

# ERİŞKİN HASTALARIN İNFLUENZA, PNÖMOKOK, HERPES ZOSTER VE TETANOS AŞILARI HAKKINDA TUTUM VE DAVRANIŞLARININ DEĞERLENDİRİLMESİ: TEK MERKEZLİ ANKET ÇALIŞMASI

## EVALUATION OF ADULT PATIENTS' ATTITUDES AND BEHAVIORS ABOUT INFLUENZA, PNEUMOCOCCAL, HERPES ZOSTER AND TETANUS VACCINES: A SINGLE-CENTER SURVEY STUDY

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### ÖZET

**AMAÇ:** Erişkin aşılaması, koruyucu sağlık hizmetlerinin anahtar bileşenidir. Bu çalışmanın amacı, aile hekimliği polikliniklerine başvuran hastaların erişkin aşıları ve aşılama oranları hakkındaki bilgilerini değerlendirmektir.

**GEREÇ VE YÖNTEM:** Çalışmaya toplam 442 hasta dahil edildi. Hastaların demografik ve klinik özellikleri değerlendirildi. Hastaların influenza, pnömöni, herpes zoster ve tetanos aşı durumları ve erişkin aşıları hakkındaki bilgi düzeyleri sorgulandı.

**BULGULAR:** Hastaların ortalama yaşı 42 (min-maks: 18-97) olup 227'si (%51,4) kadındı. Tetanos için aşılama oranları %32,6, influenza için %21,7, pnömokok aşısı için %3,6 ve herpes zoster için %2,5 olarak bulundu. Komorbiditesi olan hastaların aşılanma oranları beklenenden daha düşük bulundu. Geriatrik hastalarda pnömokok aşılanma oranı %2,8, tetanos aşılanma oranı %19,7, influenza aşılanma oranı %33,8 idi. 65 yaş üstü hiçbir hasta herpes zoster aşı yaptırmamıştı. Üniversite mezunlarında herpes zoster, pnömokok ve tetanos aşısı yaptıranların oranı daha yüksekti. Hastaların aşı yaptırmama nedenleri arasında yan etki korkusu (%20), aşıya ulaşma zorluğu (%6), aşı fiyatlarının yüksekliği yer alırken (%1), hastaların %16'sı aşının yararlarına inanmadığını belirtti.

**SONUÇ:** Çalışma grubumuzda erişkin bağıışıklama hızı beklenen seviyenin altındadır ve bu oranı artırmak için hastaların erişkin aşıları konusunda bilinçlendirilmesi önemlidir.

**ANAHTAR KELİMELER:** Koruyucu hekimlik, Aşılanma, İnsan İnfluenzası, Tetanos.

### ABSTRACT

**OBJECTIVE:** The key component of preventive health care is adult immunization. The aim of this study was to assess the patients' knowledge about adult vaccination and the vaccination rates of patients admitted to the family medicine outpatient clinics.

**MATERIAL AND METHODS:** A total of 442 patients were included in the study. Patient demographic and clinic characteristics were evaluated. Patients' vaccination status with influenza, pneumococcal vaccine, herpes zoster, and tetanus and their knowledge levels about adult vaccines were questioned.

**RESULTS:** The median age of the patients was 42 (min-max: 18-97) and 227 (51.4%) of them were female. Vaccination rates were found 32.6% for tetanus, 21.7% for influenza, 3.6% for pneumococcal, and 2.5% for herpes zoster. Patients with co-morbidities vaccination rates were found to be very low. The pneumococcal vaccination rate was 2.8%, the tetanus vaccination rate was 19.7%, and the influenza vaccination rate was 33.8% in geriatric patients. No patient older than 65 has ever received the zona vaccination. The rate of patients who had herpes zoster, pneumococcal vaccine, and tetanus vaccine was higher among university graduates. Fear of side effects (20%), difficulty in accessing the vaccine (6%), high vaccination prices (1%) were among the reasons why patients did not have vaccinated, and 16% of the patients stated that they did not believe in the benefits of vaccine.

**CONCLUSIONS:** In conclusion, we are still far below the desired levels of adult vaccination in our study population, and it is important to increase patients awareness of adult immunizations.

