Surveillance of adverse events following immunisation, NSW, 2016

***Aditi Dey*[A,D], *Han Wang*[A], *Helen Quinn*[A], *Su Reid*[B], *Jane Cook*[C] *and Kristine Macartney*[A]**

[A]*National Centre for Immunisation Research and Surveillance, The Children's Hospital at Westmead*

[B]*Health Protection NSW*

[C]*Pharmacovigilance and Special Access Branch, Therapeutic Goods Administration*

[D]*Corresponding author. Email: aditi.dey@health.nsw.gov.au*

Abstract: Aim: This report summarises passive surveillance data for adverse events following immunisation (AEFI) in NSW from 1 January 2016 to 31 December 2016. **Methods:** Analysis of de-identified data on all adverse events following immunisation reported to the Therapeutic Goods Administration (TGA) for persons from NSW. **Results:** There were 632 AEFI reported for vaccines administered from 1 January to 31 December 2016. Of all AEFIs, 3% were reported in Aboriginal and Torres Strait Islander people. There was a 22% increase in overall AEFI reporting rate (8.2 per 100 000 population) in 2016, compared with 2015 (6.7 per 100 000 population); however, the vast majority of reported events were of a non-serious nature, similar to previous years. This overall increase is likely due to the introduction of the booster dose of the diphtheria, tetanus, and acellular pertussis-containing vaccine (DTPa) at 18 months of age in April 2016 and the zoster vaccine for those aged 70–79 years in November 2016. Overall, the most commonly reported reactions were associated with seasonal influenza (24%), followed by HPV vaccine (16%), dTpa (14%), DTPa-IPV-HepB-Hib (9%), MMR (9%), rotavirus (9%), DTPa (6%) and zoster (6%). Only 13% of the reported adverse events were categorised as serious in 2016 compared with 17% in the previous reporting period (2015). While two people died soon after vaccination, there is no evidence to suggest the deaths were related to the vaccines. **Conclusion:** Although there were no vaccine safety signals or concerns observed in this reporting period, there was an increase in reports observed in 2016 compared with 2015.

Abbreviations of vaccine types

BCG	Bacille Calmette-Guérin
dT	diphtheria–tetanus – adolescent and adult formulation
DTPa	diphtheria–tetanus–pertussis (acellular) – paediatric formulation
dTpa	diphtheria–tetanus–pertussis (acellular) – adolescent and adult formulation
dTpa-IPV	combined dTpa and inactivated poliovirus
DTPa-HepB	combined diphtheria–tetanus–pertussis (acellular) and hepatitis B
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)
HepB	hepatitis B
Hib	*Haemophilus influenzae* type b
Hib-MenC	combined *Haemophilus influenzae* type b and meningococcal C vaccine
HPV	human papillomavirus
IPV	inactivated poliovirus vaccine
Men4PV	meningococcal polysaccharide tetravalent vaccine
MenCCV	meningococcal C conjugate vaccine
MMR	measles–mumps–rubella
MMRV	measles–mumps–rubella–varicella
7vPCV	7-valent pneumococcal conjugate vaccine
13vPCV	13-valent pneumococcal conjugate vaccine
23vPPV	23-valent pneumococcal polysaccharide vaccine

Introduction

This is the eighth in a series of annual reports of adverse events following immunisation (AEFI) in New South Wales (NSW). This report summarises passive surveillance data reported from NSW for 2016 and describes reporting trends over the 17-year period 2000–2016.

An adverse event following immunisation is defined as any untoward medical occurrence that 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 post-licensure surveillance of AEFI is particularly important to detect rare, late onset and unexpected events, and new vaccine safety signals that are difficult to detect in pre-licensure vaccine trials.

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

- November 2016: Zoster vaccine (Zostavax®) provided free for people aged 70 years under the NIP with a 5-year catch-up program for people aged 71–79 years.
- March 2016: NIP-funded booster dose of the diphtheria, tetanus, and acellular pertussis-containing vaccine (DTPa) at 18 months of age.
- April 2015: New immunisation requirements for family assistance payments were announced by the Federal government. With the 'No Jab, No pay' policy coming into effect as of 1 January 2016, only parents of children (aged less than 20 years) who are 'fully immunised' or on a recognised catch-up schedule will continue to receive the Child Care Benefit, Child Care Rebate, and/or the Family Tax Benefit Part A end-of-year supplement. Children with medical contraindications or natural immunity for certain diseases will continue to be exempt from the requirements; however, conscientious objection is no longer a valid exemption from immunisation requirements.
- March 2015:
  - Seasonal influenza vaccine funded for Aboriginal and Torres Strait Islander children aged 6 months to less than 5 years. The recommended upper age for children requiring two doses in the first year they receive influenza vaccine changed from less than 10 years to less than 9 years.
  - The dTpa vaccine was recommended by the National Health and Medical Research Council (NHMRC) and funded by NSW Health for women during the third trimester of pregnancy under the NSW maternal pertussis strategy from March 2015.
- December 2014: Secondary school HPV vaccine catch-up program for Year 9 male students ceased.

