Beliefs and Attitudes about Influenza Immunization among Parents of Children with Chronic Medical Conditions over a Two-Year Period

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ABSTRACT *Influenza vaccination is recommended for children with chronic medical conditions yet is infrequently performed. The reasons for low influenza vaccination rates in this group have not been well studied. We assessed and compared parents of children with chronic medical conditions regarding their beliefs and attitudes about influenza vaccination in 2003 and 2004. Parents of 2- to 13-year-old children with chronic medical conditions from health centers in low-income urban neighborhoods completed a 19-question survey, mailed following the 2002–2003 and 2003–2004 influenza seasons. Parent-reported influenza vaccination rate declined from 2003 (44%) to 2004 (25%). The most important factors related to influenza vaccination status were perceived doctor's recommendation (odds ratio [OR] = 6.0, 95% confidence interval [CI] = 3.7–9.7), parents' belief that the child should be vaccinated (OR = 5.4, 95%CI = 3.3–8.8), relatives' belief that the child should be vaccinated (OR = 1.7, 95%CI = 1.1–2.7), easy access to the doctor's office for a flu shot (OR = 2.4, 95%CI = 1.4–4.2), and receipt of a reminder from the doctor's office (OR = 1.7, 95%CI = 1.1–2.6). In 2004 compared with 2003, fewer parents reported getting a reminder, and fewer believed that their child's doctor recommended flu vaccine. Doctors' recommendation that children with chronic medical conditions should receive an annual influenza vaccine and vaccine availability are important factors that resulted in a higher likelihood of influenza vaccination. Our findings that fewer parents reported receiving reminders and that fewer children were vaccinated in 2004 suggest that sustained improvements in vaccination rates may require continual changes in the format and delivery method of vaccination reminders from physicians.*

KEYWORDS *Influenza, Vaccination, Children with chronic medical conditions*

INTRODUCTION

Annual influenza vaccination has long been recommended by the Advisory Committee on Immunization Practices, the American Academy of Pediatrics and the

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American Academy of Family Physicians for individuals older than 6 months of age and at increased risk for complications of influenza. These include children with cognitive dysfunction, spinal cord injuries, seizure disorders, or other neuromuscular disorders that can compromise respiratory function or the handling of respiratory secretions or that can increase the risk for aspiration.¹ The vaccine is also recommended for those with cardiovascular disease, diabetes, chronic respiratory disease such as asthma, or for those who are immunocompromised.²⁻⁴ Historically, influenza vaccination rates for children with chronic medical conditions have been low, ranging from 9 to 10% in health maintenance organizations⁵ to 25% in an allergy clinic.⁶ Interventions to increase influenza vaccination rates have resulted in significant improvements. For example, in children with asthma seen in primary care settings, influenza vaccination rates increased from 7–10 to 30–42% with patient reminders/recall.^{5,7-10} In the emergency department, education combined with offering vaccination increased rates to 57% compared with 36% for education only.¹¹

Although few studies have specifically addressed parental barriers to and facilitators of influenza vaccination of children with chronic medical conditions, one study reported that parents believed that children received too many immunizations, that immunizations can weaken the immune system and that influenza vaccine causes illness.¹² Another study suggested that parents may have doubts about the necessity or benefits of vaccines in general.¹³ In previous work, we found that physician recommendation is the most important factor in increasing influenza vaccination among children with chronic medical conditions.¹⁴ To further understand parental attitudes and beliefs about influenza immunization, during the summers following two influenza seasons (2002–2003 and 2003–2004), we surveyed parents of children with chronic medical conditions ages 2 to 13 years, receiving care at inner-city health centers that were actively promoting influenza vaccination. Survey responses were used to identify factors that influence vaccination status and whether those factors changed over time.

MATERIALS AND METHODS

Study Sites and Interventions

The study was conducted at health centers located in urban neighborhoods with large minority populations and serving a large number of low-income children. Investigators worked with personnel at the health centers to develop interventions to increase their vaccination rates by implementing patient-, provider-, and system-oriented strategies proposed by the Task Force on Community Preventive Services.¹⁵ Among other efforts, each health center mailed a reminder to parents of influenza vaccine-eligible children. Children were considered eligible for vaccination if they were 2- to 13-years old during the 2002–2003 and 2003–2004 influenza seasons, had a medical condition that placed them at increased risk for influenza (asthma, other respiratory, cardiovascular or immunosuppressive diseases, diabetes, HIV or sickle cell disease), and had been seen at one of the intervention sites during the past 12 months. The parents of a sample of these children were surveyed each year to explore their perspectives on influenza immunization of their children.

