How Much Time Is Spent on Well-Child Care and Vaccinations?

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Context: Because well-child care represents the most important prevention opportunity in the health care system, a growing number of activities and indicators have been proposed for it.

Objective: To measure the time spent in the various components of well-child care.

Design: Time-and-motion study.

Setting: Five private pediatric practices and 2 public providers in Rochester, NY.

Participants: One hundred sixty-four children younger than 2 years.

Main Outcome Measure: Duration of family’s encounters with the primary care provider (physician or nurse practitioner), nurse, and other personnel.

Results: The median encounter times and their component parts in minutes were: (1) primary care provider, 16.3 (physical examination, 4.9; vaccination discussion, 1.9; discussion of other health issues, 9.5; vaccination administration, 0); (2) nurse, 5.6 (physical examination, 3.3; vaccination discussion, 0; other health discussion, 0; vaccine administration, 1.6); and (3) other personnel, 0 for all categories. Public provider setting, African American race of the child, and administration of 4 vaccinations were significantly associated with an increase (3-4 minutes) in the duration of the primary care provider encounter. Only 8 (5%) of families read vaccine information materials.

Conclusions: Depending on whether a child makes the usual 3 or recommended 6 number of well-child visits, the total time of well-child care is 45 to 90 minutes during the first year of life and declines to less than 30 minutes per year thereafter as the number of recommended visits diminish. Because high-risk children make half as many well-child care visits as other children, a 3 to 4 minute increase in encounter time is insufficient to provide them with the same level of care as other children.


Editor’s Note: The results of this study are pretty depressing. Assuming the most time (90 minutes) from this study, 0.017% of a child’s life in the first year is spent in well-child care. That should delight managed money corporations.

Catherine D. DeAngelis, MD

Well-child care represents the most important opportunity for provision of clinical preventive services in the US health care system. Although other opportunities for preventive care do exist, virtually every child has made multiple well-child care visits by the age of 2 years and these visits are the primary environment in which immunizations, screening, and other essential preventive services occur. A large number of activities and indices have been proposed for well-child care: a RAND study suggested 136 indicators for the quality of pediatric preventive care; the US Preventive Services Task Force recommended that 25 different interventions be implemented for the general population through well-child care in addition to 9 other interventions specific to high-risk children; semiannual measurements of vaccination coverage have been made into a standard of pediatric care; the American Academy of Pediatrics and other organizations emphasize detailed discussion of psychosocial adjustment at each visit; the National Committee for Quality Assurance defines quality-of-care performance measures for clinical preventive service provision within managed care (HEDIS); and the Health Care Financing Administration makes a variety of re-


**SUBJECTS AND METHODS**

**STUDY ENROLLMENT**

As approved by the Research Subject Review Board of the University of Rochester, Rochester, NY, the study was conducted in a 3-month period in 5 volunteer private pediatric practices and 2 volunteer public clinics (1 community health center and 1 hospital-based clinic) in Rochester. Families of children younger than 24 months presenting for well-child care and vaccination were offered enrollment in the study at the time of registration at the provider's office. While the volunteer enrollment process produced a convenience sample, providers and their staff were not involved in participant selection and the days and times of enrollment were rotated among study sites.

**TIME MEASUREMENTS**

A study employee followed the family through the health care encounter (including in the examining room) for a single child (no multiple child visits were measured). A stopwatch was used to measure the duration of health care interactions between the family and the primary care provider (physician or nurse practitioner), the nurse, and other personnel. All were aware that time measurements were being performed and had been informed that the purpose was to examine the duration of the different components of well-child care for research purposes (rather than for assessment of performance), and it was emphasized that no identifiers would be recorded that would permit linkage of an individual staff member or family to a time measurement. Activities outside the specified interactions were not timed, eg, registration, waiting, telephone calls, obtaining supplies, recording in the medical record. Time use was categorized as (1) vaccination discussion, (2) other health care discussion, (3) physical examination, and (4) vaccine administration. We made no effort to characterize time use further; eg, whether the interactions were friendly, counseling was appropriate, etc. In addition to interaction-based measurements, the time the family spent reading federally mandated vaccination information materials was measured separately.