Methods

Adverse events following immunisation are notifiable to NSW public health units by medical practitioners and hospital CEOs under the NSW *Public Health Act 2010*. Cases with any outstanding information and all serious AEFI are followed up by public health units and Health Protection NSW. All notifications are forwarded to the Therapeutic Goods Administration (TGA). The TGA also receives reports directly from vaccine manufacturers, members of the public and other sources.[13,14]

Adverse events following immunisation data

Reports from all sources across Australia are assessed by the TGA using internationally consistent criteria[15] and entered into the Australian Adverse Drug Reaction Reporting System (ADRS) database. The term 'AEFI record' is used throughout this report to signify occurrence of an AEFI because a single adverse event can result in more than one notification and generate more than one record in the ADRS database. Duplication of adverse event reports/cases is more likely to occur in situations where there are sequential adverse reactions in a single patient or if multiple vaccines are involved. The TGA undertakes to identify duplicates and while all reports would be included these would only be identified as one report.

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

In reports published previously,[8,9] analysis was conducted using MedDRA® terms grouped into 'reaction categories' that were broadly analogous to the reactions listed in previous *Australian Immunisation Handbooks*.[13,14] However, the methodological framework for analysing and reporting on adverse events was revised in 2012 after which AEFI analysis has been conducted using MedDRA preferred terms (PTs).[17] Grouping of reactions using PTs is more comparable with data from other countries and is internationally accepted.[18–20] In conjunction with the national vaccine-specific reporting form,[21] the use of PTs allows for a better description of post-marketing surveillance data on vaccine safety in Australia.

Definitions of AEFI outcomes and reactions

This report includes only AEFI records that are classified as 'suspected' to be causally related to immunisation. An AEFI record is classified as 'not suspected' and excluded from the ADRS database if: (1) there is no reasonable temporal association between the use of a drug and the clinical event; (2) the record does not contain enough information for an adequate assessment or the information is contradictory; or (3) if a clinical event is explained as more likely to have arisen from other causes.

AEFIs were defined as 'serious' or 'non-serious' based on information in the report sent to the TGA and criteria similar to those used by the World Health Organization[16] and the US Vaccine Adverse Events Reporting System (VAERS).[22] In this report, an AEFI is defined as 'serious' if it meets one or more of the following criteria: (1) results in death; (2) is life-threatening; (3) requires inpatient hospitalisation or prolongation of existing hospitalisation; (4) results in persistent or significant disability/incapacity;

(5) is a congenital anomaly/birth defect; and/or (6) is a medically important event or reaction.

Data analysis

De-identified information on AEFI reports from the TGA's ADRS database was released to the National Centre for Immunisation Research and Surveillance (NCIRS) for analysis and reporting. AEFI records contained in the ADRS 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 2016 and 31 December 2016; and the residential address of the individual was recorded as NSW.

All data analyses were performed using SAS (version 9.4, SAS Institute, Cary, NC, USA).[23] Average annual population-based reporting rates were calculated using population estimates obtained from the Australian Bureau of Statistics.[24]

AEFI reporting rates per 100 000 administered doses were estimated where information on dose numbers was reliably available from the Australian Immunisation Register (AIR) for NIP vaccines for children aged less than 7 years, and NSW Health data on vaccines administered in schools for 12–17 year olds. From 30 September 2016, the Australian Childhood Immunisation Register (ACIR) became the AIR, a national register that records vaccinations given to people of all ages in Australia.[25] Also, note that data on adolescents does not include doses given outside the school program.

Notes on interpretation

The data reported here are provisional only, particularly for the fourth quarter of 2016, because of reporting delays and the late onset of some reported AEFIs. Numbers are updated for previous years. The information collated in the ADRS database is intended primarily to detect signals of 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, and the variable quality and completeness of information provided in individual notification reports.[12]

It is important to note that this report is based on vaccine and reaction term information collated in the ADRS database and not on comprehensive clinical notes.

Results

In NSW, there were a total of 632 AEFI records in the ADRS database with a date of vaccination in 2016. Of these, 55% ($n = 345$) were females, 43% ($n = 270$) males and 3% ($n = 17$) missing data. Also, 3% ($n = 22$) were reported in Aboriginal and Torres Strait Islander people.

Of all reports, 36% ($n = 225$) were for children aged less than 7 years and 60% ($n = 380$) were for people aged 7 years and over. Approximately 4% ($n = 27$) had age missing in the database.

Fifty-two per cent ($n = 327$) of AEFIs were reported to the TGA via NSW Health and the remainder were reported directly to the TGA; 27% ($n = 170$) by doctors/other health care providers, 10% ($n = 66$) by members of the public, 8% ($n = 50$) by drug companies and 3% ($n = 19$) by hospitals.

Reporting trends

The overall AEFI reporting rate for 2016 was 8.2 per 100 000 population, compared with 6.7 in 2015.

Figure 1 shows an increase in the reported events and annual reporting rate per 100 000 population during 2016 compared with 2015, and this increase was statistically significant. However, the vast majority of reported events were of a non-serious nature similar to previous years.[8,12,26]

Figures 2a, 2b and 3 demonstrate marked variations in reporting levels in association with previous changes to the NIP from 2000 onwards. The increase in reports in 2016 was predominantly associated with the booster dose of DTPa at 18 months of age (Figures 2a and 2b) and also an increase in reports of AEFI with zoster vaccine in the elderly (Figure 3).

The usual seasonal pattern of AEFI reporting from older Australians receiving 23vPPV and influenza vaccine during the autumn months (March–June) is evident in Figure 3.

