Time Spent by Primary Care Practices on Pediatric Influenza Vaccination Visits

Implications for Universal Influenza Vaccination

Peter G. Szilagyi, MPH, MD; Marika K. Iwane, MPH, PhD; Sharon E. Humiston, MPH, MD; Stanley Schaffer, MS, MD; Thomas McInerny, MD; Laura Shone, MSW; Jacqueline Jennings, RPA-C; Michael L. Washington, PhD; Ben Schwartz, MD

Objective: To measure the time currently spent by primary care practice personnel, and the examination room occupancy time for childhood influenza vaccination visits, to assess the practicality of annual influenza vaccination of all preschool children.

Setting: Seven primary care practices serving one fourth of the children living in Rochester, NY.


Methods: Using a standardized protocol, practice staff measured the time spent on check-in, nurse or physician examination, and the actual influenza vaccination process. Waiting and “hands-on” times were determined, as well as total visit and room occupancy times. Nonparametric tests and multivariable models were used to analyze the time spent for components of the visits and to compare time spent by different age groups and practice types (suburban or urban).

Results: The median duration of the influenza vaccination visit was 14 minutes (25th to 75th percentiles range, 9-25 minutes) across the 7 practices, with visits to urban practices being longer (22 minutes) than visits to suburban practices (9 minutes). Eighty percent of patient time involved waiting, primarily in examination rooms. The major components of influenza vaccination visits included waiting room time (4 minutes in suburban practices vs 8 minutes in urban practices; P<.01), and time in the examination room (5 minutes vs 14 minutes, respectively; P<.001), during which only 1 to 2 minutes (for both suburban and urban practices) were for hands-on vaccinations. Only 5% of visits were examined by a physician or nurse practitioner. Visit times did not vary by age.

Conclusions: Although the personnel time for influenza vaccination visits was short, there was substantial patient waiting and long occupancy of examination rooms. If universal influenza vaccination is to be efficiently managed in primary care practices, it may be necessary to implement “vaccination clinics” or sessions in which large numbers of children are scheduled for influenza vaccinations at times when adequate rooms and dedicated nursing staff are available.


Influenza vaccination has previously been recommended for children 6 months of age and older who are at increased risk for complications because of chronic pulmonary, cardiovascular, or other diseases. Although this recommendation includes children with asthma, and covers about 10% of children, only about a tenth of eligible US children currently are vaccinated. Obstacles to vaccination include the perception among some providers and parents that influenza is a benign disease; concerns about adverse effects and effectiveness of the vaccine; the already crowded pediatric immunization schedule; the additional intramuscular vaccination needed for the current influenza vaccine; the need for annual vaccinations and 2 vaccinations the first year for young children; and difficulty in identifying and recalling eligible children for vaccination. Because most children are not seen routinely during the window of opportunity for influenza vaccination, a special visit is often needed to provide the vaccine in primary care practices.

Because of the mounting evidence of the burden of influenza, the Advisory Committee on Immunization Practices (ACIP) of the Centers for Disease Control and Prevention (CDC; Atlanta, Ga) and the American Academy of Pediatrics (AAP) have recently recommended that vaccination of children between 6 and 23 months of age be “encouraged when feasible” because the mounting evidence of the burden of influenza, the Advisory Committee on Immunization Practices (ACIP) of the Centers for Disease Control and Prevention (CDC; Atlanta, Ga) and the American Academy of Pediatrics (AAP) have recently recommended that vaccination of children between 6 and 23 months of age be “encouraged when feasible” because most children are not seen routinely during the window of opportunity for influenza vaccination, a special visit is often needed to provide the vaccine in primary care practices.

