

DOI: 10.4274/mjima.galenos.2026.261047
 Mediterr J Infect Microb Antimicrob 2026;15:261047
 Erişim: <http://dx.doi.org/10.4274/mjima.galenos.2026.261047>

Factors Influencing Influenza Vaccine Acceptance Among Healthcare Workers

Sağlık Çalışanlarında İnfluenza Aşısı Kabulünü Etkileyen Faktörler

✉ Bekir Aktura, ✉ Esmehan Ayşit, ✉ Pınar Kıran

İstanbul Provincial Health Directorate, Presidency of Public Health Services, İstanbul, Türkiye

Abstract

Introduction: This study aimed to assess attitudes and vaccination behaviors among primary healthcare workers toward seasonal influenza vaccination and to examine the psychological antecedents underlying their vaccination decisions using the Psychological Antecedents of Vaccination (5C) framework.

Materials and Methods: This cross-sectional study included 181 healthcare workers employed at primary healthcare institutions affiliated with a provincial health directorate. Data were collected using a structured questionnaire assessing sociodemographic characteristics, knowledge, attitudes, and behaviors related to influenza vaccination, together with the seven-point Likert-type 5C scale. Participants who reported having received an influenza vaccine at least once in previous seasons were compared with those who had never been vaccinated. Participants were also compared according to their vaccination status during the 2025-2026 season. Variables showing significant associations in univariable analyses were subsequently entered into a multivariable binary logistic regression model.

Results: The participants had a mean age of 38.1 ± 7.2 years, and 75.1% were women. Overall, 33.1% had received an influenza vaccine at least once, whereas only 16.6% had been vaccinated during the 2025-2026 season. Participants who had received an influenza vaccine at least once had higher collective responsibility scores ($p=0.045$). Those vaccinated during the current season had lower constraints scores ($p=0.006$) and higher calculation scores ($p=0.030$). Significant differences across occupational groups were observed in confidence, complacency, constraints, and collective responsibility ($p=0.002$, $p<0.001$, $p=0.002$, and $p=0.022$, respectively). In the multivariable analysis, recommending influenza vaccination [adjusted odds ratio (OR): 7.677; 95% confidence interval (CI), 3.024-19.490; $p<0.001$], female sex (adjusted OR: 2.852; 95% CI, 1.115-7.296; $p=0.029$), and being a physician (adjusted OR: 2.904; 95% CI, 1.160-7.272; $p=0.023$) were independently associated with having received an influenza vaccine at least once.

Conclusion: Influenza vaccination uptake among primary healthcare workers was low, both historically and during the 2025-2026 season. Having recommended influenza vaccination to others, being female, and being a physician were independently associated with previous influenza vaccination, while higher collective responsibility was associated with vaccination history. These findings support the need for multicomponent interventions that address psychological, behavioral, and practical barriers to vaccination while promoting collective responsibility among healthcare workers.

Keywords: Influenza vaccines, health personnel, vaccination hesitancy, primary health care, attitude of health personnel

Öz

Amaç: Bu çalışmanın amacı, birinci basamak sağlık hizmetlerinde görev yapan sağlık çalışanlarının mevsimsel influenza aşısına yönelik tutum ve davranışlarını belirlemek ve aşılama kararlarının psikolojik öncüllerini “Aşılamanın Psikolojik Öncülleri (5C)” modeli çerçevesinde incelemektir.

Gereç ve Yöntemler: Kesitsel tipteki bu çalışma, bir il sağlık müdürlüğüne bağlı birinci basamak sağlık kurumlarında görev yapan 181 sağlık çalışanı ile yürütülmüştür. Veriler; sosyodemografik özellikler, influenza aşısına ilişkin bilgi, tutum ve davranışlar ile yedili Likert tipi 5C ölçeği’ni içeren



Address for Correspondence/Yazışma Adresi: Bekir Aktura, MD, İstanbul Provincial Health Directorate, Presidency of Public Health Services, İstanbul, Türkiye

E-mail: bekiraktura@gmail.com **ORCID ID:** orcid.org/0000-0002-1143-8572

Received/Geliş Tarihi: 11.07.2026 **Accepted/Kabul Tarihi:** 10.09.2026 **Published/Yayınlanma tarihi:** 26.10.2026

Cite this article as/Atf: Aktura B, Ayşit E, Kıran P. Factors influencing influenza vaccine acceptance among healthcare workers. Mediterr J Infect Microb Antimicrob. 2026;15:336-345



©Copyright 2026 The Author(s). Published by Galenos Publishing House on behalf of Infectious Diseases and Clinical Microbiology Specialty Society of Turkey. Licensed under a Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International License (CC BY-NC-ND 4.0)

yapılandırılmış bir anket ile toplanmıştır. Geçmiş sezonlarda en az bir kez aşılananlar hiç aşılanmayanlarla karşılaştırılmış, aynı özellikler 2025-2026 sezonundaki aşılanma durumuna göre de değerlendirilmiştir. Tek değişkenli analizlerde anlamlı bulunan değişkenler çok değişkenli ikili lojistik regresyon modeline alınmıştır.

