

S C I E N T I F I C C O N T R I B U T I O N S

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Estimating Vaccination Coverage Using Parental Recall, Vaccination Cards, and Medical Records

S Y N O P S I S

Objective. To compare estimates based on vaccination cards, parental recall, and medical records of the percentages of children up-to-date on vaccinations for diphtheria, tetanus, and pertussis; polio; and measles, mumps, and rubella.

Method. The authors analyzed parent interview and medical records data from the Baltimore Immunization Study for 525 2-year-olds born from August 1988 through March 1989 to mothers living in low-income Census tracts of the city of Baltimore.

Results. Only one-third of children had vaccination cards; based on medical records, these children had higher up-to-date coverage at 24 months of age than did children without cards. For individual vaccines, only two-thirds of parents could provide information to calculate coverage rates; however, almost all provided enough information to estimate coverage for the primary series. For each vaccine and the series, parental recall estimates were at least 17 percentage points higher than estimates from medical records. For children without vaccination cards whose parents could not provide coverage information, up-to-date rates based on medical records were consistently lower than for children with cards or with parents who provided coverage information.

Conclusions. Population-based vaccine coverage surveys that rely on vaccination cards or parental recall or both may overestimate vaccination coverage.

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Until 1985, national estimates of vaccination coverage were based solely on parental recall.¹ However, since 1991, concern over the accuracy of recall has led to more frequent use of both parent-held vaccination cards and audits of medical records. The National Health Interview Survey (NHIS), conducted annually by the Centers for Disease Control and Prevention, now uses vaccination cards when available; only if a child does not have a card is the parent asked to recall vaccinations. Even then, the vaccination coverage of some children is double-checked against their medical records to improve the accuracy of the data.²⁻⁴

Despite concerns, little has been published on whether recall is less accurate than vaccination cards and medical record audits. Studies from the United Kingdom suggest that before a national effort was put in place to improve vaccination coverage medical records were less accurate than recall³ or only slightly more accurate than recall and cards combined.⁵

Our objective was to look at agreement among vaccination cards, parental recall, and medical records for children at age two years. How well do these data sources agree in measuring the coverage of individual children and populations? We studied an inner-city population using data from each source to create separate coverage estimates for diphtheria vaccine, tetanus toxoid, and pertussis vaccine (DTP); oral polio vaccine (OPV); measles, mumps and rubella vaccine (MMR); and the 4:3:1 series of four doses of DTP, three doses of OPV, and one dose of MMR. This was the primary series recommended by the American Academy of Pediatrics for the study's birth cohort.⁶

METHODS

Data for this analysis come from the Baltimore Immunization Study (BIS) conducted by Guyer et al. in 1991-1992.^{7,8} Children eligible for this community-based study were born from August 1, 1988, through March 31, 1989, to women residing in the 57 Census tracts of Baltimore in which at least 50% of the resident births in 1987 were to mothers eligible for Medicaid.

From the eligible children, the BIS first excluded children who weighed less than 500 grams at birth, children who had died, and children who had been adopted prior to the survey. From the remaining 2489 eligible children, 1100 were then randomly selected. By the survey termination date, the primary caregiver (henceforth referred to as the parent) of 735 children had been located and 557 had been interviewed. The study found

no significant differences in maternal age, "race," and marital status between children whose parents were interviewed and those whose parents were located but not interviewed.⁷

Trained interviewers conducted in-home interviews between November 1991 and April 1992. Prior to the home interview, parents were asked to locate their child's vaccination card(s). If the card was available, the interviewer made note of the dates and types of vaccinations. If the card was unavailable, parents were asked to recall each vaccination the child had received by age 2 years. Consistent with NHIS methodology, the parent could state the number of doses for each vaccine received or report "Do not know the number but know the child is up-to-date" or "Do not know the number or whether the child is up-to-date." For the 4:3:1 series, parents were asked if the child was up-to-date for baby shots by 24 months of age. Parents could respond yes, no, or "do not know."

Finally, each parent was asked to name all outpatient providers used by the child since birth. Written informed consent to review their children's medical records was granted for 546 (98%) of the children. Trained auditors collected data for 525 of the 546 children.

Data analysis. For the present study, we calculated vaccine coverage for DTP, OPV, MMR, and the 4:3:1 series for the following groups of children:

1. *Vaccination card subset:* children for whom cards were available at interview.
2. *No vaccination card subset:* children for whom cards were not available, further divided for each type of vaccine into:
 - a. *Parental recall subset:* children in the "no vaccination card" subset whose parents stated the number of doses received of a given vaccine *or* said they were up-to-date for the vaccine.
 - b. *Do not know subset:* children in the "no vaccination card" subset whose parents could not remember the number of doses or whether the child was up-to-date.

For this analysis, we defined up-to-date by age 2 years for DTP as having received four doses, for OPV as having received three doses, and for MMR as having received one dose—regardless of the intervals between doses. We considered children who had received four doses of DTP, three doses of OPV, and one dose of MMR by age 2 years as up-to-date for the 4:3:1 series, regardless of the intervals between doses.