

Determining Immunization Rates for Inner-City Infants: Statewide Registry Data vs Medical Record Review

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ABSTRACT

Objective. This study evaluated the benefit of consulting a statewide immunization registry for inner-city infants whose immunizations appeared, after single-site chart review, to have been delayed.

Methods. We prospectively enrolled 315 newborns in 3 inner-city pediatric clinics. When the infants turned 7 months old, we obtained immunization data from clinic charts and the state registry.

Results. On the basis of chart review, 147 infants (47%) were assessed to be delayed in their immunizations; of these, registry data revealed that 28 (19%) had received additional immunizations and 15 (10%) were actually up to date.

Conclusions. A statewide registry can capture immunizations from multiple sources, improving accurate determination of immunization rates in a mobile, inner-city population. (*Am J Public Health*. 2000;90:1613–1615)

Recent efforts to increase immunization rates among the nation's children have been successful; in 1998, rates of up-to-date immunization were at an all-time high.¹ To properly focus efforts to achieve complete immunization for all children, accurate assessment of rates is essential. Proper identification of children whose immunizations are delayed can ensure that outreach is used only when needed.

The current "gold standard" for estimating immunization rates, parent-linked and provider-validated immunization status, is labor-intensive and requires multiple telephone contacts for each child.² For inner-city children who move frequently and have no telephone, this method may be even more problematic. Less rigorous methods, such as parent-held records and single-site chart review, tend to underestimate rates.²⁻⁵

One method that holds promise for accurate assessment is the use of centralized, population-based registries. A state registry incorporating a tracking and outreach component can capture immunizations given by every pediatric provider in the state and can identify and refer children in need of immunization services. State registries have been found to be more useful than parent-held vaccination cards in determining immunization rates, but, to our knowledge, comparisons with chart review have not been published.⁶

In this study, we attempted to answer the clinical question "What is the value of consulting the state immunization registry for inner-city infants who appear to have delayed immunizations after single-site chart review?" We report on the benefit gained from using the registry in assessing immunization rates and the impact of the mobility of inner-city infants on their immunization rates.

Methods

Subjects

We prospectively enrolled 315 newborn infants at 3 primary care sites in Hartford,

Conn, between October 1997 and May 1998. These sites, staffed by University of Connecticut pediatric faculty and residents, serve more than 80% of Hartford's Medicaid population. Subjects were infants whose parents had enrolled in an educational intervention study; eligible for the study were all infants younger than 1 month, presenting for their first well-child visit, who were enrolled in the Connecticut Immunization Registry and Tracking System (CIRTS) and whose parents spoke English or Spanish. The parent completed a demographic questionnaire. Compared with all 1997 births to Hartford residents, the study included a larger proportion of Hispanic infants (56% vs 47%) and a smaller proportion of Black infants (29% vs 38%).

Medical Record Data Generation

When each infant turned 7 months of age, the medical record at the site of enrollment was reviewed for immunization dates. Although criteria for delay vary between studies, the Centers for Disease Control and Prevention (CDC) defines an infant as incompletely immunized if he or she has not received 3 diphtheria-tetanus-pertussis (DTP) doses, 3 *Haemophilus influenzae* type b (Hib) doses, 2 polio doses, and 2 hepatitis B doses by 7 months of age (Lance Rodewald, MD, CDC, oral communication, May 1997). For infants who appeared to be delayed in their immunizations, provider

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changes and immunizations given by other providers were gathered from the CIRTS.