Age group and vaccine

Figure 4a shows that the reporting rates were highest in 2–6 year olds during 2016 (44.7 per 100 000 doses, 95% CI 34.7–56.6) and appeared to have increased compared with 2015 (31.0 per 100 000 doses, 95% CI 24.1–39.2), although this increase was not statistically significant. Also, no statistically significant changes were observed in less than 1 year and 1 year olds in 2016 compared with 2015.

Since vaccine dose information was not available for 7 years and over prior to 30 September 2016, population-based AEFI reporting rates were estimated as shown in Figure 4b. There was a 66% increase in reports in the 65 years and older age group during 2016 (7.6 per 100 000 population) compared with 2015 (4.6 per 100 000 population). This increase in those aged 65 years

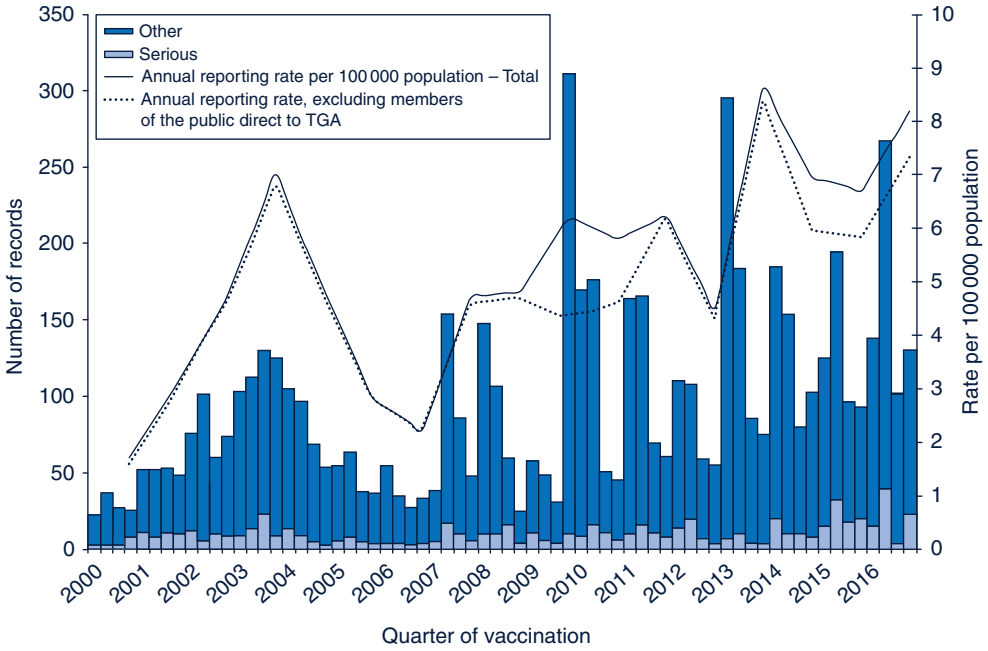

Figure 1. Reports of adverse events following immunisation, NSW, 2000–2016, by quarter of vaccination.

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 Drug Reactions Reporting System database, Therapeutic Goods Administration.

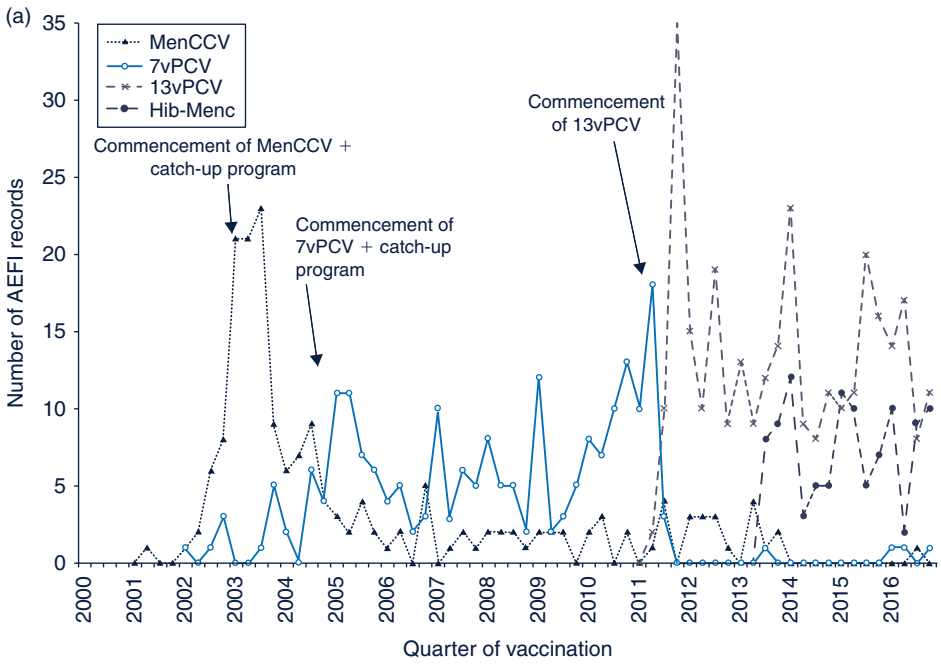

Figure 2a. Adverse events following immunisation in children aged less than 7 years for selected vaccines, NSW, 2016, by quarter of vaccination.

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.

