

Kronik Hastalığı Olan Çocuklarda Mevsimsel İnfluenza Aşılması :Bir Üçüncü Basamak Sağlık Merkezi Deneyimi

Seasonal Influenza Vaccination in Chronically Ill Children : The Experience of A Tertiary Healthcare Center

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ABSTRACT

Objective: Seasonal influenza vaccination is place an important role in the prevention of children with chronic disease. However, the vaccination rate in this group is sub-optimal and far from the public health goal. The aim of this study is to contribute to research addressing the need for a higher rate of seasonal influenza vaccination of chronically ill children at our center.

Material and Methods: This study was conducted in Ankara Child Health and Diseases, Hematology Oncology Training and Research Hospital and is a single-center retrospective study. The study covers 3 consecutive flu seasons between October 2015 and May 2018.

Results: Seasonal influenza vaccine was administered to 315 chronically ill children in 3 consecutive flu seasons. During three seasons between October 1, 2015 and May 31, 2018, 12,690 chronically ill children were admitted to our center in the same diagnoses as children who were vaccinated. Of these 315 children, 87.0% had asthma, 4.4% had selective deficiency of immunoglobulin A, 2.2% had nephrotic syndrome, 1.6% had diabetes mellitus, 1.3% had cystic fibrosis, 1.3% were hematopoietic stem cell transplantation patients, 0.96% had cerebral palsy, 0.64% had Duchenne muscular dystrophy, and 0.6% had acute lymphoblastic leukemia.

Conclusion: In this study, seasonal influenza vaccination rates of chronically ill children increased gradually in these 3 influenza seasons. However, the number is still low. It is clear that we need a plan to increase the vaccination rates of this patient group at our center.

Key Words: Child, Chronic illness, Influenza, Vaccination

ÖZ

Amaç: Kronik hastalığı olan çocukların korunmasında mevsimsel influenza aşılması önemli rol oynamaktadır. Bununla birlikte, bu grupta aşılanma oranı olmasının gerekenin altındadır ve halk sağlığı hedefinden uzaktır. Bu çalışmanın amacı; kronik hastalığı olan çocukların mevsimsel influenza aşılması ihtiyaçlarının merkezimizde daha yüksek oranda karşılanabilmesine yönelik çalışmalara katkı sağlamaktır.

Gereç ve Yöntemler: Bu çalışma Ankara Çocuk Sağlığı ve Hastalıkları Hematoloji Onkoloji Eğitim ve Araştırma Hastanesi'nde yapılmıştır ve tek merkezli, retrospektif bir çalışmadır. Çalışma Ekim 2015 ile Mayıs 2018 tarihleri arasındaki ardışık 3 influenza sezonunu kapsamaktadır.

Bulgular: Ardışık 3 influenza sezonunda 315 kronik hastalığı olan çocuğa mevsimsel influenza aşısı uygulandı. Hastanemize 1 Ekim 2015 ve 31 Mayıs 2018 tarihleri arasındaki üç sezonda, aşı uygulanan çocuklarla aynı tanılardaki 12.690 kronik hasta çocuk kabul edilmiştir. Bu 315 çocuğun %87'si Astım, %4.4'ü Selektif IgA eksikliği, %2.2'si Nefrotik Sendrom, %1.6'sı Diyabetes Mellitus, %1.3'ü Kistik Fibrozis, %1.3'ü Hematopoetik Kök Hücre Nakli yapılan hasta, %0.96'sı Serebral Palsi hastası, %0.64'ü Duchenne Müsküler Distrofi hastası ve %0.6'sı Akut Lenfoblastik Lösemi hastasıdır.



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Sonuç: Bu çalışmada; kronik hastalıklı çocukların mevsimsel influenza aşılama oranları bu 3 influenza sezonunda giderek artmıştır. Ancak sayı halen düşüktür. Merkezimizde bu hasta grubunun aşılama oranlarını artıracak planlar yapmamız gerektiği açıktır.

