Surveillance of adverse events following immunisation, NSW, 2020

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Abstract: Aim: This report summarises spontaneous surveillance data for adverse events following immunisation (AEFI) in New South Wales (NSW) from 1 January 2020 to 31 December 2020. **Methods:** Analysis of de-identified data on all AEFI reported to the Therapeutic Goods Administration (TGA) for individuals from NSW. AEFI are defined as any untoward medical occurrence which follows immunisation; AEFI may be coincidental or may be caused by a vaccine(s), or during handling or administration. **Results:** There were 746 AEFI reported for vaccines administered from 1 January to 31 December 2020. Of all AEFI, 4.7% were reported in Aboriginal and Torres Strait Islander people. The overall AEFI reporting rate (9.1 per 100 000 population, 95% CI 8.5–9.8 per 100 000 population) in 2020 was not significantly different to the overall AEFI rate in 2019 (8.7 per 100 000 population, 95% confidence interval 8.0–9.3 per 100 000 population). Approximately 9% of AEFI were classified as serious in 2020, a decrease over 2019 (36%). The vast majority of reported events were of a non-serious nature, similar to previous years. Overall, reported adverse events were most commonly associated with the following vaccines: seasonal influenza (33.0%), 13vPCV (16.6%), DTPa-IPV-HepB-Hib (11.0%), rotavirus (9.8%), dTpa (9.1%), DTPa-IPV (8.3%), HPV (7.5%), meningococcal ACWY (6.6%), 23PPV (5.8%) and MMR (5.5%). The most frequently reported adverse events were injection site reaction (233), pyrexia (131), rash (114), pain (49), headache (49) vomiting (48), urticaria (38), nausea (37) and diarrhoea (37). Two deaths were reported in this period, and for both the TGA was unable to establish a link between vaccination and the condition that caused the death. **Conclusion:** The reporting rate for AEFI from NSW in 2020 was not significantly different to the AEFI rate in 2019. The majority of AEFI reported to the TGA were mild transient events. These data are useful to inform the ongoing immunisation program in NSW.

Abbreviations of vaccine types

BCG	Bacille Calmette-Guérin
DTPa	diphtheria-tetanus-pertussis (acellular) – paediatric formulation
dTpa	diphtheria-tetanus-pertussis (acellular) – adolescent and adult formulation
dTpa-IPV	combined dTpa and inactivated poliovirus
DTPa-IPV	combined diphtheria-tetanus-pertussis (acellular) and inactivated poliovirus (quadrivalent)
DTPa-IPV-HepB-Hib	combined diphtheria-tetanus-pertussis (acellular), inactivated poliovirus, hepatitis B and *Haemophilus influenzae* type b vaccine (hexavalent)
Hib	*Haemophilus influenzae* type b
Hib-MenC	combined *Haemophilus influenzae* type b and meningococcal C vaccine
HPV	human papillomavirus
IPV	inactivated poliovirus vaccine
MenACWY	quadrivalent meningococcal (serogroups A, C, W-135, Y) conjugate vaccine
MenB	meningococcal B
MenCCV	meningococcal C conjugate vaccine
MMR	measles-mumps-rubella
MMRV	measles-mumps-rubella-varicella
pH1N1	pandemic influenza A (H1N1)
7vPCV	7-valent pneumococcal conjugate vaccine
13vPCV	13-valent pneumococcal conjugate vaccine
23vPPV	23-valent pneumococcal polysaccharide vaccine

Introduction

This is the 12th in a series of annual reports of adverse events following immunisation (AEFI) in New South Wales (NSW). This report summarises spontaneous AEFI surveillance data reported from NSW for 2020 and describes reporting trends over the 21-year period 2000–2020. It does not include COVID-19 AEFIs.

An adverse event following immunisation is defined as any untoward medical occurrence which follows immunisation.[1] The adverse event may be any unfavourable or unintended sign, abnormal laboratory finding, symptom or disease.[1] Thus, AEFI may be caused by a vaccine(s) or may be coincidental. Adverse events may also include conditions that occur following the incorrect handling and/or administration of a vaccine(s). The surveillance of AEFI after the Therapeutic Good Administration (TGA) approves a vaccine is particularly important to detect rare, late onset and unexpected events, and new vaccine safety signals which are difficult to detect in pre-licensure vaccine trials.

Trends in reported AEFI are heavily influenced by changes to the schedule of vaccines provided through the National Immunisation Program (NIP). Changes to the NIP in previous years have been reported elsewhere.[2–12] Recent NIP and NSW immunisation schedule changes that may have affected AEFI surveillance data in NSW presented in this report are:

March 2020

- Influenza vaccine funded under the National Immunisation Program for all children aged 6 months to less than 5 years.
- First enhanced quadrivalent influenza vaccine (adjuvanted) funded nationally for people aged 65 years and over.

July 2020

Meningococcal B vaccine funded under the National Immunisation Program (NIP) for all Aboriginal children at 6 weeks, 4 months and 12 months of age, with a catch up program until 30 June 2023 for Aboriginal children less than 2 years of age.

A single dose of 13-valent pneumococcal conjugate vaccine (13vPCV) funded for Aboriginal adults at 50 years of age, followed by a dose of 23-valent pneumococcal polysaccharide vaccine (23vPPV) 2–12 months later and then a second dose of 23vPPV 5–10 years after that. For non-Aboriginal adults, a single dose of 13vPCV is funded at 70 years of age, replacing the previously funded dose of 23vPPV at 65 years of age.

Methods

AEFI are notifiable to NSW public health units by medical practitioners and hospital chief executive officers under the *Public Health Act 2010* (NSW). Cases with any missing information and all serious AEFI are followed up by public health units and Health Protection NSW. All notifications are forwarded to the TGA. The TGA also receives reports directly from vaccine manufacturers, members of the public and other sources. The TGA sends these reports to NSW Health, and they are included in this report.[13,14] Where there is insufficient information to determine causality for select serious adverse events the TGA will attempt to contact the reporter on up to three occasions to elicit further information.

If the TGA considers that an adverse event report or cluster of adverse event reports represent a potential new safety concern that could change the positive benefit–risk balance of a vaccine, it may seek an expert causality assessment, for example from a Vaccine Safety Investigation Group. Each individual report is de-identified and published in the Database of Adverse Event Notification (DAEN). Publication of a report in the DAEN does not mean that the vaccine caused the adverse event, but simply reflects the observations of the person who reported the event.

