Safety of excess doses of vaccine: Reports from the Vaccine Adverse Event Reporting System (VAERS), 2007 - 2017

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BACKGROUND

- Administration of an excess dose of a vaccine can occur under several scenarios:
  - Administration of an excess dose of the same antigen due to a vaccination error
  - When there is need to provide one of the antigens not readily available as a single antigen (e.g combination vaccines)
  - When there is a need to provide immunizations to individuals with uncertain vaccination histories (e.g, refugees with missing records and unknown immune status).
- Administration of excess antigens contained in a combination vaccine should be avoided in most situations according to the Advisory Committee on Immunization Practices [a]
- Risk for an adverse event (AE) might increase when excess doses are administered at an earlier time than the recommended interval for certain vaccines [e.g., tetanus toxoid vaccines]

[a] Kroger AT, Duchin J, Vázquez M. General Best Practice Guidelines for Immunization. Best Practices Guidance of the Advisory Committee on Immunization Practices (ACIP). www.cdc.gov/vaccines/hcp/acip-recs/general-recs/downloads/general-recs.pdf

OBJECTIVE

- The objective of this study is to describe the characteristics of AEs associated with reports in VAERS where an excess dose of vaccine was administered.

Vaccine Adverse Event Reporting System (VAERS)

Strengths	Limitations
National data	Reporting bias
Rapidly detects safety signals	Inconsistent data quality and completeness
Can detect rare adverse events	Lack of unvaccinated comparison group
Data available to public	Generally cannot assess causality
Accepts reports from anyone	

- VAERS accepts all reports from all reporters without making judgements on causality, irrespective of clinical seriousness
- As a hypothesis generating system, VAERS identifies potential vaccine safety concerns that can be studied in more robust data systems

METHODS

- The VAERS database was searched from 1/1/2007 – 7/31/2017 for:
  - Reports containing any of the following MedDRA PTs: accidental overdose, excess dose administered, incorrect dose administered, multiple drug overdose, overdose , incorrect dosage administered and
  - Reports containing the text string "extra dose""excess dose""overdose" or "additional dose" in the symptom, pre-existing and medical history variables.
- Excess dose of a vaccine was defined as greater than recommended volume, quantity, or dosage of a vaccine which may have been given on the same date or on separate dates
- We conducted descriptive analyses of reports by age, sex, vaccines administered, vaccines given in excess, type of administration error or reason for the excess dose, and the most common MedDRA PTs among reports where an adverse health event was described.

RESULTS

- 366,815 total reports were submitted to VAERS. We detected 5,067 reports of excess doses of vaccine administered
- The proportion of reports of excess dose received increased from 0.8% in 2007 to a peak of 2.4% in 2015
- The vaccine type most commonly associated with these reports (which also peaked during 2015) were inactivated influenza vaccines
- Of the 5,067 reports, 3,898 (76.9%) did not describe an adverse event or any sign or symptom

Table 1. Characteristics of recipients of excess doses of vaccine, VAERS, 1/2007-7/2017

Characteristic	
Median age (range), years	11 (0-98)
	N (%)
No of reports	5067
Serious	158 (3.1)
Reports with no adverse events	3898 (76.9)
Female	1849 (36.5)
Children	2258 (44.6)
Adults	2809 (55.4)

Table 2. Most common vaccines administered in excess reported to VAERS, 1/2007-7/2017

Vaccine	N (%)
Trivalent inactivated influenza	778 (15.4)
Varicella	706 (13.9)
Hepatitis A	579 (11.4)
Measles, mumps, rubella, varicella	561 (11.1)
Varicella zoster	545 (10.8)
Hepatitis B	519 (10.2)
Quadrivalent human papilloma virus	374 (7.4)
Measles, mumps, rubella	359 (7.1)
Pneumococcal polysaccharide vaccine (23-valent)	299 (5.9)
Pneumococcal conjugate vaccine (13-valent)	280 (5.5)

Table 3. MedDRA preferred terms most commonly reported in reports where an excess dose of vaccine was given compared to the rest of the VAERS database, 01/20007-07/2017

MedDRA PT	Excess dose	VAERS database
	N = 1,169 N (%)	N = 301,805 N (%)
Pyrexia	150 (12.8)	44,574 (14.8)
Injection site erythema	113 (9.7)	48,767 (16.2)
Injection site pain	104 (8.9)	33,183 (11.0)
Headache	77 (6.6)	24,455 (8.1)
Injection site swelling	76 (6.5)	36,419 (12.1)
Pain in extremity	75 (6.4)	24,375 (8.1)
Pain	69 (5.9)	29,143 (9.7)
Vomiting	61 (5.2)	16,824 (5.6)
Nausea	52 (4.4)	18,997 (6.3)
Dizziness	51 (4.4)	1,221 (6.4)
Fatigue	50 (4.3)	14,836 (4.9)
Cough	46 (3.9)	5,707 (1.9)

SUMMARY

- Excess dose of vaccine accounted for 5,067 (1.4%) reports among 366,815 reports received during a 10 year period
- Trivalent inactivated influenza, varicella, hepatitis A and measles, mumps, rubella, varicella were the most common vaccines associated with these reports
- 3,898 (76.9%) of 5,067 did not describe an adverse event
- The most common MEdDRA PTs for all reports of excess dose of vaccine where systemic (e.g. fever) or local injection site reactions

CONCLUSIONS

- No new or unexpected adverse event were associated with reports of excess dose of vaccine
- In some circumstances the following actions may help in preventing these vaccination errors:
  - Querying patients about vaccination history especially with influenza vaccine
  - Better awareness of specific vaccine recommendations,
  - Improved documentations in the medical record and timely access to vaccination

CONTACT INFORMATION

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