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What a pandemic teaches us about vaccination attitudes of parents of children with asthma

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ABSTRACT

Background: During the recent pandemic, Influenza A/H1N1 vaccine uptake remained far below the targeted rates. Associated factors regarding vaccine refusal in the general population have been reported in many studies, however the reasons behind refusals for asthmatic children have not yet been identified. We aimed to investigate Influenza A/H1N1 virus vaccine acceptance for children with asthma, to determine the attitudes and beliefs of parents concerning Influenza A/H1N1 disease and vaccine and to identify the association of asthma control parameters with vaccination.
Methods: The parents of asthmatic children aged 6–18 years participated in a cross-sectional survey study in three pediatric allergy outpatient clinics. The survey measured demographic factors, asthma control parameters, vaccination rates, and beliefs and attitudes regarding Influenza A/H1N1 vaccine.
Results: Of the 625 asthmatic children, 16.8% ($n = 105$) were immunized with Influenza A/H1N1 and 45.7% ($n = 286$) with seasonal influenza vaccine. Educational background of parents ($p < 0.001$ and $p = 0.002$, for father's and mother's educational level, respectively), previous vaccination with seasonal influenza ($p < 0.001$), and having a family member vaccinated against Influenza A/H1N1 ($p < 0.001$) had a significant influence on vaccine acceptance, while fear of side effects (88.6%) was the major parental reason for refusing the vaccine. Asthma control parameters had no influence on uptake of the vaccine. Physician recommendation (84.8%) was important in the decision-making process for immunization. The statement "Children with asthma should receive swine flu vaccine" increased the likelihood of being vaccinated [OR: 2.160, (95%CI 1.135–4.111), $p = 0.019$].
Conclusion: Although asthmatic children are considered to be a high-priority group for Influenza A/H1N1 vaccination, we found low uptake of vaccine among our patients. Beliefs and attitudes rather than asthma control parameters influenced parental decisions for immunization. Understanding the underlying determinants for refusing the vaccine will help to improve vaccine campaigns in advance of a future outbreak.

1. Introduction

The pandemic of Influenza A/H1N1 virus established a major challenge to health care providers globally in 2009. In May 2009, the first laboratory-confirmed case of Influenza A/H1N1 virus infection was reported in Turkey, and thereafter 10,700 patients were hospitalized due to the virus. During the pandemic, 656 patients with Influenza A/H1N1 virus infection died, two thirds of whom had chronic diseases or were pregnant [1].

The Ministry of Health of Turkey launched a vaccination campaign as a component of an action plan against Influenza A/H1N1 virus according to the suggestion of the World Health Organization. Individuals most susceptible to Influenza A/H1N1 virus infection, such as pregnant women, persons between the ages of 6 months to 24 years of age and patients with chronic health disorders or compromised immune systems were prioritized to receive Influenza A/H1N1 vaccine [2]. Vaccination was offered free of charge to the public and was carried out in family health centers and government hospitals. The Ministry of Health of Turkey made plans to

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order 43 million doses of Influenza A/H1N1 virus vaccine [3] but purchased 6 million doses. Three million doses of Influenza A/H1N1 virus vaccine were administered to the public, which was far below the expected immunization rate [1].

Immunization of certain risk groups is an important issue of preventive health care for decreasing mortality and morbidity. Patients with asthma were advised to receive Influenza A/H1N1 virus vaccine during the pandemic since they were considered to be high-priority group [4]. Though the safety and effectiveness of the vaccine were reported [5,6], Influenza A/H1N1 virus vaccine uptake was low worldwide. In the USA, 20.3% of population received the vaccine, 29.4% of whom were between 6 months and 18 years old [7]. Nearly one tenth of individuals living in France were immunized against Influenza A/H1N1 virus during the pandemic [8]. In England, 37.1% of the patients in risk groups, including pregnant women, accepted to be vaccinated [9]. However, findings from these studies did not reveal information about the vaccination status of specific risk groups, including children with asthma, nor about the barriers and motives for uptake of the vaccine. The aims of this study were to estimate Influenza A/H1N1 virus vaccine acceptance for children with asthma, to determine attitudes and beliefs of parents about Influenza A/H1N1 disease and vaccine and to identify factors influencing vaccine refusal.