Adverse events following immunisation data

Notifications from all sources across Australia are received by the TGA, coded using internationally consistent criteria[15] and entered into the TGA's Adverse Events Management System (AEMS). The term 'AEFI record' is used throughout this report to signify the occurrence of an AEFI because a single adverse event can result in more than one notification and generate more than one record in the AEMS. Duplication of adverse event reports/cases is more likely to occur in situations where there are sequential adverse events in a single patient or if multiple vaccines are involved. Records identified as duplicates are linked and not included as separate reports.

Typically, each AEFI record lists several symptoms, signs and diagnoses that have been coded from the description provided by the reporter into standardised terms using the Medical Dictionary for Regulatory Activities (MedDRA®).[16]

Study definitions of AEFI outcomes

Australian sponsors are required to apply seriousness coding to AEFI reports to ensure legislated requirements are met. Reports are coded by the TGA as 'serious' or 'non-serious' based on criteria similar to those used by the World Health Organization[16] and the United States Vaccine Adverse Events Reporting System (VAERS).[17]

In this report, an adverse event is defined as 'serious' if it meets one or more of the following criteria:

- results in death;
- is life-threatening;
- requires inpatient hospitalisation or prolongation of existing hospitalisation;

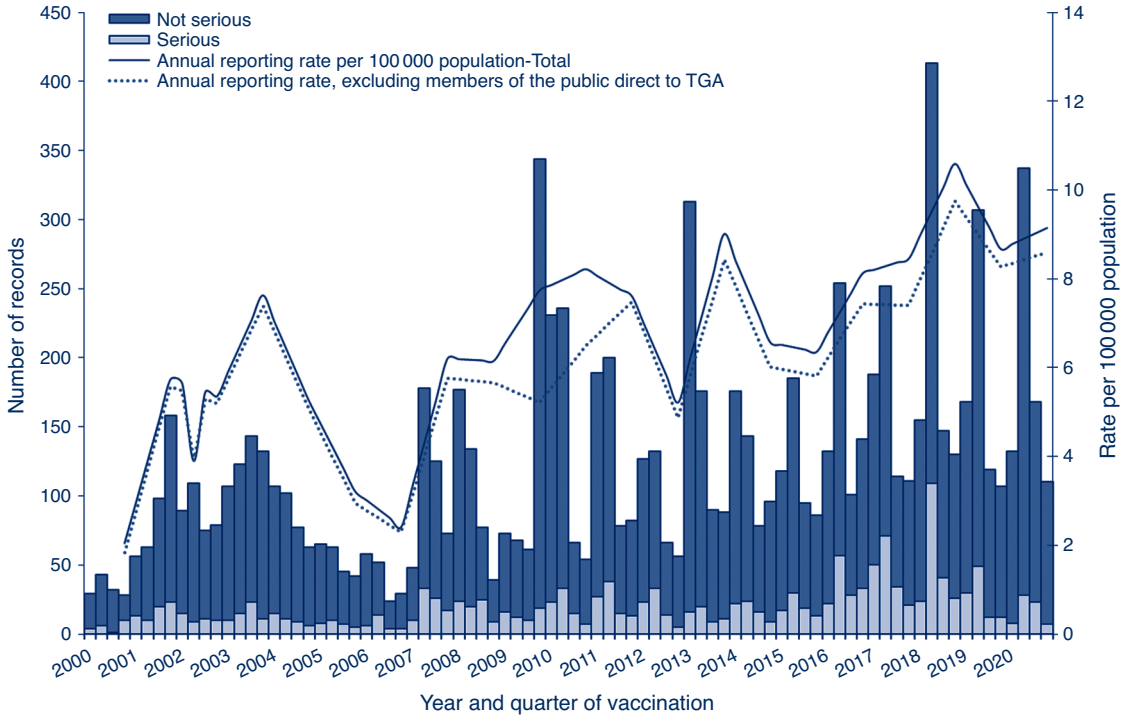

Figure 1. Reports of adverse events following immunisation, NSW, 2000–2020, by quarter of vaccination.

NB: For reports where the date of vaccination was not recorded, the date of onset was used as a proxy for vaccination date.

Source: Adverse Events Management System database, Therapeutic Goods Administration.

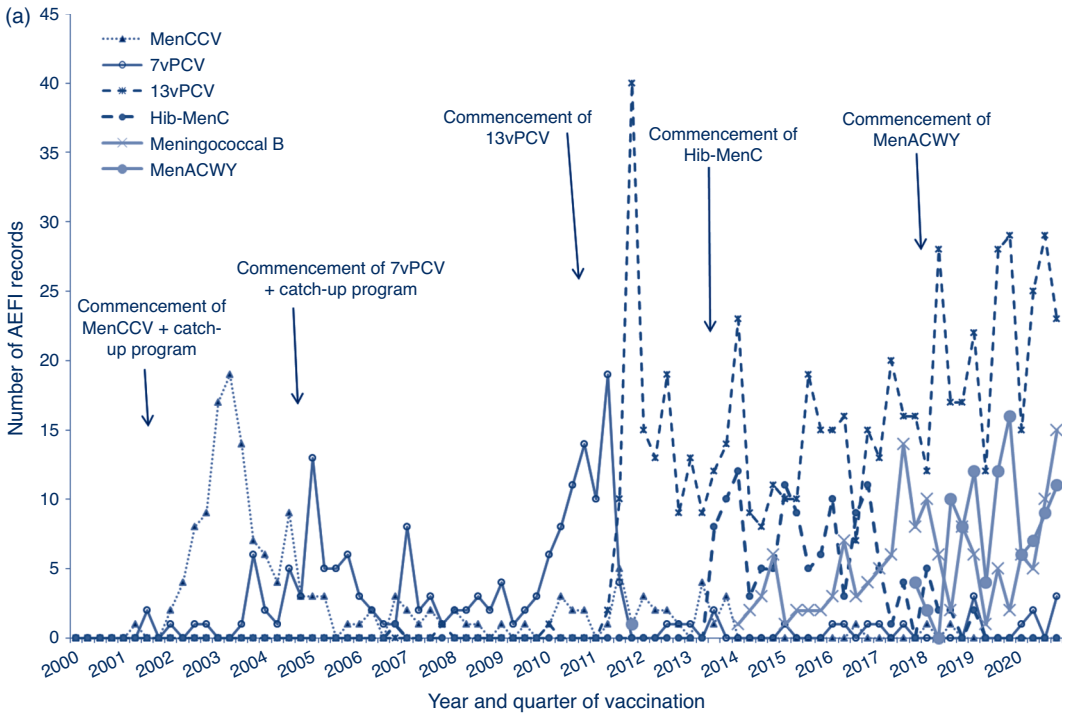

Figure 2a. Adverse events following immunisation in children aged <7 years for selected vaccines, NSW, 2000–2020, by quarter of vaccination.

