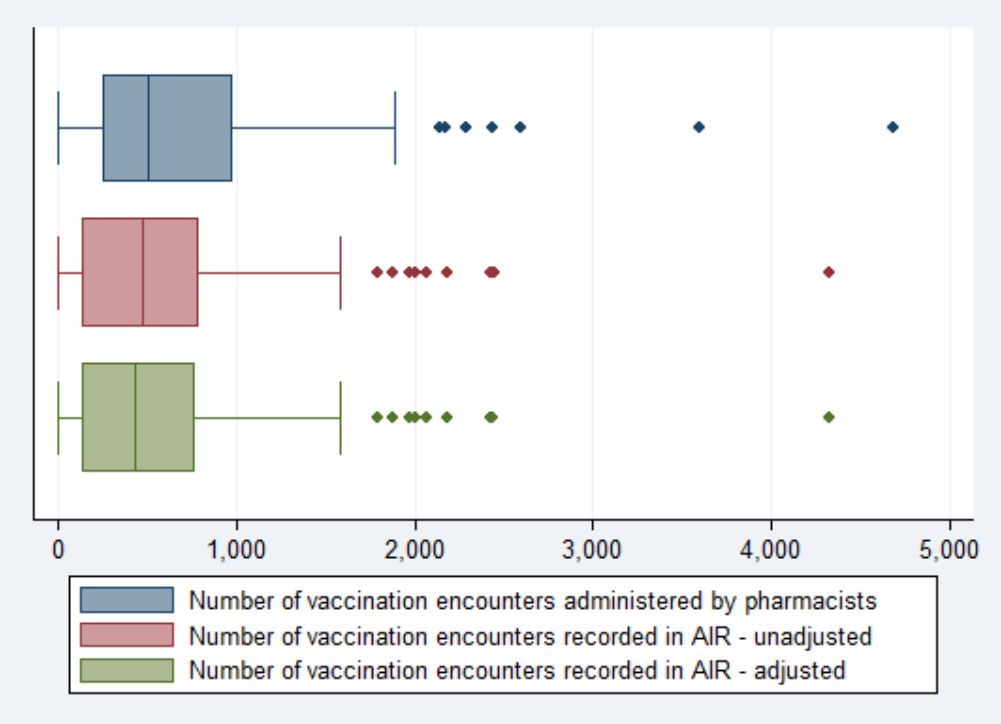
The characteristics of the 121 respondents included in further analysis differed from those of survey respondents who did not provide sufficient information to be included in this analysis. Of note, there were no responses from participants in the ACT or the NT. A substantially greater proportion reported administering NIP-funded vaccines (46.3% versus 33.6%). Almost all (120/121, 99.2%) recorded vaccination encounters using pharmacy software (compared with 87.7% of respondents excluded from this analysis). A greater proportion of those included in this analysis reported to AIR via automatic upload from software relative to respondents excluded from this analysis (85.7% versus 54.3%), and fewer manually entered data on the AIR site (26.1% versus 58.1%). Details on all the characteristics of participants included in and excluded from this part of the study are provided in Appendix 5.

Proportion of vaccinations administered by pharmacists reported to AIR

The 121 pharmacist responses included in this analysis reported a total of 87,665 individual vaccination encounters at their pharmacies in April and May 2020, ranging from 3 to 4,681 per individual pharmacy (mean: 724.5; median: 501; IQR: 250–978). There were 74,625 vaccinations recorded in AIR as given by these pharmacies over the same period (mean: 616.7; median: 475; IQR: 131–791; range: 0–4329), suggesting 85.1% completeness of reporting to AIR. The 74,625 vaccinations recorded in AIR represent 10.5% of all pharmacy vaccinations recorded in AIR over this period.

However, for 26 pharmacies the number of vaccination encounters recorded in AIR was greater than the number reported administered. The number of excess encounters in AIR compared with what was reported by respondents ranged from an additional 1 to 856 doses, but the difference was less than 100 for 19 of 26 respondents (mean: 99.2; median: 19; IQR: 4–106). The difference of the excess encounters in AIR represented between 0.1% and 79.9% of encounters reported by individual respondents (mean: 13.5%; median: 5.6%; IQR: 1.3%–12.5%). When we adjusted the number of AIR vaccination records for these pharmacies down to the number they reported they had administered, it left a total of 72,045 vaccine encounters recorded in AIR (mean: 595.4; median: 429; IQR: 131–772; range: 0–4329), suggesting 82.2% (95% CI: 76.6–87.7%) completeness of reporting. Distribution of the number of doses reported as administered and recorded in AIR, by individual pharmacy, is shown in Figure 2. Of the 121 respondents included, 11 reported exactly 100% of vaccines administered to AIR, while 7 did not report data on any vaccines administered to AIR.

Figure 2: Distribution of the number of vaccinations reported as administered in April and May 2020, and number recorded in AIR, for individual pharmacies, unadjusted versus adjusted* (n=121)



* Adjustment made where the number of vaccination encounters recorded in AIR was greater than the number reported as administered by the survey respondent. In these cases, the number of vaccination encounters recorded in AIR was adjusted to equal the number reported as administered by the respondent, that is, the proportion recorded in AIR was 100%.

Factors associated with the proportion of vaccinations administered by pharmacists reported to AIR

The following results are based on analysis of the adjusted data, that is, the assumption that 100% of vaccination encounters were reported to AIR where more encounters were recorded in AIR than reported as administered by the respondent. Detailed findings on the proportion of vaccination encounters reported to AIR by a range of variables examined in the study are available in Appendix 6. Caution should be used in interpreting the results where the sample size in a particular group is small and represents data from fewer than five pharmacies.

Demographics

The completeness of reporting to AIR (proportion of vaccinations reported as administered and recorded in AIR) varied by jurisdiction, being highest in WA (95.7%) and lowest in TAS (61.6%). The proportion of vaccinations reported did not vary substantially by geographical region, but declined with increasing remoteness (84.3% in major cities, 80.4% in regional areas and 77.9% in remote areas). Completeness of reporting was higher for respondents who owned the pharmacy than for those who were employees (86.0% versus 78.3%), and for those who stated that NIP-funded vaccines were administered in the pharmacy (89.0% versus 77.4%). Completeness of reporting was higher in jurisdictions with mandatory reporting to AIR (NSW only in these data, 87.6% versus 80.5%).

Recording methods

Completeness of reporting to AIR did not vary substantially by method used to record vaccinations administered in the pharmacy (software – 82.2%, paper records – 80.1%, patient-held records 81.1%, other – 5.8%), although it should be noted that all but one participant used electronic software to record data. Reporting was slightly better among those who used fewer recording methods (84.8% and 84.0% among those using one or two recording methods, respectively) than among those who used more recording methods (79.2% and 79.1% among those using three or four methods, respectively), and was better among those using MedAdvisor (87.0%) compared with GuildCare NG (81.7%).

Completeness was higher among those who reported changing their recording methods in the previous year (90.9% among those who changed software platform and 89.7% among those who changed from paper-based to electronic recording) than those who indicated no change (76.9%).

Completeness of reporting was substantially higher for pharmacies where respondents indicated always recording Medicare card numbers (87.4%) than for those who indicated recording it sometimes (65.4%) or not at all (6.1%, noting only two respondents, representing 523 encounters, indicated not recording Medicare card number).

Use of AIR and perceived reporting compared with actual reporting

While there was no difference in the completeness of reporting to AIR by familiarity with and frequency of use of AIR, completeness was higher among pharmacists who reported using AIR to check the patient's vaccination history (89.7% versus 79.0%). Completeness of reporting was highest for respondents who indicated they report all encounters (88.1%), and lower for those who indicated reporting "most" (56.7%), "some" (17.1%) or "none" (0.2%, 2 respondents only) encounters. Completeness of reporting was also substantially higher among those who indicated they believed all vaccinations reported as administered in the survey had been reported to AIR (84.8%) than among those who specified that no encounters had been reported (9.6%).

Reporting methods

All respondents (noting two did not answer this question) reported vaccination encounters automatically through pharmacy software integrated with AIR and/or manually via the AIR site. Those who reported via automatic uploads to AIR from 'software only' had higher completeness of encounters recorded in AIR (84.8%) than those who only manually entered data on the AIR site (68.3%). Completeness of reporting was highest for those who indicated using both methods (97.4%). Among the 36 respondents whose completeness of reporting to AIR was 100%, all recorded vaccinations in pharmacy software and all but one reported via automatic uploads. Completeness was also higher among pharmacists who reported encounters immediately (87.4%) than those who reported them in batches (71.3%).

Vaccinations administered by independent providers in pharmacies

The proportion of vaccines administered that were reported to AIR did not vary substantially by whether vaccinations were administered in pharmacies where independent providers provided vaccination services (79.7%) or not (83.3%). However, the proportion reported was lower if respondents indicated that vaccination encounters were reported by the independent provider (65.4%) than if they were reported by the pharmacy (96.3%), noting the small sample size.

Number of vaccinating pharmacies

Data from Services Australia show that the number of pharmacies registered with AIR as vaccination providers in Australia has increased exponentially in Australia between 2017 and 2020, from 218 to 3,275 (refer to Appendix 6). As of May 2020, 75.8% of these pharmacies reported vaccination encounters to AIR, although this proportion varied by jurisdiction (refer to Table 10). Among those not reporting any vaccination encounters to AIR, it is not possible to differentiate between pharmacies that are not actively vaccinating and those that are vaccinating but not reporting.

Table 10: Number of pharmacies registered with and reporting to AIR as of 1 May 2020, by jurisdiction

Jurisdiction	Number of pharmacies registered with AIR	Number of pharmacies reporting to AIR	% registered reporting
ACT	60	51	85.0
NSW	1,051	807	76.8
NT	22	14	63.6
QLD	557	430	77.2
SA	289	205	70.9
TAS	130	89	68.5
VIC	616	444	72.1
WA	550	443	80.5
Total	3,275	2,483	75.8

Vaccination encounters received as 'pend' files

We calculated the proportion of vaccinations reported to AIR that were recorded as pends between April and May 2020 for each provider type. The data represent 'original pends' (i.e. the state of the record when it first enters the system) and demonstrate the number of vaccination records that must be manually reviewed by Services Australia staff. We also calculated similar proportions for vaccinations reported by pharmacies by jurisdiction and by pend category (combining similar pend categories together) for the same time period.

Among all provider types, pharmacies had the highest proportion of vaccinations recorded as 'pend' files in AIR in April and May 2020 (9.0%), and comprised more than a quarter of all pend encounters (28.3%) despite accounting for only 8.3% of all vaccination encounters (refer to Table 11). Of the total 711,183 pharmacy vaccinations, more than 60% were recorded in April 2020 (441,674, compared with 269,509 in May 2020), likely reflecting when most influenza vaccinations were administered.

Table 11: Number and proportion of pend vaccination encounters recorded in AIR by provider type, April and May 2020

Provider type	Number of vaccination records	Number of pends	% pends
Aboriginal Health Service/Worker	41,295	955	2.3
Community Health Service/Nurse	154,806	5,474	3.4
Council	204,558	15,390	7.0
General Practice	6,910,785	149,060	2.1
Other*	24,349	105	0.4
Pharmacy	**711,183**	**70,548**	**9.0**
Public and Private Hospitals	82,476	2,303	2.7

State Health/PHU	478,960	5,395	1.1
Total	8,608,412	249,230	2.8

* Other includes commercial providers, Flying Doctor Service, nurse practitioners and unknown providers.

The distribution of pend encounters reported by pharmacists varied by jurisdiction. The greatest number of pend encounters was in NSW (200,520), but the highest proportion of encounters recorded as pend was in the ACT (26.2%) (refer to Table 12).

Table 12: Number and proportion of pend vaccination encounters reported by pharmacy providers recorded in AIR by jurisdiction, April and May 2020

Jurisdiction	Number of vaccination records	Number of pends	% pends
ACT	11,919	4,238	26.2
NSW	200,520	21,998	9.9
NT	3,685	153	4.0
QLD	86,301	14,755	14.6
SA	64,284	5,153	7.4
TAS	24,132	3,148	11.5
VIC	150,064	11,566	7.2
WA	170,278	9,537	5.3
Total	711,183	70,548	9.0

The vast majority of pend encounters reported by pharmacies (64,596, 91.6%) were categorised as ‘individual not identified (80)’, indicating that the patient’s identifying information was not able to be automatically matched to an existing Medicare record (refer to Table 13). This type of pend usually occurs when a Medicare card number has not been provided or the provider has not provided enough information to allow a unique match in AIR. Such records require manual resolution by Services Australia. The next most frequent category of pends received from pharmacies during this period related to invalid intervals between doses (3,361, 4.8%) either reported by the same or different providers. Detailed numbers for each pend category and definitions are available in Appendix 8.

Table 13: Number and proportion of pend encounters reported by pharmacy providers to AIR by pend type/category, April and May 2020

Type of pend	Pend category number	Reason for pend	Number of pends	% of total pends
Error in demographic information	1, 10, 12, 15, 16, 17, 24	Could be due to the Medicare number, name, date of birth or address supplied being either invalid or incomplete.	423	0.6
Incomplete vaccine information	33	The vaccine and/or dose number administered not supplied	37	0.1
Patient end date	53	The date of immunisation after the end date recorded on the individual's	1,786	2.5

		registration*		
Individual not identified	80	Individual not identified (unable to be matched to existing Medicare record)	64,596	91.6
Invalid patient age	100	Antigen has been administered under the minimum required age	2	0.0
Invalid interval between doses	101, 104	Period between doses of the same antigen is less than the minimum time required (reported by the same or different provider)	3,361	4.8
Duplicate antigens	102,103	Duplicate antigen dose (same provider or different providers)	324	0.5
Dose errors	105, 106, 109, 111	Dose greater than maximum allowable dose	19	0.0
All pends reported by pharmacy providers			**70,548**	**100**

* An end date can be recorded on an individual's record for a number of reasons, including Medicare entitlements have ceased or the individual is deceased.

Discussion and summary

This study is the first to examine pharmacist-administered vaccination reporting in Australia, and is the first to provide an estimate of the completeness of reporting of vaccinations administered by pharmacists to AIR. In our study cohort, which represented 10.5% of all pharmacist vaccination encounters in AIR, we estimated that 82% of vaccinations administered by pharmacy providers were reported to AIR.

Our findings provide insight into factors associated with better recording and reporting practices and the enablers of and barriers to reporting, while suggesting ways to improve reporting.

Our survey was conducted during the initial months of the COVID-19 pandemic, at a time when there was substantial disruption to the provision of health services, highlighted by the fact that a quarter of our study respondents indicated that pharmacist vaccination services were adversely affected. However, our respondents did not indicate that ability or capacity to report to AIR was affected by the pandemic, despite increased demand for vaccinations and disruptions to service. The majority of respondents who provided vaccination encounter data recorded data electronically and reported via automated software methods, which would be less affected by changes in demand for or ability to supply vaccination services. The impact may have been greater for pharmacies where recording was not electronic and reporting not automated.

In comparison to our findings in Parts A and B of this study of likely substantial underreporting of pharmacist vaccinations to AIR, our estimate of 82% completeness in this study is higher than expected. However, this study may have overestimated the true completeness of reporting because of potential selection and measurement bias, and so the findings should be interpreted with caution. The pharmacies for which data were supplied may not be representative of all community pharmacies in Australia, as respondents who provided data on the number of vaccines administered may have had a higher use of electronic methods of recording data on vaccination encounters and automated reporting to AIR via software compared with non-respondents. Respondents in our study may also be more aware of reporting requirements.

The absence of a national register, or even jurisdictional registers for some states, of vaccinating pharmacists and pharmacies increases the difficulty in obtaining information on the number on vaccinations administered by pharmacists. Truly reliable assessment of completeness of pharmacist vaccination reporting is likely only achievable by manually auditing pharmacies, which is a resource-intensive exercise. NSW Health has undertaken quality assurance audits of randomly selected pharmacies to gain a greater understanding of pharmacists' compliance with the NSW Pharmacist Vaccination Standards for internal program and monitoring purposes.[18]

Electronic record keeping and automation of reporting

Completeness of reporting to AIR was higher among respondents using automatic upload from pharmacy software (84.8%) than those manually entering data via the AIR secure site (68.3%). Automation of reporting was specified by respondents as the most important reason for improving their reporting to AIR. Almost a fifth (18.6%) of respondents indicated that they changed from paper-based recording to electronic reporting in the previous year, showing a clear preference

among pharmacists to shift towards electronic means of recording data on vaccinations administered. Completeness of reporting was also higher among those who recently changed software platforms (90.9%) than those who did not make any changes in their data recording processes (76.9%), which could indicate that the former changed to a platform that integrates with AIR. Those who changed from paper-based recording to electronic also had higher levels of reporting (89.7%), as this change likely reduced the need to manually enter data into AIR.

