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# Syncope After Vaccination --- United States, January 2005--July 2007

Syncope (vasovagal reaction), or fainting, can be triggered by various stimuli, including medical procedures (*1--3*). Syncope has been documented to occur after vaccination, most commonly among adolescents, and can result in hospitalization for a medical evaluation or because of injury (*2,4*). During 2005 and 2006, the Advisory Committee on Immunization Practices (ACIP) recommended use of three newly licensed vaccines for adolescents*: the quadrivalent human papillomavirus recombinant vaccine (HPV) (Gardasil®, Merck & Co., Inc., Whitehouse Station, New Jersey) in a 3-dose series, the quadrivalent meningococcal conjugate vaccine (MCV4) (Menactra®, Sanofi Pasteur, Inc., Swiftwater, Pennsylvania) in a single dose, and the tetanus toxoid, reduced diphtheria toxoid, and acellular pertussis vaccine (Tdap) (Adacel®, Sanofi Pasteur; Boostrix®, GlaxoSmithKline Biologicals, Research Triangle Park, North Carolina) in a single dose. To describe trends in occurrence of postvaccination syncope, CDC and the Food and Drug Administration (FDA) analyzed data from the Vaccine Adverse Event Reporting System (VAERS) for January 1, 2005--July 31, 2007, and compared the results with VAERS reports received during January 1, 2002--December 31, 2004. The findings indicated that, since 2005, reports to VAERS regarding postvaccination syncope have increased, primarily among females aged 11--18 years, and rarely, subsequent serious injuries have occurred. To prevent syncope-related injuries, vaccine providers should follow the ACIP recommendation to strongly consider observing patients for 15 minutes after vaccination (*4*).

VAERS, a passive surveillance system operated jointly by FDA and CDC, receives reports of vaccine adverse events (VAEs) and is designed to generate, not test, vaccine-safety hypotheses (*5*).† Detecting new or rare VAEs, monitoring trends in known adverse events, and identifying risk factors for particular types of VAEs are the primary objectives of VAERS (*5*). Reports included in this analysis were those received by VAERS during January 1, 2005--July 31, 2007, that had VAEs coded as "syncope" or "syncope

vasovagal," on the basis of coding terms from the *Medical Dictionary for Regulatory Activities* (MedDRA®).§ Reports to VAERS typically involve multiple coding terms. Because vasovagal reactions have a relatively rapid onset and syncope is less likely to occur in young children, only reports of persons who had syncope onset after vaccination on the same date and were aged ≥5 years at the time of vaccination were included in the analysis. Persons with either unknown age or unknown date of syncope onset were excluded.

The rate of reports for postvaccination syncope was calculated by dividing the total number of reports by the net number of doses of vaccine distributed in the United States each year (CDC, unpublished data, 1991--2006). Patient characteristics, including age, sex, and vaccines received, were compiled. To assess trends, these variables were compared with VAERS reports of syncope during January 1, 2002--December 31, 2004. Adverse events were defined as serious if one or more of the following patient outcomes were indicated in the report: death, life-threatening illness, hospitalization, prolonged hospitalization, or permanent disability. For each serious event, the narrative descriptions of VAEs and medical records were reviewed by CDC medical officers to validate the diagnosis of syncope, determine the interval between vaccination and onset in minutes, and identify any syncope-related injuries.

Following are selected case reports of postvaccination syncope in adolescents.

**Case 1.** A girl aged 13 years fainted within 10 minutes of receiving HPV and MCV4 vaccinations. She fell backward and hit her head on the carpeted floor of the clinic. The girl was admitted to the pediatric intensive-care unit because of skull fractures and subarachnoid hemorrhage. When VAERS contacted her approximately 6 months after the injury, she had recovered completely.

**Case 2.** A girl aged 16 years felt dizzy and had pallor within 5 minutes of receiving an HPV vaccination. While being escorted back to an examination room, she fainted, but the physician caught her as she fell. She was observed for 30 minutes in the clinic and recovered completely.

A total of 463 reports of postvaccination syncope during January 1, 2005--July 31, 2007 (Figure), were identified among persons aged ≥5 years, compared with 203 reports during 2002--2004. The rate of reports for postvaccination syncope among persons aged ≥5 years were as follows: 0.30 reports per million doses distributed in 2002, 0.35 per million doses distributed in 2003, 0.28 per million doses distributed in 2004, 0.31 per million doses distributed in 2005, and 0.54 per million doses distributed in 2006.¶ Compared with reports received during 2002--2004, those received during 2005--2007 were more likely to involve females (61.1% versus 77.5%) or persons aged 11--18 years (47.3% versus 62.0%) (Table). In 292 (63.1%) of the 463 reports during 2005--2007, syncope was associated with at least one of the following recently approved and recommended adolescent vaccines: MCV4, Tdap, and HPV.