NB: Meningococcal C conjugate vaccine (MenCCV) was introduced into the National Immunisation Program schedule on 1 January 2003; 7-valent pneumococcal conjugate vaccine (7vPCV) on 1 January 2005; 13-valent pneumococcal conjugate vaccine (13vPCV) on 1 July 2011; and Hib–MenC on 1 July 2013 and MenACWY vaccine was introduced at 12 months in July 2018.

Source: Adverse Events Management System database, Therapeutic Goods Administration.

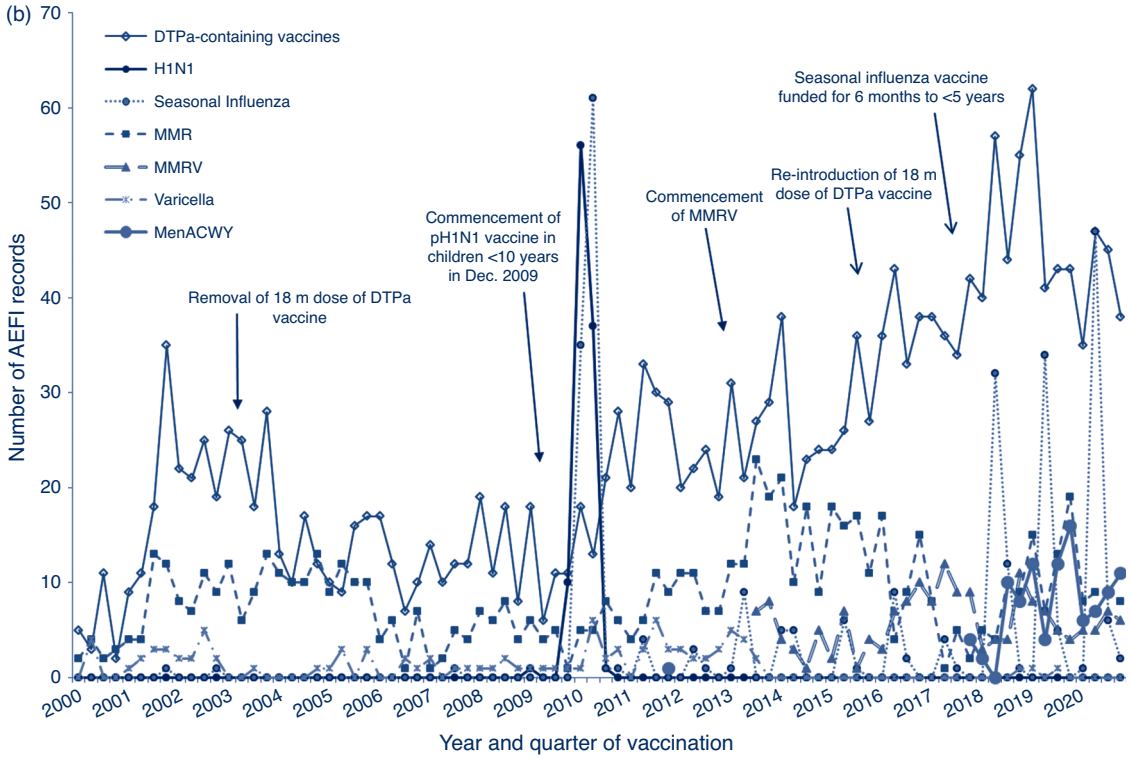

Figure 2b. Adverse events following immunisation in children aged <7 years for selected vaccines, NSW, 2000–2020, by quarter of vaccination.

NB: DTPa-IPV was introduced into the NIP schedule in November 2005 replacing DTPa and oral polio vaccine (OPV); commencement of the pH1N1 (pandemic influenza vaccine) in children aged <10 years occurred in December 2009; seasonal trivalent influenza vaccine was extended to medically at risk children in 2010; seasonal quadrivalent influenza vaccine was state-funded from 2018 for children aged 6 months to <5 years; enhanced immunogenicity trivalent influenza vaccine for individuals aged ≥65 years was introduced in 2018; MMRV vaccine was introduced on 1 July 2013 and re-introduction of 18 month booster dose of DTPa vaccine occurred in April 2016.

Source: Adverse Events Management System database, Therapeutic Goods Administration.

- results in persistent or significant disability/incapacity;
- is a congenital anomaly/birth defect;
- is a medically important event or reaction.

Data analysis

De-identified information on AEFI reports from the TGA's AEMS database was released to NCIRS in June 2021. AEFI records contained in the AEMS database were eligible for inclusion in the analysis if:

- a vaccine was recorded as 'suspected' of involvement in the reported adverse event;
- the vaccination occurred between 1 January 2000 and 31 December 2020 (or if vaccination date was missing, the date of onset of symptoms or signs occurred between 1 January 2000 and 31 December 2020);
- the residential address of the individual was recorded as within NSW.

Vaccines are classified as 'suspected' if the notification/report contains sufficient information to be valid and a causal relationship between reported adverse events and the vaccine is deemed at least possible.

Data cleaning and analyses were performed using SAS (version 9.4, SAS Institute, Cary, NC, USA).[18] Average annual population-based reporting rates were calculated using mid-year population estimates obtained from the Australian Bureau of Statistics.[19] Vaccine dose counts were calculated using data from the Australian Immunisation Register (AIR) as on 31 March 2021 for doses recorded from 1 January 2020 to 31 December 2020. AEFI reporting rates per 100 000 administered doses were estimated where information was available on the number of doses administered. The number of administered doses of each of the vaccines given was obtained from the Australian Immunisation Register (AIR), a national population-based register.[20] From 30 September 2016, the Australian Childhood Immunisation Register (ACIR) became a whole of life register (AIR), with the ability to record all vaccinations for people of all ages given by a registered vaccination provider.[21] Exact Poisson 95% confidence intervals (CI) were calculated for reporting rates per 100 000 population and per 100 000 vaccine doses.

Notes on interpretation

The data reported here are provisional only, particularly for the fourth quarter of 2020, because of reporting delays and the late onset of some reported AEFI. Numbers have been updated for previous years.

It is important to note that this report is based on vaccine and adverse event information collated in the AEMS database and not on comprehensive clinical notes.

Also, Indigenous status is not routinely recorded in all AEFI reports received by the TGA and so estimates of AEFI rates in Aboriginal people are likely to be underestimates.