Many respondents reported still using manual methods to record and report vaccinations, using software that does not integrate with AIR (largely via dispensing software that does not link to pharmacy software) and entering data multiple times, such as using both paper and electronic records, and entering data into dispensing software, pharmacy software and/or AIR site. Manual data entry and recording data in multiple systems can introduce errors and is labour-intensive. The use of paper-based records increases the scope for inaccuracies and missing data, which can affect both the quantity and quality of data transferred to AIR. The time of year when influenza vaccinations are administered is often busy for pharmacists, and if they have to report data using manual, labour-intensive methods, it increases the strain on pharmacists, further affecting their ability to report to AIR.

Respondents who indicated that they report to AIR via automatic upload and manually entering data on the AIR site had the highest completeness of reporting (97.4%). These pharmacists may be checking that all encounters have been transmitted successfully to AIR, and manually entering data for vaccination encounters that did not transmit. Two-way flow of information between pharmacy software and AIR, whereby AIR sends notifications through software when an encounter is not transferred or does not link with a Medicare record, could improve reporting.

Completeness of the data reported to AIR can more generally be improved by streamlining recording and automation by using electronic software, linking dispensing software with professional services software and using software that links directly with AIR. The use of pharmacy software that automatically integrates with AIR should be strongly encouraged. Improving integration with AIR by working with software vendors to build in this functionality, especially among more commonly used software platforms, can also improve reporting.

Recording of Medicare card number was strongly linked to completeness of reporting, with a greater proportion of vaccination encounters reported among respondents who always recorded Medicare card number information. We found that the vast majority of pends were for encounters that did not link with existing Medicare records (i.e. they generate new records that require manual review); information from Services Australia indicates that in most cases this occurs where a Medicare card number was not provided (Services Australia, personal communication, 13 November 2020). In our study, a fifth of respondents indicated that they did not always or ever recorded data on patients' Medicare card numbers, with several stating that they did not report data on vaccination encounters for patients without a Medicare card number. The quality and completeness of patient data recorded could be improved by asking patients to complete pre-vaccination information and consent electronically at the time of booking or before vaccination. This can also reduce errors during data entry. Recording of this information, and consequently reporting to AIR, could also be improved by making this field mandatory in pharmacy software (with an option to indicate when a patient does not have a Medicare card number). In addition, educating

pharmacists on the need to report all vaccination encounters, including those without a Medicare card, could also improve underreporting.

Access to AIR

Many pharmacists reported difficulties in registering and gaining access to AIR, and in accessing and using the AIR site. This included difficulties during the registration process, expiring passwords and getting them reissued, and logging in to the AIR site; for example, pharmacists commented that “AIR (is) always down” or that “it doesn’t load on some computers”.

Access to AIR was the second most important factor identified by respondents as a barrier to reporting. Respondents reported being locked out of the AIR site because their password expired; at present, passwords must be renewed on a regular basis for security reasons, but respondents indicated that they did not receive adequate reminders. Some have had to reapply for access to AIR rather than simply renewing their password. Similar issues have been reported by other provider types.[19] Some of these issues can be alleviated through simple changes, such as confirming with the pharmacist that they no longer intend to provide vaccination services before deactivating their provider number after an extended period of inactivity, and sending multiple reminders to change passwords to maintain access. Several of these issues will be addressed through recent changes to the registration process (i.e. with access via PRODA).

Respondents also reported difficulties navigating the AIR site, indicating it is difficult and time-consuming to enter data on the AIR site and to perform other functions like checking the patient’s vaccination history. Several respondents indicated that they were dissatisfied with the technical support provided by Services Australia, saying capacity to troubleshoot these issues with providers may need to be increased. A review of the useability of AIR may also be beneficial in identifying ways to make the AIR site more user-friendly to enable providers to easily navigate the AIR site to access the information they need.

A few pharmacists reported not having an Immunisation Provider Number for their pharmacy. This could indicate a lack of knowledge about AIR processes, as all pharmacies providing immunisation services are required to register for an AIR Immunisation Provider Number. This number is associated with the organisation (i.e. the pharmacy), and all pharmacists and other delegated staff can access the AIR site using this number. Lack of awareness about these processes could mean some pharmacists are unable to access AIR and hence, are not reporting.

Registration processes to access AIR are now changing. Access to the AIR site is transitioning to PRODA and is now available for recognised immunisation providers, including pharmacists. This involves registering the pharmacy as an organisation and then making individual pharmacists members of the relevant organisation. Individual pharmacists and other delegated staff will then be able to access the AIR site via their own individual PRODA login and act on behalf of the pharmacy that they are a member of to enter data or view records. This streamlined access will alleviate difficulties relating to password expiry, as the individual will now control their own login and password details. However, support is required to promote and support PRODA registration specifically for pharmacies and pharmacists, with room to further streamline the registration process.

Legislation regarding reporting vaccinations

At the time of the survey, mandatory reporting to AIR was legislated only in the ACT and NSW , and had only recently been introduced in QLD. However, existing jurisdictional legislation did not include a provision to penalise providers who did not report data on vaccinations administered to AIR, and there is only limited compliance monitoring in NSW to date.

Legislation mandating reporting to AIR did not appear to be a major influencing factor on attitudes to reporting among our study respondents, and the proportion of vaccination encounters reported was not higher in jurisdictions where it is mandated. It is important to take this finding into consideration in the context of introduction of legislation mandating vaccination reporting to AIR nationally. Legislation alone is likely to be insufficient in improving reporting; compliance monitoring processes and enforcement also need to be considered. Although introducing legislation can help raise awareness about reporting, more support and education will be needed to address issues regarding AIR access. Along with legislation, the implementation of pharmacy-based requirements, particularly for the large banner groups, may be more effective and also more enforceable. Work with multiple stakeholders, including the Pharmacy Guild and the PSA, will be necessary to implement and enforce these changes.

With the introduction of mandatory reporting of all NIP-funded vaccines to AIR from 1 July 2021, reporting by pharmacists could improve, particularly if the scope of pharmacist-vaccination services grows to include NIP-funded vaccines in more jurisdictions. Completeness of reporting in our study was better among pharmacies that offered NIP-funded vaccines. It is possible that these pharmacies have to comply with jurisdictional requirements, are subject to greater scrutiny or are more likely to be compliant with rules if they administer government-supplied vaccines. Examination of whether jurisdictions have additional reporting or recording requirements for pharmacies ordering NIP-funded vaccines, and if so, how compliance with requirements is assessed, could help inform strategies to improve reporting.

Training, education and communication

Respondents to our survey were largely aware of AIR, with none indicating that they have never heard of AIR and 84.2% using AIR either regularly (66.7%) or occasionally (22.5%). However, knowledge about AIR and reporting varied. Ownership of the pharmacy was linked to improved reporting, which may reflect greater knowledge about how information on vaccines administered is recorded and reported compared with employees who may be less experienced, especially if they are not the ones completing reporting to AIR. Pharmacists' acknowledgement of poor reporting to AIR was also strongly linked to underreporting.

There are some gaps in pharmacists' knowledge about how AIR works and what it is used for. For example, one respondent believed influenza vaccinations did not need to be reported as per their training received in 2016, before ACIR transitioned to the whole-of-life AIR. As pharmacists could only administer vaccines to adolescents and adults, reporting would not have been required at that time. Regulations, requirements and processes have also changed since many pharmacists would have received their initial training. Jurisdictions may determine it appropriate to undertake audits similar to those conducted by NSW to determine gaps in knowledge and support practice

improvements. NSW Health has indicated that it will share the audit tool to assist other jurisdictions.

Some pharmacists commented that checking vaccination history was not important for the types of vaccines they administered, namely, influenza vaccines. However, unnecessary repeated vaccinations may be a safety issue depending on the vaccine and context they are being used in. While repeated influenza vaccinations are unlikely to cause substantial harm to the patient, they can cause unnecessary minor adverse events. There are other downfalls, including the potential for a reduced response to influenza vaccination in subsequent seasons.[20] Extra doses administered unnecessarily also means doses in limited supply are being wasted. For COVID-19 vaccination, checking vaccination history will be essential to ensure that patients receive a second dose of the same vaccine. Pharmacists may require reminders on these issues, particularly in the period immediately before and during the months when most influenza vaccinations are administered.

Our survey found that pharmacists did not always keep records of vaccinations given by independent providers in their pharmacies. It was unclear whether independent providers used their own provider number or the pharmacy provider number when reporting data to AIR. The proportion of vaccines administered that were recorded in AIR was lower where pharmacist indicated that independent providers report encounters administered in pharmacy. This indicates there may be some confusion or lack of processes over who is responsible for reporting these encounters.

All pharmacies providing immunisation services are required to register for an AIR immunisation provider number. This number is associated with the organisation and all pharmacists and other delegated staff can access the AIR site on behalf of the pharmacy as an organisation. Pharmacies need to ensure they have internal protocols on the reporting processes to AIR, and communicate these clearly to any independent providers who provide vaccination services in their pharmacy. Guidance on who is responsible for reporting these vaccination encounters from Health or jurisdictional health departments may also help clarify these roles and responsibilities.

Several aspects of pharmacists' knowledge and practices can be addressed through initial training including:

- how to effectively use AIR, for example, to check vaccination history
- who should be reporting, for example, the administering pharmacist at an individual pharmacy or central reporting through headquarters for pharmacy chains; independent providers or the pharmacy where vaccines are administered
- what should be reported, particularly the importance of capturing Medicare card numbers, and that encounters for patients without a Medicare card number should also be reported
- clarity around remuneration for vaccination services and how it differs from remuneration for vaccinations given by GPs, which is subsidised by the Australian government under Medicare benefits arrangements, particularly addressing any misconceptions (e.g. clarifying that payment for GP reporting to AIR is now limited to a one-off payment when a child completes their NIP-required vaccinations, and that no reimbursement is provided for reporting data on adult vaccinations)

- clarification on what to do in specific scenarios, such as pharmacists' obligations if a patient requests that data on their vaccines not be reported to AIR.

There have been multiple changes to requirements for reporting to AIR over the years, and changes will likely continue. Ongoing communication with pharmacists to update them about these changes is necessary. The development of and a requirement to complete mandatory annual update training for vaccinating pharmacists should be considered. The PSA currently offers an annual update which could be a potential avenue to deliver this training.

Pharmacists need to be sent ongoing reminders about reporting to AIR, reminding them about their obligations to report and to check that all vaccination encounters have been reported and accepted by AIR. Health could work with jurisdictions to send through these ongoing communications. States where JICs distributed our survey were overrepresented in our respondents, indicating that pharmacists received communications from jurisdictional sources. The PSA website provides practice guidelines for pharmacies providing vaccination services in which reporting to AIR is detailed.[21] This could be promoted in communication as well as at immunisation updates and training.

A resource specifically on reporting requirements for pharmacists, or other general FAQs and information sheets for vaccinating pharmacists, may help address gaps in knowledge and troubleshoot common issues and misconceptions. A video demonstrating registration and use of AIR may be helpful for pharmacists and other provider types. Resources may be especially valuable in light of the implementation of legislated mandatory reporting to AIR.

Incentives and remuneration

Several respondents commented on remuneration for vaccination services and incentives for reporting. Respondents perceived that GPs get paid to report data on vaccinations administered to AIR while they do not, creating an 'us versus them' mentality. There were some incorrect assumptions about the payments GPs receive for administering vaccinations; however, there is no incentive payment for any type of provider administering adult vaccinations. The purpose of the incentive payment that GPs receive upon reporting vaccinations for a child who has completed the required NIP schedule is primarily to increase coverage of childhood vaccinations.[22,23] Payments are now not linked to administration of individual vaccinations, but are only linked to certain NIP-funded vaccines, and are also only paid once upon the completion of the schedule.[24] Education and communication is needed to address information gaps and perceptions about payments to other providers.

Apart from these misconceptions, pharmacists had concerns about the costs associated with providing vaccination services. GPs can bulk bill or patients get a Medicare rebate for the consultation, whereas for pharmacist vaccination services patients are charged a dispensing fee. Pharmacists reported difficulties responding to patient queries about dispensing fees particularly when receiving NIP-funded vaccines. Respondents also commented that they must place orders for private stock of influenza vaccines in September or October of the previous year and so the risk is assumed by pharmacist in case demand is lower than expected, or they otherwise face shortages in vaccine supply. It may be appropriate to consider equitable charges with increasing

scope of practice, namely, a Medicare item for consultation for pharmacist vaccination service, particularly for NIP-funded vaccinations.

Limitations of the study

As discussed above, our survey sample may not be representative of community pharmacists in Australia. In addition to capturing only 10.5% of all pharmacist-administered vaccination encounters in AIR, certain jurisdictions were overrepresented while others underrepresented. There was only one eligible respondent each from the ACT and the NT, and both of these were excluded from the analysis of the proportion of vaccines administered that are recorded in AIR because of insufficient information. Regional areas were overrepresented in our survey relative to major cities, likely reflecting that a greater proportion of pharmacist-administered vaccinations are given in regional areas, as reported in Parts A and B of our study.[6] Our survey sample is likely reflective of our survey distribution methods, with a greater proportion of our sample affiliated with banner groups and identifying as owners.

Our survey is likely to be affected by measurement bias as data were self-reported by respondents. There is the potential for data quality issues, such as over- or under-reporting of numbers of vaccinations administered. We found that for 26 pharmacies there were more encounters recorded in AIR than reported as administered by the corresponding respondent. This may be due to vaccinations administered during the time covered by the survey being recorded and reported after the survey was completed by these respondents.

Our survey included 243 eligible participants, but only half (50.2%) were included in the analysis comparing the number of vaccinations administered with those recorded in AIR because of incomplete data provided by respondents. Respondents who used software to record encounters (99.2% versus 87.7%) and automatically upload data to AIR (87.7% versus 54.3%) were overrepresented compared with respondents excluded from this analysis. The use of electronic methods may make it easier to extract and report data, which means those included in our analysis would have higher completeness of reporting to AIR. This is in concurrence with our previous audit of AIR data transfer across all providers, which identified more accurate reporting through practice software.[13]

Pharmacists are known to work at multiple pharmacies, with several respondents in our survey indicated owning more than one pharmacy. However, we requested respondents to provide data only for the one they primarily work at, which means data on vaccination encounters from other pharmacies that the respondent owned or worked at would have been omitted. It is also possible that more than one pharmacist at a pharmacy responded to our survey; however, only one duplicate Immunisation Provider Number was found in our study.

Weighted proportions for the proportion of vaccination encounters reported to AIR were not calculated as weighting by demographic factors was problematic (as no responses were received from the ACT and the NT). Additionally, weighting by demographic factors would not account for other characteristics that differ between respondents included in the analysis of the proportion of vaccination encounters reported to AIR compared with those excluded, namely, the use of electronic means to record and report vaccinations. Given the proportion of our sample that used

electronic means to record and report vaccinations was high, we lacked the sample size to conduct multiple regression analyses to further examine these factors.

Our study was conducted in context of the COVID-19 pandemic under extraordinary circumstances that are not representative of previous years. However, our study provides an indication of what the rapid growth in demand for pharmacist vaccination services can mean for the capacity of pharmacists and current systems and processes for reporting.

Conclusions

There has been an increasing demand for pharmacist-administered vaccinations in recent years. This is likely to continue in future years because of the increasing scope of pharmacists' practice and their involvement in the administration of COVID-19 vaccines. Our study is the first in Australia to examine pharmacists' practices of recording and reporting data on vaccinations administered in pharmacy, and provides insight into the enablers of and barriers to providing pharmacist-administered vaccination services and reporting to AIR. It also provides an estimate of the proportion of vaccinations administered that are reported to AIR, predominantly among pharmacists recording vaccination data using software that integrates with AIR, with evidence that these factors are associated with better reporting.