Because of the mounting evidence of the burden of influenza, the Advisory Committee on Immunization Practices (ACIP) of the Centers for Disease Control and Prevention (CDC; Atlanta, Ga) and the American Academy of Pediatrics (AAP) have recently recommended that vaccination of children between 6 and 23 months of age be “encouraged when feasible” because most children are not seen routinely during the window of opportunity for influenza vaccination, a special visit is often needed to provide the vaccine in primary care practices.
mented annually and within a specific time frame. It is therefore important to consider the feasibility of universally administering the influenza vaccination using current practices within primary care settings. A critical feasibility issue concerns the time required by primary care office personnel to implement the recommendation.

Studies in the 1960s and 1970s\textsuperscript{22-27} and recent studies\textsuperscript{28-32} have documented the time spent on pediatric well-child care visits. Data are lacking, however, on the time spent by personnel in primary care practices for influenza vaccination visits. Studies measuring the times for vaccinations at well-child care visits,\textsuperscript{30-33} found that the majority of personnel time is spent not on actually administering the vaccinations, but rather on vaccine preparation and paperwork. The objective of this study was to measure the personnel time and examination room occupancy time required by primary care practices to complete influenza vaccination visits.

**METHODS**

**STUDY POPULATION AND SETTING**

The study was conducted during an 8-week period between December 1, 2000, and January 31, 2001, in 7 primary care practices in Monroe County, New York, an upstate metropolitan region with a population of 750,000 including the city of Rochester, NY. These practices were selected because their practice characteristics varied from each other: a small private pediatric practice (1 physician), a large group practice associated with a community hospital (7 physicians), a large private pediatric practice (8 physicians), a combined medicine-pediatrics practice (3 physicians), the 2 hospital-based pediatric continuity clinics in Rochester (16 attending physicians), and a small practice serving high-risk children in foster care (2 physicians). All practices approached for the study agreed to participate. These 7 practices had a total 2-year-old birth cohort of 2734, or 24% of all 2-year-old children served by the 85 primary care practices in Monroe County. A practice was defined as urban or suburban if more than 75% of its birth cohort resided in either the city of Rochester or in the suburbs. Three practices were suburban, and 4 were urban.

All children 12 months to 18 years of age seen for influenza vaccination-only visits were eligible. Children seen for well-child care, acute, or follow-up visits were ineligible. Children seen with siblings (13% of influenza vaccination visits) and children who received other vaccinations in addition to influenza (9%) were excluded because of the difficulty in performing accurate timings. Practices were asked to enroll every child who had an influenza vaccination visit during the study period, including evening or weekend visits.

The study was approved by the Research Subjects Review Boards of the University of Rochester. Patient identifiers were not recorded, and practice-specific results are not available.

**MEASUREMENTS**

Because of the prohibitive cost of having external observers for the few influenza vaccination visits scattered throughout the day, we had staff from each practice measure the time spent on the different components of the visit. A specific protocol was developed, training sessions were conducted with staff, and a clipboard with a stopwatch and study flow sheet was placed at the practices’ nursing stations for timing purposes. The check-in time served as the “start time” for the visit.

The following components of the visit were timed, using “start time” and “end time” for each component on the flow sheet that accompanied every patient: check-in, nursing examination, physician or nurse practitioner examination (if performed), vaccination steps (explanation, preparation, administration, clean-up, and record keeping), and check-out time. Although individual components were not always performed for every child, all children had check-in and check-out times obtained. The total time of the visit (check-out minus check-in time) was calculated, as was the waiting time throughout the visit. Since the study focused on the visit times, other practice activities (eg, staff time identifying eligible children, preparing and refiling medical records, and billing) and patient travel time were not measured.

**ANALYSIS**

Although total visit time was determined for all children, nurses were often unable to distinguish each component of the vaccination process. For example, a nurse often explained and prepared the vaccine simultaneously. Thus, we report the time for each component of the vaccination process when available, and determined for all children a “total vaccination time,” which was the sum of all available components. Analyses were performed for 3 age groups—12 to 35 months, 36 to 59 months, and older than 60 months—because at the time of the study, possible scenarios for universal influenza vaccinations targeted children 12 to 35 months, or younger than 60 months.