Bulgular: Katılımcıların yaş ortalaması $38,1 \pm 7,2$ yıl olup %75,1'i kadındır. Katılımcıların %33,1'i en az bir kez influenza aşısı yaptırmış, 2025-2026 sezonunda aşılanma oranı ise yalnızca %16,6 olarak saptanmıştır. En az bir kez aşılananlarda kolektif sorumluluk puanı hiç aşılanmayanlara göre daha yüksek ($p = 0,045$); içinde bulunulan sezonda aşılananlarda ise kısıtlılık puanı daha düşük ($p = 0,006$) ve hesaplama puanı daha yüksek ($p = 0,030$) bulunmuştur. Meslek grupları arasında güven, kayıtsızlık, kısıtlılık ve kolektif sorumluluk alt boyutlarında anlamlı farklılık saptanmıştır (sırasıyla $p = 0,002$, $p < 0,001$, $p = 0,002$ ve $p = 0,022$). Çok değişkenli analizde influenza aşısı önermek [düzeltilmiş olasılık oranı (OR): 7,677; %95 güven aralığı (GA), 3,024-19,490; $p < 0,001$], kadın cinsiyet (düzeltilmiş OR: 2,852; %95 GA, 1,115-7,296; $p = 0,029$) ve hekim olmak (düzeltilmiş OR: 2,904; %95 GA, 1,160-7,272; $p = 0,023$) en az bir kez influenza aşısı yaptırmış olma ile bağımsız olarak ilişkili bulunmuştur.

Sonuç: Birinci basamak sağlık çalışanlarında influenza aşılanma oranları düşüktür. Aşılanma; aşırı başkalarına önerme, kadın cinsiyet, hekim olmak ve daha yüksek kolektif sorumluluk ile ilişkili bulunmuştur. Psikolojik ve davranışsal belirleyicilerin yanı sıra uygulamadaki engelleri de ele alan ve kolektif sorumluluğu güçlendiren çok bileşenli müdahalelere ihtiyaç vardır.

Anahtar Kelimeler: Influenza aşıları, sağlık personeli, aşı kararsızlığı, birinci basamak sağlık hizmetleri, sağlık personelinin tutumu

Introduction

Influenza is a viral disease characterized by acute respiratory tract infection. The virus, which infects millions of people worldwide each year, causes approximately 290,000-650,000 deaths^[1]. One in five unvaccinated children and one in ten unvaccinated adults contract seasonal influenza each year^[2]. Although the symptoms of the disease can be mild, influenza can cause severe illness and death in high-risk individuals and is associated with high morbidity and mortality in children, older adults, individuals with chronic diseases, and pregnant women^[1,3]. Due to its high transmission rate and pandemic potential, influenza poses a significant public health risk. Seasonal influenza vaccination reduces the occurrence of severe symptoms and hospitalization by providing immunity against the disease^[4,5].

Healthcare workers are at a higher risk of seasonal influenza than other adults^[6]. This occupational group, which plays a critical role in the nosocomial transmission cycle because of its close contact with infected patients, may transmit the virus to high-risk patients. Furthermore, significant workforce losses and associated economic burdens occur among healthcare personnel infected with seasonal influenza^[7,8]. Considering these risks, seasonal influenza vaccination for healthcare workers is recommended by authorities in many countries, and in some countries, it is mandatory for employment^[9]. A recent survey of 34 European countries found that 33 have an influenza vaccination policy for healthcare personnel, and 16 mandate at least one vaccination for this group, with nine requiring vaccination as a prerequisite for employment^[10]. In Türkiye, healthcare workers are among the risk groups for whom the seasonal influenza vaccine is provided free of charge, and vaccination is voluntary^[11].