**RESULTS**

**POPRO/provider and visit characteristics**

For each encounter, study personnel recorded the practice type (public or private), primary care provider type (physician or nurse practitioner), whether and where vaccination information materials were offered to the family, whether the primary care provider solicited questions about the materials, and the number and type of vaccinations administered during the visit.

**FAMILY DEMOGRAPHICS AND HEALTH CARE ATTITUDES**

Before the encounter, study personnel used an instrument to obtain from the family the child's birth date, sex, and race/ethnicity, as well as the family's medical insurance status, number of parents and children in the home, mother's age and educational attainment, and the family's level of concern about vaccination protection and adverse events (self-reported as extremely, moderately, slightly, or not concerned). After the encounter, but before the family left the provider's office, study personnel administered a multiple choice, nonpretested questionnaire concerning the vaccination information materials.

**ANALYSIS**

Only encounters with complete time measurements, demographic information, and questionnaire responses were included in the analysis. The median, the 25th and 75th quartiles, and the variance about the median ([75th-25th percentiles]/2) were used as the principal indicators of duration, with a comparison made to the mean. To examine risk factors for increased duration, the Wilcoxon rank sum test was used to test for differences between the levels of each variable. The Spearman test was used to test for correlation among variables, and the Cochran-Mantel-Haenszel test was used to test for association among the levels of different variables. Linear regression was performed, with encounter duration as the dependent variable and risk factors identified as significant (P<.05) by bivariate analysis as the candidate independent variables.

**POPULATION AND PROVIDER CHARACTERISTICS**

Of 197 total encounters, 164 had complete information and were included in the analysis. The median value for the child's age was 4.2 months; mother's age, 25 years;
mother's education, 12 years; total number of children in the home, 2; and number of vaccinations administered during the visit, 3. The population seeing public providers was significantly different from those seeing private providers; eg, African American, 55% vs 11%; single parent, 30% vs 8%; teenaged mother, 20% vs 3%; and maternal education lower than 12th grade, 30% vs 2% (all \( P < .05 \)). Child’s age and sex were not significantly different between provider types.

**ENCOUNTER DURATION**

Primary care providers (physicians or nurse practitioners) interacted with the family for a median of 16.3 minutes (variance, 5.6; mean, 17.2) (Table 1). Most primary care provider time (median, 9.5; variance, 3.2; mean, 9.3) was devoted to discussion of nonvaccination health issues.

Nurses devoted essentially all of their 5.6-minute median encounter time (variance, 2.4 minutes; mean, 6.4 minutes) to physical examination and vaccine administration. Vaccination issues were discussed in 19 of 164 encounters (12%; median, 1.0 minute) and other health issues in 12 encounters (7%; median, 1.9 minutes). Other personnel interacted with 1 family for a total of 9.9 minutes.

**FACTORS ASSOCIATED WITH ENCOUNTER DURATION**

In bivariate analysis, 5 factors were identified as significantly associated with increased encounter duration of the primary care provider (Table 2): public provider, primary care provider who was a nurse practitioner, minority race or ethnicity of the child, Medicaid insurance status, and receipt of 4 vaccinations during the index visit. Each of the 5 factors was significantly correlated with at least 1 of the others, and 3 were significantly correlated with at least 3 of the others. In multivariate analysis, the nurse practitioner lost significance when paired with the public provider (nurse practitioners saw 42% of children in public provider offices compared with 20% in private offices, \( P = .002 \)). Insurance status lost significance when combined in a model with the public provider (24% of children seen in public provider offices had private health insurance compared with 87% in private offices, \( P = .001 \)) and number of vaccinations (only 12% of children receiving 4 doses were privately insured compared with 72% of children receiving 1-3 doses, \( P = .001 \), apparently because of risk-oriented, rather than routine, hepatitis B administration practices). Among the 3 factors included in the final model, receipt of 4 vaccinations increased total encounter duration by increasing median vaccination discussion time to 5.8 minutes from 3.6 minutes for 1 vaccination (\( P = .01 \)), public provider status increased total encounter duration by increasing duration of the physical examination to 7.9 minutes from 6.9 minutes for private providers (\( P = .008 \)), and African American race raised total duration of the encounter but was not significantly associated with an increase in any specific activity. No factor was significantly associated with increased time of nonvaccination health discussions.