Since the times were not normally distributed, we calculated the median and the 25th and 75th percentiles. To assess whether times for influenza vaccination visits varied by practice or patient age group, the Median test, the Kruskal-Wallis test, and the Mann-Whitney U tests were used, depending on the type of measure. Statistical models were fit using SUDAAN statistical software (Research Triangle Institute, Research Triangle Park, NC), with total visit time and total vaccination time as dependent variables transformed on the log scale to reduce skewness in measured times. The models specified practices to be clusters and visit times to be correlated with one another, with age groups and practice type (urban or suburban) included as independent variables. Comparisons were made between age groups, and between urban vs suburban practices.

Timing measurements were completed for 102 children. Table 1 presents the number of children seen in each practice according to age group. Two-thirds of children were older than 3 years. The distribution of children by age group did not vary significantly by practice ($P = .4$), although the power to detect differences was low due to small sample sizes in some practices.

**RESULTS**

Table 2 shows the median times for all 7 practices combined, 25th and 75th percentiles (1st and 3rd quartiles) for the different components of the influenza vaccination visits, as well as the percent of the total visit time spent on the major activities. Times are shown for patients who had that component measured (eg, a median time of 1.0 minute for 14 patients who had a nurse examination), and for the entire population of 92 children. The median length of the entire influenza vacci-
The duration of the visit and its components did vary significantly by practice type (Table 3). The 3 practices that primarily serve suburban children had substantially shorter times than the 4 practices that serve primarily urban children, for all visit components including waiting room time (4.1 vs 7.5 minutes; \(P<.001\) by Mann-Whitney U Test) and examination room time (5.3 vs 14.3 minutes, \(P<.001\)). The actual hands-on vaccination time was only 1.4 minutes (15%) of the total visit time in the suburban practices and only 2.4 minutes (11%) of the total visit time in the urban practices (\(P<.001\)).

Statistical models found the total duration of visits to be significantly longer for urban practices compared with suburban practices (\(P = .003\)) and not significantly different among age groups (\(P = .60\)). Models did not find statistically significant differences in total vaccination time between urban and suburban practices (\(P = .07\)), or among age groups (\(P = .20\)). Results for group comparisons were similar for models that specified correlated patient times and those that assumed independent times.

### Table 1. Number of Children, by Practice, Age Group, and Receipt of Other Vaccinations

<table>
<thead>
<tr>
<th>Practice No.</th>
<th>Practice Type</th>
<th>Total</th>
<th>12-35 mo</th>
<th>36-59 mo</th>
<th>≥60 mo</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Suburban</td>
<td>15</td>
<td>2</td>
<td>3</td>
<td>10</td>
</tr>
<tr>
<td>2</td>
<td>Suburban</td>
<td>10</td>
<td>2</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>3</td>
<td>Suburban</td>
<td>21</td>
<td>2</td>
<td>2</td>
<td>17</td>
</tr>
<tr>
<td>4</td>
<td>Urban</td>
<td>5</td>
<td>1</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>5</td>
<td>Urban</td>
<td>10</td>
<td>5</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>6</td>
<td>Urban</td>
<td>10</td>
<td>2</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>7</td>
<td>Urban</td>
<td>20</td>
<td>8</td>
<td>3</td>
<td>9</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>92</td>
<td>20</td>
<td>14</td>
<td>58</td>
</tr>
</tbody>
</table>

