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Title: THE KNOWLEDGE LEVEL OF PHYSICIANS ABOUT INFLUENZA AND PNEUMOCOCCAL VACCINATION

Short Title: THE KNOWLEDGE LEVEL OF PHYSICIANS

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Abstract

Objective: The aim of this study was to evaluate the knowledge level of influenza and pneumococcal vaccine in physicians.

Material and Methods: A questionnaire was performed to physicians who work in Kyrenia University Hospital and Near East University School of Medicine

Results: There were 38 female (56,7%) and 29 male (43,3%). The mean age was $39,3\pm 12,5$ years.

Influenza vaccine and its' risk minimization for infection were well known among 92,5 % of the participants. However, 76,1% of them mentioned that they have knowledge about the pneumococcal vaccine and this ratio about its' reducing the risk of infection was 73,1 %. There were 24 general practitioners and 43 specialists in the study. 83,7% of specialists and 79,2% of general practitioners thought that adult vaccines were effective ($p=0,6$). The rate of influenza vaccination among specialists was higher than that of general practitioners (67,4% vs 41,7%, $p=0,04$). However, the rates of pneumococcal vaccination were low and similar in both groups ($p=0,3$). In both specialists and general practitioners, the most common reason for not having the vaccine was the belief of not being in the risk group ($p=0,9$). The knowledge level of pneumococcal vaccination in general practitioners was found to be statistically lower than specialists ($p<0,05$).

Conclusion: Although influenza vaccine and its' risk minimization for infection are well known among physicians, the pneumococcal vaccine is not well known. It's suggested that training about vaccination for both specialists and general practitioners are important for preventive medicine.

Keywords: knowledge, vaccination, influenza, pneumococcus, physician

INTRODUCTION

Influenza and pneumococcal infections are leading causes of mortality and morbidity all over the world particularly in older adults [1]. Every year pneumococcal infections account for about 1.6

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million deaths worldwide [2]. It is also known that pneumococcal infections are more prevalent during spikes in the incidence of influenza. Secondary bacterial pneumonias (mostly *S. pneumonia*) correspond to approximately 50 % of deaths during season of flu in the US [2].

Although the effectiveness, safety and efficacy of pneumococcal and influenza vaccines were proven by many studies, vaccination coverage of high-risk adults even in developed countries still remains low [3-5]. Pneumococcal vaccination rates in elderly is as low as 31 % in Germany. For influenza it is about 37 % which is lower than the target of 75 % given by the WHO [6].

Healthcare workers are also at high risk of both acquiring influenza and transmitting it to the patients and other medical staff. Vaccination is the best preventive way against influenza. Thus, immunization is recommended annually for all healthcare providers by the WHO, the CDC in the US and the national health authorities of most European countries [7]. A survey reporting influenza vaccination rates belonging to 10 European countries during 3 consecutive flu seasons (from 2008 to 2011) among healthcare workers remained below 35 % [7]. A review including 14 studies from around the world found that one of the strongest predictors of vaccination is physician recommendation [8]. Because vaccination coverage rates even among healthcare professionals remain low, the objective of this study was to understand the knowledge and attitudes of physicians about influenza and pneumococcal vaccines.

MATERIAL AND METHODS

The study was carried out in xxxx University Hospital and xxx University School of Medicine. All of the participants were physicians. A self-administered questionnaire was performed to all volunteer

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physicians between the dates of September 2017 - October 2017. Physicians included general practitioners (GP) and specialists (Infectious Disease, Pulmonary Disease, Internal Sciences, and Surgical Sciences). Approximately 100 physicians were reached and 67 of them responded the questionnaire.