Nurses’ encounter duration was relatively invariant: only the number of vaccinations was significantly associated with an increase: 6.2 minutes for children with 4 vaccinations compared with 5.1 minutes for children with 1 vaccination (\( P = .049 \)). As a result, total well-child encounter time was controlled by variations in the primary care provider’s, rather than the nurse’s, encounter.

**VACCINATION INFORMATION MATERIALS**

Vaccine information materials were given to the family in 160 (98%) of the 164 visits. Of the 160 families receiving the materials, 114 (71%) received them in the waiting room or in the examination room before the primary care provider arrived and 123 (77%) reported that they had never received the materials before (although most children were older than 4 months and had at least 1 sibling, which suggested previous well-child care visits by the family). Only 8 (5%) families spent any time during the visit reading the materials (25th, 50th, and 75th percentile reading time overall and for all risk factors, 0 seconds). The family’s level of concern about vaccination issues, as reported to study personnel, was not a risk factor for reading the materials (\( P = .45 \)). Despite the fact that only 9% of families actually read the materials, 79% (127) indicated on the questionnaire that the materials had “greatly” increased their understanding of vaccinations, and gave strong approval to the content of the materials in their responses to 6 other related queries. The primary care provider solicited questions about the materials in 25 encounters (16%). Duration of family’s discussion of vaccination issues with the primary care provider was not associated with the expressed level of parental concern about vaccinations, but was longer for

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**Table 1. Encounter Times for 164 Well-Child Care Visits**

<table>
<thead>
<tr>
<th>Encounter Time, min*</th>
<th>Percentile 25th</th>
<th>Median</th>
<th>Percentile 75th</th>
<th>Proportion of Total Encounter Time, %†</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary care provider‡</td>
<td>10.6</td>
<td>16.3</td>
<td>21.7</td>
<td>76</td>
</tr>
<tr>
<td>Vaccination discussion</td>
<td>0.9</td>
<td>1.9</td>
<td>3.8</td>
<td>9</td>
</tr>
<tr>
<td>Other health discussion</td>
<td>5.8</td>
<td>9.5</td>
<td>12.2</td>
<td>44</td>
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<tr>
<td>Physical examination</td>
<td>3.9</td>
<td>4.9</td>
<td>5.7</td>
<td>23</td>
</tr>
<tr>
<td>Vaccination administration</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Nurse</td>
<td>3.2</td>
<td>5.1</td>
<td>7.9</td>
<td>24</td>
</tr>
<tr>
<td>Vaccination discussion</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Other heath discussion</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Physical examination</td>
<td>2.2</td>
<td>3.5</td>
<td>4.6</td>
<td>16</td>
</tr>
<tr>
<td>Vaccination administration</td>
<td>1.0</td>
<td>1.6</td>
<td>3.3</td>
<td>7</td>
</tr>
<tr>
<td>Other personnel</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Vaccination discussion</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Other health discussion</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Physical examination</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Vaccination administration</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>13.8</td>
<td>21.4</td>
<td>29.6</td>
<td>100</td>
</tr>
</tbody>
</table>

*Only health-care–related interactions were timed, and other activities were not (eg, waiting time for the family and note-taking by the primary care provider). All activity categories are mutually exclusive.