Results

There was a total of 746 AEFI records in the AEMS database with a date of vaccination during 2020 and where the vaccinated person was a resident in NSW. Of these, 61.3% were females (457), 36.1% (269) were males and 2.7% (20) had their gender information missing or unspecified in the database. Also, 4.7% (35) were reported as Aboriginal people. Of all 746 reports, 39.7% (295) were for children aged <7 years and 56.3% (420) were for people aged ≥7 years. Approximately 4% (31) had age missing in the database. Fifty-one per cent (378) of AEFI records were reported by the state health department (representing notifications reported to NSW Health via public health units), 40% (297) were reported by health professionals, 6% (45) by patients/consumers and 4% (26) by pharmaceutical companies.

Reporting trends

The overall AEFI reporting rate (9.1 per 100 000 population, 95% CI 8.5–9.8 per 100 000 population) in 2020 was not significantly different to the overall AEFI rate in 2019 (8.7 per 100 000 population, 95% CI 8.0–9.3 per 100 000 population) (Fig. 1). The vast majority of reported events (9%) in 2020 were of a non-serious nature, similar to previous years.[8,12,22–24]

Figures 2a, 2b and 3 demonstrate variations in reporting for select vaccines in people aged <7 or ≥7 years, in association with changes to the NIP from 2000 onwards. The usual seasonal pattern of AEFI reporting in older Australians receiving pneumococcal vaccine and influenza vaccine during the autumn to winter months (March–June) is evident in Figure 3. This seasonal pattern is also apparent in Figure 2b for children aged <7 years, especially from commencement of state funding for seasonal influenza vaccine in children aged 6 months to <5 years.

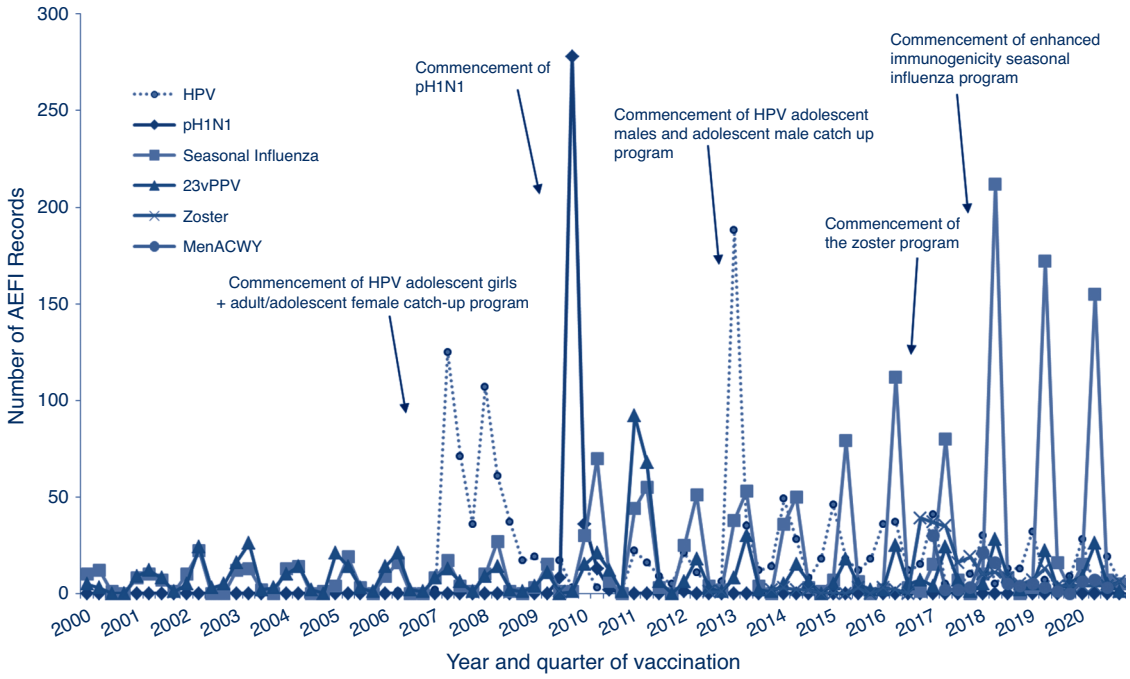

Figure 3. Adverse events following immunisation for people aged ≥7 years for selected vaccines, NSW, 2000–2020, by quarter of vaccination.

NB: 4vHPV vaccine was NIP funded for females aged 12–13 years with a catch up program for females aged 14–26 years in mid-2007; commencement of the pH1N1 (pandemic influenza vaccine) in children and adults occurred in December 2009; 4vHPV was NIP funded for males aged 12–13 years with a catch up program for males aged 14–15 years in February 2013; zoster vaccine was NIP funded for people aged 70 years with a catch up program for people aged 71–79 years and enhanced immunogenicity trivalent seasonal influenza vaccines were NIP funded for people aged ≥65 years in April 2018.

Source: Adverse Events Management System database, Therapeutic Goods Administration.