Anahtar Sözcükler: Çocuk, Kronik hastalık, Influenza, Aşılama

INTRODUCTION

Influenza is an acute respiratory illness caused by influenza A or B viruses, which occurs in outbreaks worldwide every year, mainly during the winter seasons (in temperate climates). Among healthy children, influenza generally is a self-limited and uncomplicated disease. However, it can be associated with severe morbidity and mortality in healthy children and certain groups of children and adults who are at increased risk of severe or complicated illness from influenza (1). Immunization is the most effective means of preventing influenza infection. Children are important vectors for the spread of disease. Increasing the numbers of immunized individuals also may reduce influenza among unimmunized contacts within the household and community. This may be particularly helpful in preventing influenza infection among infants younger than six months and high-risk individuals who did not receive the vaccine (2). In a previous study in Japan covering elementary schoolchildren aged 7-12 years, during the 2014-2015 influenza season, high vaccine coverage was significantly and negatively correlated with low-level influenza epidemic among elementary school. However, no protective effects of non-pharmaceutical interventions, such as mask wearing, hand washing, and water gargling, were detected (3). In the United States, the Center for Disease Control and Prevention's and the American Academy of Pediatrics recommend universal annual influenza vaccination for persons ≥ 6 months (4). However, recommendations for influenza vaccine vary from country to country. The Advisory Committee on Immunization Practices (ACIP) has identified some of chronic medical conditions (asthma, chronic pulmonary disease, cardiac disease, immunosuppression, chronic renal dysfunction, metabolic and endocrine conditions etc.) for which annual influenza vaccination is recommended (5).

Vaccine uptake in chronically ill children are sub-optimal and far from the public health goal (6). The aim of this study is to find out the need for a higher rate of seasonal influenza vaccination of chronically ill children at our center. And also we reviewed literature regarding with this topic. In Turkey there is very little data on seasonal influenza vaccination of these groups of at-risk children. With our study results, we aim to increase the seasonal influenza vaccination rates of these children in our country.

MATERIAL and METHODS

We conducted a monocentric retrospective investigation in Ankara Child Health and Diseases, Hematology Oncology Training and Research Hospital. In our hospital there are approximately 500.000 out-patient admissions and 16.000

patient hospitalizations annually. The study covers 3 consecutive flu seasons between October 2015 and May 2018. In Turkey, every year the vaccination campaign begins in October and ends in May.

In this study, we used variables from the Well Child Clinic's Vaccine Unit and statistical data from the hospital. The ICD-10 version was used for the diagnosis of chronic diseases (7). Seasonal influenza vaccine was administered to children in our unit with chronic illness on the list designated by ACIP (5). Since our hospital is a large center for hematopoietic stem cell transplantation (HSCT), HSCT patients were vaccinated in addition to those on the above list (8,9). Healthy children without chronic illnesses were excluded from the study.

Turkey's influenza vaccination programme covers persons with clinical risk factors, pregnant women, those aged 65 years and older. The Turkish National Advisory Committee on Immunization recommends influenza immunization for people at high risk of serious infection as well as for their contacts (10). Social Security Institution in Turkey, if the disease is documented by a health report, it meets 1 dose of influenzae vaccine per year in all risk groups (11).

The influenza vaccine which has been registered by the Ministry of Health of Turkey have been used in this 3 consecutive flu seasons. For the pediatric population, the vaccination strategy depends on the age. Between six to 35-month-old children: 2 half dose (0.25 ml) of vaccine are given for primary immunization and only 1 half dose for booster. Between three to eight-year-old children: 2 doses (0.5 ml) within a month are administered for primary immunization and 1 dose for booster. Above 9-year-old children only one dose is given. Each dose was given by intramuscular injection.

Ethical approval was obtained for this study numbered 2018-155 from the University of Health Sciences, Ankara Child Health and Diseases, Hematology Oncology Training and Research Hospital.