**KEYWORDS:** Preventive medicine, Vaccination, Influenza, Tetanus.

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## INTRODUCTION

Vaccination, the most effective method to prevent infectious diseases, is the leading preventive health care service. While significant improvements have been achieved in childhood vaccination both in our country and around the world, adult immunization rates are still insufficient (1).

According to the vaccination program published by the Centers for Disease Control and Prevention (CDC) in 2021, it is recommended to inoculate adults against influenza, diphtheria, tetanus, pertussis, measles, rubella, mumps, herpes zoster, chickenpox, human papilloma virus, pneumococcus, Hepatitis A, Hepatitis B, meningococcus, and haemophilus influenza type B. Vaccination is also recommended for geriatric patients, pregnant women, health-care professionals, and the followed-up patients due to some diseases, including immunosuppression, HIV, asplenia, end-stage renal disease, heart and lung diseases, alcoholism, chronic liver disease, and diabetes mellitus (2). Updated in 2016, adult immunization guidelines of the Turkish Infectious Diseases and Clinical Microbiology Specialist Association for vaccination have made similar proposals (1).

The geriatric population is increasing both in the world and in our country. According to data released by the Turkish Statistical Institute, the population over the age of 65 has increased by 21.9% in the last five years and reached approximately 7 million and 550 thousand in 2019 (3). Infectious diseases result in more serious health conditions in older adults. Moreover, the *dependence on others* to perform *daily activities*, frailty, and mortality increases with advancing age (4). Age related dysregulation in the immune system is called immunosenescence. It is associated with an increase in infectious diseases in older patients, as well as a decrease in vaccine response and low antibody titres in older adults after vaccination (5). Older adults constitute an important target group for adult vaccination programs.

Among the reasons why adult vaccination rates are under the desired target, patient and

health system related factors, as well as socioeconomic problems can be taken into account. Some of the most important problems are that healthcare professionals have insufficient knowledge about adult vaccination and do not recommend it for adult patients (6).

In a study conducted in our country in which 200 physicians were included, 45.5% of the physicians did not think that they gave the necessary importance to adult vaccination in their daily practice (7).

In the present study, we aimed to investigate the patients' knowledge about adult vaccination and the vaccination rates of patients admitted to the family medicine outpatient clinics.

## MATERIAL AND METHODS

### *Study Population*

Every patient who applied to a family medicine outpatient clinic between November 15, 2017 and November 15, 2018, was informed about the study. A total of 442 patients over the age of 18 who participated in the study voluntarily and did not have a disease that would prevent them from answering the questions were included.

### *Data Collection*

Data on the vaccine awareness and patients' vaccination rates were collected by a face to face questionnaire method. A standardized questionnaire was developed for the survey based on data in the literature. Six questions about the patients' level of adult vaccination knowledge were asked after assessing the patients' sociodemographic and clinical characteristics in the questionnaire form. 1. Have you heard of influenza, herpes zoster, tetanus, and pneumococcal vaccines for adults? 2. Have you ever been recommended these vaccinations in your adult life? 3. Have you ever been vaccinated in your adult life? 4. Where did you get the information about the vaccines? 5. Do you think immunizations are beneficial? 6. If you have not been vaccinated, what is your reason for not getting vaccinated? (**Appendix-1**).

## Ethical Committee

Ethics committee approval for the study was obtained by the local (Taksim Training and Research Hospital Ethics Committee number: 94/ Date:15.11.2017). All patients signed a document of informed consent.

## Statistical Analysis

In the power analysis, the awareness of the vaccine obtained from studies was determined to be 32% (7,8). At least 335 cases with a margin of error of 5% were included in the study. To strengthen the validity of the study, the questionnaire was continued to be applied even after the target number was reached until the scheduled last day of the study. They were expressed as mean  $\pm$  standard deviation for variables with a normal distribution, as median (minimum-maximum) for variables with non-normal distribution, and as percentage (%) for categorical variables. For values that did not conform to the normal distribution, the Mann Whitney U test or the Kruskal Wallis test were used, depending on the number of groups. A chi-square test was used to compare categorical variables. The results were considered statistically significant for  $p < 0.05$ . The IBM SPSS 23 program was utilized for data analysis.