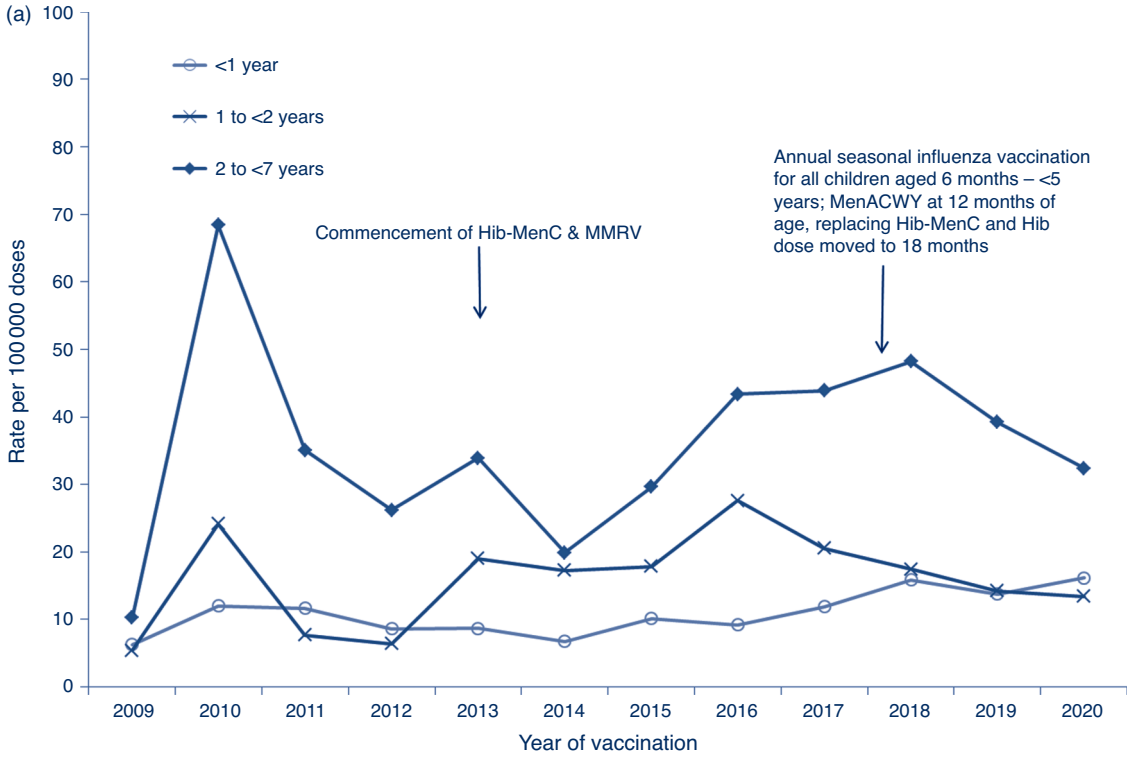

Figure 4a. Reporting rates of adverse events following immunisation per 100 000 doses for children aged <7 years, NSW, 2009–2020, by year of vaccination

NB: Hib-MenC was NIP funded for infants aged 12 months, and MMRV was NIP funded for children aged 18 months, in July 2013; DTPa was re-introduced to the NIP schedule for children aged 18 months in March 2016; seasonal influenza vaccine was state funded for children aged 6 months to <5 years in April 2018; and MenACWY replaced Hib-MenC at 12 months, the third dose of 13vPCV was moved from 6 months to 12 months, and a monovalent Hib dose was introduced at 18 months on the NIP schedule in July 2018.

Source: Adverse Events Management System database, Therapeutic Goods Administration.

Age group and vaccine

Figure 4a shows that among children aged <7 years, the estimated AEFI reporting rate was highest in children aged 2 to <7 years during 2020 (32.4 per 100 000 doses, 95% CI 26.3–39.4 per 100 000 doses), lower than in 2019 (39.2 per 100 000 doses, 95% CI 32.5–46.9 per 100 000 doses) although not statistically significant. No statistically significant changes were observed in reporting rates for children aged <2 years in 2020 compared with 2019, although the reporting rates appeared to increase in those aged <1 year and decrease in those aged 1 to <2 years.

Although vaccine dose information was available from AIR for people aged ≥7 years from 30 September 2016 onwards, the dose data completeness was variable across age groups. Therefore, we only estimated population based AEFI reporting rates in people aged ≥7 years (Fig. 4b). There was an increase in estimated AEFI reporting rates in the ≥65 years age group in 2020 (7.5 per 100 000 population, 95% CI 6.2–9.1 per 100 000 population) compared with 2019 (6.7 per 100 000 population, 95% CI 5.4–8.3 per 100 000 population) though this was not statistically significant. Although there was a slight increase in estimated AEFI reporting rates in the 7 to <20 years age group in 2020 (8.5 per 100 000 population, 95% CI 6.9–10.2 per 100 000 population) compared with 2019 (8.0 per 100 000 population, 95% CI 6.6–9.8 per 100 000 population), this was not statistically significant. Similarly, for those aged between 20 and <65 years, the estimated AEFI reporting rate was slightly increased for 2020 (4.3 per 100 000 population, 95% CI 3.8–4.9 per 100 000 population) compared with 2019 (3.9 per 100 000 population, 95% CI 3.3–4.8 per 100 000 population) though this was not statistically significant.

Among children aged <7 years, 13-valent pneumococcal conjugate vaccine (13vPCV) was associated with the most AEFI records (92 reports) (Table 1). For those aged between 12 and 17 years, there were 45 reports related to human papillomavirus (HPV) vaccine. In those aged ≥65 years, seasonal influenza vaccine was recorded in 31 reports. Overall, as shown in Table 2, reported adverse events were associated most commonly with seasonal influenza (33.0%), 13vPCV (16.6%), DTPa-IPV-HepB-Hib (11.0%), rotavirus (9.8%), dTpa (9.1%), DTPa-IPV (8.3%), HPV (7.5%), meningococcal ACWY (6.6%), 23PPV (5.8%) and MMR (5.5%).

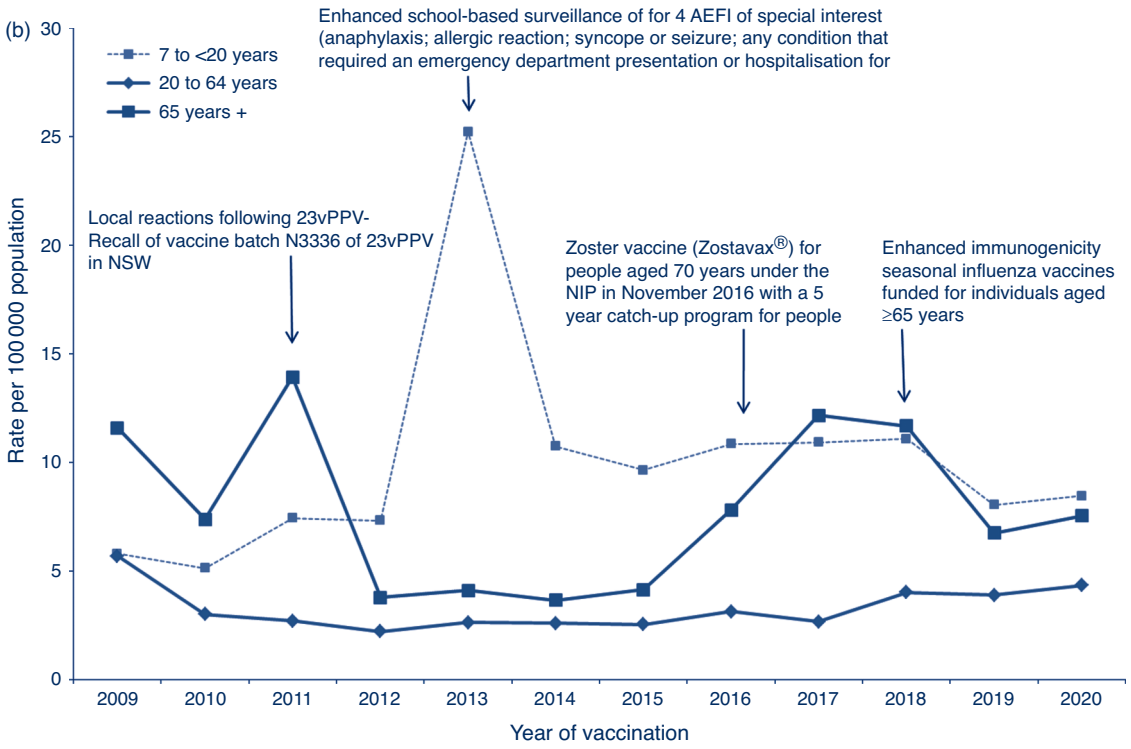

Figure 4b. Reporting rates of adverse events following immunisation per 100 000 population for people aged ≥7 years, NSW, 2009–2020, by year of vaccination.

