

Changes in Parents' Perceptions of Infant Influenza Vaccination over Two Years

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Background: Inner-city health centers serving large proportions of low-income and minority children participated in a study to introduce influenza vaccination among healthy infants in 2002–2003 and 2003–2004.

Methods: Following the 2002–2003 and 2003–2004 influenza vaccination seasons, a short, low-literacy level survey was mailed to parents of vaccine-eligible children. Factors related to vaccination status were determined using Chi-squared and logistic regression procedures. In 2003, 436 of 1,000 surveys were returned and in 2004, 274 of 583 surveys were returned.

Results: Influenza vaccination rate by parental report was 56% in 2003 and 45% in 2004. The most important factors related to immunization were doctor's recommendation (OR=10.5, 95% CI: 6.2–17.7; P<0.001), receiving a reminder (OR=1.6, 95% CI: 1.01–2.6; P=0.047) and parental belief that the child should be vaccinated (OR=7.1, 95% CI: 4.3–11.6; P<0.001). From 2003–2004, nonphysician social influences to have infants vaccinated against influenza increased overall, and perceived positive consequences of vaccination increased among parents of vaccinated children.

Conclusions: Social support for influenza vaccination of healthy infants increased over the two years of the encouragement period, suggesting that information regarding this vaccine was reaching the general public. The most important facilitators of influenza immunization were physician recommendation, parental support and reminders. This suggests that reminders from physicians should specifically state that the doctor recommends influenza vaccine and address common misperceptions about influenza vaccine. These findings may have broader applications as the age groups for whom influenza vaccination is recommended continue to expand.

Key words: children's health ■ immunizations ■ influenza

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INTRODUCTION

During the 2002–2003 and 2003–2004 influenza seasons, the Advisory Committee on Immunization Practices, the American Academy of Pediatrics and the American Academy of Family Physicians “encouraged influenza vaccination of children 6–23 months of age whenever feasible,” due to high rates of influenza-related hospitalization among very young children.^{1–3} This encouragement lacked the weight of a full recommendation and, during its first year, the Vaccines for Children Program (VFC) did not provide influenza vaccine for VFC-eligible children in this age group.

During the first two years of the encouragement, using tailored interventions, five inner-city health centers with 10 offices in Pittsburgh, PA, successfully introduced influenza vaccine without detrimental impact on timely receipt of other vaccines due at approximately the same age.^{4,6} Following the first influenza vaccination season during the encouragement period, parents of 6–23-month-old children were surveyed. In that study, infant vaccination status confirmed by medical record review was associated with physician recommendation and believing that getting the child vaccinated was a smart idea. During the second season of the encouragement, we expected higher vaccination rates and more favorable attitudes toward the vaccine. The current study reports on the survey responses of parents of 6–23-month-old children following the second influenza season of the encouragement period, using the same instrument as previously used. We compared the survey responses from both years to assess whether parent-reported influenza vaccination rate and factors related to vaccination changed over time.

METHODS

Site Descriptions, Interventions and Eligibility

All health centers were located in inner-city neighborhoods serving large proportions of low-income and minority populations. Investigators worked with the health centers

to develop interventions to introduce and increase influenza vaccination of children aged 6–23 months. Patient-, provider- and system-oriented intervention strategies derived from the Task Force for Community Preventive Services⁷ were suggested, such as posters in waiting and exam rooms, reminders to providers in patient charts, provider and staff education sessions, establishment of standing orders for nurses to vaccinate without a signed individual order and walk-in “flu shot clinics.” Each health center selected interventions that were believed would be feasible and effective for raising rates. Among the various interventions selected, all health centers mailed a letter or flier to parents of 6–23-month-old vaccine-eligible children informing them of the new “encouragement to vaccinate.” Additionally, during the 2002–2003 influenza season, the

investigators purchased vaccine supplies and distributed them to all sites to allow them to administer vaccines free of charge to children aged 6–23 months who were uninsured or VFC eligible, thereby eliminating direct cost as a barrier. In the 2003–2004 season, VFC paid for influenza vaccine for low-income children. Vaccine-eligible children were aged 6–23 months (born between December 1, 2000 and March 31, 2002 for the first intervention year and between December 1, 2001 and March 31, 2003 for the second intervention year), and were active patients of the practice (seen in the office within the last six months). Parents of these children were surveyed. This project was approved by the institutional review boards of the University of Pittsburgh and Children’s Hospital of Pittsburgh.