## RESULTS

Four hundred forty two patients were included in the study. The median age of the patients was 42 (min-max: 18-97) and 227 (51.4%) of them were female. 306 of the patients (69.2%) were married. In terms of their education levels, 32 (7.2%) patients were illiterate, 77 (17.4%) were primary school graduates, 60 (12.6%) were secondary school graduates, 74 (16.7%) were high school graduates and, 199 (45%) were university graduates. 197 (44.6%) of those included in the study lived in the city centre. The median number of household members was 3 (0-11).

A total of 164 (37.1%) study participants had chronic illnesses for which vaccination would be recommended or had high-risk occupations such as healthcare workers, people who work in childhood education and care, caregivers, staff of nursing homes, and long-term care facilities for people of any age. Of the patients included

in the study, 47 (10.6%) had diabetes mellitus (DM), 29 (6.6%) had chronic obstructive pulmonary disease (COPD), 27 (6.1%) had congestive heart failure, 15 (3.5%) had chronic kidney disease, 7 (1.6%) had haematological diseases, 6 (1.4%) underwent immunosuppressive treatment, 2 (0.5%) had chronic liver disease and 2 (0.5%) were followed up patients due to alcohol abuse. The clinical and socio-demographic data of the patients are demonstrated in **Table 1**.

**Table 1:** Clinical and socio-demographic data of the patients

Parameter	n=442
Age	42 (18-97)
Gender (Female %)	227 (51.4%)
Marital status	
Married	306 (69.2%)
Single	128 (29%)
Divorced	8 (1.8%)
Education level	
Illiterate	32 (7.2%)
Primary school	77 (17.4%)
Middle School	60 (12.6%)
High school	74 (16.7%)
University	199 (45%)
Income (Monthly)	
<1500 TL	114 (25.8%)
1,501-2,500 TL	95 (21.5%)
2,501-3,500 TL	104 (23.5%)
>3,500 TL	92 (20.8%)
Living place	
Provincial center	197 (44.6%)
District	99 (22.4%)
Village	146 (33%)
Risk factor *	164 (37.1%)
Co-morbidities	
Diabetes Mellitus	47 (10.6%)
Chronic Obstructive Pulmonary Disease	29 (6.6%)
Congestive heart failure	27 (6.1%)
Chronic Kidney Disease	15 (3.5%)
Haematological Disease	7 (1.6%)
Immunosuppressive treatment	6 (1.4%)
Chronic Liver Disease	2 (0.5%)
Alcohol abuse	2 (0.5%)

\* Risk factors = to have a chronic illness ( Diabetes Mellitus, Chronic Obstructive Pulmonary Disease, Congestive heart failure, Chronic Kidney Disease, Haematological Disease, Immunosuppressive treatment, Chronic Liver Disease, Alcohol abuse) or high-risk occupations (healthcare workers, people who work in childhood education and care, carers, staff of nursing homes, and long-term care facilities for people of any age)TL=Turkish Lira

**Table 2** summarizes the patients' levels of knowledge of adult vaccines, whether they have heard of tetanus, herpes zoster, influenza, and pneumococcal vaccines; whether these were recommended to them, and their level of immunization.

**Table 2:** Patients' level of knowledge about adult vaccinations

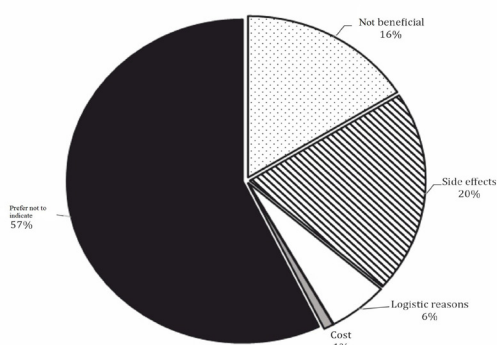
	Heard of adult vaccines	Recommended adult vaccines	Received adult vaccines
Tetanus	399 (90.3%)	196 (44.3%)	144 (32.6%)
Pneumococcal vaccine	361 (81.7%)	88 (19.9%)	16 (3.6%)
Herpes zoster	376 (85.1%)	104 (23.5%)	11 (2.5%)
Influenza	404 (91.4%)	189 (42.8%)	96 (21.7%)

Two hundred and sixty four (59.7%) patients obtained information about adult vaccines from healthcare professionals, 93(21%) from the internet or printed and visual media, and 74 (16.7%) from their relatives. The patient group, who had previously been recommended to have tetanus, pneumococcal vaccine, herpes zoster ( $p<0.001$ ), and influenza ( $p=0.004$ ) vaccines, were informed about adult vaccination mainly by healthcare professionals. The younger ( $p=0.028$ ) and the patient group employed in high risk occupations ( $p=0.012$ ), as well as the patient group for whom adult immunization was recommended ( $p=0.028$ ), also received information about vaccines from healthcare professionals (**Table 3**).

