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Seasonal influenza vaccination rates and reasons for non-vaccination in children with gastrointestinal disorders

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ABSTRACT

Objectives: Despite advances in the treatment and prevention of influenza, it is still considered an important cause of morbidity and mortality worldwide. Annual vaccination is the safest and most effective mean of prevention. Our study aims were to explore the uptake of influenza vaccination among children with gastrointestinal disorders, and to characterize non-adherent patients.
Methods: The present cross-sectional study included parents of pediatric patients attending the Gastroenterology Institute at Schneider Children's Medical Center of Israel between September and October 2011. Parents were asked to complete a questionnaire concerning demographic and clinical parameters, influenza vaccination of the child, and reasons for not vaccinating the child, when appropriate.
Results: The study population included 273 patients (50% female), with a median age of 10 years (range, 2–18 years). Overall, the rate of seasonal influenza vaccination was 30.8%. Higher rates were found among immunosuppressed patients (46.1%), and in patients with inflammatory bowel disease (50%). There was no significant effect of patient age, gender, ethnic origin or parental level of education on the vaccination rate. Vaccination rates were significantly associated with parents' information and knowledge of, as well as their personal beliefs regarding the vaccine ($P < 0.001$).
Conclusions: Influenza vaccination rates are relatively low in the pediatric population attending gastroenterology clinics, in both high- and low-risk groups. The importance of parental knowledge in compliance with influenza vaccination of children should prompt general pediatricians and gastroenterologists to discuss and address the common misconceptions regarding the vaccine.

1. Introduction

Influenza epidemics affect 10–20% of the general population every winter [1]. Seasonal influenza is associated with considerable morbidity and mortality and exerts a heavy economic burden on society [2]. Population groups primarily at risk for influenza complications are adults over age 65 years, patients with chronic diseases of the heart, lungs (e.g., asthma, chronic obstructive pulmonary disease), or kidneys, immunocompromised patients, pregnant women, morbidly obese patients and infants less than 2 years old [3]. According to the study of Thompson et al., about 50,000 people in the United States die every year of complications following influenza [3]. In addition, from October 2004 through September 2012, 830 pediatric influenza-associated deaths were reported in the United States, and 43% of them had no high-risk medical conditions [4].

The seasonal influenza vaccine has a variable efficacy against severe disease (70–80%) depending on the matching of circulating influenza A & B strains [5] and is considered the safest and most effective way to prevent infection [6]. Therefore, healthcare systems worldwide recommend either universal vaccination or vaccination of at-risk populations [7]. Nevertheless, during the 2010–2011 influenza seasons in the US, the rate of vaccination against influenza (one dose or more) in children aged 6 months to 18 years was only 49% [8]. Overall, in children at risk such as those with chronic diseases, the estimated yearly vaccination rate is 10% or lower [9], and in children with asthma, it does not exceed 25% [10]. Potential reasons for non-vaccination in general

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and against influenza in particular include insufficient information about the vaccine and its safety, low socioeconomic status, cost of the vaccine, fear of side effects, negative attitudes and prejudices towards immunizations, and low parental education [11–14].

In Israel, the current data on vaccination rates in the general population of children and in children with chronic illnesses or specific risk groups are limited. The current policy in Israel is to offer the vaccine for all adults and children older than 6 months. Although adult and pediatric patients in Israel can be vaccinated for free and can choose between live attenuated vaccine to inactivated one, Stein et al. have shown that vaccination rates in children in Israel were very low: only 4.1% of the children were vaccinated, and in high risk group patients only 6.5% were vaccinated [15]. The objectives of the present study were to determine these rates and to identify the main reasons for non-vaccination in children attending the Institute for Gastroenterology in a major tertiary pediatric medical center. This site was chosen because of the diversity of patients attending the clinic including both healthy children with functional abdominal pain as well as high risk groups such as immunocompromised patients.

2. Methods

The study was conducted in the Institute of Gastroenterology, Nutrition, and Liver Diseases at Schneider Children's Medical Center of Israel between September and October 2011. All visitors were invited to participate, regardless of medical condition or background features of any kind, including both patients visiting the clinic for an initial assessment and patients with long-term illness on a follow-up visit. All children were accompanied by at least one parent. The parents were asked to complete a questionnaire covering demographics, medical history, and influenza vaccination of the child. The questionnaire was written in Hebrew, and the wording was based on a similar study of compliance to vaccinations in children [16].