A true estimate of the completeness of data recorded in AIR is only possible if accurate data are available on the number of vaccines administered by pharmacies and the number of vaccinating pharmacists and pharmacies. A detailed audit of pharmacist immunisation records is necessary to achieve this, but would likely be a labour- and resource-intensive process. Availability of a register of immunisation providers that includes vaccinating pharmacists and pharmacies would assist in tracking the number and proportion of vaccinating pharmacists who are reporting data on vaccines administered to AIR. This would help demonstrate the value of these services in improving immunisation coverage in Australia, particularly in regional and remote areas.

Our study identified that difficulties in registering for and accessing AIR were substantial barriers to reporting to AIR. The useability of the AIR site was also criticised by respondents. Further examination of these barriers would be helpful in informing strategies from Health and Services Australia to address the barriers, particularly to increase pharmacists' adoption of new access pathways via PRODA. This is particularly important in the context of legislation mandating reporting to AIR.

With the scope of pharmacists' practice likely to expand in future, strong collaboration with jurisdictional health departments, the Guild, the PSA and other stakeholders is needed to ensure the provision of safe and effective pharmacist-administered vaccinations services and accurate recording and reporting of vaccination data.

References

1. Department of Human Services. What the register is. 2019. Available from: https://www.humanservices.gov.au/individuals/services/medicare/australian-immunisation-register/what-register (Accessed 10/12/2019).

2. Australian Government Department of Health. Using the Australian Immunisation Register. 2018. Available from: https://www.health.gov.au/health-topics/immunisation/health-professionals/using-the-australian-immunisation-register (Accessed 20 February 2020).

3. National Centre for Immunisation Research and Surveillance. Vaccine coverage. 2019. Available from: http://www.ncirs.org.au/our-work/vaccine-coverage (Accessed 20 February 2020).

4. Pharmacy Guild of Australia. Policy: Immunisation in Community Pharmacy. 2018. Available from: https://www.guild.org.au/__data/assets/pdf_file/0020/56216/20180305-Immunisation-in-Community-Pharmacy-Policy-January-2018.pdf (Accessed 29/1/2020).

5. Pharmaceutical Society of Australia. Nationally consistent approach to pharmacist administered vaccinations will improve access for all Australians. 2018. Available from: https://www.psa.org.au/pharmacist_administered_vaccinations/ (Accessed 14 February 2020).

6. National Centre for Immunisation Research and Surveillance. Review of pharmacist vaccination reporting to the Australian Immunisation Register. Sydney NSW: National Centre for Immunisation Research and Surveillance; 2020. Available from: http://ncirs.org.au/sites/default/files/2020-06/Review%20of%20pharmacist%20vaccination%20reporting%20to%20the%20AIR_Final%20report_May%202020.pdf (Accessed 16 August 2020).

7. Burt S, Hattingh L, Czarniak P. Evaluation of patient satisfaction and experience towards pharmacist-administered vaccination services in Western Australia. *International Journal of Clinical Pharmacy* 2018;40:1519-27.

8. Bushell M, Webby R, Patel B, et al. Pharmacist-led immunisation in the Northern Territory: Results from the pilot study. *The Northern Territory Disease Control Bulletin* 2017;24.

9. HealthConsult Pty Ltd. Evaluation of the Victorian Pharmacist-Administered Vaccination Program: Final evaluation report for the Department of Health and Human Services. Melbourne: HealthConsult; 2018.

10. Department of Health and Human Services Communicable Diseases Prevention Unit. Evaluation of the 2016 Tasmanian Pharmacist-administered Influenza Vaccination Program. Hobart: Tasmanian Department of Health and Human Services; 2017.

11. Nissen L, Glass B, Lau E, Rosenthal M. Queensland pharmacist immunisation pilot phase 1 pharmacist vaccination - Influenza final report. Brisbane: Queensland University of Technology; 2015.

12. Hattingh HL, Sim TF, Parsons R, et al. Evaluation of the first pharmacist-administered vaccinations in Western Australia: a mixed-methods study. *BMJ Open* 2016;6:e011948.

13. National Centre for Immunisation Research and Surveillance. Australian Immunisation Register Data Transfer Study: Stage 2 Final Report. Sydney NSW: National Centre for Immunisation

Research and Surveillance; 2018. Available from: http://www.ncirs.org.au/sites/default/files/2018-12/2018%20AIR%20data%20tranfer%20report_FINAL_0.pdf (Accessed 28 October 2020).

14. Commonwealth of Australia. House of Representatives on 3/12/2020: BILLS – Australia Immunisation Register Amendment (Reporting) Bill 2020 – Second Reading. 2020. Available from: https://www.aph.gov.au/Parliamentary_Business/Hansard/Hansard_Display?bid=chamber/hansardr/11b18738-de56-4d82-82f6-2c10fddd6b2b/&sid=0019 (Accessed 15 December 2020).

15. Phamaceutical Society of Australia. Pharmacists protecting Australians from the deadly flu virus. 2019. Available from: https://www.psa.org.au/pharmacists-protecting-australians-from-the-deadly-flu-virus/ (Accessed 10 December 2019).

16. SurveyMonkey. SurveyMonkey. 2020. Available from: https://www.surveymonkey.com (Accessed 18 December 2020).

17. Pharmacy Board of Australia. Statistics – Registration Data Table March 2020. 2020. Available from: https://www.pharmacyboard.gov.au/About/Statistics.aspx (Accessed 15 December 2020).

18. NSW Health. Pharmacist initiation and administation of vaccines. 2020. Available from: https://www.health.nsw.gov.au/immunisation/Pages/pharmacist-vaccination-expansion.aspx (Accessed 18 December 2020).

19. Carman R, Andrew L, Devine A, Oosthuizen J. Barriers to vaccination service delivery within general practice: opportunity to make a sustainable difference in Aboriginal child health? *Australian and New Zealand Journal of Public Health* 2019;43:563-9.

20. Kwong JC, Chung H, Jung JK, et al. The impact of repeated vaccination using 10-year vaccination history on protection against influenza in older adults: a test-negative design study across the 2010/11 to 2015/16 influenza seasons in Ontario, Canada. *Euro surveillance : bulletin Europeen sur les maladies transmissibles = European communicable disease bulletin* 2020;25:1900245.

21. Pharmaceutical Society of Australia. Practice Guidelines for pharmacists providing immunisation services. Deakin West ACT: Pharmaceutical Society of Australia; 2020. Available from: https://my.psa.org.au/servlet/fileField?entityId=ka10o0000009JkqAAE&field=PDF_File_Member_Content__Body__s (Accessed 18 December 2020).

22. Achat H, McIntyre P, Burgess M. Health care incentives in immunisation. *Australia and New Zealand Journal of Public Health* 1999;23:285-8.

23. Hallinan CM. Does the removal of financial incentives from Australian general practices affect immunisation rates? PhD thesis, University of Melbourne, Melbourne; 2019.

24. Department of Human Services. Incentive news update. 2019. Available from: https://www.servicesaustralia.gov.au/sites/default/files/2019/03/incentives-news-update-february-2019.pdf (Accessed 15 April 2021).

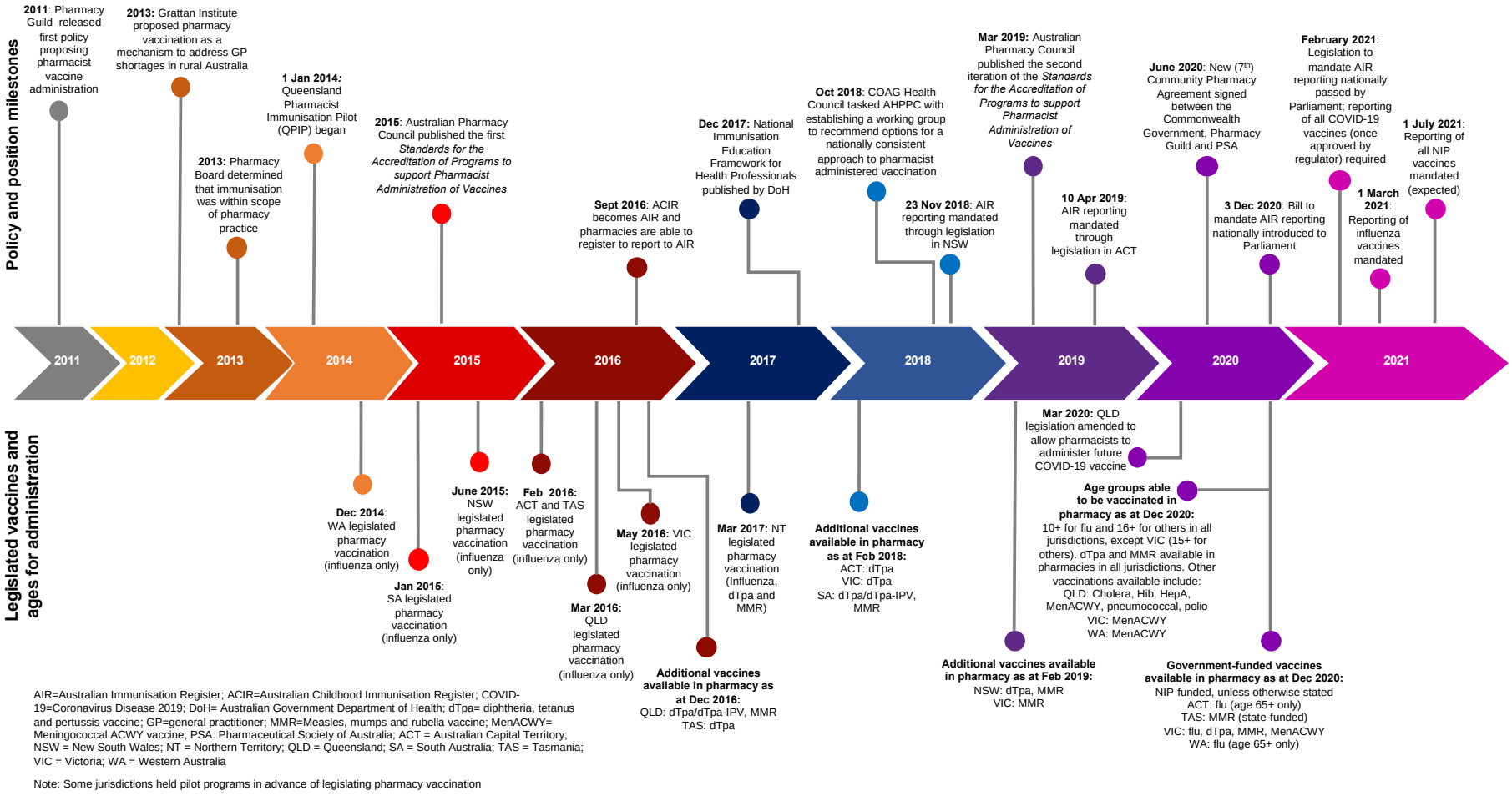
25. National Centre for Immunisation Research and Surveillance. Vaccines from community pharmacy - at a glance (updated 10 June 2020). 2020. Available from: http://ncirs.org.au/sites/default/files/2020-06/NCIRS%20Information%20Sheet-

%20Vaccines%20from%20community%20pharmacy_updated%2010%20June%202020_final.pdf
(Accessed 24 August 2020).

Appendices

Appendix 1: Timeline of pharmacist vaccination in Australia

Note: this timeline has been updated since the report on findings from Parts A and B



AIR=Australian Immunisation Register; ACIR=Australian Childhood Immunisation Register; COVID-19=Coronavirus Disease 2019; DoH= Australian Government Department of Health; dTpa= diphtheria, tetanus and pertussis vaccine; GP=general practitioner; MMR=Measles, mumps and rubella vaccine; MenACWY= Meningococcal ACWY vaccine; PSA: Pharmaceutical Society of Australia; ACT = Australian Capital Territory; NSW = New South Wales; NT = Northern Territory; QLD = Queensland; SA = South Australia; TAS = Tasmania; VIC = Victoria; WA = Western Australia

Note: Some jurisdictions held pilot programs in advance of legislating pharmacy vaccination

Appendix 2: NCIRS Information Sheet – Vaccines from community pharmacy: at a glance

This information sheet indicates which vaccines are permitted to be administered by pharmacists in each jurisdiction.[25]

NCIRS National Centre for Immunisation Research and Surveillance

Information sheet

Vaccines from community pharmacy – at a glance

Q. What are the vaccines that I may be able to receive from a community pharmacy, and do I have to pay for them?
A. This varies across the country and is controlled by the legislation of the state or territory. It also depends on your age, whether you are pregnant and your eligibility for vaccines funded under the National Immunisation Program (NIP). The summary table below provides a guide.*

State/Territory	Vaccines that can be administered by a pharmacist immuniser†	Who can receive vaccinations administered by a pharmacist?†	Is the vaccine free if I get it from a community pharmacy?‡	Would the same vaccine be free if I get it from a GP, local medical centre or an Aboriginal medical service?#
Australian Capital Territory	Influenza	10 years and older	**Yes**, for people aged 65 years and older (NIP-funded); otherwise **No**	**Yes**, if you meet any condition for a NIP-funded dose – Refer to Notes
	Diphtheria-tetanus-pertussis (dTpa)	16 years and older	**No**	
	Measles-mumps-rubella (MMR)	16 years and older	**No**	**Yes**, for people born in 1966 and onwards (state-funded), or if you meet any condition for a NIP-funded dose – Refer to Notes
New South Wales	Influenza	10 years and older	**No**	**Yes**, if you meet any condition for a NIP-funded dose – Refer to Notes
	Diphtheria-tetanus-pertussis (dTpa)	16 years and older	**No**	
	Measles-mumps-rubella (MMR)	16 years and older	**No**	**Yes**, for people born in 1966 and onwards (state-funded), or if you meet any condition for a NIP-funded dose – Refer to Notes
Northern Territory	COVID-19	18 years and older	**Yes,** if you meet any of the conditions of the current phase of vaccine roll-out.	**Yes,** if you meet any of the conditions of the current phase of vaccine roll-out.
	Influenza	10 years and older	**No**	**Yes**, if you meet any condition for a NIP-funded dose – Refer to Notes
	Diphtheria-tetanus-pertussis (dTpa)	16 years and older	**No**	
	Measles-mumps-rubella (MMR)	16 years and older	**No**	**Yes,** for people born in 1966 and onwards (territory-funded), or if you meet any condition for a NIP-funded dose – Refer to Notes
Queensland	COVID-19	18 years and older	**Yes,** if you meet any of the conditions of the current phase of vaccine roll-out.	**Yes,** if you meet any of the conditions of the current phase of vaccine roll-out.
	Influenza	10 years and older	**No**	**Yes**, if you meet any condition for a NIP-funded dose – Refer to Notes
	Diphtheria-tetanus-pertussis (dTpa)§	16 years and older	**No**	
	Measles-mumps-rubella (MMR)	16 years and older	**No**	**Yes**, for people born in 1966 and onwards (state-funded), or if you meet any condition for a NIP-funded dose – Refer to Notes
	Cholera	16 years and older	**No**	**No**
	Haemophilus influenzae type B	16 years and older	**No**	
	Hepatitis A	16 years and older	**No**	
	Meningococcal ACWY	10 years and older	**No**	**Yes**, for catch up of missed doses for all people aged <20 years
	Pneumococcal	16 years and older	**No**	**Yes,** if you meet any condition for a NIP-funded dose – Refer to Notes
	Poliomyelitis	16 years and older	**No**	**Yes,** for catch up of missed doses for all people aged <20 years, all refugees and other humanitarian entrants
South Australia	COVID-19	18 years and older	**Yes,** if you meet any of the conditions of the current phase of vaccine roll-out.	**Yes,** if you meet any of the conditions of the current phase of vaccine roll-out.
	Influenza	10 years and older	**No**	**Yes**, if you meet any condition for a NIP-funded dose – Refer to Notes
	Diphtheria-tetanus-pertussis (dTpa)§	16 years and older	**No**	
	Measles-mumps-rubella (MMR)	16 years and older	**No**	
Tasmania	Influenza	10 years and older	**No**	**Yes**, if you meet any condition for a NIP-funded dose – Refer to Notes
	Diphtheria-tetanus-pertussis (dTpa)	16 years and older	**No**	
	Measles-mumps-rubella (MMR)	16 years and older	**Yes,** for people born in 1966 and onwards (state-funded); otherwise **No**	**Yes,** for people born in 1966 and onwards (state-funded), or if you meet any condition for a NIP-funded dose – Refer to Notes
Victoria	COVID-19	18 years and older	**Yes,** if you meet any of the conditions of the current phase of vaccine roll-out.	**Yes,** if you meet any of the conditions of the current phase of vaccine roll-out.
	Influenza	10 years and older	**Yes**, if you meet any condition for a NIP-funded dose – Refer to Notes	**Yes**, if you meet any condition for a NIP-funded dose – Refer to Notes
	Diphtheria-tetanus-pertussis (dTpa)	15 years and older	**Yes**, for partners‖ of pregnant women, parents‖ or guardians‖ of babies <6 months of age (state-funded), or if you meet any condition for a NIP-funded dose –	**Yes,** for partners‖ of pregnant women, parents‖ or guardians‖ of babies <6 months of age (state-funded), or if you meet any condition for a NIP-funded dose – Refer to Notes