**Table 3:** Methods of obtaining information about vaccination

Where did you get information about vaccination?	Health Professional n = 264 (59.7%)	The Internet or printed and visual media n= 93 (21%)	Relatives n=74 (16.7%)	p
Age (median, min-max)	40 (20-95)	50 (22-97)	43.5 (18-90)	<b>0.028</b>
Gender (Female)	142 (64.5%)	48 (21.8%)	30 (13.7%)	0.130
High-risk occupations	32 (82.1%)	2 (5.1%)	5 (12.8%)	<b>0.012</b>
Vaccine recommended group	106 (67.5%)	23 (14.6%)	28 (17.9%)	<b>0.028</b>
Tetanus vaccine recommended	143 (97.3)	27 (13.7%)	26 (13.3%)	<b>&lt;0.001</b>
Tetanus vaccine received	101 (70.1%)	26 (18.1%)	17 (11.8%)	<b>0.022</b>
Influenza vaccine recommended	129 (68.3%)	27 (14.3%)	33 (17.4%)	<b>0.004</b>
Influenza vaccine received	61 (63.5%)	20 (15.7%)	15 (20.8%)	0.857
Pneumococcus vaccine recommended	76 (86.4%)	2 (2.2%)	10 (11.4%)	<b>&lt;0.001</b>
Pneumococcus vaccine received	13 (81.3%)	0 (0%)	3 (18.7%)	<b>0.048</b>
Herpes zoster vaccine recommended	85 (81.7%)	7 (6.8%)	12 (11.5%)	<b>&lt;0.001</b>
Herpes zoster vaccine received	10 (90.9%)	1 (10.1%)	0 (0%)	0.150

While almost 85% of the patients had an opinion that vaccines were beneficial, 16% of them stated that they did not believe in the benefits of vaccines. Although adult vaccination was recommended for patients, fear of side effects (20%), difficulty in accessing the vaccine due to logistic reasons (6%), high vaccination prices (1%) and prefer not to indicate (57%) were listed as reasons for not having adult vaccination (**Figure 1**).



**Figure 1:** Vaccine hesitancy reasons

Although 376 of the patients (85.1%) stated that they were aware of the herpes zoster vaccine, it was recommended for 104 (23.5%) patients. However, only 11 (2.5%) patients had the herpes zoster vaccine. All of the patients who had the herpes zoster vaccine were university graduates ( $p = 0.015$ ). 139 (77.7%) patients over the age of 50 were aware of the herpes zoster vaccine, while 40 (22.3%) patients were not ( $p<0.001$ ). Of the patients involved in the study, 361 (81.7%) were aware of the pneumococcal vaccine, 88 patients (19.9%) were recommended vaccination, and 16 patients (3.6%) had pneumococcal vaccine. While 152 (92.7%) of 164 patients with an indication of pneumococcal vaccine did not get vaccinated, 12 (7.3%) patients were vaccinated ( $p=0.002$ ). Of 361 patients who were aware of the pneumococcal vaccine, 30.2% ( $n=109$ ) lived in the village, 22.7% ( $n= 82$ ) and 47.1% ( $n=170$ ) lived in the city centre ( $p=0.021$ ). In addition, 50.4% ( $n=182$ ) of the patients who were aware of the pneumococcal vaccine were university graduates, 17.5% ( $n=63$ ) were high school graduates, 27.4% ( $n=99$ ) were primary school graduates and; 4.7% ( $n=17$ ) were illiterate ( $p<0.001$ ). Pneumococcal vaccine was recommended for 4 (66.7%) of 6 immunosuppressive patients ( $p=0.016$ ), but only one patient had pneumococcal vaccine.