Source: Adverse Drug Reactions Reporting System database, Therapeutic Goods Administration.

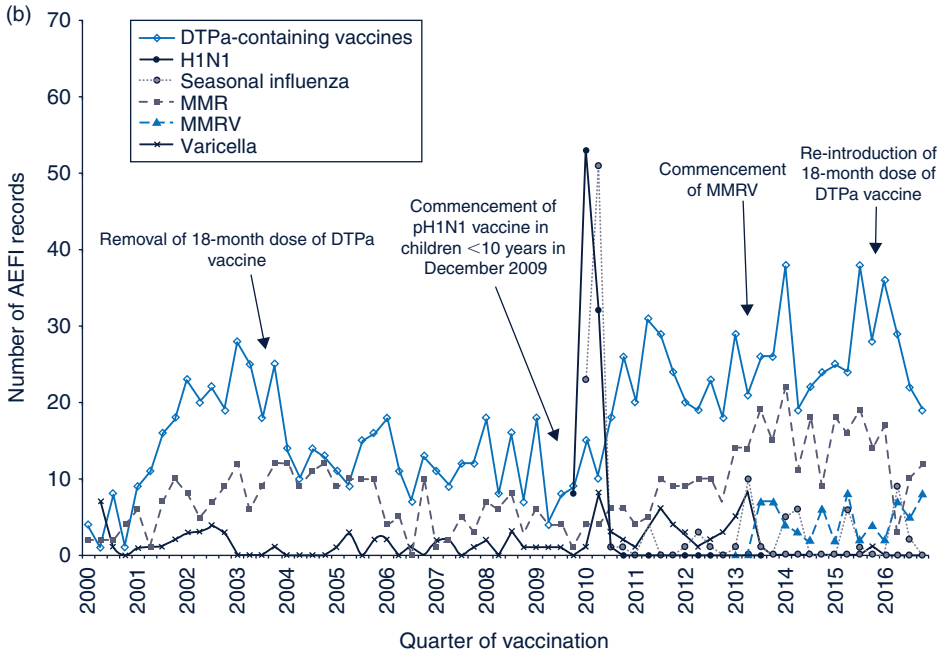

Figure 2b. Adverse events following immunisation in children aged less than 7 years for selected vaccines, NSW, 2000–2016, by quarter of vaccination.

NB: DTPa-IPV was introduced into the NIP schedule in November 2005 replacing DTPa and OPV; seasonal trivalent influenza vaccine was extended to medically at risk children in 2010; MMRV vaccine was introduced on 1 July 2013; re-introduction of 18 month booster dose of DTPa vaccine in April 2016.

Source: Adverse Drug Reactions Reporting System database, Therapeutic Goods Administration.

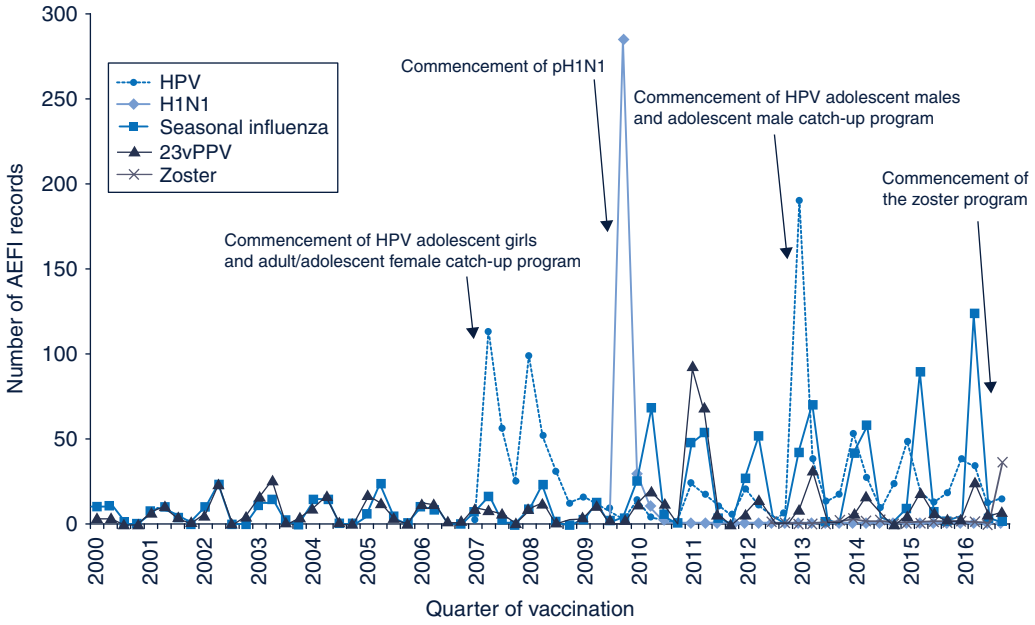

Figure 3. Adverse events following immunisation for people aged ≥7 years in frequently reported vaccines, NSW, 2000–2016, by quarter of vaccination.

Source: Adverse Drug Reactions Reporting System database, Therapeutic Goods Administration.

and older was mainly due to the zoster vaccine (43% of all AEFIs in those aged 65 years and older). There were no significant changes in those aged between 7 years to less than 65 years.