†Percentage of total encounter time, based on median values. Rounding errors produce some discrepancies between components and totals.

‡Physician or nurse practitioner who provided the well-child care to the patient.
the 8 families who read the vaccination information materials than for the 152 who did not (median/mean, 5.3/5.9 vs 2.1/2.7 minutes; \( P = .002 \)).

Our finding that the average primary care provider encounter with a family lasted about 16 minutes suggests that the total well-child care time during the first year of life may be only 45 to 90 minutes, depending on whether the infant makes the usual (3-4) or recommended (6) number of visits. The total time of discussion of nonvaccination issues during the first year of life may be 30 to 60 minutes. After the first year of life, well-child care probably diminishes to a few minutes a year because the recommended number of visits drops off markedly.\(^{11,12}\)

Our study was limited by the volunteer selection of providers, the convenience sampling of patients, a limited time frame and geographic range, and a relatively small study population. These factors may have created biases both in the direction of increasing interaction duration (cooperative providers displaying "exemplary behavior") and in other cases decreasing it (overrepresentation of the least problematic patients).

However, a comprehensive literature search identified 10 published articles that measured the duration of provider encounters, with findings that appear similar to ours: 10 minutes in the 1998 study by Stange et al\(^ {15}\) of the types of visits (by adults and children) made to family physicians; 10 minutes in the 1980 study by Reisinger and Bires\(^ {16}\) of anticipatory guidance; 9 minutes in the 1978 study by O'Bannon et al\(^ {17}\) of the effect of patient load on visit length; 18 minutes for pediatricians, and 26 minutes for nurse practitioners in the 1977 study by Foye et al\(^ {18}\) comparing the interview styles of these 2 primary care providers; 14 to 23 minutes for phy-

<table>
<thead>
<tr>
<th>Table 2. Factors Potentially Influencing Duration of Family’s Encounter With the Primary Care Provider</th>
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</thead>
<tbody>
<tr>
<td><strong>Factor</strong></td>
</tr>
<tr>
<td>Practice type</td>
</tr>
<tr>
<td>Private</td>
</tr>
<tr>
<td>Public</td>
</tr>
<tr>
<td>Provider type</td>
</tr>
<tr>
<td>Physician</td>
</tr>
<tr>
<td>Nurse practitioner</td>
</tr>
<tr>
<td>Age of child, d</td>
</tr>
<tr>
<td>0-44</td>
</tr>
<tr>
<td>45-364</td>
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<tr>
<td>365-730</td>
</tr>
<tr>
<td>Sex</td>
</tr>
<tr>
<td>F</td>
</tr>
<tr>
<td>M</td>
</tr>
<tr>
<td>Race/ethnicity</td>
</tr>
<tr>
<td>White</td>
</tr>
<tr>
<td>African American</td>
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<tr>
<td>Hispanic</td>
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<tr>
<td>Type of insurance</td>
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<tr>
<td>Private</td>
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<tr>
<td>Medicaid</td>
</tr>
<tr>
<td>Uninsured</td>
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<tr>
<td>Parents in home</td>
</tr>
<tr>
<td>1</td>
</tr>
<tr>
<td>2</td>
</tr>
<tr>
<td>Mother’s age, y</td>
</tr>
<tr>
<td>&lt;20</td>
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<tr>
<td>&gt;20</td>
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<tr>
<td>Mother’s education level, grade completed</td>
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<tr>
<td>&lt;12</td>
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<tr>
<td>12</td>
</tr>
<tr>
<td>&gt;12</td>
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<tr>
<td>No. of children</td>
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<tr>
<td>1</td>
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<tr>
<td>2</td>
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<tr>
<td>&gt;3</td>
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<tr>
<td>No. of vaccinations</td>
</tr>
<tr>
<td>1</td>
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<tr>
<td>2</td>
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<tr>
<td>3</td>
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<td>4</td>
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</tbody>
</table>