91.4% of the patients ( $n=404$ ) were aware of the influenza vaccine. While vaccination was recommended for 42.8% ( $n=189$ ), only 21.7% ( $n=96$ ) of the patients had influenza vaccine. The rate of influenza vaccination was lower in those with a monthly income of 1500 Turkish Lira (TL) or less than the other groups (16.7% vs. 83.3%,  $p=0.039$ ).

A total of 399 (90.3%) patients were aware of the tetanus vaccine, 44.3% ( $n=196$ ) were recommended to be vaccinated before, and 32.6% ( $n=144$ ) patients had the tetanus vaccine. Similar to the influenza vaccine, the vaccination rate for tetanus was statistically lower in the patient group with the lowest monthly income compared to the other groups ( $p 0.001$ ). The rate of patients who had the tetanus vaccine was higher among university graduates compared to other groups (61.1% vs. 38.9%;  $p0.001$ ). While 130 (35%) of 144 patients who had the tetanus vaccine were under 65 years old, 14 (19.7%) were 65 years old or over ( $p=0.012$ ).

Seventy-one of the study participants are 65 years of age or older. When patients over 65 are evaluated separately, individuals who knew about the tetanus [53 (74.6%) vs 18 (25.4%),  $p < 0.001$ ], herpes zoster [52 (73.2%) vs 19 (26.8%),  $p = 0.002$ ], influenza [58 (81.7 %) vs 13 (18.3%),  $p = 0.001$ ], and pneumococcal vaccine [46 (64.8%) vs 25 (35.2%),  $p < 0.001$ ] were higher than those who did not. Only 2 (2.8%) of 71 patients had pneumococcal vaccine, while 24 patients (33.8%) had influenza vaccine ( $p = 0.007$ ), 14 patients (19.7%) had tetanus vaccine ( $p = 0.012$ ). No patient older than 65 has ever received the zona vaccination.

When the patients were evaluated according to their comorbidities, it was observed that only 1 (2.1%) of 47 patients followed-up for DM received pneumococcal vaccine ( $p = 0.562$ ) and 19 patients (40.4%) had influenza vaccine ( $p = 0.001$ ). Of the patients with CHF, 4 (14.8%) had the pneumococcal vaccine, while 23 (85.2%) did not ( $p = 0.012$ ) and 11 (40.7%) had the influenza vaccine, while 16 (59.3%) did not ( $p = 0.013$ ). In the patient group with COPD, 6 patients received the pneumococcal vaccine ( $p < 0.001$ ) and 13 patients had the influenza vaccine ( $p = 0.002$ ). Vaccination rates were found to be very low in patients followed up for CKD. While none of the 15 patients received pneumococcal vaccine, only 2 patients had influenza vaccine. Two patients with chronic liver disease had influenza vaccine but not pneumococcal vaccine (**Table 4**).

**Table 4:** Comparison of Pneumococcus and influenza vaccine in terms of their co-morbidities

Co-morbidity	Pneumococcus vaccine			Influenza vaccine		
	Received (n,%)	Not received (n,%)	p	Received (n,%)	Not received (n,%)	p
DM	1 (2.1%)	46 (97.9%)	0.562	19 (40.4%)	28 (59.6%)	0.001
CHF	4 (14.8%)	23 (85.2%)	0.012	11 (40.7%)	16 (59.3%)	0.013
COPD	6 (20.7%)	23 (79.3%)	<0.001	13 (44.8%)	16 (55.2%)	0.002
CKD	-	15 (100%)	-	2 (13.3%)	13 (86.7%)	0.540
Chronic liver disease	-	2 (100%)	-	2 (100%)	-	-
> 65 years old	2 (2.8%)	69 (97.2%)	0.693	24 (33.8%)	47 (66.2%)	0.007

\* DM: Diabetes mellitus, CHF: Congestive heart failure, COPD: Chronic obstructive pulmonary disease, CKD: Chronic kidney disease

## DISCUSSION

In our study, vaccination rates were found to be very low in patients over the age of 18 admitted to family medicine clinics. Although 85% of

the patients believed that vaccines were beneficial, they did not have the vaccine due to side effects, inability to access the vaccine, and cost.