### Table 2. Time for Different Components of Influenza Vaccination Visits (in Minutes)

<table>
<thead>
<tr>
<th>Area of Practice</th>
<th>Component of Visit</th>
<th>No. of Patients Timed</th>
<th>Time for Patients With Component Timed</th>
<th>Percentiles for All Patients (n = 92)*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>25th</td>
<td>50th</td>
</tr>
<tr>
<td>Total visit</td>
<td>Total time (% of total visit)</td>
<td>92</td>
<td>9.0 (100)</td>
<td>14.2 (100)</td>
</tr>
<tr>
<td>Waiting room</td>
<td>Total time (% of total visit)</td>
<td>92</td>
<td>4.0 (44)</td>
<td>5.9 (42)</td>
</tr>
<tr>
<td>Examination room</td>
<td>Total time† (% of total visit)</td>
<td>92</td>
<td>5.0 (56)</td>
<td>8.3 (58)</td>
</tr>
<tr>
<td></td>
<td>Nurse examination time (% of total visit)</td>
<td>14</td>
<td>0.5 (6)</td>
<td>1.0 (7)</td>
</tr>
<tr>
<td></td>
<td>MD or PNP examination time (% of total visit)</td>
<td>5</td>
<td>0.2 (2)</td>
<td>0.3 (3)</td>
</tr>
<tr>
<td></td>
<td>Total vaccination time (% of total visit)</td>
<td>92</td>
<td>1.0 (12)</td>
<td>2.0 (14)</td>
</tr>
<tr>
<td></td>
<td>Explanation</td>
<td>57</td>
<td>0.2</td>
<td>0.5</td>
</tr>
<tr>
<td></td>
<td>Preparation</td>
<td>63</td>
<td>0.5</td>
<td>1.0</td>
</tr>
<tr>
<td></td>
<td>Administration</td>
<td>72</td>
<td>0.1</td>
<td>0.3</td>
</tr>
<tr>
<td></td>
<td>Clean-up</td>
<td>66</td>
<td>0.1</td>
<td>0.3</td>
</tr>
<tr>
<td></td>
<td>Charting</td>
<td>55</td>
<td>0.5</td>
<td>1.0</td>
</tr>
<tr>
<td></td>
<td>Waiting in room (% of total visit)</td>
<td>92</td>
<td>2.4 (27)</td>
<td>5.4 (38)</td>
</tr>
</tbody>
</table>

Abbreviations: MD, physician; PNP, pediatric nurse practitioner.

*Time for each visit component for the entire population, whether or not that component was performed, is included here.

†Total examination room time includes time of nurse examination, plus MD or PNP examination time, plus vaccination time, plus time spent in the waiting room.

This study sheds light on several of these issues. First, there was substantial variability across practices (and sub-
urban vs urban practice types) in the total visit time, although not for the actual vaccination process, which was universally brief. Second, using current practice models, the availability of examination rooms is critical because the time that patients spent waiting in the examination room was far greater than the time spent on the vaccination process. Since the median examination room time was 8.3 minutes, 1 examination room could possibly accommodate 7 patients per hour, or 56 patients per 8-hour day, with a range of 28 to 96 patients based on the 25th to 75th percentiles (Table 2).

Extrapolation from the times measured by our study and adding additional nursing time from other studies (eg, for bringing children into examination rooms, obtaining medical records, etc) yields the following estimates: for 100 children requiring an influenza vaccination visit, a typical primary care practice would devote (1) 13 hours or 4 half-day sessions in an examination room (25th-75th percentiles of 8-28 hours), (2) 12 hours of additional staff nurse time (25th-75th percentiles of 6-24 hours), and (3) 10 minutes of either physician or nurse practitioner time for the 5% of patients having an examination. This assumes that all of these visits were accomplished as additional “influenza vaccination visits.” Practices could make this process more efficient by incorporating as many influenza vaccinations as possible into visits already being made during the relatively short period when the vaccine is available.

Why was there so much waiting time with no patient-provider interaction during these influenza vaccination visits? In all 7 practices, these visits were incorporated into regular operations since they were scattered throughout each day, it was not feasible to assign external observers to time the components of the visit. This was manageable because these visits were infrequent, but it could pose problems if the patient numbers were increased substantially.