Reporting rates per 100 000 doses in under 7 year olds did not change significantly for any existing vaccine (Table 1). However, DTPa vaccine was recorded in 40 reports and two of these were coded as serious (Table 2). Also, MMRV

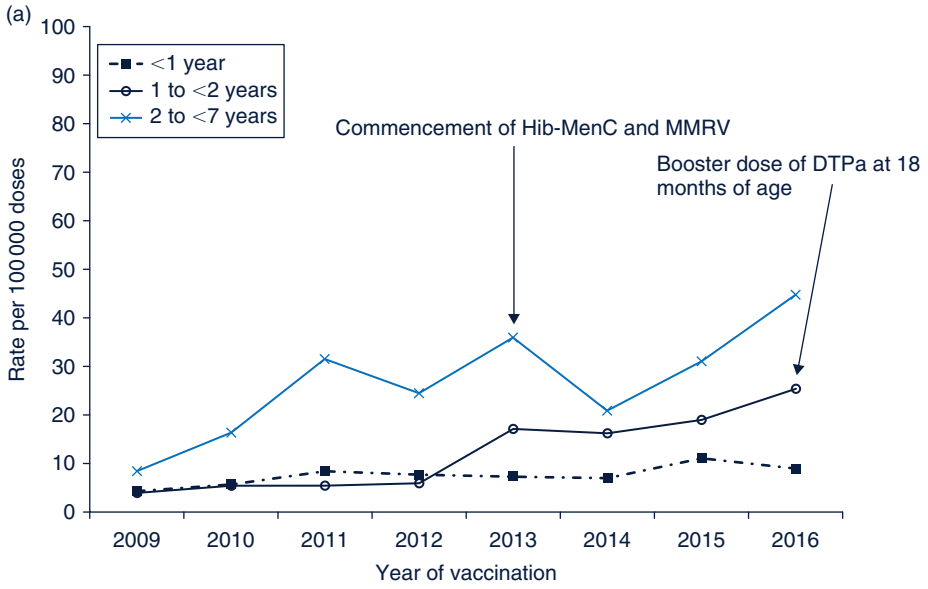

Figure 4a. Reporting rates of adverse events following immunisation for NSW per 100 000 doses, 2009–2016, for people aged less than 7 years, by year of vaccination.

Source: Adverse Drug Reactions Reporting System database, Therapeutic Goods Administration.

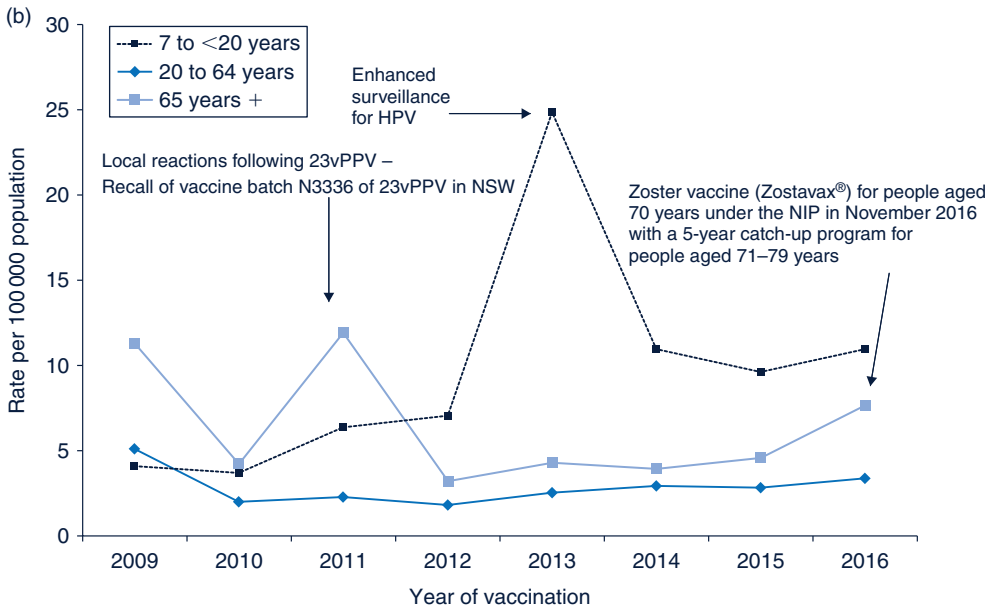

Figure 4b. Reporting rates of adverse events following immunisation for NSW per 100 000 population, 2009–2016, for people aged ≥7 years, by year of vaccination.

Source: Adverse Drug Reactions Reporting System database, Therapeutic Goods Administration.

was recorded in 24 reports and two of these were coded as serious. For those aged over 65 years, zoster was recorded in 38 reports. There was also one report following zoster vaccine in a 63 year old woman and a report with missing age. Overall, as shown in Table 2, the most commonly reported reactions were associated with seasonal influenza (24%), followed by HPV vaccine (16%), dTpa (14%), DTPa-IPV-HepB-Hib (9%), MMR (9%), rotavirus (9%), DTPa (6%) and zoster (6%). Only 13% of all reported adverse events were categorised as serious.