In a study involving patients aged 18-64 years admitted to internal medicine outpatient clinics in our country, the adult vaccination rate was found to be 36.1%. Similar to our study, tetanus vaccination was performed most frequently in the study (23%) (6). In another study evaluating tetanus seropositivity, it was observed that tetanus seropositivity was 95.2%, 84.4%, and 57.3% in participants aged 21-39, 40-49 and over 50 years old, respectively (9). High awareness of tetanus vaccination in pregnant women, routine vaccination before military service, and post-exposure prophylaxis are among the reasons why tetanus is the most common adult vaccine. In a study conducted on inpatients, 26.6% of the patients stated that they had the tetanus vaccine. Similar to our study, awareness and vaccination rates were higher among well-educated patients in comparison to those with low education (10). In a study conducted in 2015, the rate of tetanus vaccination was found to be 61% for those aged 19-49, 72.2% for those aged 50-64, and 81.4% for those over 65 years old. In contrast to this study, our study found that tetanus immunization rates were much lower in the patient population over 65. This difference may be the result of the fact that adult vaccines do not contain sufficient records, and vaccination is not recommended for routine health care (11). In a study evaluating the patient groups with vaccine indication, the proportion of patients who received diphtheria-tetanus vaccination in the last 10 years similar to our study was 29.9% (95% CI: 20.2-41.5) for Type 2 DM and 26.5% (95% CI: 21-32.8) for solid organ transplantation, 37.7% (95% CI: 27.1-49.5) for CHF, and 34.1% (95% CI: 27.1-41.8) for COPD (12).

Influenza is still an important cause of mortality and morbidity worldwide. Annual influenza vaccination is recommended for patients over the age of 65, pregnant women, and immunosuppressed patients, as well as for patients with metabolic diseases such as chronic heart disease.

ase, chronic kidney disease, chronic liver disease, chronic neurological disease, DM, morbid obesity and respiratory system diseases, including COPD, asthma, and cystic fibrosis, and for healthcare professionals (13). In a study carried out in Turkey, the influenza vaccination rate was determined to be 20%. Although there was no statistical difference between the educational levels of the patients and vaccination rates, a positive correlation was observed between health literacy, especially about disease prevention, and vaccination rates (14). In our study, the rate of influenza vaccination was found to be 21.7%, and no statistical difference was found between educational levels and vaccine administration.

In a different study, the vaccination rate was 40%, and it was found that vaccination rates increased as education levels improved (15). One of the key aspects in removing barriers to adult immunization is education. Patients of all education levels should be offered adult immunization in a way that allows them to understand it and confidently address their concerns. It's possible that the lack of adequate information provided by medical staff contributed to the low and consistent rates of influenza vaccination in our study across all educational levels. In a study involving geriatric patients in Turkey, the influenza vaccination rate was found to be 44.4%. In order to improve vaccination in older patients, it has been recommended to expand the information about vaccination and facilitate vaccine access, considering the sociocultural differences, with the efforts of healthcare professionals, family, friends, and communication tools (16). In another study, influenza vaccination was observed more frequently in patient group over 65 years of age and those with at least one risk factor and a chronic disease. Similar to our study, the reasons for not getting the influenza vaccine were reported as follows: not catching the flu frequently, fear of side effects, concerns about the effectiveness of the vaccine, and the belief that the vaccine causes flu (17). In pneumococcal vaccination, the 13-valent conjugated pneumococcal vaccine (PCV13 [Pneumovax 13, Pfizer, Inc.]) and the 23-valent polysaccharide pneumococcal vaccine (PPSV23 [Pneumovax 23, Merck and Co., Inc.]) were used because they are the ones that are available in our country. Considering that the