©NCIRS

Updated 4 March 2021

			Refer to Notes	
	Measles-mumps-rubella (MMR)	15 years and older	**Yes**, for people born in 1966 and onwards, women planning pregnancy or post-partum with low or negative rubella antibody levels (state-funded), or if you meet any condition for a NIP-funded dose – Refer to Notes	**Yes**, for people born in 1966 and onwards, women planning pregnancy or post-partum with low or negative rubella antibody levels (state-funded), or if you meet any condition for a NIP-funded dose – Refer to Notes
	Meningococcal ACWY	15 years and older	**Yes**, for catch up of missed doses for all people aged <20 years	**Yes**, for catch up of missed doses for all people aged <20 years
Western Australia	Influenza	10 years and older	**Yes**, for people aged 65 years and older (NIP-funded); otherwise **No**	**Yes**, if you meet any condition for a NIP-funded dose – Refer to Notes
	Diphtheria-tetanus-pertussis (dTpa)	16 years and older	**No**	
	Measles-mumps-rubella (MMR)	16 years and older	**No**	**Yes**, for people born in 1966 and onwards (state-funded), or if you meet any condition for a NIP-funded dose – Refer to Notes
	Meningococcal ACWY	16 years and older	**No**	**Yes**, for catch up of missed doses for all people aged <20 years

Notes
The National Immunisation Program (NIP) provides free vaccines to people who meet specified conditions, as listed below:
Influenza vaccine: Free for people aged 6 months to <5 years and ≥65 years, Aboriginal and Torres Strait Islander people, pregnant women and people with specified medical conditions that increase their risk of influenza disease (for a full list of conditions eligible for NIP-funded influenza vaccines, refer to Seasonal influenza vaccines – clinical advice for vaccination providers fact sheet).
MMR vaccine: Free for catch up of missed doses for all people aged <20 years, all refugees and other humanitarian entrants.
dTpa vaccine: Free for pregnant women, for catch up of missed doses for all people aged <20 years, all refugees and other humanitarian entrants.
Pneumococcal vaccine: The 23-valent pneumococcal polysaccharide vaccine (23vPPV) is free for Aboriginal and Torres Strait Islander people aged 15–49 years with specified medical risk factors,** Aboriginal and Torres Strait Islander people aged ≥ 50 years and for people aged ≥65 years.
There are additional NIP- and state-funded vaccines available free through a GP, local medical centre or an Aboriginal Medical Service.

* This information sheet is a guide to show what is permissible under the state/territory legislation. Not all pharmacies will offer this service, and not all pharmacists are permitted to administer vaccines.
† These vaccination restrictions only apply to pharmacist immunisers and may differ for other immunisers, such as nurses, who may be administering vaccines in a community pharmacy.
‡ Although some vaccines may be free as a result of being funded on the NIP or by the state/territory, pharmacies may charge a service fee.
# Although vaccines may be free as a result of being funded on the NIP or by the state/territory, GP and local medical centres may charge a consultation fee.
§ Diphtheria-tetanus-pertussis-inactivated poliovirus vaccine (dTpa-IPV) may be used if diphtheria-tetanus-pertussis (dTpa) vaccine is not available.
ǀ Only for those who have not received a pertussis booster in the last 10 years.
** Refer to the Australian Immunisation Handbook for the list of specified medical risk factors.

Appendix 3: Survey instrument

Welcome to the survey

This study is examining the transfer of vaccination data into the Australian Immunisation Register by community pharmacists. We will ask you about vaccine administration, record keeping, reporting and the number of vaccines given in your pharmacy.

If you work in or own multiple pharmacies, please answer the questions based on the community pharmacy you administer vaccines in or that you spend the most time in.

Completion of this survey is voluntary and anonymous. It will take approximately 10–15 minutes of your time. Responses will be analysed and stored by the National Centre for Immunisation Research and Surveillance. Individual responses will not be shared with any external parties.

This research is funded by The Australian Government Department of Health, and has received ethical approval from the Sydney Children's Hospital Network Human Research Ethics Committee (2019/ETH13380).

If you have any questions about this study, please contact Cyra Patel (cyra.patel@health.nsw.gov.au) or Lauren Dalton (lauren.dalton@health.nsw.gov.au).

*1. I agree to participate in this study, and confirm that I am a pharmacist.

- Yes → continue with survey (go to Q2)
- No → SURVEY ENDS ('end of survey' page)

Your role in the pharmacy

The following questions will ask you about your role in your pharmacy.

If you work in or own multiple pharmacies, please answer the survey about the community pharmacy where you spend the most time, and ask pharmacists in your other pharmacies to answer the survey about those pharmacies.

2. Do you work in or own a community pharmacy?

- Yes – I work in a community pharmacy → go to Q4
- Yes – I own a community pharmacy → go to Q3
- Yes – I both own and work in a community pharmacy → go to Q3
- No – I do not work in or own a community pharmacy → SURVEY ENDS (disqualification page)

3. How many pharmacies do you own?

- 1
- 2–4
- 5–9
- 10 or more

*4. What is your role in your pharmacy?

- Pharmacist
- Assistant pharmacist
- Dispensing technician
- Trainee pharmacist
- Other (please specify)

5. What is your position title?

<free-text response>

6. How old are you?

- 18–29 years
- 30–39 years
- 40–49 years
- 50–59 years
- 60 years or older

7. What is your gender?

- Male
- Female
- Other

Information about your pharmacy

*8. Which jurisdiction is your pharmacy based in?

- ACT
- NSW
- NT
- QLD
- SA
- TAS
- VIC
- WA

*9. Where is your pharmacy located?

- Major city
- Regional area
- Remote area

*10. Which type of pharmacy do you work in or own?

- Banner group, e.g. Chemist Warehouse, Priceline, Terry White

- Buying group
- Friendly society
- Independently owned
- Other (please specify)

*11. Does the pharmacy that you spend most of your time in provide vaccination services?

- Yes → go to Q13
- No → go to Q12

*12. Have you (or someone else in your pharmacy) undertaken training that allows you to administer vaccinations in your pharmacy? (select all that apply)

- ☐ Yes, I have undertaken training in my state/territory
- ☐ Yes, I have undertaken training in another state/territory (but does not allow me to administer vaccines in my current jurisdiction)
- ☐ No, I have not undertaken any training
- ☐ Yes, another pharmacist in my pharmacy has undertaken training
- ☐ Other (please specify)
  → SURVEY ENDS (disqualification page), regardless of answer

Vaccine administration

*13. Which vaccines do you administer in your pharmacy? (select all that apply)

- ☐ Measles, mumps and rubella (MMR)
- ☐ Influenza - standard quadrivalent vaccine
- ☐ Influenza - adjuvanted quadrivalent vaccine (Fluad Quad)
- ☐ Diphtheria, tetanus and pertussis (dTpa)
- ☐ dTpa - inactivated poliovirus (dTpa-IPV)
- ☐ Meningococcal ACWY
- ☐ Other (please specify)

14. Do you administer any vaccines supplied through the National Immunisation Program in your pharmacy?

- Yes (please specify which ones in the comment box below)
- No
- I'm not sure

Please indicate which NIP-funded vaccines are given at your pharmacy (or provide any other details).

<free-text response>

*15. What is your current process, if any, to check a patient's vaccination history before administering a vaccine? (select all that apply)

- ☐ Ask the patient
- ☐ Check paper based records

- ☐ Check software records
- ☐ Check the Australian Immunisation Register (AIR) online site
- ☐ Check My Health Record
- ☐ We don’t check the patient’s vaccination history before administering a vaccine
- ☐ Other (please specify)

16. What are the reasons, if any, that you don’t check the patient’s vaccination history prior to vaccinating? (select all that apply) If you always check the patient's history, please select "N/A I always check the patient's vaccination history".

- ☐ It's too time consuming
- ☐ I don't know how to
- ☐ It's not part of my pharmacy's vaccination protocol
- ☐ It's not important to check vaccination history
- ☐ I don't have access to the Australian Immunisation Register (AIR) website
- ☐ It's not a legislated requirement
- ☐ N/A - I always check the patient's vaccination history
- ☐ Other (please specify)

17. Do you record the patient’s Medicare number in your pharmacy records when they are given a vaccine?

- ○ Yes, always
- ○ Yes, sometimes
- ○ No

Vaccination record keeping

The following questions are about the way your pharmacy keeps its own records of vaccines administered to patients (vaccination encounters). These questions are not about reporting to the Australian Immunisation Register.

*18. How do you keep a record of vaccination encounters in your pharmacy? (select all that apply)

- ☐ Pharmacy software → go to Q19
- ☐ Paper-based records → go to Q20
- ☐ Patient-held records → go to Q20
- ☐ We don’t keep a record of vaccination encounters → go to Q20
- ☐ Other (please specify) → go to Q20

19. Which pharmacy software do you use to record vaccination encounters in your pharmacy? (select all that apply)

- ☐ GuildCare NG
- ☐ MedAdvisor
- ☐ Dispensing software (e.g. Fred Dispense, Minfos Dispense, Lots Dispense)
- ☐ Other (please specify)

20. Have you changed the way you record vaccination encounters? Please provide any relevant details in the comment box below.

- Changed software platforms
- No change to the way vaccines are recorded
- Changed from paper based to electronic record keeping
- Changed from electronic record keeping to paper based
- Other (please provide details below)

Please provide details here. <free-text response>

21. Do you have a computer in the consultation room where vaccinations are performed?

- Yes → go to Q22
- No → go to Q23
- Other (please specify) → go to Q23

22. Does this computer have professional services software for you to record the vaccination encounter?

- Yes
- No
- I don't know
- Other (please specify)

Reporting to the Australian Immunisation Register (AIR)

The following questions will ask you about your reporting practices to the Australian Immunisation Register (AIR).

*23. How familiar are you with AIR?

- I have never heard of it
- I am aware of it but have never used it
- I have used it occasionally
- I use it on a regular basis

*24. Do you report vaccinations administered in your pharmacy to AIR?

- Yes → go to Q25
- No → go to Q33

25. What are the reasons you **do** report vaccinations to AIR? (select all that apply)

- ☐ I believe it is important to report to AIR
- ☐ Legislative requirements to report to AIR
- ☐ Pharmacy-based requirements to report to AIR
- ☐ Having professional services software that automatically uploads data to AIR
- ☐ Requests from patients to ensure their AIR record is up to date

☐ Other (please specify)

*26. How does your pharmacy report the vaccinations you administer to AIR? (select all that apply)

☐ Automatic upload from professional services software→ go to Q28
☐ Manually enter vaccination encounters onto the AIR website → go to Q27
☐ Fax vaccination records to AIR → go to Q28
☐ Post vaccination records to AIR → go to Q28
☐ Send vaccination records through secure email to AIR → go to Q28
☐ Provide my patients with a vaccination record and ask that their GP uploads it to AIR → go to Q28
☐ I don't know → go to Q28
☐ Other → go to Q28

27. When entering data on a vaccination encounter on the AIR website, how do you usually search for the patient? (select all that apply)

☐ The patient's name
☐ The patient's Medicare number
☐ The patient's date of birth
☐ The patient's address
☐ Other (please specify)

Please provide additional details. <free-text response>

28. Who uploads vaccination encounters to AIR in your pharmacy? (select all that apply)

☐ No one, it is automated
☐ The pharmacist who administers the vaccine
☐ A pharmacist, but not necessarily the one who administers the vaccine
☐ Pharmacy assistant
☐ Dispensing technician
☐ I don't know
☐ Other (please specify)

29. Which vaccinations do you report to AIR? (select all that apply)

☐ All vaccines that we administer
☐ Influenza - standard quadrivalent vaccine
☐ Influenza - adjuvanted quadrivalent vaccine (Fluad Quad)
☐ Diphtheria, tetanus and pertussis (dTpa)
☐ Meningococcal ACWY
☐ Measles, mumps and rubella (MMR)
☐ Other (please specify)

30. When do you usually report the vaccination encounter to AIR?

o At the time of or immediately after the vaccination is administered → go to Q32
o Vaccination encounters are batched and reported in a group (e.g. at the end of the day, week or month) → go to Q31
o Other → go to Q32

31. How frequently do you report batched vaccination encounters?

- Once a day
- Once a week
- Once a month
- Other (please specify)

32. Approximately how many vaccinations administered in your pharmacy are reported to AIR?

- All of them → go to Q34
- Most of them
- Some of them
- Few of them

33. What are the reasons you **do not** report all vaccinations administered in your pharmacy to AIR? (select all that apply)

- ☐ I have never heard of AIR
- ☐ It's too time consuming
- ☐ I don't have access to the AIR website
- ☐ I don't see the benefit in reporting
- ☐ It's not part of my pharmacy's vaccination protocol
- ☐ It's not a legislated requirement
- ☐ There is no remuneration for reporting
- ☐ My pharmacy's software does not link to the AIR
- ☐ I don't know how to report to AIR
- ☐ I didn't know that I should report
- ☐ I don't report if my patient doesn't have a Medicare card
- ☐ I don't report if I don't have all of my patient's details (please provide an example of missing details)
- ☐ Other (please specify)

34. Have you changed your AIR reporting practices in the past year?

- Increased reporting to AIR → go to Q35
- Decreased reporting to AIR → go to Q36
- No change in reporting to AIR → go to Q37
- I used to report to AIR but have stopped over time → go to Q36
- I have never reported to AIR → go to Q37
- Don't know → go to Q37

35. Why have you increased your reporting to AIR?

<free-text response>

→ go to Q37

36. Why have you decreased your reporting to AIR?

<free-text response>

*37. What would increase your reporting of vaccination encounters to AIR? (select all that apply)

- ☐ More information about how to report
- ☐ More information about the benefits of reporting
- ☐ Automated reporting from pharmacy software
- ☐ AIR reporting being a legislative requirement
- ☐ Incentive for reporting
- ☐ Training on the use of AIR
- ☐ A more user-friendly AIR secure website
- ☐ Other (please specify)

Independent providers

*38. Do independent providers (e.g. nurses, nurse practitioners or pharmacists who do not routinely work in your pharmacy) conduct vaccination clinics in your pharmacy?

- ○ Yes → go to Q39
- ○ No → go to Q42
- ○ Don't know → go to Q42.

Please provide any comments <free-text response>

39. Which type of independent providers does your pharmacy engage to conduct vaccination clinics? (select all that apply)

- ☐ Nurse immunisers
- ☐ Nurse practitioners
- ☐ General practitioners
- ☐ Midwives
- ☐ Pharmacists who do not otherwise work in the pharmacy
- ☐ Don't know
- ☐ Other (please specify)

40. Does your pharmacy keep a record of the vaccinations given by independent providers?

- ○ Yes, always
- ○ Yes, sometimes
- ○ No
- ○ Don't know
- ○ Other (please specify)

41. Who reports the vaccination encounters that are given by an independent provider to AIR?

- ○ The independent provider
- ○ Our pharmacy
- ○ Neither (records are not reported to AIR)
- ○ Other (please specify)

Vaccinations during the COVID-19 pandemic

The COVID-19 pandemic has had a widespread impact on health services and, more broadly, on the society. The questions on this page will ask about your experiences providing vaccinations in 2020.