Thirty-three (7.1%) of the 463 postvaccination syncope reports during 2005--2007 were coded as serious (Table); the percentage was not substantially different from the corresponding 20 (9.9%) serious reports during the earlier comparison period. After clinical review, seven of the reports coded as serious were excluded because they were either not compatible with the diagnosis of syncope (n = 4) or did not meet the criteria of seriousness (n = 3); 26 reports of serious adverse events were analyzed further. The 26 patients ranged in age from 11 to 84 years (median: 18 years), and 20 (76.9%) were female. Similar to the findings for syncope reports overall, females aged 11--18 years accounted for the largest number of serious syncope reports (n = 11 [42.3%]). Among the 23 patients for whom times of vaccination and syncope onset were indicated, 12 (52.2%) occurred within 5 minutes of vaccination, and 16 (69.6%) occurred within 15 minutes. Ten of the 26 serious reports indicated that secondary injuries occurred after syncope, including head injuries (n = 9) after syncope-related falls and a motor-vehicle incident (n = 1) because the patient lost consciousness while driving. Seven (70.0%) of the 10 secondary injuries occurred within 15 minutes of vaccination.

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## Editorial Note:

During 2005--2007, ACIP decided to add several newly licensed adolescent vaccines to the routine immunization schedule and the Vaccines for Children Program. After these vaccines were licensed and recommended for use, the number of postvaccination syncope reports to VAERS increased, primarily among females aged 11--18 years. Although only 7% of the reports met the criteria for being classified as serious, potentially life-threatening injuries after postvaccination syncope were described, and one fatality was documented, resulting from intracranial hemorrhage caused by head trauma in a boy aged 15 years (*7*). ACIP and the American Academy of Pediatrics have published recommendations to prevent postvaccination syncope and related injuries (Box) (*4*,*8*). These preventive strategies apply to all ages and all types of vaccines. However, the observed increase in postvaccination syncope and secondary injuries suggests that adherence to the 15-minute postvaccination observation period and its efficacy in preventing syncope-related injuries should be evaluated systematically.

The findings in this report are subject to at least four limitations. First, because of underreporting and lack of age-specific data on vaccine doses administered, the rates calculated from VAERS data do not represent the actual incidence rates of postvaccination syncope. The rates might be underestimated in this report because the

denominators used in the analysis were calculated from vaccine doses distributed, not doses administered, and syncope reports were excluded for children aged <5 years, the population that receives the majority of vaccine doses. Second, hypotheses generated from VAERS need additional clinical and epidemiologic analysis (*5*). Although this report indicates that vaccines most commonly noted in VAERS syncope reports are universally recommended for adolescents, this age group also has a higher background rate of syncope than other age groups (*9*). The predominance of female patients in syncope reports could reflect an actual difference in the occurrence of syncope between the sexes (*9*). However, this predominance also could be a result of reporting bias; the currently licensed HPV was recommended in a 3-dose series for females only, and MCV4 and Tdap were each recommended for single-dose use in both sexes. Third, MedDRA coding terms might not accurately reflect the diagnosis of syncope. The number of postvaccination syncope reports might be either underestimated because certain syncope episodes might also be categorized as seizures or convulsions (*2*) or overestimated because certain near-syncope or nonsyncope reports might be misclassified as syncope. Finally, clinical details of nonserious reports were not reviewed; for example, although current recommendations suggest a 15-minute postvaccination observation period, data regarding distribution of minutes of time lapsed from vaccination to syncope were not reviewed for nonserious reports.

All providers administering vaccinations should be aware of the potential for syncope after vaccination and should take appropriate measures to prevent potential injuries. If syncope develops, patients should be observed until symptoms resolve. In accordance with ACIP recommendations, providers should strongly consider observing patients for 15 minutes after they are vaccinated (*4*).

## References


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* Additional information available at http://www.cdc.gov/vaccines/recs/acip/meetings.htm#min.

† Reports to VAERS can be made by anyone, including health-care providers, health departments, vaccine manufacturers, and members of the public. Any clinically significant adverse events after vaccination can be reported; no confirmed causal relationship to vaccination is required. Limited mandated reporting exists for health-care providers; however, vaccine manufacturers are required to report all adverse events that have been reported to them. Typically, such reports to manufacturers originate from health-care providers. Published studies indicate that underreporting to VAERS varies but that events judged by the reporter to be serious are more likely to be reported (*6*).

§ Available at http://www.meddramsso.com/mssoweb/index.htm. Narrative descriptions of VAEs are coded using MedDRA coding terms.

¶ 2007 data not yet available.