The questionnaire included demographic data (age, gender, duration of working) and 10 questions about influenza and pneumococcal vaccine. The knowledge of influenza and pneumococcal vaccine, the effect of vaccines on reducing infection risk, vaccination rates among physicians, and reasons for refusing the vaccine were asked. The knowledge of vaccination was defined according to one question 'Do you have knowledge about the influenza / pneumococcal vaccine?'. The questionnaire was prepared by specialists in pulmonary disease and infectious diseases and it was not a validated questionnaire. All statements included in the questionnaire were either exactly right or wrong in order to decrease inter-individual interpretation difference. Thus, the answers were classified 'yes', 'no' or 'no idea'. If the participants were sure about the answer they chose 'yes or no'. But if they were not sure about the question, they chose 'no idea'. For example;

- I heard the name of the vaccine and I know the efficacy-**Yes**
- I did not hear the name of the vaccine and I don't know the efficacy- **No**
- I heard the name of the vaccine but I did not know the effectiveness of it- **No idea**

All participants were informed about the aim of the study and they gave written informed consent. The study was approved by the local ethical committee of University of xxx (22/08/2017; ref no: RY-2017-12)

Statistical analysis

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All statistical analyses were performed using IBM SPSS for Windows version 20.0 (SPSS, Chicago, IL, USA). Continuous variables were expressed as mean± standard deviation, and categorical variables were expressed as counts (percentage). Comparisons of categorical variables between the groups were performed using the chi-square test. A two-sided *P* value <0.05 was considered statistically significant.

RESULTS

Totally 67 physicians; 38 female (56,7%) and 29 males (43,3%) were enrolled. The mean age was $39,3 \pm 12,5$ years. The mean age was higher in male than female physicians and the difference was statistically significant ($44,6 \pm 13,3$ vs $35,2 \pm 10,3$ years, $p=0,001$). Two third of the physicians had been working for at least 5 years.

Eighty one percent of physicians stated that adult vaccination is effective. There was no significant difference in gender about the opinion of efficacy of adult vaccination ($p=0,2$). Influenza vaccine and its' risk minimization for infection was well known among 92,5% of the physicians (Figure-1). However, 76,1% of them mentioned that they have knowledge about pneumococcal vaccine and this ratio about its' reducing the risk of infection was 73,1% (Figure-2).

Among the participant physicians the rates of vaccination were 58% for influenza and 4,5% for pneumococcal vaccination. The rate of influenza vaccination was similar in both gender ($63,2\%$ vs $51,7\%$, $p=0,3$). Only 3 (4,5%) of the cases had pneumococcal vaccination and all were female. The ages of these physicians were 34, 30 and 31 years respectively. One of them was general surgeon and others were general practitioners. All of them stated that they had a pneumococcal vaccine with a doctor's recommendation.

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There were 24 (35,8%) GP and 43 (64,2%) specialist in the study. The distribution of the physicians according to working specialties were shown at Figure-3. 83,7% of specialists and 79,2% of general practitioners thought that adult vaccines were effective ($p=0,6$). The rate of influenza vaccination among specialists was higher than that of general practitioners (67,4% vs 41,7%, $p=0,04$). However, the rates of pneumococcal vaccination were low and similar in both groups ($p=0,3$). All of the influenza vaccinated specialists indicated that their colleague had recommended the vaccination but the colleague recommendation was 70% in the general practitioners and the difference was statistically significant ($p=0,009$). Among vaccinated specialists and general practitioners, the proportion of people who thought that vaccination was beneficial found similar (72,4% vs 70%, $p = 0,6$).

In both specialists and general practitioners, the most common reason for not having the vaccine was the belief of not being in the risk group ($p=0,9$) (Figure-4). While the knowledge level of influenza vaccination was similar between practitioners and specialists, the knowledge level of pneumococcal vaccination in general practitioners was found to be statistically lower than specialists ($p<0,05$) (Table-1).

DISCUSSION

This study demonstrated that the knowledge level of influenza vaccination was similar between general practitioners and specialists, however the knowledge level of pneumococcal vaccination in GP was found to be statistically lower than specialists. Nearly sixty percent of the physicians had influenza vaccination. The rate of influenza vaccination among specialists was higher than that of GP. Additionally, the rates of pneumococcal vaccination were low in both groups. The most common reason for refusing the vaccine was the belief of not being in the risk group.