Survey Development

The survey was developed using the theory of reasoned action, specifically, the Triandis model,¹⁶ which includes facilitating conditions, behavioral habits, value of consequences of the activity, social influences (including clinician influence on patients), and attitude about the activity.^{17,18} This model, designed to predict a variety of health-related behaviors, has been used in diverse cultural and economic situations,¹⁷⁻²¹ is internally consistent, and has been externally validated.¹⁸

The 19-question survey used simple language, three-point Likert scales (agree, not sure, disagree), and limited length to promote response in a potentially limited-literacy population. It included questions about facilitating conditions or access, knowledge of and attitudes towards influenza vaccination, social influences on the parent regarding vaccination, and perceived consequences of influenza vaccination. 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.²² Demographic data were limited to sex, race/ethnicity and number of other children in the household < 18 years, to allow space for the Triandis model questions. The same questionnaire was used in each of the two years of the study.

Survey Sampling and Mailing

The health centers provided electronic databases of eligible children from which one child from each family was selected. To achieve at least 80% statistical power to detect an odds ratio (OR) of 1.44 between vaccinated and unvaccinated children with a significance level of 5%, we estimated needing a survey sample size of approximately 500 participants. Anticipating a low response rate, in 2003 parents of 1,000 children were sent surveys. All eligible children from two smaller health centers were included, supplemented with a random sample (30%) from a large pediatric residency with five offices. In 2004, 898 surveys were mailed to parents of all eligible children at the pediatric residency site. A simply formatted, low-literacy cover letter to the parent explained the study and offered \$10 as an incentive 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 child listed.

A self-addressed, stamped envelope was included to facilitate returns, and the surveys were mailed between March and May 2003 and between June and August 2004 in three waves approximately 4 weeks apart, with re-mailings to non-respondents. This study was approved by the Institutional Review Boards of University of Pittsburgh and Children's Hospital of Pittsburgh.

Statistical Analyses

Descriptive statistics of survey responses for each year were calculated. Chi-square tests were used to compare the differences in categorical responses between parents of vaccinated and unvaccinated children in each year and the overall differences between respondents in 2003 and 2004. We also performed logistic regression analysis to examine the association between influenza vaccination status (dependent variable) and parental attitudes and beliefs about influenza vaccination (independent variables). Survey responses that were significantly associated with vaccination status at $p < 0.2$ were entered into the logistic regression model. Statistical significance for all analyses was set at $p < 0.05$. Data analyses were conducted using SAS Version 8.2 (SAS Institute Inc., Research Triangle NC, 2001).

RESULTS

Overall, 476 of 1,000 parents returned the survey in 2003 (response rate = 48%) while 475 of 898 parents returned the survey in 2004 (response rate = 53%). Parents who were surveyed both years ($N = 28$) were not included in the analysis to reduce potential bias, and parents of nine children who were < 2 years old in 2003 and > 2 years old in 2004 were excluded from the 2004 data. Those who did not provide their child's influenza vaccination status (12 parents in 2003 and 14 parents in 2004) were also excluded.

Within the final study sample, parent-reported influenza vaccination rate was 44% in 2003 and 25% in 2004. A large proportion of minority children were sampled; 70% of 2003 respondents' children and 75% of 2004 respondents' children were black. Vaccination status did not vary by race in either year. However, in 2004 a higher proportion of parents of vaccinated black children compared with parents of vaccinated children of other races reported 1) that their child's doctor recommends the flu shot, (86 vs. 64%, $p < 0.05$); and 2) that their children were sick more during the past winter (18 vs. 4%, $p < 0.05$).

Table 1 presents the demographic characteristics and survey responses according to vaccination status for 2003 and 2004. Parents of vaccinated children were more likely to report that a child with asthma should be vaccinated against influenza ($p < 0.001$), a higher level of social support for influenza vaccination ($p < 0.001$), more positive attitudes towards influenza vaccination ($p < 0.001$) and were more likely to perceive consequences of influenza vaccination as positive ($p < 0.001$), than were parents of unvaccinated children. In 2004, parents were less likely to report having received a letter from their child's physician, that getting a flu shot was easy and convenient, and that their child's doctor had recommended the flu shot. However, parents in 2004 were more likely to accept a larger number of shots at one visit than in 2003.

In logistic regression analyses (Table 2), compared with 2004 respondents, influenza vaccination was significantly more likely among those children whose parents were surveyed in 2003. The most important factors associated with influenza vaccination included the belief that the doctor thinks that the child should have a flu shot, parental belief that the child should have a flu shot, belief that relatives think the child should have a flu shot, having easy access to the doctor's office for a flu shot, and receipt of a reminder from the doctor's office.