42. Has the COVID-19 pandemic affected the expected demand for vaccines administered at your pharmacy?

- Yes, it has increased demand
- Yes, it has decreased demand
- No, demand is what we expected it to be
- I'm not sure

43. Has the COVID-19 pandemic affected your ability to administer vaccinations?

- No
- Yes, please specify <free-text response>

44. Has the COVID-19 pandemic affected your ability to report vaccinations administered to AIR?

- Yes, it has decreased our ability to report to AIR
- Yes, it has increased our ability to report to AIR
- No, our ability to report to AIR is unchanged

Vaccination encounters in your pharmacy

The following questions will be used to validate the number of vaccination encounters that were successfully transmitted to the Australian Immunisation Register (AIR).

To answer the question, please extract a report from your software or check your records to provide an accurate and specific response. Please do not estimate the number. Click here for instructions for extracting these numbers and checking your Immunisation Provider Number in certain softwares.

If you need to exit the survey to check these numbers, you can re-enter the survey by clicking the link as long as you are accessing the survey from the same browser on the same computer/device.

Only the research team at the National Centre for Immunisation Research and Surveillance will have access to these data. Your data will be kept confidential, and your provider number will not be used to identify your pharmacy in any capacity. Your information will not be shared with any external parties.

45. How many vaccines were provided in your pharmacy between 1 April 2020 and 31 May 2020? Please include all types of vaccines provided e.g. for influenza, measles, etc.

<free-text response>

46. What is your pharmacy's Immunisation Provider Number?

<free-text response>

47. To your knowledge, have the vaccines administered in your pharmacy between 1 April 2020 and 31 May 2020 been report to AIR?

- Yes
- No
- Don't know
- Other (please specify)

Other comments

48. Is there anything else you would like us to know about administering and reporting vaccinations in pharmacy?

<free-text response>

Appendix 4: Comparison of demographic characteristics of survey respondents compared with the national population of pharmacists

Demographics (n=121)

Characteristic	National population of pharmacists		Survey respondents			Ratio (survey / national)
	Number	Proportion	Number	Proportion	95% CI	
Total	29,620	100%	243	100%	–	–
Gender						
Male	10,967	37.0%	103	42.4%	36.3% – 48.7%	0.9
Female	18,653	63.0 %	140	57.6%	51.3% – 63.7%	1.1
Age group						
18–29 years	6,564	22.2%	52	21.4%	16.7% – 27.0%	1.0
30–39 years	11,294	38.1%	76	31.3%	25.7% – 37.4%	0.8
40–49 years	5,617	19.0%	53	21.8%	17.0% – 27.5%	1.2
50–59 years	3,409	11.5%	40	16.5%	12.3% – 21.7%	1.4
60 years or older	2,736	9.2%	22	9.1%	6.0% – 13.4%	1.0
State/territory						
ACT	577	1.9%	1	0.4%	0.1% – 2.9%	0.2
NSW	8,888	30.0%	54	22.2%	17.4% – 27.9%	0.7
NT	244	0.8%	1	0.4%	0.1% – 2.9%	0.5
QLD	5,981	20.2%	26	10.7%	7.4% – 15.3%	0.5
SA	2,099	7.1%	18	7.4%	4.7% – 11.5%	1.0
TAS	737	2.5%	38	15.6%	11.6% – 20.8%	6.3
VIC	7,650	25.8%	90	37.0%	31.2% – 43.3%	1.4
WA	3,203	10.8%	15	6.2%	3.7% – 10.0%	0.6
Geographic region						
Major city	19,044	77.4%	122	50.2%	43.9% – 56.5%	0.6
Regional	5,268	21.4%	109	44.9%	38.7% – 51.2%	2.1
Remote	296	1.2%	12	4.9%	2.8% – 8.5%	4.1

Sources of data for national population of pharmacists: Data on gender, age group and state/territory were obtained from the latest available statistics on registered pharmacists reported by the Pharmacy Board of Australia (reporting period 1 January 2020 to 31 March 2020). These data did not include numbers on pharmacist distribution by geographic region, so older data on the health workforce from 2017 published by the Department of Health were utilised.
Statistics on registered pharmacists from the Pharmacy Board of Australia: available at https://www.pharmacyboard.gov.au/About/Statistics.aspx
Factsheet on registered pharmacists, 2017, published by the Department of Health: available at https://hwd.health.gov.au/webapi/customer/documents/factsheets/2017/Pharmacists.pdf
(Links accessed on 15 April 2021)

Appendix 5: Characteristics of participants included in and excluded from the analysis of vaccination encounters reported to AIR

Characteristics	Included in AIR analysis		Excluded in AIR analysis		All survey respondents	
	No.	%	No.	%	No.	%
All survey respondents	**121**	**49.8%**	**122**	**50.2%**	**243**	**100%**
Demographics						
Age of respondent	121		122		243	
18-29 years	18	14.9%	34	27.9%	52	21%
30-39 years	39	32.2%	37	30.3%	76	31%
40-49 years	28	23.1%	25	20.5%	53	22%
50-59 years	27	22.3%	13	10.7%	40	16%
60 years or older	9	7.4%	13	10.7%	22	9%
Gender of respondent	121		122			
Male	56	46.3%	47	38.5%	103	42%
Female	65	53.7%	75	61.5%	140	58%
State/territory	121		122		243	
ACT	0	0.0%	1	0.8%	1	0.4%
NSW	23	19.0%	31	25.4%	54	22%
NT	0	0.0%	1	0.8%	1	0.4%
QLD	10	8.3%	16	13.1%	26	11%
SA	12	9.9%	6	4.9%	18	7%
TAS	17	14.1%	21	17.2%	38	16%
VIC	49	40.5%	41	33.6%	90	37%
WA	10	8.3%	5	4.1%	15	6%
Geographical location	121		122		243	
Major city	53	43.8%	69	56.6%	122	50%
Regional	59	48.8%	50	41.0%	109	45%
Remote	9	7.4%	3	2.5%	12	5%
Ownership status	121		122		243	
Owner	10	8.3%	44	36.1%	94	39%
Employee	56	46.3%	78	63.9%	15	6%
Both	55	45.5%	0	0%	134	55%
Number of pharmacies owned	65		44		109	

Characteristics	Included in AIR analysis		Excluded in AIR analysis		All survey respondents	
	No.	%	No.	%	No.	%
1	46	70.8%	28	63.6%	74	68%
2-4	18	27.7%	15	34.1%	33	30%
5-9	1	1.5%	1	2.3%	2	2%
Affiliation	121		122		243	
Banner group	90	74.4%	93	76.2%	183	75%
Buying group	8	6.6%	8	6.6%	16	7%
Friendly society	2	1.7%	0	0.0%	2	1%
Independently owned	20	16.5%	21	17.2%	41	17%
Other	1	0.8%	0	0.0%	1	0%
Type of vaccine(s) administered	121		122		243	
Influenza	120	99.2%	121	99.2%	241	99%
QIV	118	97.5%	114	93.4%	232	95%
Adjuvanted QIV	62	51.2%	49	40.2%	111	46%
MMR	77	63.6%	59	48.4%	136	56%
dTpa	107	88.4%	72	59.0%	179	74%
dTpa only	107	88.4%	69	56.6%	176	72%
dTpa-IPV	18	14.9%	12	9.8%	30	12%
MenACWY	25	20.7%	15	12.3%	40	16%
Other (pneumococcal)	1	0.8%	0	0.0%	1	0%
Administers NIP-funded vaccines	121		122		243	
Yes	56	46.3%	41	33.6%	97	40%
No	63	52.1%	68	55.7%	131	54%
Unsure	2	1.7%	13	10.7%	15	6%
Pharmacists' recording practices						
Method of recording vaccination encounters	121		122		243	
Pharmacy software	120	99.2%	107	87.7%	227	93.4%
Paper-based records	85	70.3%	80	65.6%	165	67.9%
Patient-held records	54	44.6%	43	35.3%	97	39.9%
Other	7	5.8%	6	4.9%	13	5.3%
Number of methods used to record vaccination encounters	121		122		243	
1	25	20.7%	40	32.8%	65	26.7%
2	52	43.0%	52	42.6%	104	42.8%
3	39	32.2%	28	23.0%	67	27.6%
4	5	4.1%	2	1.6%	7	2.9%
Pharmacy software type used	120		105		225	

Characteristics	Included in AIR analysis		Excluded in AIR analysis		All survey respondents	
	No.	%	No.	%	No.	%
GuildCare NG	44	36.7%	30	28.6%	74	32.9%
MedAdvisor	68	56.7%	31	29.5%	99	44.0%
Dispensing software	90	75.0%	73	69.5%	163	72.4%
Other	11	9.2%	18	17.1%	29	12.9%
Patient's Medicare card number is recorded in pharmacy	121		122		243	
Yes, always	94	77.7%	95	77.9%	189	77.8%
Yes, sometimes	25	20.7%	26	21.3%	51	21.0%
No	2	1.7%	1	0.8%	3	1.2%
Computer in consultation room	121		120		241	
Yes	66	54.6%	78	65.0%	144	59.8%
With professional services software*	63	95.5%	71	93.4%	134	94.4%
Without software*	2	3.0%	5	6.6%	7	4.9%
Unsure*	1	1.5%	0	0.0%	1	0.7%
No	48	39.7%	38	31.7%	86	35.7%
Other	7	5.8%	4	3.3%	11	4.6%
Changes to method of recording vaccination encounters	118		118		236	
Changed software platforms	12	10.2%	8	6.8%	20	8.5%
Changed from paper based to electronic record keeping	18	15.3%	26	22.0%	44	18.6%
Changed from electronic record keeping to paper based	1	0.9%	0	0.0%	1	0.4%
No change	81	68.6%	82	69.5%	163	69.1%
Other	6	5.1%	2	1.7%	8	3.4%
Pharmacists' reporting practices						
Familiarity with AIR	121		119		240	
Regular use	81	66.9%	67	56.3%	148	61.7%
Occasional use	27	22.3%	27	22.7%	54	22.5%
Aware but never used	13	10.7%	25	21.0%	38	15.8%
Never heard of it	0	0.0%	0	0.0%	0	0.0%
Report to AIR	121		118		239	
Yes	119	98.4%	108	91.5%	227	95.0%
No	2	1.7%	10	8.5%	12	5.0%
How many vaccines are reported	119		102		221	
All of them	107	89.9%	88	86.3%	195	88.2%
Most of them	11	9.2%	13	12.8%	24	10.9%
Some of them	1	0.8%	1	1.0%	2	0.9%
Few of them	0	0.0%	0	0.0%	0	0.0%

Characteristics	Included in AIR analysis		Excluded in AIR analysis		All survey respondents	
	No.	%	No.	%	No.	%
Method of reporting to AIR	119		104		223	
Automated upload only	88	74.0%	41	39.4%	129	57.8%
Manual entry to AIR site only	17	14.3%	45	43.3%	62	27.8%
Automated upload and AIR site	14	11.8%	16	15.4%	30	13.5%
Other method only	0	0.0%	2	1.9%	2	0.9%
Number of reporting methods used	119		104		223	
1	113	86.6%	86	82.7%	189	84.8%
2	16	13.5%	17	16.3%	33	14.8%
3	0	0.0%	1	1.0%	1	0.4%
Person who uploads data to AIR	119		103		222	
No one, it is automated	31	26.1%	13	12.6%	44	19.8%
The pharmacist who administers the vaccine	82	68.9%	70	68.0%	152	68.5%
A pharmacist, but not always the administrating pharmacist	27	22.7%	32	31.1%	59	26.6%
Pharmacy assistant	10	8.4%	12	11.7%	22	9.9%
Dispensing technician	24	20.2%	11	10.7%	35	15.8%
Don’t know	0	0.0%	4	3.9%	4	1.8%
Other	4	3.4%	1	1.0%	5	2.3%
When are vaccination encounters reported	119		67	65.7%	221	
At the time of or immediately after administration	83	69.8%	33	32.4%	150	67.9%
Batch reported	29	24.4%	10	30.3%	62	28.1%
Once a day	16	55.2%	13	39.4%	26	41.9%
Once a week	4	13.8%	4	12.1%	17	27.4%
Once a month	2	6.9%	6	18.2%	6	9.7%
Other frequency of batch reporting	7	24.1%	2	2.0%	13	21.0%
Other	7	5.9%	67	65.7%	9	4.1%
Changed reporting practices in past year	121		109		230	
Increased reporting	28	23.1%	21	19.3%	49	21.3%
Decreased reporting	1	0.8%	2	1.8%	3	1.3%
No changed	90	74.4%	73	67.0%	163	70.9%
Stopped reporting over time	1	0.8%	1	0.9%	2	0.9%
Never reported	0	0.0%	8	7.3%	8	3.5%
Don’t know	1	0.8%	4	3.7%	5	2.2%
Vaccination by independent providers in pharmacies						
Vaccination clinics conducted by independent pharmacists	121		108		229	
Yes	21	17.4%	13	12.0%	34	14.8%

Characteristics	Included in AIR analysis		Excluded in AIR analysis		All survey respondents	
	No.	%	No.	%	No.	%
No	100	82.6%	95	88.0%	195	85.2%
Type of provider	20		13		33	
Nurse immuniser	17	85.0%	7	53.9%	24	72.7%
Nurse practitioner	2	10.0%	6	46.2%	8	24.2%
General practitioner	2	10.0%	0	0.0%	2	6.1%
Pharmacist who does not otherwise work in the pharmacy	2	10.0%	5	38.5%	7	21.2%
Vaccinations by independent provider recorded by pharmacy	20		12		32	
Yes, always	16	80.0%	9	75.0%	25	78.1%
Yes, sometimes	1	5.0%	0	0.0%	1	3.1%
No	2	10.0%	0	0.0%	2	6.3%
Don't know	0	0.0%	2	16.7%	2	6.3%
Other	1	5.0%	1	8.3%	2	6.3%
Person who reports vaccinations by independent provider to AIR	20		12		32	
Independent provider	11	55.0%	7	58.3%	18	56.3%
Pharmacy	7	35.0%	3	25.0%	10	31.3%
Neither (i.e. not reported)	1	5.0%	0	0.0%	1	3.1%
Other	1	5.0%	2	16.7%	3	9.4%
Impact of COVID-19 pandemic on pharmacist-administered vaccination services						
Impact of COVID-19 on expected demand for vaccines	121		106		227	
Increased	119	98.4%	98	92.5%	217	95.6%
Decreased	1	0.8%	2	1.9%	3	1.3%
Unchanged	1	0.8%	2	1.9%	3	1.3%
Not sure	0	0.0%	4	3.8%	4	1.8%
Impact of COVID-19 on ability to administer vaccines	121		107		228	
Yes	36	29.8%	25	23.4%	61	26.8%
No	85	70.3%	82	76.6%	167	73.2%
Impact of COVID-19 on ability to report vaccinations to AIR	121		107		228	
Yes, increased	0	0.0%	2	1.9%	2	0.9%
Yes, decreased	4	3.3%	9	8.4%	13	5.7%
No change	117	96.7%	96	89.7%	213	93.4%

Appendix 6: Proportion of vaccination encounters reported by AIR

Characteristics	Number of respondents	Number of vaccinations in AIR	Number of vaccinations administered	Proportion administered	95% CI
Demographics					
State/territory					
ACT	0	0	0	0.0%	–
NSW	23	18,313	20,899	87.6%	77.6% – 97.7%
NT	0	0	0	0.0%	–
QLD	10	6,598	8,616	76.6%	55.6% – 97.5%
SA	12	4,626	6,278	73.7%	52.0% – 95.4%
TAS	17	6,793	11,025	61.6%	39.7% – 83.5%
VIC	49	27,610	32,375	85.3%	77.5% – 93.1%
WA	10	8,105	8,472	95.7%	93.4% – 98.0%
From a jurisdiction where reporting is a legislative requirement					
Yes	23	18,313	20,899	87.6%	77.6% – 97.7%
No	98	53,732	66,766	80.5%	74.0% – 87.0%
Geographical location					
Major city	53	34,469	40,882	84.3%	77.5% – 91.2%
Regional	59	36,180	44,992	80.4%	71.4% – 89.4%
Remote	9	1,396	1,791	77.9%	51.3% – 104.6%
Ownership status					
Owner	10	6,551	7,246	90.4%	73.3% – 107.5%
Employee	56	34,055	43,484	78.3%	69.2% – 87.5%
Both	55	31,439	36,935	85.1%	78.1% – 92.2%
Ownership status					
Owner	65	37,990	44,181	86.0%	79.5% – 92.5%
Employee	56	34,055	43,484	78.3%	69.2% – 87.5%
Number of pharmacies owned					
1	46	20,982	26,015	80.7%	71.3% – 90.0%
2-4	18	16,290	17,425	93.5%	87.4% – 99.6%
5-9	1	718	741	96.9%	N/A
Affiliation					
Banner group	90	62,064	76,117	81.5%	74.9% – 88.2%
Buying group	8	2,327	2,655	87.6%	67.2% – 108.1%
Friendly society	2	570	570	100.0%	N/A