Reactions

The distribution and frequency of reactions listed in AEFI records for 2016 are shown in Table 3. The most frequently reported adverse events were injection site reaction (ISR)

Table 1. Vaccine types listed as 'suspected' in records of adverse events following immunisation (AEFI) for four age groups (<7, 12–17, 18–64 and ≥65 years), NSW, 2016

Vaccines[a]	AEFI records[b] 2016	Serious[c] 2016	Reporting rate per 100 000 doses[d] 2016	
	n	*n*	Rate	(95% CI)
<7 years				
Hexavalent (DTPa-IPV-HepB-Hib)	56	14	20.0	(15.1–25.9)
DTPa-IPV	50	5	49.5	(36.7–65.3)
13vPCV	50	12	17.6	(13.1–23.2)
Rotavirus	50	11	27.3	(20.3–36.0)
Measles–mumps–rubella	42	8	37.7	(27.2–50.9)
DTPa	37	2	50.2	(35.3–69.2)
Hib-MenC	31	5	31.5	(21.4–44.7)
MMRV	22	2	22.8	(14.3–34.6)
Meningococcal B	18	1	–	–
Seasonal influenza[e]	11	0	–	–
12–17 years				
HPV	92	13	41.8	(33.7–51.2)
dTpa	43	5	56.3	(40.8–75.9)
Varicella	29	5	46.5	(31.1–66.7)
Hepatitis B	4	0	–	–
Seasonal influenza[e]	4	1	–	–
18–64 years				
Seasonal influenza[e]	94	14	–	–
dTpa	28	3	–	–
23vPPV	13	1	–	–
MMR	9	1	–	–
Hepatitis B	6	0	–	–
Yellow fever	4	0	–	–
MenC	3	0	–	–
Zoster	1	0		
≥65 years				
Zoster	38	5	–	–
23vPPV	25	1	–	–
Seasonal influenza[e]	32	3	–	–
dTpa	4	0	–	–

[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 2016 and 31 December 2016. 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.
[e]Rates for seasonal influenza are not provided as dose data not reliable/available.
Source: Adverse Drug Reactions Reporting System database, Therapeutic Goods Administration.

($n = 173$), rash ($n = 109$), pyrexia ($n = 107$), vomiting ($n = 51$), pain ($n = 51$) and headache ($n = 50$).

Of the total 173 cases of ISR, the majority ($n = 106$; 61%) were in those aged 7 years and over. Also, more than half of the rashes ($n = 56$) were reported in children aged less than 7 years, while 92% ($n = 47$) of pain and 90% ($n = 45$) of headache was observed in those aged 7 years and over.

There were 13 reported cases of syncope and six cases of presyncope during 2016. Eighty-five per cent ($n = 11$) of cases of syncope and 83% ($n = 5$) of presyncope were reported in persons aged 7 years and older.

There were only five reports of hypotonic-hyporesponsive episode (HHE) and all were reported from children aged less than 7 years.

Furthermore, there were three reported cases of Guillain–Barre syndrome (GBS) during this period. Of the three cases, two cases were reported in adults. The suspected

Table 2. Vaccine types listed as 'suspected' in records of adverse events following immunisation (AEFI), NSW, 2016

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]
Influenza	150	(23.7)	129	(86)	19	(13)	11	(7)	131	(87)
HPV	103	(16.3)	44	(43)	13	(13)	0	(0)	99	(96)
dTpa	86	(13.6)	35	(41)	9	(10)	1	(1)	82	(95)
DTPa-IPV-HepB-Hib	59	(9.3)	7	(12)	14	(24)	56	(95)	3	(5)
MMR	57	(9.0)	13	(23)	10	(18)	42	(74)	14	(25)
Rotavirus	56	(8.9)	13	(23)	13	(23)	50	(89)	0	(0)
DTPa-IPV	55	(8.7)	46	(84)	6	(11)	50	(91)	5	(9)
PCV13	50	(7.9)	2	(4)	12	(24)	50	(100)	0	(0)
23vPPV	41	(6.5)	27	(66)	2	(5)	1	(2)	38	(93)
DTPa	40	(6.3)	22	(55)	2	(5)	37	(93)	3	(8)
Zoster	40	(6.3)	39	(98)	5	(13)	0	(0)	39	(98)
Hib-MenC	34	(5.4)	2	(6)	5	(15)	31	(91)	3	(9)
Varicella	30	(4.7)	7	(23)	5	(17)	0	(0)	30	(100)
MMRV	24	(3.8)	6	(25)	2	(8)	22	(92)	2	(8)
Meningococcal B	19	(3.0)	15	(79)	1	(5)	18	(95)	1	(5)
Hepatitis B	11	(1.7)	3	(27)	0	(0)	0	(0)	11	(100)
MenCCV	8	(1.3)	2	(25)	1	(13)	1	(13)	7	(88)
dT	6	(0.9)	1	(17)	1	(17)	0	(0)	6	(100)
Yellow fever	6	(0.9)	5	(83)	0	(0)	0	(0)	5	(83)
Hepatitis A-Typhoid	4	(0.6)	1	(25)	0	(0)	0	(0)	4	(100)
Hepatitis A	3	(0.5)	1	(33)	1	(33)	0	(0)	3	(100)
Typhoid	3	(0.5)	2	(67)	0	(0)	0	(0)	3	(100)
Rabies	3	(0.5)	2	(67)	0	(0)	0	(0)	3	(100)
Hepatitis A + B	2	(0.3)	0	(0)	0	(0)	0	(0)	2	(100)
Hib	1	(0.2)	0	(0)	0	(0)	1	(100)	0	(0)
Total[d]	632	(100.0)	427	(68)	81	(13)	225	(36)	380	(60)

[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. Influenza was 'suspected' in 150 AEFI records; this was the only suspected vaccine in 86% of the 150 AEFI records,11% were defined as 'serious' and 87% 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 Drug Reactions Reporting System database, Therapeutic Goods Administration.

vaccine was seasonal influenza in these cases and no clear causal relationship with vaccination was found.