NB: 23vPPV batch N3336 was recalled in March 2011; the TGA implemented enhanced school-based surveillance for four types of AEFI of special interest in 2013 in collaboration with state and territory health departments; zoster vaccine was NIP funded for people aged 70 years with a catch up program for people aged 71–79 years and enhanced immunogenicity trivalent seasonal influenza vaccines were NIP funded for people aged ≥65 years in April 2018.

Source: Adverse Events Management System database, Therapeutic Goods Administration.

Adverse events in 2020

The distribution and frequency of adverse events listed in AEFI records for 2020 are shown in Table 3. The most frequently reported adverse events were injection site reaction (233), pyrexia (131), rash (114), pain (49), headache (49) vomiting (48), urticaria (38), nausea (37) and diarrhoea (37).

Of the total 233 cases of injection site reaction, 61% (143) were in those aged ≥7 years. More than half the cases of pyrexia (80; 61%) and rash (64; 56%) were reported in those aged <7 years.

There were 30 reports of anaphylaxis: two in children aged <7 years and 25 in individuals aged ≥7 years (three had missing age).

There were four cases of Guillain-Barre syndrome, all in people who had received seasonal influenza vaccines, with two being in adults and two with age missing.

There were three cases of intussusception reported in children aged <1 year within 7 days of rotavirus vaccination.

Approximately 9% of reported events (65) were recorded as serious in 2020, a decrease compared with 2019, when 103 events (14.7%) were recorded as serious. Adverse events recorded as 'serious' included pyrexia (11), ISR (7), rash (6), anaphylaxis (5), convulsions (4) and others, as shown in Table 3. Fifty per cent of convulsions (2) recorded as serious were febrile convulsions in children aged <7 years.

The TGA reviews all AEFI reports where a fatal outcome is reported, to assess whether the medical condition that caused death represents an emerging safety concern with the vaccine. For each report the TGA receives, a team of staff, including doctors and nurses, consider the strength of the evidence for a link between vaccination and the condition that caused the death. The team may request more information from health authorities and coroners.

Deaths in 2020

Two deaths were reported to the TGA where the reporter considered a causal link between the vaccination and death was possible. Both were in children aged one year or less

Table 1. Vaccine types listed as 'suspected' in records of adverse events following immunisation for four age groups (<7, 12–17, 18–64 and ≥65 years), NSW, 2020

Vaccine[a]	AEFI records[b] 2020	Serious[c] 2020	Reporting rate per 100 000 doses[d] 2020	
	n	*n*	Rate	(95% CI)
<7 years				
13vPCV	92	9	34.4	(27.7–42.2)
DTPa-IPV-HepB-Hib	79	10	29.7	(23.5–37.1)
Rotavirus	71	9	41.7	(32.5–52.5)
DTPa-IPV	59	0	60.5	(46.0–78.0)
Seasonal influenza	56	5	19.3	(14.6–25.1)
Meningococcal ACWY	38	1	39.5	(28.0–54.2)
Meningococcal B	36	5	55.1	(38.6–76.2)
MMR	33	1	34.8	(23.9–48.8)
DTPa	27	3	29.0	(19.1–42.2)
MMRV	23	2	24.8	(15.7–37.1)
Hib	21	3	22.5	(14.0–34.4)
Hepatitis B	3	0	47.6	(9.8–139.0)
12–17 years				
HPV	45	0	28.7	(20.9–38.4)
dTpa	30	0	34.3	(23.1–48.9)
Meningococcal ACWY	14	1	18.6	(10.2–31.3)
Seasonal influenza	6	0	4.6	(1.7–9.9)
Meningococcal B	2	0	146.6	(17.8–529.7)
MMR	1	0	32.3	(8.2–179.8)
Hepatitis B	1	0	17.3	(0.4–96.1)
Varicella	1	0	42.1	(1.1–234.4)
18–64 years				
Seasonal influenza	134	14	10.0	(8.4–11.8)
dTpa	29	1	15.4	(10.3–22.1)
23vPPV	10	0	55.2	(26.5–101.5)
Hepatitis B	9	0	17.2	(7.9–32.7)
MMR	7	0	27.3	(11.0–56.3)
13vPCV	5	0	72.2	(23.5–168.5)
Meningococcal B	4	1	152.1	(41.4–389.4)
Meningococcal ACWY	1	0	14.3	(0.4–79.7)
Yellow fever	1	0	44.9	(1.1–250.1)
≥65 years				
Seasonal influenza	31	3	3.4	(2.3–4.9)
23vPPV	31	0	33.9	(23.1–48.2)
13vPCV	25	0	29.7	(19.2–43.9)
Zoster	17	1	29.9	(26.5–101.5)
dTpa	2	0	5.7	(0.7–20.6)

AEFI, adverse events following immunisation.
[a]Records where at least one of the vaccines shown in the table was suspected of involvement in the reported adverse event.
[b]Number of AEFI records in which the vaccine was coded as 'suspected' of involvement in the reported adverse event and the vaccination was administered between 1 January 2020 and 31 December 2020. More than one vaccine may be coded as 'suspected' if several were administered at the same time.
[c]'Serious' is defined in the Methods section.
[d]The estimated AEFI reporting rate per 100 000 vaccine doses recorded.
Source: Adverse Events Management System database, Therapeutic Goods Administration.

with underlying medical conditions and/or an acute illness, and involved different combinations of childhood vaccinations.

For both of the deaths reported in NSW in 2020, the TGA was unable to establish a link between vaccination and the condition that caused the death.