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Influenza causes more than 200000 hospitalizations and 300-49000 deaths annually in the US [9,10]. It can lead to severe illness and serious complications such as secondary bacterial pneumonia [11,12]. *Streptococcus pneumoniae* is the most commonly isolated microorganism from adults with pneumonia and sepsis [13]. Failure of natural immunity leads to invasive pneumococcal infections. The highest rates of pneumococcal disease are observed in infants, the elderly, immune compromised patients and patients with chronic respiratory disease [14]. Health-care workers are also at increased risk for influenza and vaccination is justified in order to protect them from occupational exposure and to prevent the spread of disease to susceptible patients [15].

Vaccination of patients with high risk against influenza and pneumococcal infections prevents disease-associated mortality and morbidity, and it is one of the key public health issues in most countries. Influenza vaccination is a fundamental tool for the prevention of influenza in healthcare settings and its administration to healthcare workers is recommended in more than 40 countries including United States of America and many countries of the European Union [16]. Furthermore, pneumococcal disease is a vaccine preventable disease. The 23-valent pneumococcal polysaccharide vaccine (PPSV) and the 13-valent pneumococcal conjugate vaccine (PCV13) have been recommended for individuals at high risk of pneumococcal disease since 2003, including adults over the age of 65 years [14]. The Advisory Committee on immunization practice (ACIP) of the CDC recommends immunization schedules and updates them regularly. Although these recommendations are available to healthcare professionals, studies show that almost 50% of those don't rely on guidelines [17].

Studies suggest that additional control strategies for pneumococcal disease are needed particularly during influenza season and pandemic outbreaks. This means policymakers can potentially control 2 diseases that co-occur [2].

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According to surveys by CDC approximately 20 % of adults aged ≥ 65 years having received flu vaccine reported that they have never received a pneumococcal vaccination [18]. Many barriers to successful vaccination programs have been identified including fears of adverse effect, missed opportunities, lack of awareness regarding the seriousness of those infections. The results of a study from Korea showed that the most important barrier to vaccination was that %75 of high-risk patients were not even aware that the vaccine existed. Second most common barrier was a negative attitude on the side of clinicians. However, doctors advice was the most triggering factor that encouraged patients to get vaccination similar to results of several studies [18].

Being both in high risk group and a potential motivator of flu vaccine, physicians play an important role in successful vaccination programs. Immunization rates of health care workers have changed according to years and countries. The highest immunization rates among physicians (88.3%) with influenza vaccination was reported in Saudi Arabia [19]. In the 2005-2006 NICS study in Canada, the physician coverage of flu vaccine was close to that of elderly patients (physicians: 74,3%; patients: 69,9 %) [5]. According to a survey from Turkey physicians' self-vaccination rate of influenza was about 41,2% [18]. Similarly, Maltezoğlu et al reported a coverage level of 44% among physicians in their survey [20]. This rate varied 30% to 76,4% in Italy [16,21]. There is no significant data about immunization of healthcare workers in Northern Cyprus. As a first study conducted in Northern Cyprus, the self-vaccination rate of all physicians was 58,2 % in our study. It was 67,4% for specialists and 41,7% for general practitioners. These findings suggest that priority should be given to general practitioners' training in the action plan.

The main reasons for refusing vaccination are feeling of invulnerability to vaccination, conviction of not being at risk, of being too young or in good health. Misconceptions about vaccine efficacy, fear of needles, fear of adverse effects, and fear of contracting illness from the vaccine are

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significantly associated with noncompliance with vaccination [20,22,23]. In Haridi et al's study, the main reasons for vaccination avoidance were misconception that the vaccine causes influenza (38.5%) and concern about vaccine efficacy (32.7%) [19]. In our study the most common reason for refusing vaccination among the physicians was the belief of not being at risk group (51,9 %). As similar to Haridi, there was a concern about the efficacy of vaccination in 30,8% of the specialists and 28,6% of the general practitioners. A data from United States show that, the flu vaccination rate increased from 47% to 96% where influenza vaccination is legally obligatory [20]. It is thought that stronger recommendations are needed to achieve higher vaccination coverage against vaccine preventable diseases. Furthermore, the barriers in front of the vaccination can be overcome with education and legal regulations.

In some studies, the vaccination rate was increased with longer working durations and this can be explained with increased awareness. In our study, two third of the physicians had been working for at least 5 years. There was no significant difference of vaccination rates with respect to longer working durations. This might be explained by our relatively small study group.