Statistical analyses:

Analyzes were performed SPSS 22 (IBM Corporation, Armonk, NY) and e-picos program. Categorical data were given as frequency and percentage. Chi-square test was used for categorical data. Differences were considered statistically significant with P values of < 0.05 .

RESULT

Of the 315 chronically ill children receiving seasonal influenza vaccine, 33.7% were female (106/315) and 66.3% were male (209/315). The mean age of the patients was 87.2 ± 43.9 months

Table I: Distribution of seasonal influenza vaccine administered to chronically ill children according to disease in 3 consecutive flu seasons, the number of chronically ill children admitted to the hospital having the same diagnoses in these 3 consecutive flu seasons in our hospital.

	Seasonal influenza vaccine administered to chronically ill children according to disease in 3 consecutive flu seasons. The number of chronically ill children admitted to the hospital having the same diagnoses in these 3 consecutive flu seasons						Total†	Disturbation of vaccination rates according to the flu seasons and chronic diseases		
	01.10.2015 - 31.05.2016 flu seasons Total	01.10.2015 - 31.05.2016 flu seasons vaccinated	01.10.2016-31.05.2017 flu seasons Total	01.10.2016-31.05.2017 flu seasons vaccinated	01.10.2017 - 31.05.2018 flu seasons Total	01.10.2017-31.05.2018 flu seasons vaccinated		01.10.2015-31.05.2016 flu seasons	01.10.2016-31.05.2017 flu seasons	01.10.2017-31.05.2018 flu seasons
Acute lymphoblastic leukemia	106	0	69	0	118	2	295	0.00	0.00	1.69
Selective deficiency of immunoglobulin A	57	7	59	5	85	5	218	12.28	8.47	5.88
Diyabetes mellitus	61	0	138	1	81	4	285	0.00	0.72	4.94
Cystic fibrosis with pulmonary manifestations	4	0	1	0	14	4	23	0.00	0.00	28.57
Asthma	2457	22	2524	148	3456	143	8750	0.90	5.86	4.14
Nephrotic syndrome	69	0	62	5	56	6	198	0.00	8.06	10.71
HSCT patient	41	1	49	1	102	2	196	2.44	2.04	1.96
Serebral palsy	1294	0	710	0	517	3	2524	0.00	0.00	0.58
Duchenne muscular dystrophy	94	2	60	0	45	0	201	2.13	0.00	0.00
TOTAL	4183*	32	3672*	160	4474*	169	12690	0.77	4.36	3.78

*Total number of chronically ill children vaccinated and unvaccinated in each flu seasons. †Total number of children with and without vaccination in each chronic disease during 3 flu seasons.

Table II: Distribution of seasonal influenza vaccines administered to chronically ill children in different flu seasons.

Flu seasons	Number of children vaccinated	
	n	%
2015-2016 season	20	6.3
2016-2017 season	120	38.1
2017-2018 season	132	41.9
2015-2016 and 2016-2017 seasons	6	1.9
2015-2016 and 2017-2018 seasons	3	1.0
2016-2017 and 2017-2018 seasons	31	9.8
Number of children vaccinated in 3 seasons	3	1.0
Total	315	100

(10 months-18 years). 0.6% (2/315) of the patients were 10-12 months of age, 34.6% (109/315) were 1-5 years of age, 64.8% (204/315) were over 5 years of age. Table I provides some information on seasonal influenza vaccine administration.

Table II shows the distribution of seasonal influenza vaccines administered to 315 chronically ill children in different flu seasons.

The number of vaccines administered to these children in our hospital during 2016-2017 and 2017-2018 flu seasons increased compared to 2015-2016 flu seasons ($p < 0.001$). However, the increase in the number of vaccinations in 2017-2018 flu season is not statistically significant compared to 2016-2017 flu season ($p = 0.186$).