Anaphylaxis was reported in only two people, a 13-year-old girl and the other had age missing. The 13-year-old girl had received the third dose of the quadrivalent HPV vaccine and the other person had received a seasonal influenza vaccine. Both of them recovered rapidly following adrenaline administration.

Severity

Only 13% ($n = 81$) of reported events were defined as 'serious' (i.e. recovery with sequelae, requiring hospitalisation, experiencing a life-threatening event or death) in 2016. As shown in Figure 1, the overall percentage of 'serious' events in this reporting period (13%) declined compared with the previous reporting period (17%; $n = 85$).

Reactions recorded as 'serious' were pyrexia ($n = 16$), injection site reaction ($n = 14$), rash ($n = 11$), headache ($n = 6$), dyspnoea ($n = 5$), vomiting ($n = 4$), syncope ($n = 3$), hypotonic hyporesponsive episodes ($n = 3$), anaphylactic reaction ($n = 2$), intussusception ($n = 3$), convulsion ($n = 1$), Guillain-Barre syndrome ($n = 3$) and others as shown in Table 3.

Of the three reported cases of intussusception that were 'serious', two of them had received the second dose of Infanrix hexa, 13vPCV and Rotarix. Also, the three reported cases developed intussusception after 1 day, 8 days and 1 month following their respective vaccinations.

Table 3. Selected reported adverse events and reactions of interest[a] as classified predominantly by MedDRA Preferred Terms in records of adverse events following immunisation (AEFI), NSW, 2016[b]

MedDRA Preferred Terms (Adverse events)	AEFI records	Only reaction 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]	173	80	(46)	14	(8)	66	(38)	106	(61)
Rash[g]	109	39	(36)	11	(10)	61	(56)	45	(41)
Pyrexia	107	3	(3)	16	(15)	54	(50)	50	(47)
Vomiting	51	2	(4)	4	(8)	22	(43)	28	(55)
Pain	51	4	(8)	2	(4)	3	(6)	47	(92)
Headache	50	1	(2)	6	(12)	4	(8)	45	(90)
Nausea	37	0	(0)	5	(14)	2	(5)	37	(100)
Extensive limb swelling	33	16	(48)	0	(0)	18	(55)	15	(45)
Dizziness	29	0	(0)	8	(28)	0	(0)	28	(97)
Diarrhoea	29	0	(0)	3	(10)	14	(48)	14	(48)
Lethargy	28	0	(0)	4	(14)	5	(18)	23	(82)
Urticaria	28	7	(25)	3	(11)	11	(39)	16	(57)
Myalgia	23	1	(4)	1	(4)	0	(0)	23	(100)
Irritability	20	0	(0)	3	(15)	18	(90)	2	(10)
Fatigue	19	1	(5)	2	(11)	2	(11)	17	(89)
Abdominal pain	18	1	(6)	4	(22)	4	(22)	14	(78)
Arthralgia	17	3	(18)	2	(12)	1	(6)	16	(94)
Malaise	17	0	(0)	4	(24)	0	(0)	16	(94)
Chills	16	0	(0)	2	(13)	1	(6)	15	(94)
Dyspnoea	15	1	(7)	5	(33)	1	(7)	13	(87)
Injected limb mobility decreased	14	0	(0)	0	(0)	2	(14)	12	(86)
Syncope	13	5	(38)	3	(23)	1	(8)	11	(85)
Erythema	13	3	(23)	1	(8)	6	(46)	6	(46)
Paraesthesia	12	0	(0)	3	(25)	0	(0)	12	(100)
Hyperhidrosis	11	0	(0)	3	(27)	0	(0)	11	(100)
Pruritus	10	0	(0)	1	(10)	2	(20)	8	(80)
Decreased appetite	10	0	(0)	0	(0)	6	(60)	4	(40)
Cough	9	0	(0)	3	(33)	2	(22)	6	(67)
Swelling face	9	1	(11)	0	(0)	2	(22)	6	(67)
Oropharyngeal pain	8	0	(0)	1	(13)	1	(13)	7	(88)
Pallor	7	1	(14)	3	(43)	3	(43)	4	(57)
Tachycardia	7	0	(0)	4	(57)	1	(14)	6	(86)
Chest discomfort	7	0	(0)	3	(43)	0	(0)	7	(100)
Presyncope	6	2	(33)	1	(17)	1	(17)	5	(83)
Rhinorrhoea	6	0	(0)	1	(17)	4	(67)	2	(33)
Hypotonic-hyporesponsive episodes	5	2	(40)	3	(60)	5	(100)	0	(0)
Somnolence	5	0	(0)	1	(20)	4	(80)	1	(20)
Hypoaesthesia	5	1	(20)	0	(0)	0	(0)	5	(100)
Haematochezia	5	0	(0)	0	(0)	5	(100)	0	(0)
Intussusception	4	3	(75)	3	(75)	4	(100)	0	(0)
Convulsions[h]	4	2	(50)	1	(25)	3	(75)	1	(25)
Crying	4	0	(0)	1	(25)	3	(75)	1	(25)
Guillain–Barré syndrome	3	2	(67)	3	(100)	0	(0)	2	(67)
Anaphylactic reaction	2	1	(50)	2	(100)	0	(0)	1	(50)