Characteristics	Number of respondents	Number of vaccinations in AIR	Number of vaccinations administered	Proportion administered	95% CI
Independently owned	20	6,708	7,905	84.9%	74.4% – 95.4%
Other	1	376	418	90.0%	N/A
Role of respondent					
Pharmacist	121	72,045	87,665	82.2%	N/A
Pharmacy assistant	0	–			
Trainee pharmacist	0	–			
Other	0	–			
Age of respondent					
18-29 years	18	12,922	18,257	70.8%	52.5% – 89.1%
30-39 years	39	25,587	28,758	89.0%	80.8% – 97.1%
40-49 years	28	14,630	16,731	87.4%	79.4% – 95.4%
50-59 years	27	10,897	14,978	72.8%	58.3% – 87.2%
60 years or older	9	8,009	8,941	89.6%	76.2% – 103.0%
Gender of respondent					
Male	56	25,584	32,320	79.2%	70.1% – 88.3%
Female	65	46,461	55,345	83.9%	76.9% – 91.0%
Type of vaccine administered at pharmacy					0.0% – 0.0%
Influenza	120	71,495	87,062	82.1%	76.5% – 87.7%
QIV	118	70,195	85,759	81.9%	76.2% – 87.5%
Adjuvanted QIV	62	36,708	41,603	88.2%	81.7% – 94.7%
MMR	77	56,033	64,373	87.0%	81.5% – 92.6%
dTpa	107	68,211	83,123	82.1%	76.1% – 88.0%
dTpa	107	68,211	83,123	82.1%	76.1% – 88.0%
dTpa-IPV	18	13,481	14,774	91.2%	88.6% – 93.9%
MenACWY	25	20,193	25,194	80.2%	65.9% – 94.4%
Other	1	131	132	99.2%	N/A
Administers NIP-funded vaccines	121				
Yes	56	24,510	38,765	89.0%	83.0% – 95.1%
No	63	37,332	48,239	77.4%	68.8% – 86.0%
Unsure	2	203	661	30.7%	-60.6% – 122.0%
Pharmacists' reporting practices					
Checks vaccination history using AIR					
Yes	31	23,248	25,917	89.7%	81.1% – 98.3%
No	90	48,797	61,748	79.0%	72.2% – 85.9%
Patient's Medicare number is recorded in pharmacy records					

Characteristics	Number of respondents	Number of vaccinations in AIR	Number of vaccinations administered	Proportion administered	95% CI
Yes, always	94	59,749	68,377	87.4%	82.4% – 92.3%
Yes, sometimes	25	12,264	18,765	65.4%	48.6% – 82.1%
No	2	32	523	6.1%	-41.3% to 53.6%
Patient's Medicare number is recorded in pharmacy records					
Yes	119	72,013	87,142	82.6%	77.1% – 88.1%
No	2	32	523	6.1%	-41.3% to 53.6%
Method of recording vaccination encounters					
Pharmacy software	120	71,936	87,554	82.2%	76.6% – 87.7%
Paper-based records	85	48,290	60,322	80.1%	72.9% – 87.2%
Patient-held records	54	34,546	42,585	81.1%	72.9% – 89.4%
Other	7	3,864	4,651	83.1%	63.6% – 102.5%
Method of recording vaccination encounters					
Software only	36	23,755	27,343	86.9%	78.7% – 95.0%
Paper-based only	1	109	111	98.2%	N/A
Software and paper records	84	48,181	60,211	80.0%	72.9% – 87.2%
Number of methods used to record vaccination encounters					
1	25	16,606	19,572	84.8%	74.7% – 95.0%
2	52	26,710	31,803	84.0%	74.8% – 93.1%
3	39	26,306	33,226	79.2%	69.1% – 89.2%
4	5	2,423	3,064	79.1%	51.2% – 107.0%
Used software to record vaccination encounters					
Yes	120	71,936	87,554	82.2%	76.6% – 87.7%
No	1	109	111	98.2%	N/A
Pharmacy software type used					
GuildCare NG	44	23,689	29,007	81.7%	73.1% – 90.2%
MedAdvisor	68	44,555	51,228	87.0%	80.8% – 93.2%
Dispensing software	90	56,881	68,674	82.8%	76.5% – 89.1%
Other	11	12,852	13,986	91.9%	88.2% – 95.6%
Changes to method of recording vaccination encounters					
Changed software platforms	12	5,625	6,188	90.9%	77.3% – 104.5%
Changed from paper based to electronic record keeping	18	15,886	17,719	89.7%	83.8% – 95.5%
Changed from electronic record keeping to paper based	1	15	15	100.0%	N/A
No change	81	39,109	50,873	76.9%	68.6% – 85.1%

Characteristics	Number of respondents	Number of vaccinations in AIR	Number of vaccinations administered	Proportion administered	95% CI
Other	6	7,675	8,371	91.7%	87.3% – 96.1%
Computer in consultation room					
Yes	66	46,191	56,182	82.2%	74.3% – 90.1%
With professional services software	63	41,614	50,762	82.0%	73.7% – 90.3%
Without software	2	248	739	33.6%	-60.7% – 127.9%
Unsure	1	4,329	4,681	92.5%	N/A
No	48	20,312	25,023	81.2%	72.4% – 89.9%
Other	7	5,542	6,460	85.8%	75.3% – 96.3%
Pharmacists' reporting practices					
Familiarity with AIR					
Regular use	81	54,328	66,064	82.2%	75.6% – 88.9%
Occasional use	27	13,312	16,532	80.5%	67.9% – 93.2%
Aware but never used	13	4,405	5,069	86.9%	68.8% – 105.0%
Never heard of it	0	–	–	–	–
Ever used AIR					
Yes	108	67,640	82,596	81.9%	76.0% – 87.8%
No	13	4,405	5,069	86.9%	68.8% – 105.0%
Vaccinations are reported to AIR					
Yes	119	72,043	86,766	83.0%	77.6% – 88.4%
No	2	2	899	0.2%	-0.3% to 0.7%
Method of reporting to AIR					
Automatic upload from software	102	59,916	69,020	86.8%	81.8% – 91.9%
Manually entered onto AIR site	31	22,734	28,632	79.4%	67.2% – 91.6%
Fax	1	2,187	2,592	84.4%	N/A
Post	0	–	–	0.0%	–
Sent through secure email	0	–	–	0.0%	–
Provide patients with record and ask that their GP upload it	0	–	–	0.0%	–
Don't know	0	–	–	0.0%	–
Other	1	4,329	0	92.5%	N/A
Method of reporting					
Automated upload (does not manually upload to AIR)	88	49,309	58,134	84.8%	79.0% – 90.6%
Manual entry to AIR site (does not automatically upload)	17	12,127	17,746	68.3%	49.2% – 87.5%
Automated upload and AIR site	14	10,607	10,886	97.4%	95.3% – 99.5%

Characteristics	Number of respondents	Number of vaccinations in AIR	Number of vaccinations administered	Proportion administered	95% CI
Other method only	0	–	–	–	–
Number of reporting methods used					
1	113	54,920	68,607	80.1%	73.7% – 86.4%
2	16	17,123	18,159	94.3%	91.5% – 97.1%
3	0	0	0	0.0%	–
Identifying patient on AIR site					
Patient's name	11	6,770	11,854	57.1%	28.3% – 85.9%
Patient's Medicare number	15	11,491	17,027	67.5%	45.3% – 89.7%
Patient's date of birth	9	6,386	11,383	56.1%	23.4% – 88.8%
Patient's address	0	–	–	–	–
Other	0	–	–	–	–
Person who uploads data to AIR					
No one, it is automated	31	18,276	20,435	89.4%	81.2% – 97.7%
The pharmacist who administers the vaccine	82	49,099	60,856	80.7%	73.6% – 87.7%
A pharmacist, but not always the administrating pharmacist	27	25,310	28,311	89.4%	83.5% – 95.3%
Pharmacy assistant	10	6,415	10,166	63.1%	32.2% – 94.0%
Dispensing technician	24	17,510	21,111	82.9%	71.7% – 94.2%
Don’t know	0	–	–	–	–
Other	4	3,815	4,360	87.5%	82.6% – 92.4%
When are vaccination encounters reported					
At the time of or immediately after administration	83	46,557	53,239	87.4%	82.2% – 92.7%
Batch reported	29	17,228	24,150	71.3%	56.4% – 86.3%
Once a day	16	8,691	13,582	64.0%	41.0% – 87.0%
Once a week	4	1,355	3,050	44.4%	-4.8% – 93.6%
Once a month	2	1,293	1,501	86.1%	84.8% – 87.5%
Other	7	5,889	6,017	97.9%	95.1% – 100.7%
Other	7	8,258	9,377	88.1%	75.8% – 100.4%
How many vaccines are reported					
All of them	107	64,541	73,240	88.1%	83.7% – 92.6%
Most of them	11	7,429	13,098	56.7%	29.5% – 83.9%
Some of them	1	73	428	17.1%	N/A
Few of them	0	0	0	0.0%	–
Changed reporting practices in past year					
Increased reporting	28	20,395	25,073	81.3%	70.7% – 92.0%

Characteristics	Number of respondents	Number of vaccinations in AIR	Number of vaccinations administered	Proportion administered	95% CI
Decreased reporting	1	73	428	17.1%	N/A
No changed	90	51,445	61,622	83.5%	77.0% – 89.9%
Stopped reporting over time	1	2	408	0.5%	N/A
Never reported	0	–	–	–	–
Don’t know	1	130	134	97.0%	N/A
Independent providers					
Independent pharmacists conduct vaccination clinics					
Yes	21	21,686	27,200	79.7%	64.6% – 94.8%
No	100	50,359	60,465	83.3%	77.5% – 89.1%
Don't know	0	–	–	–	–
Type of provider					
Nurse immuniser	17	20,801	22,714	91.6%	83.7% – 99.4%
Nurse practitioner	2	792	792	100.0%	N/A
General practitioner	2	694	4,297	16.2%	-60.7% – 93.0%
Midwife	0	0	0	0.0%	–
Pharmacist who does not otherwise work in the pharmacy	2	797	798	99.9%	99.6% – 100.1%
Don’t know	0	–	–	–	–
Other	0	–	–	–	–
Pharmacy keeps a record of vaccinations given by independent provider					
Yes, always	16	16,092	20,801	77.4%	56.8% – 97.9%
Yes, sometimes	1	1,212	1,215	99.8%	N/A
No	2	2,716	3,341	81.3%	51.5% – 111.1%
Don't know	0	–	–	–	–
Other	1	1,578	1,755	89.9%	N/A
Vaccination encounters reported by					
Independent provider	11	8,424	13,064	64.5%	29.6% – 99.3%
Pharmacy	7	11,960	12,425	96.3%	92.8% – 99.7%
Neither (i.e. not reported)	1	2	408	0.5%	N/A
Other	1	1,212	1,215	99.8%	N/A
Impact of the COVID-19 pharmacist-administered vaccination services					
Impact of COVID-19 on expected demand for vaccines					
Increased	119	71,914	87,043	82.6%	77.1% – 88.1%
Decreased	1	0	491	0.0%	N/A
Unchanged	1	131	131	100.0%	N/A

Characteristics	Number of respondents	Number of vaccinations in AIR	Number of vaccinations administered	Proportion administered	95% CI
Impact of COVID-19 on ability to administer vaccines					
Yes	36	15,950	18,836	84.7%	74.9% – 94.4%
No	85	56,095	68,829	81.5%	74.8% – 88.2%
Impact of COVID-19 on ability to report vaccinations to AIR					
Yes, increased	0	–	–	–	–
Yes, decreased	4	1,284	2,823	45.5%	-5.2% – 96.2%
No change	117	70,761	84,842	83.4%	78.0% – 88.8%
Reporting of vaccine encounters					
Respondent claims all vaccine doses have been reported to AIR					
Yes	111	69,335	80,964	85.6%	80.6% – 90.7%
No	5	252	2,638	9.6%	-16.0% – 35.1%
Unsure	5	2,458	4,063	60.5%	22.1% – 98.9%

'N/A' indicates a 95% CI could not be calculated as there was no variation in the proportion (i.e. a standard error could not be calculated); "–" indicates that a statistic could not be calculated due to the absence of data.

Appendix 7: Number of vaccinating pharmacies registered with AIR, 2016 to 2020

Year	Status	Jurisdiction								
		ACT	NSW	NT	QLD	SA	TAS	VIC	WA	Total
2016	Registered	0	0	0	0	0	0	0	0	0
	Reported	0	0	0	0	0	0	0	0	0
	%	–	–	–	–	–	–	–	–	–
2017	Registered	0	12	0	0	1	13	185	7	218
	Reported	0	0	0	0	0	1	26	0	27
	%	–	0.0%	–	–	0.0%	7.7%	14.1%	0.0%	12.4%
2018	Registered	10	78	2	96	128	48	331	200	893
	Reported	4	9	1	17	34	10	144	54	273
	%	40.0%	11.5%	50.0%	17.7%	26.6%	20.8%	43.5%	27.0%	30.6%
2019	Registered	41	746	15	359	215	101	458	447	2,382
	Reported	16	473	9	228	131	68	308	325	1,558
	%	39.0%	63.4%	60.0%	63.5%	60.9%	67.3%	67.2%	72.7%	65.4%
2020	Registered	60	1,051	22	557	289	130	616	550	3,275
	Reported	51	807	14	430	205	89	444	443	2,483
	%	85.0%	76.8%	63.6%	77.2%	70.9%	68.5%	72.1%	80.5%	75.8%

Appendix 8: Number of pend vaccination encounters submitted by pharmacists in April and May 2020, by pend category

Pend category	Pend Description	Number of pends	% of total pends
1	Medicare number invalid	4	0.01%
6	Invalid character in given name	54	0.08%
10	Individual's Medicare number or full name and date or birth not supplied	2	0.00%
12	Invalid character in surname	27	0.04%
15	Address details invalid or incomplete	1	0.00%
16	Invalid postcode	70	0.10%
17	Invalid character in address	6	0.01%
24	Postcode/locality incompatible	259	0.37%
33	The vaccine and/or dose number administered not supplied	37	0.05%
53	The date of immunisation after the end date recorded on the individual's registration	1,786	2.53%
80	Individual not identified	64,596	91.56%
100	Antigen has been administered under the minimum required age	2	0.00%
101	Period between doses of the same antigen is less than the minimum time required	2,618	3.71%
102	Duplicate antigen dose – same provider	211	0.30%
103	Duplicate antigen dose – different provider	113	0.16%
104	Administered within minimum time required between doses – different provider	743	1.05%
105	Dose greater than maximum allowable dose	10	0.01%
106	Higher dose already administered – same provider	5	0.01%
109	Higher dose already administered – different provider	3	0.00%
111	Different provider: Period between doses less than 6 months	1	0.00%
	Total pends	70,548	100%

Appendix 9: Study results by jurisdiction

Data are not provided separately for the Australian Capital Territory and the Northern Territory as only 1 response each was received.