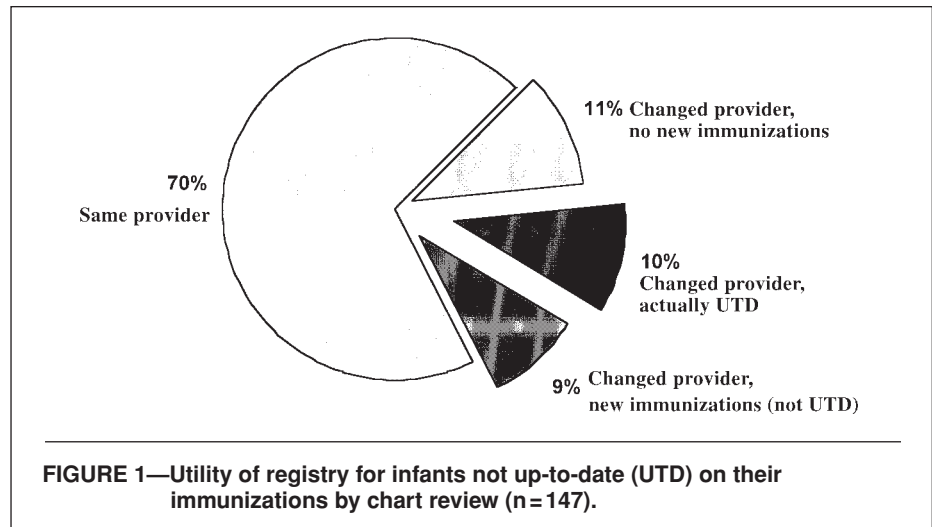
Registry Data Generation

CIRTS, which began operation in Hartford in 1994, now tracks 78% of Connecticut newborns, including 97% with Medicaid insurance. In Hartford, 94% of all newborns are enrolled. In August 2000, software problems still prevented statewide enrollment of all newborns, but these problems were expected to be resolved during the next few months. By state law, enrollment is mandatory at birth unless a parent refuses, and reporting of all immunizations is required of every child health provider in the state.

Immunization information is submitted by providers either electronically at the point of service or by submission of paper billing forms or immunization history forms. Each month, Medicaid insurers provide data on provider and client demographic changes. If at 7 and 19 months of age a child appears not to be fully immunized according to the American Academy of Pediatrics/Advisory Committee on Immunization Practices schedule, the medical record at each site where the child has received care is reviewed and CIRTS data are updated on the basis of this information. The child's family is also contacted for additional information. With aggressive outreach, about 90% of enrolled infants are successfully tracked.

Comparison of Data

For the cohort, differences in percentages of age-appropriate immunization and in total immunizations given, as determined by each



method, were assessed and 95% confidence intervals for the differences were calculated. The difference in the immunization rate between infants who had changed providers and those who had not was compared by means of the Pearson χ^2 test.

Results

The demographic characteristics of the cohort reflect the poor, young, non-White population of Hartford (Table 1). Of the 315 infants enrolled, chart review at the site of enrollment revealed that 168 (53%) were fully immunized. Registry data were available for all of the remaining 147 infants (Figure 1). Of these, 44 (30%) had changed providers during their first 7 months of life, 28 (19%; 95% confidence interval [CI]=13%, 25%) had been

given additional immunizations by those providers, and 15 (10%; 95% CI=5%, 15%) were actually up-to-date on their immunizations. As a result of registry data, the up-to-date immunization rate for the entire cohort changed from 53% before registry review to 58% after review (95% CI=56%, 61%).

The immunization rate of infants who had changed providers during their first 7 months of life was approximately one half that of infants who had kept the same provider (32% vs 62%), with a relative risk for immunization delay of 1.81 (95% CI=1.41, 2.33; $P=.0001$).

Discussion

The CIRTS immunization registry was one of the first to incorporate virtually the entire Medicaid birth cohort into its database. According to the methodology used by the registry, all differences in immunization records between our chart review and final registry data occur among infants seen by multiple providers. Even for infants in the first 7 months of life, the tendency of families in our population to change providers can make a registry and tracking system essential for accurate determination of immunization rates. If used appropriately, registry data can decrease the number of unnecessary immunizations of children that are erroneously thought to be delayed and focus outreach efforts on children whose immunizations are truly delayed. Providers can help by encouraging families to maintain continuity during this critical period, when infants receive the bulk of their immunizations.

Several limitations should be kept in mind in interpreting these data. Since 7 months is 1 of 2 "target ages" for record review, tracking, and outreach in our registry, data at 7 months are likely to be more complete than data at other ages. The registry also cannot record immunizations not recorded by providers or im-

TABLE 1—Demographics of Families in Study of Inner-City Infant Immunization Rates: Hartford, Conn, October 1997–May 1998

No. families	315
Maternal age, y, mean \pm SD	22.4 \pm 5.4
Birth order of child, mean \pm SD	2.0 \pm 1.2
Maternal education, mean level \pm SD ^a	1.7 \pm 0.8
Insurance type, %	
Medicaid	85.7
Self-pay (no insurance)	9.2
Private/other	5.1
Marital status, %	
Single	77.1
Married	15.2
Other/unknown	7.7
No. other children in house, mean \pm SD	1.3 \pm 1.6
Reported ethnicity, %	
Hispanic	55.6
African American	28.9
White	4.1
Mixed/other/unknown	11.4

^aCode: 1 = less than high school education, 2 = high school graduate, 3 = some college, 4 = college graduate or higher.

munizations given by providers who are not identified by parents or insurers as the child's provider. Children moving out of state cannot be tracked, and their immunizations may erroneously appear to be delayed. As state registries mature, linkages across states should be undertaken. At present, however, full implementation of registries in all states and territories is the primary goal.

Contributors

C. J. Stille conceived the study, directed patient enrollment and data collection, collected the majority of the data, analyzed the data, and wrote the first draft of the paper. J. Christison-Lagay advised on study design, facilitated the collection of the registry data, and helped write the intermediate and final versions of the paper.

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