*NS indicates not significant; \( P \) was considered significant at less than .05.
physicians and 28 to 36 minutes for nurse practitioners in the 1975 study by Hoekelman19 of the adequacy of health care activities in well-child care; 6 to 15 minutes in the study by Kahn and Wirth20 of changes in pediatrician activity after the addition of a nurse practitioner to the practice, 10 minutes in the 1971 study by Korsch et al21 of how well-child care was conducted; 13 minutes for pediatricians and 21 minutes for nurse practitioners in the 1971 study by Charney and Kitzman22 of nurse practitioners teaming with pediatricians in private practice; 14 minutes for pediatricians and 30 minutes for nurse practitioners in the 1969 study by Schiff et al23 of nurse practitioners in pediatric offices; and 13 minutes in the 1967 study by Bergman et al24 of how private pediatricians use their work time. The apparent consistency of our measurements with those of other studies conducted in a wide range of settings and times suggests that the encounters we measured are not atypical of well-child care.

Several other studies found, as we did, that families reacted favorably to receiving vaccine information materials,33-36 but we were not able to identify any studies that measured the extent to which the materials were actually read. Similarly, we did not identify any studies that could confirm the relative lack of involvement of nurses and other personnel in well-child care, but several studies have documented that the recommendation of the primary care provider is the most important factor in determining whether a patient receives a vaccination.29-31

Our data imply that by the time a child reaches series completion (which normally requires 4-5 visits in 2 years), the cumulative discussion of vaccination issues is likely to have been less than 10 minutes. In addition, our data suggest that parents are unlikely to read vaccination information materials, regardless of how they respond to questions about how well they liked the materials. Because almost all children reach series completion by the time they begin school,32 communication of detailed information may not be critical to motivating a family to accept vaccination. This is consistent with results of intervention trials that demonstrated that programs to remind and encourage providers or families to keep a child up-to-date are more likely to raise vaccination levels than programs to increase parental or provider knowledge.33-36

The primary care provider encounter appeared to lengthen in response to demographic markers associated with increased health risk of the child, rather than in response to factors that might be associated with greater reimbursement to the provider—a reassuring finding. These results should be interpreted with caution, however, because all factors associated with increased visit duration were also associated with visits taking place in a public provider’s office. While multivariate analysis should control for these associations, productivity expectations and incentives for salaried public providers are very different than for self-employed private providers, and such expectations and incentives may determine how providers use their time.

Nevertheless, the maximum increase in median encounter duration for the positive risk factors was 3 to 4 minutes. Children with demographic markers of health risk (eg, minority or poor) make only one quarter to half of the number of well-child care visits of other children,1-7 for which a 3- to 4-minute increase in encounter time is unlikely to compensate. Furthermore, the range of health risk among different demographic groups can be extreme; eg, the infant mortality rate for white children born to college-educated mothers in the United States is lower than the overall rate of any nation in the world, while the infant mortality rate for children of subgroups of African American teenaged mothers in the United States is higher than the rates for all but a few nations in the world.37-39

We were not able to identify any reports of intervention trials that sought to determine if varying the frequency or duration of well-child care had an effect on morbidity or mortality, although it has been estimated that such care takes up 50% of the time of pediatricians.40 However, a recent study found that reminder-recall interventions directed at increasing the frequency of well-child care did, in fact, increase the number of visits, but had no effect on immunization rates.41 This contrasts with the results of other studies in which reminder-recall directed at immunization increased both visit and immunization rates,42-46 suggesting that focus on a measurable outcome may be necessary for an increase in well-child care time to result in a positive effect on health.

A large proportion of deaths and hospitalizations of children are for conditions accessible to ambulatory care prevention strategies.37,47 Because the average child may be exposed to less than 3 hours of well-child care in preschool life, studies are needed to examine how best to use this extremely limited time to reduce childhood morbidity and mortality.

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REFERENCES