Table 2. Vaccine types listed as 'suspected' in records of adverse events following immunisation (AEFI), NSW, 2020

Suspected vaccine type	AEFI records		One suspected vaccine only[a]		'Serious'		Age group[b] <7 years		Age group[b] ≥7 years	
	n	(%)	*n*	(%)[c]	*n*	(%)[c]	*n*	(%)[c]	*n*	(%)[c]
Seasonal influenza	246	(33.0)	220	(89)	23	(9)	56	(23)	182	(74)
13vPCV	124	(16.6)	26	(21)	9	(7)	92	(74)	31	(25)
DTPa-IPV-HepB-Hib	82	(11.0)	12	(15)	10	(12)	79	(96)	2	(2)
Rotavirus	73	(9.8)	10	(14)	9	(12)	71	(97)	0	(0)
dTpa	68	(9.1)	38	(56)	1	(1)	0	(0)	68	(100)
DTPa-IPV	62	(8.3)	54	(87)	0	(0)	59	(95)	3	(5)
HPV	56	(7.5)	31	(55)	0	(0)	1	(2)	54	(96)
Meningococcal ACWY	49	(6.6)	11	(22)	2	(4)	33	(67)	16	(33)
23vPPV	43	(5.8)	30	(70)	0	(0)	2	(5)	41	(95)
MMR	41	(5.5)	10	(24)	3	(7)	33	(80)	8	(20)
Meningococcal B	42	(5.6)	22	(52)	6	(14)	36	(86)	6	(14)
DTPa	27	(3.6)	6	(22)	3	(11)	27	(100)	0	(0)
MMRV	23	(3.1)	4	(17)	2	(9)	23	(100)	0	(0)
Hib	21	(2.8)	2	(10)	3	(14)	21	(100)	0	(0)
Zoster	18	(2.4)	13	(72)	1	(6)	0	(0)	18	(100)
Hepatitis B	14	(1.9)	12	(86)	0	(0)	3	(21)	10	(71)
Hepatitis A	5	(0.7)	2	(40)	0	(0)	2	(40)	3	(60)
Varicella	4	(0.5)	2	(50)	0	(0)	0	(0)	4	(100)
Q fever	3	(0.4)	3	(100)	0	(0)	0	(0)	3	(100)
Rabies	3	(0.4)	3	(100)	0	(0)	1	(33)	2	(67)
BCG	2	(0.3)	2	(100)	0	(0)	0	(0)	1	(50)
Typhoid	1	(0.1)	0	(0)	0	(0)	1	(100)	0	(0)
dT	1	(0.1)	1	(100)	0	(0)	0	(0)	1	(100)
Yellow fever	1	(0.1)	0	(0)	0	(0)	0	(0)	1	(100)
Total[d]	746	(100.0)	518	(69)	65	(9)	295	(40)	420	(56)

[a]AEFI records where only one vaccine was suspected of involvement in a reported adverse event.
[b]AEFI records are not shown if both age and date of birth were not reported.
[c]Percentages are calculated for the number of AEFI records where the vaccine was suspected of involvement in the AEFI, e.g. seasonal influenza was 'suspected' in 246 AEFI records; this was the only suspected vaccine in 89% of the 246 AEFI records, 9% were defined as 'serious' and 74% were for those aged ≥7 years.
[d]Total number of AEFI records analysed, not the total in each column as categories are not mutually exclusive and an AEFI record may list more than one vaccine.
Source: Adverse Events Management System database, Therapeutic Goods Administration.

Discussion

Adverse event reporting rates have generally increased over the past decade. This is partly due to having more population-wide vaccination programs (increasing the number of vaccines administered per person) and partly due to efforts to improve reporting to NSW Health and the TGA. AEFI reporting is encouraged in order to monitor the safety of all vaccines used. Nevertheless, the overall reporting rate for AEFI from NSW in 2020 was not significantly different to the AEFI reporting rate in 2019.

Several vaccines were associated with similar AEFI reporting rates in 2020 compared with 2019. However, there were slight increases in rates and numbers of AEFI for specific vaccines (e.g. meningococcal B, 13vPCV) in 2020 compared to 2019. In children aged <7 years, there was an increase in reported AEFI for meningococcal B in 2020 ($n = 36$; rate = 55.1, 95% CI 38.6–76.2 per 100 000 doses) compared to 2019 ($n = 14$; rate = 22.3, 95% CI 12.2–37.5 per 100 000 doses). This increase could be attributed to meningococcal B vaccine being funded under the NIP from July 2020 for all Aboriginal children at 6 weeks, 4 months and 12 months of age, with a catch up program for Aboriginal children less than 2 years of age.

In 2020, a single dose of 13-valent pneumococcal conjugate vaccine (13vPCV) was also funded for Aboriginal adults at 50 years of age and for non-Aboriginal adults, a single dose of 13vPCV is funded at 70 years of age. This was reflected in the numbers and rates of AEFI reported for 13vPCV in adults for the first time in 2020. In adults aged ≥65 years, there were 25 reported AEFI for 13vPCV in

Table 3. Selected reported adverse events[a] as classified predominantly by MedDRA Preferred Terms in records of adverse events following immunisation (AEFI), NSW, 2020[b]

MedDRA Preferred Terms (adverse events)	AEFI records	Only adverse event reported[c]		'Serious'		Age group[d] <7 years		Age group[d] ≥7 years	
	n	*n*	(%)[e]	*n*	(%)[e]	*n*	(%)[e]	*n*	(%)[e]
Injection site reaction[f]	233	105	(45)	7	(3)	89	(38)	143	(61)
Pyrexia	131	5	(4)	11	(8)	80	(61)	49	(37)
Rash[g]	114	39	(34)	6	(5)	64	(56)	50	(44)
Headache	49	5	(10)	2	(4)	6	(12)	40	(82)
Pain	49	1	(2)	4	(8)	3	(6)	45	(92)
Vomiting	48	4	(8)	4	(8)	22	(46)	24	(50)
Urticaria	38	18	(47)	3	(8)	19	(50)	18	(47)
Nausea	37	1	(3)	4	(11)	1	(3)	35	(95)
Diarrhoea	37	0	(0)	5	(14)	17	(46)	17	(46)
Dizziness	34	0	(0)	2	(6)	0	(0)	34	(100)
Malaise	32	1	(3)	2	(6)	1	(3)	29	(91)
Anaphylaxis	30	18	(60)	5	(17)	2	(7)	25	(83)
Chills	26	0	(0)	2	(8)	3	(12)	22	(85)
Pruritus	25	2	(8)	2	(8)	6	(24)	18	(72)
Dyspnoea	25	1	(4)	2	(8)	2	(8)	22	(88)
Decreased appetite	23	0	(0)	3	(13)	16	(70)	7	(30)
Paraesthesia	23	0	(0)	4	(17)	0	(0)	23	(100)
Irritability	22	0	(0)	2	(9)	21	(95)	0	(0)
Throat irritation	22	1	(5)	0	(0)	1	(5)	21	(95)
Convulsions[h]	22	12	(55)	4	(18)	18	(82)	2	(9)
Lethargy	21	2	(10)	2	(10)	12	(57)	9	(43)
Myalgia	21	0	(0)	3	(14)	0	(0)	21	(100)
Abdominal pain	20	0	(0)	2	(10)	7	(35)	13	(65)
Extensive limb swelling	19	10	(53)	2	(11)	12	(63)	7	(37)
Chest discomfort	19	1	(5)	2	(11)	0	(0)	19	(100)
Injected limb mobility decreased	17	0	(0)	0	(0)	2	(12)	13	(76)
Hypotonic hyporesponsive episode	16	13	(81)	1	(6)	15	(94)	1	(6)
Fatigue	16	0	(0)	0	(0)	2	(13)	12	(75)
Cough	15	0	(0)	2	(13)	7	(47)	7	(47)
Syncope	15	7	(47)	0	(0)	3	(20)	11	(73)
Hyperhidrosis	14	0	(0)	0	(0)	1	(7)	12	(86)
Hypotonia	14	0	(0)	4	(29)	13	(93)	1	(7)
Rhinorrhoea	13	0	(0)	0	(0)	10	(77)	3	(23)
Pallor	13	1	(8)	3	(23)	10	(77)	3	(23)
Apnoea	12	2	(17)	3	(25)	12	(100)	0	(0)
Arthralgia	12	2	(17)	1	(8)	1	(8)	11	(92)
Presyncope	11	3	(27)	0	(0)	3	(27)	8	(73)
Flushing	9	0	(0)	2	(22)	2	(22)	7	(78)
Bradycardia	9	0	(0)	1	(11)	9	(100)	0	(0)
Oropharyngeal pain	8	0	(0)	0	(0)	0	(0)	6	(75)
Tachycardia	7	0	(0)	2	(29)	2	(29)	5	(71)
Haematochezia	6	3	(50)	1	(17)	5	(83)	0	(0)
Somnolence	6	0	(0)	1	(17)	3	(50)	3	(50)
Asthenia	6	0	(0)	1	(17)	1	(17)	5	(83)
Hypoaesthesia	6	0	(0)	0	(0)	0	(0)	6	(100)