Table 1. Survey responses for overall sample by year

| Survey Question | 2003 n=417 (%) | 2004 n=266 (%) | P |
|---|-------------------|-------------------|--------|
| <i>Demographics</i> | | | |
| Hispanic or Latino | 2.8 | 1.9 | 0.486 |
| Race | | | 0.009 |
| Black | 62.5 | 73.2 | |
| Other | 36.5 | 26.8 | |
| Number of other children in household <18 years | | | 0.260 |
| 0–1 | 37.4 | 32.1 | |
| 2–4 | 29.7 | 29.4 | |
| ≥4 | 32.9 | 38.5 | |
| <i>Knowledge</i> | | | |
| A child with asthma should get a flu shot* | 39.1 | 50.6 | 0.004 |
| <i>Facilitating Conditions</i> | | | |
| Received reminder letter from doctor's office to get flu shot* | 69.9 | 57.2 | 0.002 |
| It is easy to get to the pediatrician's office for a flu shot* | 81.2 | 81.9 | 0.820 |
| <i>Attitudes</i> | | | |
| I think that my child should get a flu shot* | 59.7 | 67.4 | 0.044 |
| A flu shot for my child is too much trouble* | 12.5 | 11.7 | 0.752 |
| Maximum number of shots for a child at 1 visit | | | 0.042 |
| 1 | 7.0 | 7.2 | |
| 2 | 44.5 | 40.7 | |
| 3 | 31.3 | 40.7 | |
| 4 | 17.2 | 11.4 | |
| My child got sick from the flu shot* | N/A | N/A | N/A |
| This past winter, my child was sick: | | | <0.001 |
| More | 36.0 | 20.0 | |
| Less or the same | 64.0 | 80.0 | |
| <i>Social Support</i> | | | |
| Doctor thinks that my child should get a flu shot* | 65.8 | 65.8 | 0.997 |
| Relatives think that my child should get a flu shot* | 33.6 | 47.7 | <0.001 |
| My friends think that my child should get a flu shot* | 21.2 | 36.9 | <0.001 |
| <i>Perceived Consequences</i> | | | |
| Child without flu shot will likely get the flu* | 24.0 | 27.8 | 0.261 |
| A flu shot prevents the flu* | 28.5 | 34.2 | 0.120 |
| I worried that my child would get the flu from the flu shot* | 38.5 | 31.4 | 0.063 |
| * Agrees with the statement. To determine percent who answered not sure or disagree, subtract value from 100. | | | |

Survey Sampling

A 50% response rate was anticipated based on previous work with inner-city populations. In 2003, 1,000 surveys were mailed to parents of all age-eligible children randomly selected from a large pediatric residency with multiple satellite offices and an inclusive sample from a family medicine residency center and an independent family health center, all located in inner-city neighborhoods. For logistical reasons and to comply with HIPAA regulations that prevent direct contact by the investigators, in 2004, parents of all age-eligible children at the pediatric residency sites only were included (n=583). This meant that staff at the residency site, not the investigators,

were responsible for sending and tracking surveys.

A simply formatted, low-literacy cover letter to the parent explained the study and offered \$10 for completion of the survey. Surveys were personalized with each parent's and child's name so that the parent's responses applied only to the randomized child. They were mailed during March to May 2003 and June to August 2004, in three waves approximately four weeks apart, with two remailings to nonresponders.