disease burden would be reduced with the increase of PCV 13 vaccination in children, in 2019 the Advisory Committee on Vaccination Practices (ACIP) advised that PCV 13 vaccination be performed with shared clinical decision-making for individuals aged 65 years old who did not have immunosuppressive, cerebrospinal fluid (CSF) leakage and cochlear implants as well as who had never had PCV13 before (18). In our study, the rate of pneumococcal vaccination including PCV 13 and PPSV 23 was 3.6%. In a study conducted in France, the pneumococcal vaccination rate between April 2013 and April 2017 was determined to be 4%. The rate was 12% in HIV-infected patients and 2% in patients followed up for DM (19). TEMD Vaccination Study shows that for patients with type 2 diabetes mellitus, pneumococcal vaccination rates were 7%, and the reason for this minimal difference from the current study may be that the patients applied to the family medicine outpatient or endocrine clinics (20). Although the pneumococcal vaccine is known to reduce the disease burden, pneumococcal vaccination rates in adults are lower compared to other routine vaccines (21). In our study, the frequency of awareness of the pneumococcal vaccine was higher among university graduates compared to people with lower education. In a study conducted by Mutlu H et al., as the education level increased, the pneumococcal vaccination rate and vaccine awareness increased in patients over 65 years of age (22). In our study, the herpes zoster vaccine had the lowest vaccination rate. It is recommended for people over 50 years old to reduce the risk of herpes zoster and post herpetic neuralgia. There are two types of this vaccine: recombinant zoster vaccine (RZV, Shingrix) administered in two doses and live zoster vaccine (ZVL, Zostavax) administered in a single dose. There is only a live zoster virus vaccine in Turkey, but since July 1, 2020, this vaccine is not available in the United States (23). Kizmaz M. et al. found that the rate of vaccination with herpes zoster was found to be 1.8% in patients over 65 years of age (24). In a study evaluating the efficacy of live zoster vaccine in Australia, the efficacy of the vaccine was 63.5% (95% CI: 47.5-74.6%) in the first year, while this rate was regressed to 48.2% (95% CI: 30-61.7%) in the second year (25). In addition, the effectiveness of the recombinant zoster vaccine was found

to be 85.5% (95% CI: 83.5-87.3) (26). The lack of recombinant zoster vaccine in our country and the high cost of live zoster vaccine are the most important reasons for the low vaccination rates.

The major reason for patients those did not accept vaccination even though they had been told is that they "prefer not to indicate". This does not include reasons like cost, side effects, or logistic problems. Participants may have been hesitant to declare that they do not believe in vaccines, or they may have held other unsupported beliefs. Increasing answer alternatives when planning a study might decrease the burden of "other reasons" as a response. In another study, vaccination hesitancy reasons were concerns about industrial profiteering, preference for natural immunity, thinking about whether they will not get ill, and a low sense of shared community responsibility (27).

This could be accepted as a limitation of our study. One of the other limitation of our study is that it is a cross-sectional study conducted in a single centre. Moreover, we got information about the vaccination of patients from them, but we could not check it over a registry system. We primarily evaluated the vaccination rates for influenza, pneumococcal vaccine, tetanus, and herpes zoster. Our study did not include all vaccines recommended for adult vaccination. It is among the strengths of our study that it revealed the vaccine awareness in our country and evaluated all vaccine recommended groups and the geriatric patient group separately.

As a result, we are still far below the desired levels of adult vaccination in our study group. It should be considered that adult vaccination is the most effective way to prevent diseases. As a result, it is critical to raise patient and healthcare professional awareness of on this issue.

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## APPENDIX-1

## Vaccination Questionnaire

1. Age:
2. Gender: Female  Male
3. Marital status: Married  Single  Divorced
4. Monthly income:  0-1500 Turkish lira(TL)
  - 1501-2500 TL
  - 2501-3500 TL
  - 3500+ TL
5. Occupation:
  - High-risk occupations
  - Healthcare workers
  - People who work in childhood education and care
  - Caregiver
  - Staff of nursing homes, and long-term care facilities
6. Educational degree: Illiterate  Primary school  Secondary school  High school  University
7. Living in: Urban  Rural
8. Household members:

	9. Have you heard of these vaccines for adults?	10. Have you ever been recommended these vaccination in your adult life?	11. Have you ever been vaccinated in your adult life?
Vaccination			
Tetanus			
Pneumococcal vaccine			
Herpes zoster			
Influenza			

12. Where did you get the information about the vaccines?

- Internet or printed and visual medial
- Friends or relatives
- Healthcare professionals

13. Do you think immunizations are beneficial? Yes  No

14. If you have not been vaccinated, what is your reason for not getting vaccinated?

- Fear of side effects
- Difficulty in accessing the vaccine due to logistic reasons
- High vaccination prices
- Prefer not to indicate

15. Do you have any chronic medical condition?

Diabetes mellitus
Chronic obstructive pulmonary disease or Bronchial Asthma
Underwent immunosuppressive treatment
Congestive heart failure
Haematological diseases
Chronic liver disease
Chronic kidney disease
Alcoholism
Asplenia