Guillain-Barre syndrome	4	2	(50)	3	(75)	0	(0)	2	(50)
Angioedema	3	0	(0)	1	(33)	1	(33)	2	(67)
Intussusception	3	3	(100)	0	(0)	3	(100)	0	(0)

[a]A complete list of adverse events as classified by individual Preferred Terms is available on request.
[b]Selected reported adverse events reported during January 2020–December 2020. Note: for injection site reaction, rash and convulsions, preferred terms were grouped as described below.
[c]AEFI records where only one adverse event was reported.
[d]Not shown if neither age nor date of birth were recorded.
[e]Percentages relate to the number of AEFI records in which the specific adverse event term was listed.
[f]Injection site reaction MedDRA codes included injection site reaction, injection site swelling, injection site pain, injection site mass, injection site erythema, injection site cellulitis, injection site induration, injection site abscess sterile, injection site discharge, injection site necrosis, injection site nodule, injection site urticaria, vaccination site movement impairment, vaccination site streaking, administration site erythema and administration site induration.
[g]Rash MedDRA codes included rash, rash erythematous, rash generalised, rash maculo-papular, rash macular, rash vesicular, rash papular, rash morbilliform and rash pruritic.
[h]Convulsion MedDRA codes included febrile convulsion, seizure, status epilepticus and tonic convulsion.
Source: Adverse Events Management System database, Therapeutic Goods Administration.

2020 (rate 29.7 per 100 000 doses, 95% CI 19.2–43.9), while in adults aged between 18 and 64 years, there were only five AEFI reported.

In children aged <7 years, the number of AEFI records for seasonal influenza vaccine slightly increased in 2020 compared to 2019 (56 versus 39), although the increase in reporting rate per 100 000 doses for 2020 (19.3, 95% CI 14.6–25 per 100 000 doses) was not statistically significant compared with 2019 (15.1, 95% CI 10.7–20.6 per 100 000 doses). This increase could be due to influenza vaccine's addition to the NIP for children aged 6 months to <5 years from March 2020.

There was a decrease in the number of AEFI records for DTPa-IPV from 2019 to 2020, especially in children aged <7 years (67 records in 2019 to 59 records in 2020). However, the AEFI rate per 100 000 DTPa-IPV doses was not significantly different for children aged <7 years in 2020 (60.5, 95% CI 46.0–78.0 per 100 000 doses) compared with 2019 (68.6, 95% CI 53.2–87.2 per 100 000 doses).

Injection site reaction, pyrexia and rash were the most commonly reported adverse events in 2020. Though the number of reports of most types of adverse events was similar in 2020 to 2019, there was an increase in the number of reports for some adverse events, including anaphylaxis, which increased from 20 reports in 2019 to 30 reports in 2020. This is likely due to a change in the way reports of anaphylaxis were coded by the TGA from 2018 onwards, using Brighton Collaboration Case Definition Criteria.[26] AusVaxSafety, an active sentinel vaccine safety surveillance system, also monitored the safety of select vaccines in 2020 and found no safety signals, including for influenza vaccines across all ages.[27]

A limitation of our report is interpretation of the serious code for reported adverse events, which is primarily used as a guide for sponsor reporting. As it is not necessarily based on verified clinical data, it may not capture all medically important events and is unlikely to be robust. Another limitation is that the information collated in the AEMS database is intended primarily to detect safety signals in relation to adverse events and to inform hypothesis generation. While AEFI reporting rates can be estimated using appropriate denominators, they cannot be interpreted as incidence rates due to under-reporting, biased reporting of suspected events, stimulated reporting and the variable quality and completeness of information provided in individual notifications.[12]

Finally, the AEFI reported here are not necessarily causally related to vaccination; they may be coincidental or may be caused by a vaccine(s), or during handling or administration. With large-scale vaccination programs, it is likely that some people will experience a new illness or die within a few days or weeks of vaccination. These events are often coincidental, rather than being caused by the vaccine. As the number of people, including children, being vaccinated has increased, so has reporting of fatal events with a temporal association with vaccination. Review of individual reports and overall patterns of reporting suggest that vaccines did not play a role in most of these deaths. All reports of death are included in the TGA's safety monitoring data, even if a coroner or expert panel has concluded it is unrelated to vaccination. Reviewing individual reports of adverse events with fatal outcomes is just one part of the TGA's vaccine monitoring program. The TGA also conducts analyses across all adverse event reports, including those with fatal outcomes, to detect rare or emerging safety signals. Vaccine surveillance staff monitors the medical literature, media and other potential sources of new safety information. The TGA also collaborates with international regulators to review global safety data.

Conclusion

Overall, the AEFI reporting rates in 2020 were similar to 2019. The majority of AEFI reported to the TGA were mild transient events. The data reported here are consistent with an overall high level of safety for vaccines included in the NIP schedule.

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