2. Methods

2.1. Subjects

This study was conducted from 1 April to 30 July 2010, after termination of the Influenza A/H1N1 immunization campaign. We invited parents of all children with asthma aged 6–18 years old admitted to our outpatient allergy–asthma clinics. The parents were so willingly to participate in the study that only three parents refused to participate and eight parents did not give back the questionnaires to their physicians. All three parents stated the same reason for refusal: “lack of time”. We performed the study in three centers (one university hospital, two education and research hospitals). While all these clinics serve as referral centers for their specific regions, patients may also be admitted upon request; thus they function both as primary and tertiary health care services. In these allergy–asthma departments, the patients are followed by pediatric asthma specialists so that we have no suspicious about disease diagnosis. The diagnosis of asthma was based on the criteria of The Global Initiative for Asthma (GINA) guideline defined as a history of intermittent wheezing and/or reversible airway obstruction with at least a 12% improvement in forced expiratory volume in 1 s (FEV1) following salbutamol inhalation [10].

2.2. Questionnaire

We administered a survey concerning demographic factors (age, gender, age at asthma diagnosis, parents’ education level, family history for atopic diseases, smoke exposure and monthly income) and asthma control parameters (scheduled and unscheduled healthcare resource usage and admittance to an emergency unit in the last year due to asthma, ever having hospitalization or within the last year because of asthma). The parents were asked whether their child was vaccinated against seasonal flu both in the current and any previous influenza seasons.

The parents also answered questions concerning;

- Perception and knowledge about Influenza A/H1N1 virus infection and the impact of infection on children with asthma.
- Knowledge about the indications for Influenza A/H1N1 virus vaccine.
- Potential benefits of immunization with Influenza A/H1N1 virus vaccine (decreased risk of infection, decreased risk and severity of asthma exacerbations).
- Anyone in the household who was vaccinated against Influenza A/H1N1 virus.
- Reasons for acceptance of Influenza A/H1N1 virus vaccine.
- Reasons for refusing immunization with Influenza A/H1N1 virus vaccine.

Responses to most survey items were evaluated using a 5-point Likert scale from “strongly agree” to “strongly disagree”.

The physicians noted some information related to the patient’s asthma, such as asthma severity, atopy, medications, other atopic diseases, lung function tests, and asthma control in the last four weeks. Participation was on a voluntary base.

2.3. Analysis

We performed statistical analyses with the SPSS 15 package program (SPSS, Inc, Chicago, IL, USA). The Kolmogorov–Smirnov test was used to test the normal distribution of data. Differences between the groups were compared by Student’s t or Mann–Whitney U test or chi-square as appropriate. A sample size of 603 patients achieved 80% power to detect the difference between the vaccinated and unvaccinated groups for the variables (NCSS/PASS 2006 Software). We used multivariate logistic regression to model the odds of being unvaccinated versus vaccinated. Dependent variables were dichotomized: the answers “strongly agree” and “agree” versus all others. Variables that were associated with the outcomes in the univariate analysis at a p value of less than 0.25 were entered in the multivariate logistic regression models using the stepwise selection criteria (backward elimination procedure). The results of multivariate logistic regression analysis were expressed as odds ratios (ORs) and 95% confidence intervals (CIs). A value of $p \leq 0.05$ was considered statistically significant.

3. Results

Overall, a total of 625 parents participated in the study after the Influenza A/H1N1 immunization campaign. During the 2009–2010 influenza season, 105 children with asthma (16.8%) were immunized with Influenza A/H1N1 vaccine and 286 (45.7%) children with seasonal influenza vaccine (Table 1). Patients who declared that they received the Influenza A/H1N1 vaccine had an asthma diagnosis at an earlier age [5 (2.3–7) vs. 6 (3–8) years, $p = 0.018$] and with longer duration of asthma follow up [4 (2–7) vs. 3 (1.5–5) years, $p = 0.010$]. Although asthma control parameters within the last year, including unscheduled health care or emergency department visit, or hospitalization due to asthma, did not differ between the groups; higher educational level of the parents, being vaccinated against seasonal influenza ever and/or in the current year, and having a family member vaccinated against Influenza A/H1N1 did have a positive impact on being vaccinated with Influenza A/H1N1 vaccine (Table 1).

The important correlates of being vaccinated with Influenza A/H1N1 vaccine are also the different knowledge, attitudes and beliefs of parents about Influenza A/H1N1 vaccine and disease (Fig. 1). The parents who agreed to have their children immunized were concerned about Influenza A/H1N1 disease severity both in healthy and asthmatic children. In addition, they affirmed more frequently that the Influenza A/H1N1 vaccine was safe (35.2% vs. 6.2%, $p < 0.001$) and easy to find (61% vs. 37.5%, $p < 0.001$).

Nearly half of the patients (47.6%) who were immunized against Influenza A/H1N1 experienced an adverse event attributed to the vaccine; malaise (19%), fever (15.2%), rhinorrhea (12.4%), headache