DISCUSSION

Influenza immunization of chronically ill children is important because they are particularly predisposed to more severe disease and complications. Chronic medical conditions are in fact associated with a higher rate of influenza-related complications, as measured by hospitalization, outpatient visits, and antibiotic prescriptions. However, vaccine uptake in this group is sub-optimal and far from the public health goal (6,12). In a multicenter study of children aged 6 months to 18 years, 143 patients were hospitalized during a pandemic in 55 of these patients, comorbid conditions were present and most patients with neurological or pulmonary comorbidities required hospitalization (13). In a study conducted in Madrid, Spain during the 2009 influenza season, influenza vaccine coverage was found to be 27.1% in children with chronic illness between 6 months and 14 years of age; it was particularly high among diabetics (41.1%) and particularly low in children with other pulmonary conditions (15.2%). The researchers indicated that these rates were lower than desired (14).

There are very few studies in Turkey which have examined seasonal influenza vaccine coverage rates and factors affecting immunization of chronically ill children. Studies are mostly related to seasonal influenza vaccination in the adult risk group. In Turkey, in a study involving 366 children with chronic neurological disease, 86.6% of children and 92.6% of household contacts had not received seasonal influenza vaccine previously (15). Also in another study, which was conducted in 566 adults with chronic illness in Turkey, 21.7% of the participants had been vaccinated that year, 57.8% did not want to have the vaccine. Vaccination rates were significantly higher among participants ≥ 65 years of age (56.4%), and those who were vaccinated regularly every year (22.2%). Half of the participants did not know that the vaccine was reimbursed for people at risk. The most common reason for refusing the influenza vaccine was not getting the flu frequently (51.2%). Fear of side effects, concerns about the vaccine's effectiveness, and a belief that vaccine causes the flu were other common reasons for not being vaccinated. Of the participants, 77% believed that getting official information or a recommendation from a physician would influence their decision about seasonal influenza vaccination (16). In a study in Turkey, adult patients with asthma also were found that their knowledge of influenza infections and seasonal influenza vaccine was insufficient (17).

Many studies have been conducted to examine possible ways of increasing influenza vaccination uptake and the reasons for decline in vaccination rates. The decision of whether to undergo influenza vaccination is complex, and the reasons underlying the decision may vary over time. Studies have indicated that missed immunization opportunities in vaccine-eligible individuals during the routine health care follow-up, contribute significantly to low influenza immunization rates among children

with chronic medical conditions (18). A study of 926 chronically ill children, which were between 6-72 months of age in the 2002-2003 influenza season was conducted in the US. Of these patients, 89% had asthma and 11% had other chronic conditions. Missed opportunities for vaccination, occurred at 78% of children with asthma and 74% in other high-risk conditions. Parents of unimmunized children reported lack of a physician recommendation and low perceived susceptibility to influenza as the primary reasons for not immunizing their child (6). Another reason for failure to immunize chronically ill children is inadequate policies and inconsistent enforcement of policies. There has also been wide variability in immunization policies for chronically ill children (19, 20).

Our study has found that the vaccination rates of asthmatic patients, as in the case of patients with other chronic diseases, are low at our hospital. In another study, a school-based health center program was implemented. As a result of this program, the rate of vaccinated asthma students increased from 11% to 47% (21). In a study in Israel in 2012, the study group included 186 children with a median age of 7.6 years and their parents, who attended the cardiology institute of a tertiary pediatric medical center. Thirty-six percent had been vaccinated in the previous influenza season. Vaccination was unrelated to the child's age or sex or the parents' education. Factors significantly affecting the decision of the parents to have their child vaccinated were their knowledge, beliefs and conceptions about the vaccine and their receipt of a recommendation to do so from the pediatrician or cardiologist (22). In our study, 66.3% of the patients receiving seasonal influenza vaccine were male and approximately 65% were over 5 years of age. This can be explained by the fact that the majority of the children with chronic diseases who were admitted to the hospital in 3 consecutive flu seasons were over 5 years of age and the number of boys was higher.