Survey Development

The survey was developed using the theory of reasoned action and, specifically, the Triandis model⁸ that includes

Table 2. Survey responses by vaccination status: 2003 vs. 2004

| Survey question | Vaccinated | | | Unvaccinated | | |
|--|------------|-------|-------|--------------|-------|--------|
| | 2003 | 2004 | P | 2003 | 2004 | P |
| | n=234 | n=121 | | n=183 | n=145 | |
| | (%) | (%) | | (%) | (%) | |
| <i>Demographics</i> | | | | | | |
| Hispanic or Latino | 3.5 | 3.3 | 0.910 | 1.7 | 0.7 | 0.420 |
| Race | | | 0.183 | | | 0.022 |
| Black | 63.7 | 70.8 | | 63.3 | 75.2 | |
| Other | 36.3 | 29.2 | | 36.7 | 24.8 | |
| Number of other children in household <18 years | | | 0.301 | | | 0.358 |
| 0-1 | 38.5 | 36.3 | | 35.9 | 28.5 | |
| 2-4 | 29.6 | 24.0 | | 29.8 | 34.0 | |
| ≥4 | 31.9 | 39.7 | | 34.3 | 37.5 | |
| <i>Knowledge</i> | | | | | | |
| A child with asthma should get a flu shot* | 47.3 | 59.2 | 0.036 | 28.7 | 43.4 | 0.061 |
| <i>Facilitating Conditions</i> | | | | | | |
| Received reminder letter from doctor's office to get flu shot* | 73.1 | 68.6 | 0.414 | 65.3 | 47.5 | 0.003 |
| It is easy to get to the pediatrician's office for a flu shot* | 85.8 | 86.7 | 0.833 | 75.3 | 77.9 | 0.577 |
| <i>Attitudes</i> | | | | | | |
| I think that my child should get a flu shot* | 84.4 | 88.4 | 0.303 | 28.7 | 49.7 | <0.001 |
| A flu shot for my child is too much trouble* | 6.7 | 4.1 | 0.331 | 19.8 | 17.9 | 0.675 |
| Maximum number of shots for a child at 1 visit | | | 0.041 | | | 0.631 |
| 1 | 8.4 | 10.0 | | 5.1 | 4.9 | |
| 2 | 40.9 | 35.8 | | 49.1 | 44.8 | |
| 3 | 31.6 | 44.2 | | 30.9 | 37.7 | |
| 4 | 19.1 | 10.0 | | 14.9 | 12.6 | |
| My child got sick from the flu shot* | 16.9 | 10.3 | 0.106 | N/A | N/A | N/A |
| This past winter, my child was sick: | | | 0.004 | | | 0.002 |
| More | 35.4 | 19.8 | | 36.7 | 20.1 | |
| Less or the same | 64.6 | 80.2 | | 63.3 | 79.9 | |
| <i>Social Support</i> | | | | | | |
| Doctor thinks that my child should get a flu shot* | 90.1 | 90.9 | 0.804 | 34.4 | 44.8 | 0.057 |
| Relatives think that my child should get a flu shot* | 46.8 | 60.3 | 0.016 | 16.7 | 37.1 | <0.001 |
| My friends think that my child should get a flu shot* | 30.8 | 45.0 | 0.009 | 9.1 | 30.1 | <0.001 |
| <i>Perceived consequences</i> | | | | | | |
| Child without flu shot will likely get the flu* | 30.7 | 38.0 | 0.168 | 15.4 | 19.3 | 0.349 |
| A flu shot prevents the flu* | 34.1 | 48.8 | 0.008 | 21.5 | 22.1 | 0.897 |
| I worried that my child would get the flu from the flu shot* | 34.1 | 22.3 | 0.023 | 44.4 | 39.6 | 0.391 |

* Agrees with statement (To determine percent who answered not sure or disagree, subtract value from 100)

facilitating conditions, behavioral habits, value of the consequences of the activity, social influences (including clinician influence on patients) and attitude about the activity.^{9,10} It predicts a variety of health-related behaviors, including receipt of immunizations, and has been used in diverse cultural and economic situations.⁹⁻¹³ The Triandis model, as used for influenza immunization, is internally consistent and has been externally validated.¹⁰ The survey used simple language, three-point Likert scales (agree, not sure, disagree) and limited length (19 questions) to promote response in a potentially limited-literacy population. Sample items included, "My doctor thinks that my child should receive a flu shot," and "I believe that getting a flu shot for my child is more trouble than it is worth," and other questions that have been tested and used in previous studies.¹⁴