The demographic variables included patient age and gender, parents' age, parents' years of education, ethnic origin of the family, area of residence, and number of persons living in the home. Clinical variables included the child's disease and its treatment, comorbidities, past surgery or invasive diagnostic procedures, receipt of regular medication, and immunization with the influenza vaccine of the child and other family members during the last flu season. In addition, to discern possible reasons for non-vaccination, the parents were asked to respond to questions regarding their knowledge about the influenza vaccine, their conceptions of its importance and risks, any recommendations or advice regarding the vaccine that they received from medical professionals, their trust in these professionals, and their confidence in the safety of vaccination in general and the flu vaccine in particular. The accessibility to the vaccine and its related costs were also investigated as a possible reason for non-vaccination.

The influenza vaccination rate was calculated as the proportion of children vaccinated out of the total sample population. The 95% confidence interval was determined using the conventional formula for binomial distributions close to the normal distribution. The relationship of categorical variables with non-vaccination was analyzed with the chi-square test; t-test and analysis of variance (ANOVA) were used for continuous variables. The proposed reasons for non-vaccination and their frequency were determined. In addition, the demographic data were analyzed against the data on the parents' personal beliefs and conceptions regarding vaccination. A 2×2 table was used for continuity correction, as accepted. Stepwise multivariable logistic regression analysis (P for inclusion <0.05, P for exclusion >0.1) was performed to identify significant predictors of child's uptake of seasonal influenza immunization. All the demographic and clinical variables studied as well as responses to questions on knowledge about the influenza vaccine, recommendations given, conceptions of its importance, risks accessibility and cost, were examined in addition to age and sex that were forced into the model. A backward selection procedure was then used to generate the final model. All statistical analyses were done with the SPSS version 15.0 (SPSS Inc., Chicago, IL). The study was approved by the institutional review board. All parents signed an informed consent form before inclusion in the study.

Table 1
Demographic characteristics of 273 children attending a gastroenterology clinic by influenza vaccination status.

	Total *n* (%)	Child vaccinated *n* (%)	Child not vaccinated *n* (%)	*P* value
Gender				
Male	136 (49.9%)	45 (31.1%)	91 (66.9%)	0.5
Female	137 (50.1%)	39 (28.7%)	97 (71.3%)	
Age (years)				
≤5	42 (15.3%)	8 (19%)	34 (81%)	0.25
6–9	81 (30%)	27 (33.3%)	54 (66.7%)	
10–14	85 (31.1%)	30 (35.3%)	55 (64.7%)	
15–18	65 (23.6%)	19 (29.2%)	46 (70.8%)	
Origin				
Jewish	231 (84.6%)	68 (29.4%)	163 (70.6%)	0.28
Arab	42 (16.4%)	16 (38.1%)	26 (61.9%)	
Father's education (years)				
8–12	95 (34.8%)	27 (28.4%)	68 (71.6%)	0.2
13–15	133 (47.7%)	47 (35.3%	86 (64.7%)	
16–18	45 (16.5%)	10 (22.2%)	35 (77.8%)	
Mother's education (years)				
8–12	85 (31.1%)	26 (30.6%)	59 (69.4%)	0.9
13–15	145 (53.2%)	45 (31%)	100 (69%)	
16–18	43 (15.7%)	13 (30.2%)	30 (69.8%)	
No. of siblings				
1–2	108 (39.5%)	35 (32.4%)	73 (67.6%)	0.15
3–5	144 (52.8%)	39 (27.1%)	105 (72.9%)	
>6	21 (7.7%)	10 (47.6%)	11 (52.4%)	

3. Results

3.1. Patient characteristics

Three-hundred and ten patients were offered to participate in the study and 273 agreed (response rate of 88%). The study cohort consisted of 273 patients, 137 boys and 136 girls, with mean age 10.2 years (SD 4.75). Additional demographic data are presented in Table 1. According to the questionnaire responses, 84 children (30.8%) had influenza vaccinations during the previous influenza season and 189 (69.2%) had not.

3.2. Comorbidities and risk factors

The distribution of the patients by underlying disease and vaccination status is shown in Table 2. There were 58 patients (21.2%) with inflammatory bowel disease (IBD), 42 (15.4%) with liver disease, and 173 (63.3%) with other diagnoses. Significant differences were observed in influenza vaccination rate among these patient groups ranging from 50% in IBD patients, 33.3% in participants with liver diseases to 23.7% in patients with other gastrointestinal diseases. Separate analysis of the 15 liver-transplant recipients showed that only 6 (33.3%) had been vaccinated.

Overall, 89 patients (32.7%) had received immunosuppressive drugs (glucocorticosteroids, azathioprine or anti-TNF agents), of