In our study, as shown in Tables II, in the 2015-2016 flu season, a total of 32 children with chronic illness were vaccinated with seasonal influenza vaccine; this number reached 160 patients (a 5-fold increase) with the addition of 151 new patients in the 2016-2017 flu season. In the subsequent flu season, 132 new patients were added and reached a similar number of patients in the 2016-2017 flu season ($n=169$). Although it is well below our target of meeting the vaccination requirements of our patients in chronically ill children at our hospital, this increase is promising. Influenza vaccination rates in these children are increasing all over the world. Life expectancy in chronic diseases is gradually increasing. Therefore, efforts to improve the quality of life of these patients are increasing. We think that the increase in the knowledge, experience and awareness of vaccination of healthcare providers in departments dealing with chronic diseases is effective in increasing the influenza vaccination rates at our hospital. Also, providing to increase the knowledge and awareness of the families of these patients is

effective in increasing the influenza vaccination rates. In addition, we think that the more active study of the vaccination unit and the higher inclusion of this issue in the education curriculum of the healthcare providers are effective in increasing the influenza vaccination rates at our hospital. Also, concerning this increase, we think that the priority given to this issue in the institutions and organizations that make health-related decisions in our country has also played a key role (10,11, 21-25).

Many studies have been conducted to increase seasonal influenza vaccination in children with chronic disease and the importance of physicians' recommendations to increase seasonal influenza vaccination uptake among chronically ill children. Health professionals and general practitioners, working in departments following patients with chronic diseases must be aware of influenza vaccination and should make every effort to better inform their patients and parents of the risks of flu illness and the benefits and safety of the vaccination (26). Physicians should recommend the vaccine to risk groups and have legal responsibilities. Because chronically ill children regularly visit outpatient clinics, offering seasonal influenza immunization in these settings is an effective approach to reduce missed opportunities. Promotional and informational material on that topic should be available in outpatient clinics, reaching most parents of chronically ill children. Delivering immunization in clinical settings and reducing administrative barriers to obtaining immunization services within clinics are strategies enhancing access to immunization services. In a study, education and interventions such as the use of mobile carts that facilitate access to immunization increased immunization rates. When combined with strategies to promote immunization, these strategies are effective to improve coverage (27-29). In Turkey, a study was also conducted, in which 273 medical oncologists participated. Only 23.4% of the physicians thought that their recommendation for vaccination was efficient and adequate. Lack of time and lack of knowledge or experience about vaccination were the most common limitations. Experience with autologous or allogeneic bone marrow transplant patients was related with more tendency to evaluate patients for vaccination (23).

The retrospective nature of our study may have biased the findings. Therefore the results of our study cannot be generalized for Turkey.

In conclusion, it is clear that we must increase the vaccination rates of this patient group at our center. Therefore, as a vaccination unit, we plan to increase our communication with clinics that follow chronically ill children, conduct periodic trainings and prepare written documents to raise the awareness of healthcare providers working in these clinics. Since allocating an adequate amount of time to patients, and acquiring knowledge and experience are important, the employment of a healthcare provider, whose job description is only to follow the immunization of these patients, will also contribute to increasing

vaccination rates. We also plan periodic trainings to inform healthcare providers working in outpatient clinics that are likely to encounter these patients and to prepare written documents to inform these staff members and the families of patients. During the flu season, calling patients and sending letters to inform patients could increase vaccination rates. We intend to conduct a study of these children's families to understand their knowledge and attitudes about influenza-related infections and seasonal influenza vaccine. Finally, it should be mentioned that the financial support offered by the 'Ministry of Health' in Turkey, is an important facilitator for the implementation of seasonal influenza immunization. Future studies should be conducted to determine the effectiveness and cost-effectiveness of the influenza vaccine in preventing hospitalizations and serious complications in these children.

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