Statistical Analyses

Descriptive statistics of survey responses by year and by vaccination status for each year were calculated. Chi-squared tests were used to compare the differences in responses over time by vaccination status. In order to examine whether those who responded "agree" to the survey questions were more likely to have their children vaccinated, logistic regression modeling was used. Survey responses that were associated at $P < 0.2$ with vaccination status in the entire sample were entered into the logistic regression model. SAS statistical software, version 8.2 (SAS Institute Inc., Research Triangle, NC, 2001) was used for analysis, with statistical significance set at $P < 0.05$.

RESULTS

In 2003, 436 parents returned the surveys for a 44% response rate. Of 583 parents who were sent surveys in 2004, 274 (47%) responded. Nineteen parents in 2003 and eight parents in 2004 did not answer whether or not their children were vaccinated. Forty parents were surveyed in both years and were included only in the 2003 sample. This left a sample of 417 in 2003 and 266 in 2004. In 2003, 56.1% and, in 2004, 45.4% of parents reported that their children receive a flu shot ($P < 0.05$). Table 1 summarizes the demographic characteristics and survey responses for 2003 and 2004 overall and the P values for comparisons of the two survey years. In contrast to respondents to the earlier survey, respondents in 2004 were more likely: 1) to report that their children were black than of another race; 2) to report that they, as well as their relatives

and friends, believe that their child should receive a flu shot; 3) to believe that a child with asthma should be vaccinated against influenza; and 4) to report that their child was generally sick less this winter than the previous one. Significantly fewer 2004 respondents reported that they had received a reminder letter from their child's doctor.

Table 2 shows the demographics and survey responses by vaccination status and the P values for comparisons of the two survey years. Among children vaccinated in 2003 and 2004, there were no demographic differences. However, in 2004, attitudes toward influenza vaccination had clearly changed, with more parents of vaccinated children expressing positive attitudes toward and increased social support for vaccination, and viewing consequences of vaccination as positive. Among the unvaccinated, there were more black children in 2004 than 2003. While fewer parents recalled receiving a reminder letter in 2004, their own knowledge and attitudes about influenza vaccine and social support for vaccination improved significantly. Notably, their beliefs about the flu shot preventing the flu or causing the flu did not change.

To determine the most important factors related to influenza vaccination over two years, logistic regression analyses were used (Table 3). This method allows us to use a larger sample size than either year alone. Influenza vaccination was significantly more likely among children whose parents were surveyed in 2003, who received a reminder letter about vaccination, whose doctor recommended the vaccine and those whose parents believed that their child should be vaccinated.

DISCUSSION

In the second year of the encouragement for infants to be vaccinated against influenza, word about the advice to vaccinate seems to have spread. Compared with parents surveyed in 2003, respondents in 2004 more often reported that family, friends and they believed that their children should be vaccinated. Awareness of the encouragement to vaccinate healthy infants may have been increased due to general publicity about the encouragement to vaccinate infants or to the considerable media coverage of deaths among young children attributed to influenza during the 2003–2004 influenza season. In early January, 93 deaths among children were reported by the Centers for Disease Control and Prevention (CDC), with the peak occurring in mid-December 2003.¹⁵ In the mid-

Table 3. Factors associated with influenza vaccination* (N=683)

| Variable | Odds Ratio (95% Confidence Interval) | P Value |
|---|---|---------|
| Doctor thinks that child needs flu shot | 10.5 (6.2 – 17.7) | <0.001 |
| Parent thinks that child needs flu shot | 7.1 (4.3 – 11.6) | <0.001 |
| Received reminder letter about flu shot | 1.6 (1.01 – 2.6) | 0.047 |
| Survey 2004 vs. Survey 2003 | 0.4 (0.3 – 0.6) | <0.001 |