DISCUSSION

Parent-reported influenza vaccination rates of children with chronic medical conditions in the two years of this study (44% in 2002–2003 and 25% in 2003–2004 influenza seasons) were well below ideal levels but similar to rates (30–42%) reported in other reminder/recall studies.^{5,7–10} Parents of children seen at these inner-city health centers were sent a reminder about the need for influenza vaccination during both seasons. Beginning with the 2002–2003 influenza season, influenza vaccine was encouraged for all children 6–23 months old. Publicity attendant to this change in recommendations, the active interventions to increase influenza vaccination rates instituted by these health centers and the notable increase in children's deaths related to influenza in 2003²³ would have been expected to increase general awareness of the influenza vaccine for children. However, the parent-reported vaccination rate declined from 2003 to 2004. Concomitantly,

TABLE 1 The 2003 and 2004 demographic characteristics and parent survey responses based on Triandis model

	2003 (N = 436)		2004 (N = 424)		2003 vs. 2004	
	Vaccinated children		Unvaccinated children			
	(N = 193)		(N = 243)			
	N (%)	P	N (%)	P	N (%)	P
Parent survey responses						
<i>Demographics of child/family</i>						
Not Hispanic or Latino	186 (98.9)	0.050	226 (95.8)	0.050	103 (98.1)	0.488
Race						
Black	136 (71.6)		163 (69.4)	0.619	77 (73.3)	0.734
Other	54 (28.4)		72 (30.6)		28 (26.7)	
Number of other children under 18 years in household						
0–1	70 (36.7)	0.024	59 (24.6)	0.024	40 (37.7)	0.202
2–4	61 (31.9)		95 (39.6)		36 (34.0)	
4+	60 (31.4)		86 (35.8)		30 (28.3)	
<i>Knowledge</i>						
A child with asthma should get a flu shot	138 (73.4)	<0.001	90 (37.5)	<0.001	68 (64.8)	<0.001
<i>Facilitating conditions</i>						
I received reminder letter from doctor's office to get flu shot for my child	141 (80.1)	0.012	141 (68.8)	0.012	65 (67.7)	<0.001
It is easy to get to the pediatrician's office for a flu shot	172 (91.0)	<.001	177 (74.0)	<.001	93 (87.7)	<0.001

Attitudes							
I think that my child should get a flu shot	162 (85.3)	95 (39.8)	<0.001	95 (90.5)	130 (40.9)	<0.001	0.080
A flu shot for my child is too much trouble	9 (4.8)	44 (18.5)	<0.001	5 (4.8)	50 (16.0)	0.003	0.917
The maximum number of shots a child should receive at one visit							
1	36 (19.1)	37 (15.8)	0.780	18 (17.2)	56 (18.0)	0.995	0.028
2	100 (53.2)	134 (57.3)		52 (49.5)	154 (49.7)		
3	40 (21.3)	47 (20.1)		31 (29.5)	88 (28.4)		
4	12 (6.4)	16 (6.8)		4 (3.8)	12 (3.9)		
My child got sick from the flu shot	20 (10.7)	N/A	N/A	8 (8.0)	N/A	N/A	0.129
Compared with last winter, this past winter, my child was sick							
More	27 (14.6)	51 (21.6)	0.066	14 (13.9)	40 (13.8)	0.986	0.064
Less or the same	158 (85.4)	185 (78.4)		87 (86.1)	250 (86.2)		
Social Support							
My child's doctor thinks that my child should get a flu shot	176 (91.2)	91 (37.8)	<0.001	85 (80.2)	92 (29.6)	<0.001	<0.001
Relatives think that my child should get a flu shot	96 (50.3)	43 (17.8)	<0.001	60 (57.1)	92 (29.1)	<0.001	0.191
My friends think that my child should get a flu shot	65 (34.0)	29 (12.2)	<0.001	49 (47.1)	54 (17.0)	<0.001	0.252
Perceived consequences							
Child without flu shot will likely get the flu	58 (30)	31 (12.8)	<0.001	37 (34.9)	50 (15.8)	<0.001	0.983
A flu shot prevents the flu	58 (30.5)	54 (22.5)	0.060	30 (28.3)	66 (20.8)	0.111	0.282
I worried that my child would get the flu from the flu shot	59 (30.6)	95 (41.5)	0.020	32 (30.5)	111 (37.2)	0.212	0.752

the proportion of parents who recalled receiving a reminder and who believed that their child’s doctor recommended the vaccine also declined. Others have reported that lack of physician recommendation was related to lower immunization rates.¹⁰ These results suggest a need for new approaches.

