Rates of 4:3:1 vaccination among U.S. children aged 19–35 months, National Health Interview Surveys, 2002–2003

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In the United States vaccination programs that target infants and children have dramatically reduced the incidence of many vaccine-preventable diseases. Until 1995 children 2 years of age were recommended to receive four doses of combined diphtheria/tetanus/pertussis vaccine (DTP), three doses of poliovirus vaccine (polio), and one dose of combined measles/mumps/rubella vaccine (MMR). All of these vaccinations together are referred to as the 4:3:1 vaccination series (1).

Prior to 1995 the National Health Interview Survey (NHIS) was used to assess national immunization coverage. The NHIS is a survey conducted by the National Center for Health Statistics (NCHS) of the Centers for Disease Control and Prevention (CDC), which provides the primary source of information on the health of the U.S. population. Trained interviewers collect this information continuously throughout the year with in-person interviews of over 100,000 individuals of all ages from approximately 40,000 households. Information about children under 18 years is collected by proxy from knowledgeable adults. If vaccination records are available from the proxy respondent, data are abstracted from the record. If such records are not available, information is based on the proxy report of a knowledgeable adult in the household. The NHIS estimates that in 1992, 55.3 percent of the children aged 19–35 months had received the 4:3:1 series. By 1993 that had increased to 67.1 percent (2).

In 1995 the National Immunization Program and NCHS began the National Immunization Survey (NIS), which obtains information about immunization coverage from provider records. Although the inclusion of medical provider data improves the accuracy and precision of national immunization estimates, data from the NIS are not available for years prior to 1995.

To allow comparison of current rates of vaccination to rates from 1992 and 1993, we considered only 4:3:1 vaccination for DTP, polio, and MMR. Data analyses were based on 1,893 children aged 19–35 months from the 2002 NHIS and 934 children aged 19–35 months from the 2003 NHIS. Vaccination with a combination DTP-Haemophilus influenzae type b (Hib) shot was considered to satisfy the recommendation for DTP vaccination. Weighted point estimates and estimates of their variances were calculated using SUDAAN, a software package that can account for the complex sample design of the NHIS.

Based on data from the immunization module of the 2002 and 2003 NHIS, 76.0 percent and 80.6 percent, respectively, of children aged 19–35 months had received the recommended 4:3:1 vaccination series for DTP, polio, and MMR. Table 1 contains these estimates and their 95 percent confidence intervals. The differences between the estimates for 2002 and 2003 were statistically significant at an α level of 0.05. More information about the NHIS can be found at the NHIS Website.

For 2002 and 2003 the NIS reports 78.5 percent and 82.2 percent coverage, respectively, for 4:3:1; these are believed to be the most accurate and precise estimates available (3,4). Additional information about the NIS may be viewed at the NIS Website.

Data from the NIS and NHIS are not directly comparable because methods differ. Although NHIS results are limited by the omission of medical provider records, they are comparable to the 1992 and 1993 results for the 4:3:1 series, but NIS results are not.

With the development of new vaccines for previously nonpreventable diseases, the recommended vaccination schedule has grown. The most commonly reported vaccine series now is the 4:3:1:3:3 series, which is the same as 4:3:1 plus three doses of Hib vaccine and three doses of hepatitis B (HepB) vaccine. Other recommended vaccines, not yet part of the series but included in the current childhood schedule, include varicella vaccine, pneumococcal conjugate vaccine, influenza vaccine, and, for children who are at the most risk for hepatitis A, hepatitis A vaccine (5).

References

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Table 1. Percentage of children aged 19–35 months with 4:3:1 vaccination series in the United States, National Health Immunization Survey

	National Health Interview Survey	National Immunization Survey
Year	Percent (95% confidence interval)	
2002	76.0 (73.4–78.6)	78.5 (76.5–80.46)
2003	80.6 (77.3–83.9)	82.2 (81.22–83.18)

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