New South Wales

Characteristics	All survey respondents				Vaccination encounters analysis			
	No.	%	95% CI	N*	In Air	Administered		
					No.	No.	%	95% CI
All survey respondents in jurisdiction	**54**	**22.2%**	**17.4% – 27.9%**	**23**	**18,313**	**20,899**	**87.6%**	**77.6% – 97.7%**
Demographics								
Age of respondent	54							
18-29 years	14	25.9%	15.7% – 39.6%	2	2,783	3,012	92.4%	84.2% – 100.6%
30-39 years	13	24.1%	14.3% – 37.7%	5	5,557	5,668	98.0%	93.2% – 102.9%
40-49 years	13	24.1%	14.3% – 37.7%	5	2,319	2,471	93.8%	85.9% – 101.8%
50-59 years	9	16.7%	8.7% – 29.5%	7	2,868	4,237	67.7%	35.5% – 99.9%
60 years or older	5	9.3%	3.8% – 20.9%	4	4,786	5,511	86.8%	59.1% – 114.6%
Gender of respondent	54							
Male	28	51.9%	38.3% – 65.1%	14	7,838	9,553	82.0%	62.7% – 101.4%
Female	26	48.1%	34.9% – 61.7%	9	10,475	11,346	92.3%	87.4% – 97.2%
Geographical location	54							
Major city	30	55.6%	41.8% – 68.5%	12	4,929	6,787	72.6%	49.4% – 95.8%
Regional	22	40.7%	28.2% – 54.6%	10	13,181	13,907	94.8%	91.8% – 97.8%
Remote	2	3.7%	0.9% – 14.2%	1	203	205	99.0%	N/A
Ownership status	54							
Owner	4	7.4%	2.7% – 18.6%	3	921	1,044	88.2%	74.8% – 101.7%
Employee	25	46.3%	33.2% – 60.0%	6	8,505	8,910	95.5%	90.9% – 100.0%
Both	25	46.3%	33.2% – 60.0%	14	8,887	10,945	81.2%	63.3% – 99.1%
Affiliation	54							
Banner group	39	72.2%	58.4% – 82.8%	17	16,570	19,028	87.1%	74.4% – 99.8%
Buying group	5	9.3%	3.8% – 20.9%	2	333	429	77.6%	23.3% – 131.9%
Friendly society	0	0.0%	–	0	0	0	–	–
Independently owned	10	18.5%	10.1% – 31.6%	4	1,410	1,442	97.8%	95.8% – 99.7%
Other	0	0.0%	–	0	0	0	–	–
Independent providers conduct vaccination clinics	50							
Yes	7	14.0%	6.6% – 27.1%	6	11,843	12,600	94.0%	90.2% – 97.8%

Characteristics	All survey respondents			Vaccination encounters analysis				
	No.	%	95% CI	N*	In Air	Administered		
					No.	No.	%	95% CI
No	42	86.0%	72.9% – 93.4%	17	6,470	8,299	78.0%	59.6% – 96.3%
Don't know	0	0.0%	–	0	0	0	–	–
Pharmacists' recording practices								
Patient's Medicare number is recorded in pharmacy records	54							
Yes, always	40	74.1%	60.4% – 84.3%	18	16,310	18,887	86.4%	73.9% – 98.8%
Yes, sometimes	14	25.9%	15.7% – 39.6%	5	2,003	2,012	99.6%	98.2% – 100.9%
No	0	0.0%	–	0	0	0	–	–
Method of recording vaccination encounters	54							
Pharmacy software	48	88.9%	76.9% – 95.1%	23	18,313	20,899	87.6%	77.1% – 98.2%
Paper-based records	47	87.0%	74.7% – 93.8%	19	17,546	18,674	94.0%	90.6% – 97.3%
Patient-held records	24	44.4%	31.5% – 58.2%	12	10,040	11,319	88.7%	77.6% – 99.8%
Other	3	5.6%	1.7% – 16.4%	2	907	1,017	89.2%	78.9% – 99.4%
Pharmacists' reporting practices								
Familiarity with AIR	54							
Regular use	35	64.8%	50.8% – 76.6%	17	13,093	15,666	83.6%	69.9% – 97.2%
Occasional use	11	20.4%	11.4% – 33.6%	6	5,220	5,233	99.8%	99.3% – 100.2%
Aware but never used	8	14.8%	7.4% – 27.4%	0	0	0	–	–
Never heard of it	0	0.0%	–	0	0	0	–	–
Method of reporting to AIR	48							
Automated upload only	26	54.2%	39.6% – 68.0%	18	14,500	16,967	85.5%	72.5% – 98.5%
Manual entry to AIR site only	16	33.3%	21.2% – 48.2%	3	1,116	1,235	90.4%	82.8% – 97.9%
Automated upload and AIR site	6	12.5%	5.6% – 25.8%	2	2,697	2,697	100.0%	N/A
Other method only	0	0.0%	–	0	0	0	–	–
When are vaccination encounters reported	47							
At the time of or immediately after administration	33	70.2%	55.2% – 81.9%	17	10,151	12,353	82.2%	66.8% – 97.6%
Batch reported	10	21.3%	11.6% – 35.8%	3	1,906	1,931	98.7%	96.6% – 100.8%
Other	4	8.5%	3.1% – 21.2%	3	6,256	6,615	94.6%	89.8% – 99.3%

* N = number of survey respondents who provided data on the number of doses administered and their immunisation provider number

'N/A' indicates a 95% CI could not be calculated as there was no variation in the proportion (i.e. a standard error could not be calculated); "–" indicates that a statistic could not be calculated due to the absence of data.

Queensland

Characteristics	All survey respondents				Vaccination encounters analysis			
	No.	%	95% CI	N*	In Air	Administered		
					No.	No.	%	95% CI
All survey respondents in jurisdiction	**26**	**10.7%**	**7.4% – 15.3%**	**10**	**6,598**	**8,616**	**76.6%**	**55.6% – 97.5%**
Demographics								
Age of respondent	26							
18-29 years	13	50.0%	30.5% – 69.5%	5	4,542	4,923	92.3%	85.3% – 99.2%
30-39 years	5	19.2%	7.7% – 40.4%	2	963	1,250	77.0%	4.8% – 149.2%
40-49 years	3	11.5%	3.5% – 32.1%	0	0	0	0.0%	–
50-59 years	3	11.5%	3.5% – 32.1%	2	93	1,243	7.5%	-2.8% – 17.8%
60 years or older	2	7.7%	1.7% – 28.1%	1	1,000	1,200	83.3%	N/A
Gender of respondent	26							
Male	9	34.6%	18.2% – 55.7%	3	1,123	2,690	41.7%	-18.0% – 101.5%
Female	17	65.4%	44.3% – 81.8%	7	5,475	5,926	92.4%	87.2% – 97.6%
Geographical location	26							
Major city	15	57.7%	37.2% – 75.8%	5	5,714	6,365	89.8%	83.4% – 96.1%
Regional	10	38.5%	21.1% – 59.3%	5	884	2,251	39.3%	-9.9% – 88.4%
Remote	1	3.8%	0.5% – 25.4%	0	0	0	0.0%	–
Ownership status	26							
Owner	1	3.8%	0.5% – 25.4%	1	33	250	13.2%	N/A
Employee	21	80.8%	59.6% – 92.3%	9	6,565	8,366	78.5%	54.3% – 102.7%
Both	4	15.4%	5.5% – 36.3%	0	0	0	0.0%	–
Affiliation	26							
Banner group	23	88.5%	67.9% – 96.5%	9	6,565	8,366	78.5%	54.3% – 102.7%
Buying group	2	7.7%	1.7% – 28.1%	1	33	250	13.2%	N/A
Friendly society	0	0.0%	–	0	0	0	0.0%	–
Independently owned	1	3.8%	0.5% – 25.4%	0	0	0	0.0%	–
Other	0	0.0%	–	0	0	0	0.0%	–
Independent providers conduct vaccination clinics	24							
Yes	2	8.3%	1.9% – 30.2%	1	1,130	1,130	100.0%	N/A
No	22	91.7%	69.8% – 98.1%	9	5,468	7,486	73.0%	46.9% – 99.1%
Don't know	0	0.0%	–	0	0	0	0.0%	–
Pharmacists' recording practices								
Patient's Medicare number is recorded in pharmacy records	26							

Characteristics	All survey respondents			Vaccination encounters analysis				
	No.	%	95% CI	N*	In Air	Administered		
					No.	No.	%	95% CI
Yes, always	16	61.5%	40.7% – 78.9%	6	4,403	5,179	85.0%	67.9% – 102.2%
Yes, sometimes	10	38.5%	21.1% – 59.3%	4	2,195	3,437	63.9%	8.1% – 119.7%
No	0	0.0%	–	0	0	0	0.0%	–
Method of recording vaccination encounters	26							
Pharmacy software	26	100.0%	N/A	10	6,598	8,616	76.6%	52.6% – 100.5%
Paper-based records	15	57.7%	37.2% – 75.8%	8	5,823	7,749	75.1%	46.8% – 103.5%
Patient-held records	11	42.3%	24.2% – 62.8%	4	3,400	3,976	85.5%	60.3% – 110.7%
Other	0	0.0%	–	0	0	0	0.0%	–
Pharmacists' reporting practices								
Familiarity with AIR	26							
Regular use	13	50.0%	30.5% – 69.5%	7	4,265	6,083	70.1%	37.4% – 102.9%
Occasional use	6	23.1%	10.1% – 44.4%	1	1,000	1,200	83.3%	N/A
Aware but never used	7	26.9%	12.7% – 48.3%	2	1,333	1,333	100.0%	N/A
Never heard of it	0	0.0%	–	0	0	0	0.0%	–
Method of reporting to AIR	22							
Automated upload only	12	54.5%	32.5% – 74.9%	7	4,341	6,197	70.1%	37.5% – 102.6%
Manual entry to AIR site only	8	36.4%	18.2% – 59.5%	3	2,257	2,419	93.3%	86.9% – 99.7%
Automated upload and AIR site	1	4.5%	0.5% – 29.6%	0	0	0	0.0%	–
Other method only	1	4.5%	0.5% – 29.6%	0	0	0	0.0%	–
When are vaccination encounters reported	22							
At the time of or immediately after administration	15	68.2%	44.7% – 85.0%	7	4,505	6,236	72.2%	42.0% – 102.5%
Batch reported	6	27.3%	11.9% – 51.0%	3	2,093	2,380	87.9%	46.6% – 129.2%
Other	1	4.5%	0.5% – 29.6%	0	0	0	0.0%	–

* N = number of survey respondents who provided data on the number of doses administered and their immunisation provider number

'N/A' indicates a 95% CI could not be calculated as there was no variation in the proportion (i.e. a standard error could not be calculated); "–" indicates that a statistic could not be calculated due to the absence of data.

South Australia

Characteristics	All survey respondents			Vaccination encounters analysis				
	No.	%	95% CI	N*	In Air	Administered		
					No.	No.	%	95% CI
All survey respondents in jurisdiction	**18**	**7.4%**	**4.7% – 11.5%**	**12**	**4,626**	**6,278**	**73.7%**	**52.0% – 95.4%**
Demographics								
Age of respondent	18							
18-29 years	3	16.7%	4.8% – 44.1%	1	0	458	0.0%	N/A
30-39 years	4	22.2%	7.7% – 49.5%	3	891	1,476	60.4%	-6.7% – 127.4%
40-49 years	4	22.2%	7.7% – 49.5%	3	1,801	1,807	99.7%	99.4% – 100.0%
50-59 years	6	33.3%	14.4% – 59.7%	5	1,934	2,537	76.2%	48.8% – 103.7%
60 years or older	1	5.6%	0.6% – 35.5%	0	0	0	0.0%	–
Gender of respondent	18							
Male	9	50.0%	26.4% – 73.6%	7	2,112	2,848	74.2%	38.6% – 109.7%
Female	9	50.0%	26.4% – 73.6%	5	2,514	3,430	73.3%	36.5% – 110.1%
Geographical location	18							
Major city	10	55.6%	30.9% – 77.8%	6	1,187	2,287	51.9%	3.6% – 100.2%
Regional	8	44.4%	22.2% – 69.1%	6	3,439	3,991	86.2%	69.9% – 102.5%
Remote	0	0.0%	–	0	0	0	0.0%	–
Ownership status	18							
Owner	0	0.0%	–	0	0	0	0.0%	–
Employee	7	38.9%	18.2% – 64.5%	3	534	1,235	43.2%	-20.1% – 106.6%
Both	11	61.1%	35.5% – 81.8%	9	4,092	5,043	81.1%	57.1% – 105.2%
Affiliation	18							
Banner group	17	94.4%	64.5% – 99.4%	12	4,626	6,278	73.7%	49.6% – 97.8%
Buying group	0	0.0%	–	0	0	0	0.0%	–
Friendly society	0	0.0%	–	0	0	0	0.0%	–
Independently owned	1	5.6%	0.6% – 35.5%	0	0	0	0.0%	–
Other	0	0.0%	–	0	0	0	0.0%	–
Independent providers conduct vaccination clinics	18							
Yes	4	22.2%	7.7% – 49.5%	3	1,539	1,992	77.3%	48.5% – 106.0%
No	14	77.8%	50.5% – 92.3%	9	3,087	4,286	72.0%	39.3% – 104.8%
Don't know	0	0.0%	–	0	0	0	0.0%	–
Pharmacists' recording practices								
Patient's Medicare number is recorded in pharmacy records	18							

Characteristics	All survey respondents			Vaccination encounters analysis				
	No.	%	95% CI	N*	In Air	Administered		
					No.	No.	%	95% CI
Yes, always	13	72.2%	45.3% – 89.1%	10	3,879	4,587	84.6%	60.5% – 108.6%
Yes, sometimes	4	22.2%	7.7% – 49.5%	1	747	1,200	62.3%	N/A
No	1	5.6%	0.6% – 35.5%	1	0	491	0.0%	N/A
Method of recording vaccination encounters	18							
Pharmacy software	17	94.4%	64.5% – 99.4%	12	4,626	6,278	73.7%	49.6% – 97.8%
Paper-based records	14	77.8%	50.5% – 92.3%	10	3,238	4,885	66.3%	38.3% – 94.2%
Patient-held records	6	33.3%	14.4% – 59.7%	4	1,694	2,390	70.9%	43.3% – 98.5%
Other	0	0.0%	–	0	0	0	0.0%	–
Pharmacists' reporting practices								
Familiarity with AIR	18							
Regular use	9	50.0%	26.4% – 73.6%	6	3,830	4,289	89.3%	72.7% – 105.9%
Occasional use	5	27.8%	10.9% – 54.7%	4	774	1,360	56.9%	2.1% – 111.7%
Aware but never used	4	22.2%	7.7% – 49.5%	2	22	629	3.5%	-9.1% – 16.1%
Never heard of it	0	0.0%	–	0	0	0	0.0%	–
Method of reporting to AIR	16							
Automated upload only	13	81.3%	51.4% – 94.7%	11	4,626	5,787	79.9%	58.4% – 101.5%
Manual entry to AIR site only	2	12.5%	2.6% – 43.0%	0	0	0	0.0%	–
Automated upload and AIR site	1	6.3%	0.7% – 39.3%	0	0	0	0.0%	–
Other method only	0	0.0%	–	0	0	0	0.0%	–
When are vaccination encounters reported	16							
At the time of or immediately after administration	12	75.0%	45.7% – 91.4%	8	3,735	4,344	86.0%	67.2% – 104.7%
Batch reported	3	18.8%	5.3% – 48.6%	2	379	837	45.3%	-65.6% – 156.2%
Other	1	6.3%	0.7% – 39.3%	1	512	606	84.5%	N/A

*N = number of survey respondents who provided data on the number of doses administered and their immunisation provider number

'N/A' indicates a 95% CI could not be calculated as there was no variation in the proportion (i.e. a standard error could not be calculated); "–" indicates that a statistic could not be calculated due to the absence of data.