## Table

**TABLE. Number and percentage of postvaccination syncope* episodes reported to the Vaccine Adverse Event Reporting System, by selected characteristics — United States, January 1, 2002–July 31, 2007**

| | 2002–2004 (N = 203) | | 2005–2007 (N = 463) | |
|---|---|---|---|---|
| **Characteristic** | **No.** | **(%)** | **No.** | **(%)** |
| **Sex** | | | | |
| Female | 124 | (61.1) | 359 | (77.5) |
| Male | 79 | (38.9) | 96 | (20.7) |
| Unknown | 0 | (0.0) | 8 | (1.8) |
| **Age group (yrs)** | | | | |
| 5–10 | 24 | (11.8) | 32 | (6.9) |
| 11–18 | 96† | (47.3) | 287§ | (62.0) |
| 19–49 | 59 | (29.1) | 114 | (24.6) |
| 50–64 | 13 | (6.4) | 12 | (2.6) |
| ≥65 | 11 | (5.4) | 18 | (3.9) |
| **Severity** | | | | |
| Serious | 20 | (9.9) | 33 | (7.1) |
| Nonserious | 183 | (90.1) | 430 | (92.9) |

* Including persons aged ≥5 years who had syncope onset interval after vaccination on the same date.
† Females: 49 (24.1%); males: 47 (23.1%).
§ Females: 229 (50.3%); males: 58 (12.7%).

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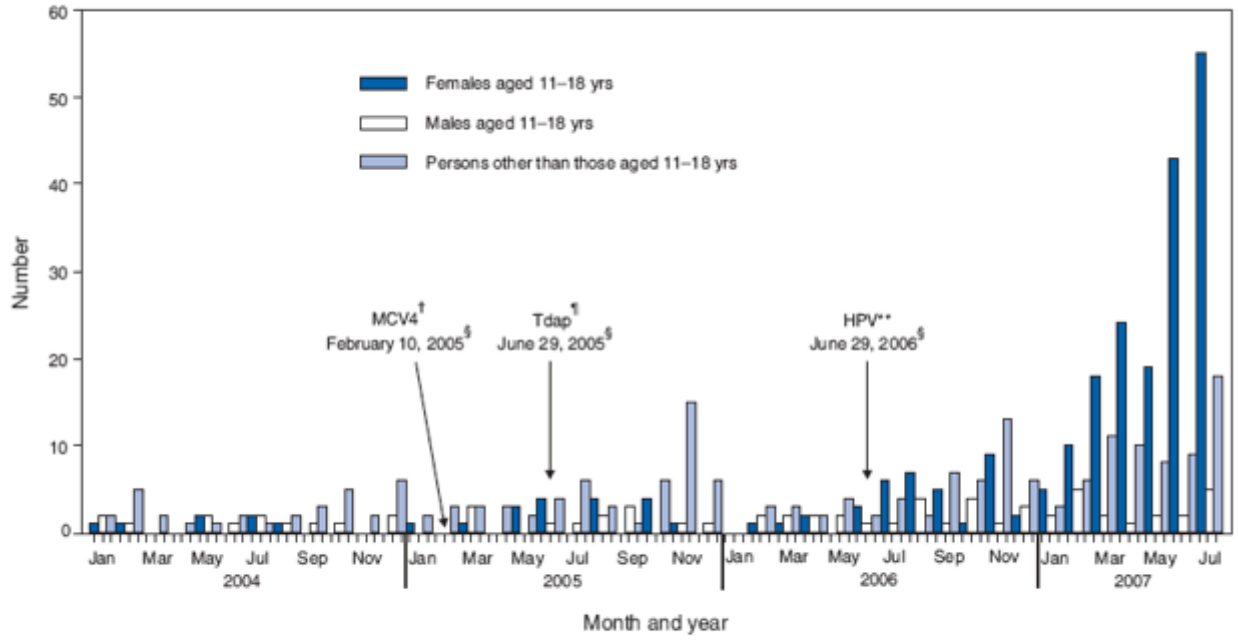
## Figure

**FIGURE. Number of postvaccination syncope* episodes reported to the Vaccine Adverse Event Reporting System, by month and year of report — United States, January 1, 2004–July 31, 2007**




* Includes persons aged ≥5 years who had syncope onset after vaccination on the same date.
† Meningococcal conjugate vaccine.
§ Date on which the Advisory Committee on Immunization Practices decided to add this newly licensed adolescent vaccine to the Vaccines for Children Program.
¶ Tetanus toxoid, reduced diphtheria toxoid, and acellular pertussis vaccine.
** Quadrivalent human papillomavirus recombinant vaccine. HPV is licensed only for females.

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**Box**

**BOX. Recommendations and guidance on preventing post-vaccination syncope and secondary injuries**

- Vaccine providers should strongly consider observing patients for 15 minutes after they are vaccinated. If syncope develops, patients should be observed until symptoms resolve.*
- Personnel should be aware of presyncopal manifestations and take appropriate measures to prevent injuries if weakness, dizziness, or loss of consciousness occurs. The relative rapid onset of syncope after vaccination in most persons suggests that having vaccine recipients sit or lie down for 15 minutes after vaccination could prevent many syncopal episodes and secondary injuries. If syncope develops, patients should be observed until symptoms resolve.†

* CDC. General recommendations on immunization: recommendations of the Advisory Committee on Immunization Practices. MMWR 55(No. RR-15); 2006.
† American Academy of Pediatrics. Active immunization. In: Pickering LK, ed. 2006 red book: report of the Committee on Infectious Diseases. 27th ed. Elk Grove Village, IL: American Academy of Pediatrics; 2006.

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