[a]Selected adverse events reported during January 2016–December 2016. Note: for injection site reaction, rash and convulsions, Preferred Terms were grouped as described below.
[b]A complete list of adverse reactions as classified by individual Preferred Terms is available on request.
[c]AEFI records where only one reaction was reported.
[d]Not shown if neither age nor date of birth were recorded or missing data.
[e]Percentages relate to the number of AEFI records in which the specific reaction term was listed.
[f]Injection site reaction MedDRA codes include injection site reaction, injection site swelling, injection site pain, injection site mass, injection site erythema, injection site cellulitis, injection site rash, injection site induration, injection site abscess, injection site pruritus, injection site nodule, injected limb mobility decreased, injection site urticaria, injection site inflammation, injection site bruising, injection site infection, and injection site warmth.
[g]Rash MedDRA codes include rash, rash generalised, rash maculo-papular, rash macular, rash vesicular, rash papular, rash morbilliform, and rash pustular.
[h]Convulsion MedDRA codes include convulsion, grand mal convulsion, partial seizures and febrile convulsion.
Source: Adverse Drug Reactions Reporting System database, Therapeutic Goods Administration.

Of these three cases, one case recovered following gas enema, while the other two recovered following surgical intervention.

Indigenous status

Three per cent (22/632) of reported AEFIs were in Aboriginal and Torres Strait Islander people. The majority (82%) of these were recorded as 'not serious'.

Deaths

Two deaths were reported as temporally associated with receipt of vaccines in NSW in this reporting period.

- A 40-year-old man died 2 weeks after receiving a dose of hepatitis A vaccine and a dose of the typhoid vaccine. These vaccines are not included in the NIP. The cause of death was acute disseminated encephalomyelitis (ADEM).
- A 1-year-old boy died a day after receiving the first dose of the MMR vaccine and a dose of the combined Hib-MenC vaccine. The child presented at hospital with prolonged seizures. There was a history of seizures in the family. The cause of death was noted as status epilepticus. The post mortem findings showed the effects of status epilepticus and cardiopulmonary arrest. After a thorough investigation by the TGA the cause was determined to be coincidental to vaccination.

In addition to the above two deaths, two foetal deaths *in utero* were reported in this period:

- A 23-year-old woman at 35 weeks gestation who presented to the emergency department 5 days post administration of the dTpa vaccine. The patient presented with decreased foetal movement and subsequent foetal death *in utero*. Third trimester ultrasound demonstrated small for gestational age foetus with declining asymmetric growth, which indicates an underlying problem was affecting the foetus prior to the vaccination.
- A 32-year-old woman at 36 weeks gestation was given the dTpa vaccine at the antenatal clinic a day before she presented at hospital with lack of foetal movements. Foetal death was confirmed at hospital.

Stillbirth affects around 1 in 200 pregnancies that reach at least 20 weeks gestation in NSW.[27] It is likely that these late fetal deaths were coincidental to vaccination; however, there was not sufficient information available to conduct a causality assessment. In summary, all deaths following immunisation reported to the TGA were investigated by the TGA and based on the information received from reporters, no clear causal relationship with vaccination was found. In some cases this was because no further information was provided by the reporter to allow an assessment of causality. The TGA encourages all reporters to provide sufficient information to allow the TGA to assess any causal relationship between the administration of a vaccine and the adverse event reported.

Discussion

There was a 22% increase in AEFI population-based rates in 2016 compared with the previous reporting period and this increase was statistically significant. This increase appeared to be due to the booster dose of the DTPa at 18 months of age and the zoster vaccine for people aged 70–79 years being funded from 1 November 2016.

From April 2016, the free booster dose of the DTPa was re-introduced at 18 months of age. During this first year of implementation of the program in NSW, there were 40 AEFI reports, although the majority (95%) of the reactions were mild reactions and not serious. This is similar to national vaccine safety data from AusVaxSafety that currently monitors the safety of the 18-month and 4-year diphtheria, tetanus and pertussis vaccines via participants recruited in 156 sentinel surveillance sites nationwide, where there were no safety signals observed for these vaccines during this reporting period.[28]

During 2016, 43% of all AEFIs in those aged 65 years and older were associated with the zoster vaccine. AusVaxSafety also monitored the safety of zoster vaccine and found no safety signal during the first 2 months of the program. In addition, there were no safety signals related to the use of influenza or diphtheria, tetanus, and acellular pertussis-containing (dTpa) vaccines in pregnancy. This is consistent with a number of large studies that have shown no increased risk of adverse pregnancy outcomes attributable to pertussis vaccination.[29,30]

Injection site reaction, rash and pyrexia were the most commonly reported reactions in 2016. Vaccines such as DTPa, DTPa-IPV, MMR, Infanrix hexa and rotavirus had higher reporting rates than other vaccines for children aged less than 7 years in the current reporting period. However, these rates were not significantly higher than the previous reporting period.[26]

Conclusion

Overall, the total number of reported AEFIs increased during 2016 compared with the previous reporting period. The majority of AEFIs 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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