Tasmania

Characteristics	All survey respondents			Vaccination encounters analysis				
	No.	%	95% CI	N*	In Air	Administered		
					No.	No.	%	95% CI
All survey respondents in jurisdiction	**38**	**15.6%**	**11.6% – 20.8%**	**17**	**6,793**	**11,025**	**61.6%**	**39.7% – 83.5%**
Demographics								
Age of respondent	38							
18-29 years	6	15.8%	7.0% – 31.9%	4	139	3,739	3.7%	-19.4% – 26.9%
30-39 years	16	42.1%	27.0% – 58.8%	6	3,169	3,281	96.6%	92.7% – 100.5%
40-49 years	6	15.8%	7.0% – 31.9%	5	3,342	3,857	86.6%	69.2% – 104.1%
50-59 years	4	10.5%	3.8% – 25.8%	2	143	148	96.6%	77.8% – 115.5%
60 years or older	6	15.8%	7.0% – 31.9%	0	0	0	0.0%	–
Gender of respondent	38							
Male	11	28.9%	16.3% – 45.9%	6	2,188	2,777	78.8%	65.2% – 92.3%
Female	27	71.1%	54.1% – 83.7%	11	4,605	8,248	55.8%	22.9% – 88.8%
Geographical location	38							
Major city	7	18.4%	8.7% – 34.8%	2	1,804	2,251	80.1%	41.6% – 118.7%
Regional	27	71.1%	54.1% – 83.7%	12	4,769	8,544	55.8%	25.3% – 86.4%
Remote	4	10.5%	3.8% – 25.8%	3	220	230	95.7%	85.4% – 105.9%
Ownership status	38							
Owner	1	2.6%	0.3% – 17.8%	1	973	978	99.5%	N/A
Employee	29	76.3%	59.5% – 87.6%	10	3,492	7,266	48.1%	14.3% – 81.8%
Both	8	21.1%	10.5% – 37.6%	6	2,328	2,781	83.7%	66.6% – 100.9%
Affiliation	38							
Banner group	26	68.4%	51.4% – 81.6%	11	5,230	9,014	58.0%	26.2% – 89.8%
Buying group	1	2.6%	0.3% – 17.8%	1	197	203	97.0%	N/A
Friendly society	0	0.0%	–	0	0	0	0.0%	–
Independently owned	11	28.9%	16.3% – 45.9%	5	1,366	1,808	75.6%	57.0% – 94.1%
Other	0	0.0%	–	0	0	0	0.0%	–
Independent providers conduct vaccination clinics	38							
Yes	7	18.4%	8.7% – 34.8%	2	973	4,578	21.3%	-65.2% – 107.7%
No	31	81.6%	65.2% – 91.3%	15	5,820	6,447	90.3%	82.5% – 98.1%
Don't know	0	0.0%	–	0	0	0	0.0%	–
Pharmacists' recording practices								
Patient's Medicare number is recorded in pharmacy records	38							

Characteristics	All survey respondents			Vaccination encounters analysis				
	No.	%	95% CI	N*	In Air	Administered		
					No.	No.	%	95% CI
Yes, always	26	68.4%	51.4% – 81.6%	9	2,777	2,951	94.1%	89.8% – 98.5%
Yes, sometimes	11	28.9%	16.3% – 45.9%	7	3,984	8,042	49.5%	9.6% – 89.5%
No	1	2.6%	0.3% – 17.8%	1	32	32	100.0%	N/A
Method of recording vaccination encounters	38							
Pharmacy software	37	97.4%	99.7%	17	6,793	11,025	61.6%	38.2% – 85.1%
Paper-based records	26	68.4%	81.6%	14	5,019	8,815	56.9%	29.0% – 84.8%
Patient-held records	17	44.7%	61.3%	9	2,598	6,297	41.3%	5.4% – 77.1%
Other	2	5.3%	19.8%	0	0	0	0.0%	–
Pharmacists' reporting practices								
Familiarity with AIR	38							
Regular use	23	60.5%	43.7% – 75.2%	10	3,804	7,940	47.9%	16.0% – 79.8%
Occasional use	10	26.3%	14.4% – 43.2%	5	1,083	1,163	93.1%	86.6% – 99.6%
Aware but never used	5	13.2%	5.4% – 28.9%	2	1,906	1,922	99.2%	97.7% – 100.7%
Never heard of it	0	0.0%	N/A	0	0	0	0.0%	–
Method of reporting to AIR	38							
Automated upload only	26	68.4%	51.4% – 81.6%	12	5,047	5,618	89.8%	80.5% – 99.2%
Manual entry to AIR site only	5	13.2%	5.4% – 28.9%	1	0	3,600	0.0%	N/A
Automated upload and AIR site	7	18.4%	8.7% – 34.8%	4	1,746	1,807	96.6%	91.8% – 101.4%
Other method only	0	0.0%	–	0	0	0	0.0%	–
When are vaccination encounters reported	38							
At the time of or immediately after administration	25	65.8%	48.8% – 79.5%	10	4,617	5,178	89.2%	78.5% – 99.8%
Batch reported	11	28.9%	16.3% – 45.9%	5	1,281	4,891	26.2%	-20.2% – 72.6%
Other	2	5.3%	1.2% – 19.8%	2	895	956	93.6%	86.9% – 100.3%

* N = number of survey respondents who provided data on the number of doses administered and their immunisation provider number

'N/A' indicates a 95% CI could not be calculated as there was no variation in the proportion (i.e. a standard error could not be calculated); "–" indicates that a statistic could not be calculated due to the absence of data.

Victoria

Characteristics	All survey respondents				Vaccination encounters analysis			
	No.	%	95% CI	N*	In Air	Administered		
					No.	No.	%	95% CI
All survey respondents in jurisdiction	**90**	**37.0%**	**31.2% – 43.3%**	**49**	**27,610**	**32,375**	**85.3%**	**77.5% – 93.1%**
Demographics								
Age of respondent	90							
18-29 years	15	16.7%	10.2% – 26.0%	5	3,454	3,956	87.3%	82.3% – 92.3%
30-39 years	29	32.2%	23.2% – 42.7%	17	9,681	11,564	83.7%	67.8% – 99.6%
40-49 years	22	24.4%	16.5% – 34.6%	14	6,685	8,104	82.5%	67.9% – 97.1%
50-59 years	18	20.0%	12.9% – 29.7%	11	5,859	6,813	86.0%	66.5% – 105.5%
60 years or older	6	6.7%	3.0% – 14.2%	2	1,931	1,938	99.6%	98.8% – 100.5%
Gender of respondent	90							
Male	40	44.4%	34.4% – 55.0%	22	9,451	11,473	82.4%	67.6% – 97.1%
Female	50	55.6%	45.0% – 65.6%	27	18,159	20,902	86.9%	77.8% – 95.9%
Geographical location	90							
Major city	51	56.7%	46.1% – 66.7%	23	14,542	16,574	87.7%	80.2% – 95.2%
Regional	37	41.1%	31.3% – 51.7%	24	12,963	15,355	84.4%	70.7% – 98.2%
Remote	2	2.2%	0.5% – 8.7%	2	105	446	23.5%	-61.8% – 108.8%
Ownership status	90							
Owner	8	8.9%	4.4% – 17.0%	5	4,624	4,974	93.0%	67.6% – 118.3%
Employee	41	45.6%	35.4% – 56.1%	22	8,885	11,308	78.6%	64.3% – 92.8%
Both	41	45.6%	35.4% – 56.1%	22	14,101	16,093	87.6%	77.7% – 97.5%
Affiliation	90							
Banner group	65	72.2%	61.9% – 80.6%	34	21,636	25,669	84.3%	74.4% – 94.2%
Buying group	7	7.8%	3.7% – 15.6%	3	1,566	1,575	99.4%	98.9% – 100.0%
Friendly society	2	2.2%	0.5% – 8.7%	2	570	570	100.0%	N/A
Independently owned	16	17.8%	11.1% – 27.3%	10	3,838	4,561	84.1%	66.3% – 102.0%
Other	0	0.0%	–	0	0	0	0.0%	–
Independent providers conduct vaccination clinics	82							
Yes	13	15.9%	9.3% – 25.7%	8	5,718	6,408	89.2%	71.2% – 107.3%
No	69	84.1%	74.3% – 90.7%	41	21,892	25,967	84.3%	75.4% – 93.2%
Don't know	0	0.0%	–	0	0	0	0.0%	–
Pharmacists' recording practices								
Patient's Medicare number is recorded in pharmacy records	90							

Characteristics	All survey respondents			Vaccination encounters analysis				
	No.	%	95% CI	N*	In Air	Administered		
					No.	No.	%	95% CI
Yes, always	78	86.7%	77.8% – 92.4%	41	24,275	28,301	85.8%	77.2% – 94.4%
Yes, sometimes	12	13.3%	7.6% – 22.2%	8	3,335	4,074	81.9%	60.2% – 103.5%
No	0	0.0%	–	0	0	0	0.0%	–
Method of recording vaccination encounters	90							
Pharmacy software	83	92.2%	84.4% – 96.3%	48	27,501	32,264	85.2%	77.2% – 93.3%
Paper-based records	57	63.3%	52.7% – 72.8%	30	15,239	18,709	81.5%	69.5% – 93.4%
Patient-held records	33	36.7%	27.2% – 47.3%	20	14,443	16,167	89.3%	80.4% – 98.2%
Other	7	7.8%	3.7% – 15.6%	4	2,307	2,928	78.8%	44.8% – 112.8%
Pharmacists' reporting practices								
Familiarity with AIR	87							
Regular use	54	62.1%	51.3% – 71.8%	32	21,881	24,320	90.0%	82.5% – 97.4%
Occasional use	19	21.8%	14.3% – 31.9%	10	4,585	6,870	66.7%	40.3% – 93.2%
Aware but never used	14	16.1%	9.7% – 25.6%	7	1,144	1,185	96.5%	92.3% – 100.8%
Never heard of it	0	0.0%	–	0	0	0	0.0%	–
Method of reporting to AIR	82							
Automated upload only	45	54.9%	43.8% – 65.5%	35	18,363	21,124	86.9%	77.5% – 96.3%
Manual entry to AIR site only	25	30.5%	21.3% – 41.5%	7	4,307	5,729	75.2%	52.9% – 97.5%
Automated upload and AIR site	11	13.4%	7.5% – 22.9%	6	4,938	5,114	96.6%	93.1% – 100.1%
Other method only	1	1.2%	0.2% – 8.5%	0	0	0	0.0%	–
When are vaccination encounters reported	81							
At the time of or immediately after administration	52	64.2%	53.0% – 74.0%	34	17,381	18,635	93.3%	86.3% – 100.3%
Batch reported	28	34.6%	24.9% – 45.8%	13	9,632	12,132	79.4%	62.2% – 96.6%
Other	1	1.2%	0.2% – 8.6%	1	595	1,200	49.6%	N/A

* N = number of survey respondents who provided data on the number of doses administered and their immunisation provider number

'N/A' indicates a 95% CI could not be calculated as there was no variation in the proportion (i.e. a standard error could not be calculated); "–" indicates that a statistic could not be calculated due to the absence of data.

Western Australia

Characteristics	All survey respondents				Vaccination encounters analysis			
	No.	%	95% CI	N*	In Air	Administered		
					No.	No.	%	95% CI
All survey respondents in jurisdiction	**15**	**6.2%**	**3.7% – 10.0%**	**10**	**8,105**	**8,472**	**95.7%**	**93.4% – 98.0%**
Demographics								
Age of respondent	15							
18-29 years	1	6.7%	0.7% – 41.6%	1	2,004	2,169	92.4%	N/A
30-39 years	8	53.3%	26.6% – 78.3%	6	5,326	5,519	96.5%	93.0% – 100.0%
40-49 years	4	26.7%	9.0% – 57.1%	1	483	492	98.2%	N/A
50-59 years	0	0.0%	–	0	0	0	0.0%	–
60 years or older	2	13.3%	2.8% – 45.4%	2	292	292	100.0%	N/A
Gender of respondent	15							
Male	6	40.0%	17.1% – 68.2%	4	2,872	2,979	96.4%	91.1% – 101.8%
Female	9	60.0%	31.8% – 82.9%	6	5,233	5,493	95.3%	92.2% – 98.3%
Geographical location	15							
Major city	8	53.3%	26.6% – 78.3%	5	6,293	6,618	95.1%	91.7% – 98.5%
Regional	4	26.7%	9.0% – 57.1%	2	944	944	100.0%	N/A
Remote	3	20.0%	5.6% – 51.2%	3	868	910	95.4%	87.4% – 103.4%
Ownership status	15							
Owner	1	6.7%	0.7% – 41.6%	0	0	0	0.0%	–
Employee	9	60.0%	31.8% – 82.9%	6	6,074	6,399	94.9%	92.0% – 97.9%
Both	5	33.3%	12.9% – 62.8%	4	2,031	2,073	98.0%	92.7% – 103.2%
Affiliation	15							
Banner group	11	73.3%	42.9% – 91.0%	7	7,437	7,762	95.8%	92.8% – 98.8%
Buying group	1	6.7%	0.7% – 41.6%	1	198	198	100.0%	N/A
Friendly society	0	0.0%	–	0	0	0	0.0%	–
Independently owned	2	13.3%	2.8% – 45.4%	1	94	94	100.0%	N/A
Other	1	6.7%	0.7% – 41.6%	1	376	418	90.0%	N/A
Independent providers conduct vaccination clinics	15							
Yes	1	6.7%	0.7% – 41.6%	1	483	492	98.2%	N/A
No	14	93.3%	58.4% – 99.3%	9	7,622	7,980	95.5%	92.7% – 98.3%
Don't know	0	0.0%	–	0	0	0	0.0%	–
Pharmacists' recording practices								
Patient's Medicare number is recorded in pharmacy records	15							

Characteristics	All survey respondents			Vaccination encounters analysis				
	No.	%	95% CI	N*	In Air	Administered		
					No.	No.	%	95% CI
Yes, always	14	93.3%	58.4% – 99.3%	10	8,105	8,472	95.7%	93.0% – 98.3%
Yes, sometimes	0	0.0%	–	0	0	0	0.0%	–
No	1	6.7%	0.7% – 41.6%	0	0	0	0.0%	–
Method of recording vaccination encounters	15							
Pharmacy software	15	100.0%	–	10	8,105	8,472	95.7%	93.0% – 98.3%
Paper-based records	5	33.3%	12.9% – 62.8%	4	1,425	1,490	95.6%	91.1% – 100.1%
Patient-held records	5	33.3%	12.9% – 62.8%	5	2,371	2,436	97.3%	93.4% – 101.2%
Other	1	6.7%	0.7% – 41.6%	1	650	706	92.1%	N/A
Pharmacists' reporting practices								
Familiarity with AIR	15							
Regular use	13	86.7%	54.6% – 97.2%	9	7,455	7,766	96.0%	93.2% – 98.8%
Occasional use	2	13.3%	2.8% – 45.4%	1	650	706	92.1%	N/A
Aware but never used	0	0.0%	–	0	0	0	0.0%	–
Never heard of it	0	0.0%	–	0	0	0	0.0%	–
Method of reporting to AIR	15							
Automated upload only	6	40.0%	17.1% – 68.2%	5	2,432	2,441	99.6%	98.8% – 100.5%
Manual entry to AIR site only	5	33.3%	12.9% – 62.8%	3	4,447	4,763	93.4%	91.3% – 95.5%
Automated upload and AIR site	4	26.7%	9.0% – 57.1%	2	1,226	1,268	96.7%	86.0% – 107.4%
Other method only	0	0.0%	–	0	0	0	0.0%	–
When are vaccination encounters reported	15							
At the time of or immediately after administration	11	73.3%	42.9% – 91.0%	7	6,168	6,493	97.9%	91.3% – 104.4%
Batch reported	4	26.7%	9.0% – 57.1%	3	1,937	1,979	95.0%	92.3% – 97.7%
Other	0	0.0%	–	0	0	0	0.0%	–

* N = number of survey respondents who provided data on the number of doses administered and their immunisation provider number

'N/A' indicates a 95% CI could not be calculated as there was no variation in the proportion (i.e. a standard error could not be calculated); "–" indicates that a statistic could not be calculated due to the absence of data.

Number of pharmacists who administer NIP-funded vaccines

Jurisdiction	N	Gives NIP vaccines			Does not give NIP vaccines			Unsure		
		n	%	95% CI	n	%	95% CI	n	%	95% CI
ACT	1	1	100%	–	0	0%	–	0	0%	–
TAS	38	7	18.4%	8.7% – 34.8%	28	73.7%	56.8% – 85.6%	3	7.9%	2.4% – 22.8%
VIC	90	73	81.1%	71.5% – 88.0%	14	15.6%	9.3% – 24.8%	3	3.3%	1.1% – 10.0%
WA	15	11	73.3%	42.9% – 91.0%	3	20.0%	5.6% – 51.2%	1	6.7%	0.7% – 41.6%

Note: Response from the ACT was not included to protect identity. 3 respondents from NSW and 2 respondents from QLD also indicated that they administer NIP-funded vaccines; however, NIP-funded vaccines are not distributed to pharmacies in these states. NIP-funded vaccines are not available in TAS; however, state-funded MMR vaccination is available for certain age groups.