The Task Force on Community Preventive Services¹⁵ suggests interventions at all levels to improve immunization rates. The surging popularity and acceptance of electronic medical or health records (EMR), immunization registries and electronic communications between health care providers and patients present many new opportunities to refine proven strategies. For instance, EMRs could be programmed to remind providers of the need to recommend influenza vaccine throughout the year when children are seen for chronic care visits. Similarly, EMRs could produce reminders when certain medications are prescribed or refilled. Electronic scheduling programs might produce a printed influenza vaccine reminder stating the physician’s recommendation to be given to the parent when a child checks in, and throughout the year, patients could be scheduled for return “flu shot clinic” visits. Electronic reminders could be sent to parents via email or text messaging on cell phones.

While concern has been expressed that the increasing use of interactive (electronic) health communication may further increase disparities in underserved populations such as minority, low literacy and low income groups,²⁴ electronic technology may provide indirect benefits. For patients who are less “wired,” reminder phone calls that are made automatically to all recipients, or colorful, eye-catching mailed reminders, designed using office graphics software, can convey vaccination messages. Based on a survey of parents regarding immunization for their children, Keane et al.¹³ and Gust et al.²⁵ suggested that vaccination messages should be customized to the parenting/vaccination style to help improve understanding and acceptance of vaccination. Computer technology through provider prompts or the ability to tailor print or audio messages for specific individuals or groups is an important and evolving tool.

This study is one of few published studies of parents of children with chronic medical conditions regarding influenza immunization. One study surveyed parents of elementary school children about influenza vaccine acceptance in relation to school and work absenteeism²⁶; another surveyed parents of children seen in an emergency department,²⁷ and our previous work used a subset of surveys, those whose parent-reported vaccination status was confirmed by medical record

TABLE 2 Factors associated with influenza vaccination over two years from logistic regression (N = 860)

Survey question	Odds ratio (95% Confidence Interval)	P
Agrees with the statement (ref. = not sure/disagrees):		
Doctor thinks that child should have a flu shot	6.0 (3.7–9.7)	<0.001
Parent thinks that child should have a flu shot	5.4 (3.3–8.8)	<0.001
It is easy to get to the pediatrician’s office for a flu shot	2.4 (1.4–4.2)	0.002
Relatives think that child should have a flu shot	1.7 (1.1–2.7)	0.010
Received reminder letter from doctor’s office	1.7 (1.1–2.6)	0.030
Responded to 2004 Survey vs. 2003 Survey	0.5 (0.3–0.8)	0.001

review.¹⁴ Our study had a response rate of 48% in 2003 and 53% in 2004, which would be considered moderate among groups of higher socioeconomic status. However, it was close to the anticipated rate of 50%, yielded a large sample size and had adequate statistical power to compare the differences in beliefs and attitudes about influenza immunization between parents of vaccinated and unvaccinated children with chronic medical conditions. The response rate was similar to that reported by Keane et al.¹³ (42–54%) and higher than that reported by Fitch et al.¹² (36%) for a telephone survey of inner-city parents. Although racial representation was limited to primarily two groups, African American and Caucasian, the study was strengthened by an over-sampling of black children.

Limitations

This study was undertaken in a combined inclusive/random sample of parents of children whose primary care physician's office implemented procedures specifically designed to increase influenza vaccination rates; therefore, parental responses in offices not attempting to increase influenza vaccination rates may have differed. Additionally, it is unknown how the characteristics of the respondents differed from the non-respondents, except that non-respondents had younger children. There might be a potential bias resulting from self-reporting vaccine uptake. Nevertheless, a comparison of parent-reported receipt of the vaccine and medical record-verified receipt of the vaccine showed that parent-reported vaccination had a sensitivity of 84.9% and a specificity of 68.7%.¹⁴ 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. This study was conducted in one state and primarily between two racial/ethnic groups. The above factors might limit the generalizability of our results.

CONCLUSION

Our findings demonstrate that parents of 2- to 13-year old children with chronic medical conditions are strongly influenced to have their children vaccinated against influenza by recommendation and reminder from their child's doctor, their own beliefs, easy to access to the vaccine, and to a lesser extent, the recommendation of a relative. We believe that physician recommendation to vaccinate can only improve vaccination rates if parents *recall* receiving reminders with physician recommendation. Sustained improvements in vaccination rates may require continual changes in the format and delivery method of vaccination reminders from physicians.

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