Because influenza vaccination visits are currently time intensive in terms of examination rooms, but not in terms of staff time, more efficient strategies might involve (1) special influenza vaccination clinics when many rooms are available, such as evenings, weekends, or lunch hours; (2) setting aside 1 or 2 rooms for influenza vaccinations, only so that the vaccination visits do not disrupt the flow of the regular practice; and (3) assigning nurses for certain periods dedicated to influenza vaccination visits. Patients could also wait in the waiting areas rather than in examination rooms and be provided vaccine information statements (or even vaccinations) in the waiting area. Influenza vaccinations could begin as early as possible, prior to the very busy winter months.

There are several limitations to this study. The study was performed in a few diverse practices in a single community, and findings may differ in other settings. However, one might expect as much variability across different practices within the same community as across communities. We therefore selected 7 practices representing different practice types, and did note more than a 2-fold variability in times across practices. Although 2 of the urban practices were hospital clinics, none of the influenza vaccination visits involved residents, students, or teaching activities.

Second, although we asked practices to enroll all patients consecutively during the study time frame, some eligible patients may have been missed, or the study itself may have affected the true times for different components of the visits. We suspect that these situations were unlikely because few patients had a nurse or physician examination, and vaccination times were short.

This study measured vaccination times after December 1, 2002; the late start was caused in part by the delayed supply of influenza vaccine, and because the impetus to assess the feasibility of universal influenza vaccination gained momentum late in 2000 with the potential licensure of a nasally administered influenza vaccine. The duration of influenza vaccination visits occurring in December and January might differ from those occurring earlier.

Because only a few influenza vaccination visits were scattered throughout each day, it was not feasible to assign external observers to time the components of the visit. However, recent studies of nurses34 and physicians35 found that self-reported timing using data collection instruments to measure start and end times of each activity achieved similar times compared with observer-measured timings, particularly for direct patient-care activities.

Finally, it was not possible to directly measure the time spent by practice personnel on, for example, determining which children should receive the influenza vaccine, scheduling appointments, pulling and filing medical records, and billing. These tasks may consume more personnel time than the actual vaccination visit. Additionally, we did not measure the total number of visits to the practice, determine provider-patient ratios, assess how busy the practice was relative to other periods throughout the year, or evaluate the effect of influenza vaccinations on routine well-child care visits.

In conclusion, this study found that influenza vaccination visits, as currently conducted in Monroe County, NY, consumed only a small amount of personnel time in primary care practices, but there was substantially more
patient time spent in the waiting and examination rooms. Universal vaccination of several age cohorts would consume a substantial amount of examination room time as directed by current practices, and it might clog practices by occupying many examination rooms for simple vaccinations. For primary care practices to efficiently vaccinate children universally with influenza vaccinations during a short window of opportunity, more effective strategies may need to be developed, particularly in practices serving urban populations. It may be necessary to implement “vaccination sessions” or “vaccination clinics” within primary care practices at times during which adequate rooms and dedicated nursing staff are available and waiting times are minimized. Early morning, noontime, evening, and weekend sessions are all times when examination rooms tend to be available, and they offer the added advantage of convenience for parents. For universal childhood influenza vaccination to be achieved, primary care practices will need to adopt more efficient means to vaccinate large numbers of children in short periods.

Accepted for publication October 17, 2002.

This study was funded by cooperative agreement U38CCU217969-01 from the Centers for Disease Control and Prevention (Atlanta, Ga).

Corresponding author: Peter Szilagyi, MPH, MD, Department of Pediatrics, Strong Memorial Hospital, Box 632, Rochester, NY 14642 (e-mail: peter_szilagyi@urmc.rochester.edu).

REFERENCES


10. Luesy TA, Capra AM, Quensberry CP, Mendoza GR, Mazar M. Computer-based models to identify high-risk adults with asthma: is the glass half empty of half full? J Asthma. 1999;36:559-570.


35. Finkler AS, Knickman JR, Hendrickson G, Lipkin M, Thompson WA. A comparison of work-sampling and time-and-motion techniques for studies in health ser-