The pneumococcal vaccination coverage rates were significantly low in our study. This was primarily due to the healthcare workers' not being in risk group for pneumococcal disease. In health care workers, influenza vaccination is indicated, although there is no recommendation about the pneumococcal vaccination in this population without any comorbidities [24]. But the study also showed that the awareness of pneumococcal vaccination was lower than that of influenza. When compared to specialists, general practitioners have similar attitudes about flu vaccination but lower information level of pneumococcal vaccination.

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This is the first study evaluating the knowledge level of physicians about influenza and pneumococcal vaccination in Cyprus. Beside this, there are some limitations of the study. As first the study is carried out in only two hospitals so study population have limited number. Second, it does not include all physicians working in Cyprus. Third, the questionnaire used in this study is prepared by authors and it is not a validated questionnaire. Fourth, the questionnaire does not include question about medical history of the physicians so it is not possible to evaluate the effect of the comorbidities on vaccination rates.

This study shows that physicians still have doubts and lack of awareness about influenza and pneumococcal vaccination. As the healthcare professionals are the key to successful community immunization programs, they must be well aware of the guidelines about it. Policymakers should consider to set up training programs about adult immunization covering all clinicians particularly the general practitioners in primary care.

Although influenza vaccine and the effect of vaccine in reducing the incidence of infection are well known among physicians, the pneumococcal vaccine is not well known. This is especially true for general practitioners. It is suggested that training about vaccination for both specialists and general practitioners are important for preventive medicine.

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Table-1: The knowledge level of specialists and general practitioners about influenza and pneumococcal vaccination

	Specialist			General practitioner			p
	Yes	No	No idea	Yes	No	No idea	
Do you have information about influenza vaccination? n (%)	40 (%93)	1 (%2,3)	2 (%4,7)	22 (%91,7)	2 (%8,3)	0	0,3
Does influenza vaccine reduce the risk of infection? n (%)	40 (%93)	2 (%4,7)	1 (%2,3)	22 (%91,7)	1 (%4,2)	1 (%4,2)	0,9
Do you have information about pneumococcal vaccination? n (%)	37 (%86)	4 (%9,3)	2 (%4,7)	14 (%58,3)	5 (%20,8)	5 (%20,8)	0,03
Does pneumococcal vaccine reduce the risk of infection? n (%)	36 (%83,7)	6 (%14)	1 (%2,3)	13 (%54,2)	4 (%16,7)	7 (%29,2)	0,00

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FIGURE LEGENDS

Figure-1: Do you have knowledge about influenza and pneumococcal vaccination? (%)

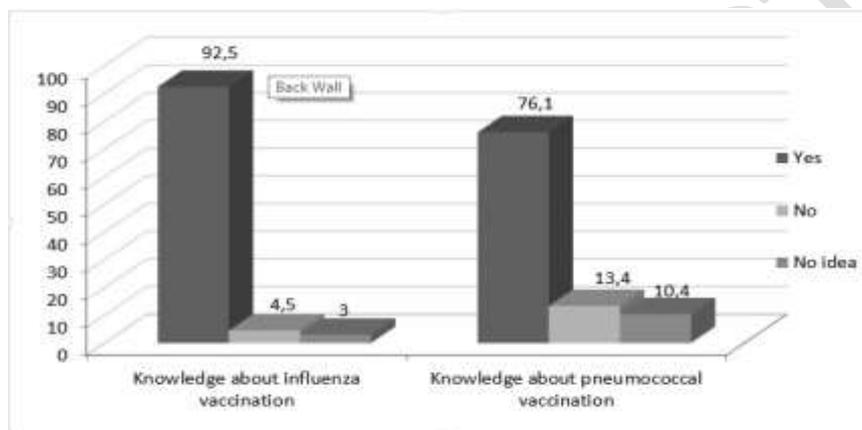
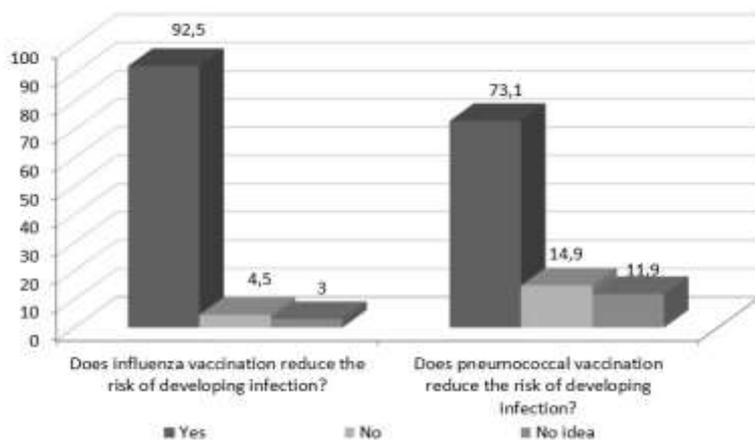