* From logistic regression

Atlantic region (which includes Pennsylvania), influenza peaked during the last weeks of December 2003 and the first week of January 2004.¹⁶ Most children would have likely been vaccinated by then and local media coverage of cases would not have materially affected vaccination rates, but might have influenced the level of awareness of influenza vaccine recommendations following the 2003–2004 season. Ma et al. reported a significant correlation between media placements about influenza disease and influenza vaccination rates among young children,¹⁷ and others have reported positive changes in parental attitudes about influenza vaccination over one season.¹⁸

Significant increases in vaccination rates among 6–23-month children have been reported in the first^{5,19} and second years²⁰ following introduction of the vaccine for this age group, and one has reported on vaccination rates over two years.⁶ In this study, *parent-reported* influenza vaccination declined in the second year of the encouragement.

In surveys following a single influenza season, we and others have reported the importance of physician recommendation for increasing influenza vaccination.^{14,17,19,21} Over a two-year period, physician recommendation, reminder letters and parental belief that the child should be vaccinated were most important to increasing the likelihood of vaccination.

Patient or parent reminder/recall systems have resulted in varying degrees of success in improving both routine and influenza vaccination rates. While individual studies and meta-analyses have shown reminder/recall methods to be effective overall,^{7,22,23} studies involving reminder/recall for inner-city and socioeconomically disadvantaged populations have been less successful in improving vaccination rates.^{24,25} Although reminders were sent to parents of all vaccine-eligible children in this study, fewer parents recalled receiving one in 2004. The pediatric and family medicine residency sites sent a letter in an envelope, and the other health center mailed a brightly colored flier with influenza vaccination information both inside and outside. Given that the mailed reminder in 2004 was a letter, the lower recollection of receiving a reminder suggests that it was: a) not received, b) not read, or c) not particularly memorable. A mailed reminder might have more impact if it stood out among other mailed items. We suggest fliers or postcards printed on colored paper or using colored ink, using large letters or pictures, sending letters in envelopes with similar eye-catching colors or sending multiple mailings. The reminder should specifically state that the child's physician recommends the vaccine. Furthermore, in situations where cost of the vaccine might inhibit parental uptake of influenza vaccine, as was found in the case of varicella immunization,²⁶ the reminder might also state that the VFC would cover the cost of the vaccine for income-eligible children. We found that even parents of the unvaccinated reported improved knowledge, attitudes and social support for influenza vaccination of

children. However, the lack of change in the perception that the influenza vaccine does not prevent the flu and that the vaccine may actually cause the flu suggests that a reminder might also address these misconceptions.

Strengths and Limitations

By selecting intervention sites in the inner city, a greater proportion of minority children were sampled than would be expected in the general population in this region. Generalizability may be limited, as this study was conducted in one state and primarily between two racial/ethnic groups. The survey sample in 2003 was much larger than that in 2004 because in the latter year, in which HIPAA regulations were in force, parents were selected from the one site that had an electronic immunization registry that made sending and tracking surveys by staff at the site more logistically feasible. Children whose parents' surveys were excluded did not differ with regard to race, ethnicity or family size from those that were included. In a previous study in this population, sensitivity and specificity of parental report of vaccination status was found to be 86% and 66%, respectively.¹⁴ Therefore, we have confidence in the validity of parental responses in this study. To our knowledge, no study has reported on parental attitudes about influenza vaccination of infants over two years.

CONCLUSIONS

Although social support for influenza vaccination of healthy infants increased among parents of children aged 6–23 months, some parents remain unconvinced that the flu shot will prevent the flu and continue to believe that the flu shot causes the flu. The most important facilitators of influenza immunization were physician recommendation, parental belief that the child should be vaccinated and receipt of a reminder from the physician. This suggests that reminders from physicians to parents should specifically state that the doctor recommends influenza vaccine and address these persistent misconceptions. These findings may have broader applications as the age groups for whom influenza vaccination is recommended continue to expand.

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