Figure-2: Do vaccinations reduce the risk of developing infections? (%)



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Figure-3: The distribution of physicians according to working specialties, %

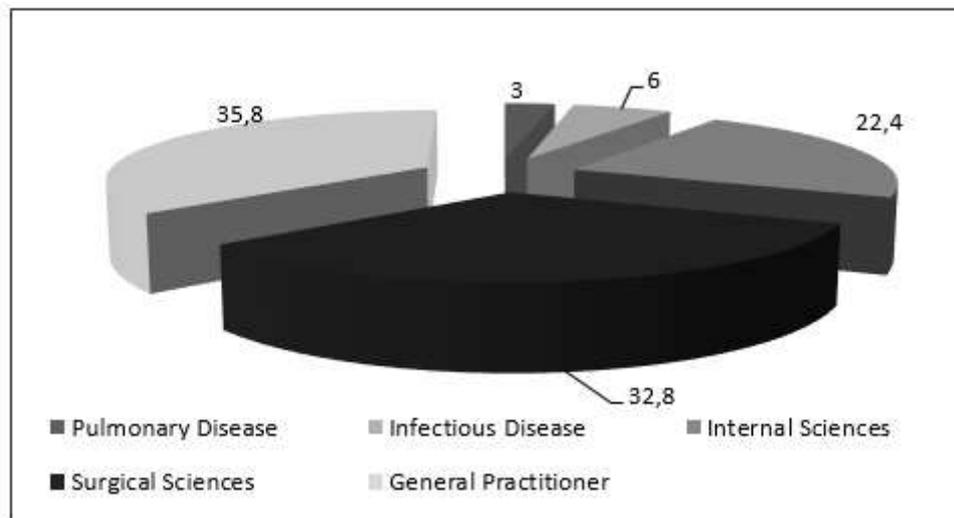
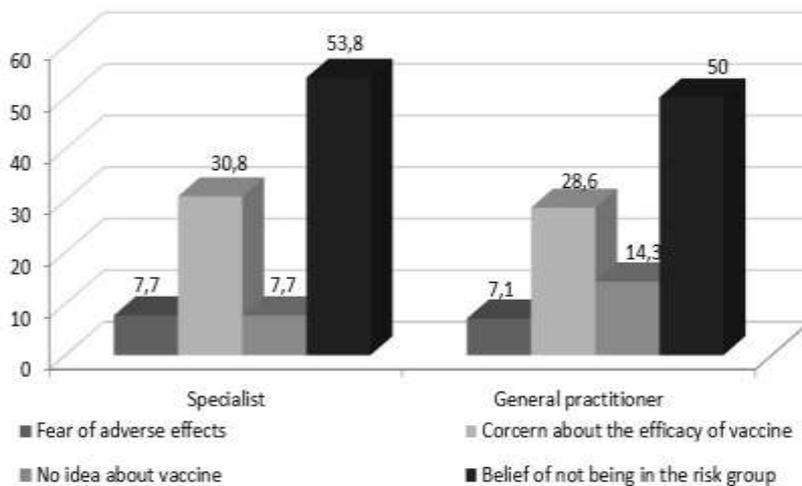


Figure-4: Reasons for not being vaccinated among specialists and general practitioners, %



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