Despite recommendations from health authorities and the free provision of the vaccine, seasonal influenza vaccine uptake

among healthcare workers remains low^[12,13]. In the most recent survey of European Union and European Economic Area countries, healthcare worker vaccination coverage was reported by only nine countries that recommended vaccination and ranged from 16.6% to 62.8%, with a median of 32%^[14]. A systematic review and meta-analysis estimated the pooled influenza vaccine uptake among nurses at 44%^[15], whereas coverage among healthcare personnel in the United States reached 76.3% in the 2024-2025 season^[16]. Vaccine hesitancy is defined as a delay in acceptance or refusal of vaccination despite the availability of vaccination services^[17]. In studies examining seasonal influenza vaccine hesitancy among healthcare workers, factors such as doubts about vaccine effectiveness, concerns regarding vaccine safety, and a low perceived personal risk of influenza have emerged as prominent factors^[18,19]. Interventions designed to improve vaccine uptake have produced heterogeneous results, and their effectiveness appears to depend strongly on the behavior-change methods employed^[20,21]. In this context, identifying the underlying causes of vaccine hesitancy among healthcare workers and developing effective strategies to address them are critically important for reducing influenza cases among both healthcare personnel and the general public.

The vaccine acceptance process is multidimensional, and the Psychological Antecedents of Vaccination (5C) model was developed by Betsch et al.^[22]. The model conceptualizes vaccination decisions across five psychological dimensions: confidence, meaning trust in vaccines and the vaccination system; complacency, meaning a low perceived risk of vaccine-preventable diseases; constraints, meaning practical or psychological barriers to vaccination; calculation, meaning extensive searching for information about the risks and benefits of vaccination; and collective responsibility, meaning the willingness to protect others through one's own vaccination^[22].

This framework provides a comprehensive approach to understanding the psychological factors underlying vaccination decisions and has been shown to explain vaccination behavior better than sociodemographic variables alone^[23].

The aim of this study is to determine the factors affecting the attitudes and vaccination behaviors of healthcare workers regarding the seasonal influenza vaccine. Furthermore, this study aimed to investigate the psychological processes underlying participants' decisions to accept or reject the seasonal influenza vaccine based on the 5C model.

Materials and Methods

The population of this cross-sectional study consisted of physicians and allied healthcare personnel (midwives, nurses, health officers, medical secretaries, workers, and others) working at primary healthcare institutions affiliated with the İstanbul Provincial Health Directorate. The study aimed to reach the entire population ($n = 222$). To evaluate the applicability of the questionnaire developed by the researchers, a pilot study was conducted with 15 healthcare workers. The questionnaire, which was finalized after the pilot implementation, was administered using the supervised questionnaire method. This study was approved by İstanbul Medipol University Non-Interventional Clinical Research Ethics Committee (decision number: 1391, date: 13.11.2025). Written informed consent was obtained from all participants before administration. Data were collected over two days, March 2 and 3, 2026, toward the end of the 2025-2026 influenza season, so that vaccination status for that season could be considered essentially complete at the time of data collection. A total of 181 healthcare workers actively working in primary care settings who fully completed the questionnaire were included in the study, corresponding to a response rate of 81.5%.

Data Collection Tool

The questionnaire, prepared by the researchers based on a literature review, consists of 18 questions divided into three sections and is provided in full, along with an English translation, in Supplementary File 1.

Demographic information: This section consists of 10 questions regarding sociodemographic characteristics, such as age, sex, occupation, and educational status.

Knowledge, attitudes, and behaviors regarding vaccination: This section included questions aimed at evaluating participants' knowledge, attitudes, and behaviors related to vaccination. Vaccination training, influenza vaccine recommendation behavior, frequency of seasonal influenza vaccination, Coronavirus Disease 2019 (COVID-19) vaccination status, and whether the vaccinations of participants' children

and/or first-degree relatives were complete were evaluated. Vaccination in previous seasons was assessed using a single item with three response options (vaccinated regularly every year, vaccinated occasionally but not regularly, or never vaccinated); participants who selected either of the first two options were classified as having been vaccinated at least once.

Psychological antecedents of vaccination (5C) scale: The psychological antecedents of vaccination (5C) scale was developed by Betsch et al.^[22] based on the World Health Organization's 3C model^[17]. The scale assesses five psychological antecedents that influence vaccination behavior. The confidence subdimension reflects trust in the effectiveness and safety of vaccines, the system that delivers them, and the motivations of policymakers; complacency reflects the perception that vaccine-preventable diseases pose a low risk and that vaccination is therefore unnecessary; constraints refer to perceived structural and psychological barriers that make vaccination difficult; calculation reflects the extent to which individuals engage in extensive information searching about the risks and benefits of vaccination; and collective responsibility reflects the willingness to protect others through one's own vaccination^[22].

Each subdimension consists of three items, and the scale comprises a total of 15 items. The items are rated on a seven-point Likert-type scale (1 = strongly disagree, 7 = strongly agree). Therefore, each sub-dimension score ranges from 3 to 21, with higher scores indicating a stronger presence of the respective antecedent. In the original validation study, Cronbach's alpha coefficients for the subdimensions ranged from 0.71 to 0.85, whereas values ranging from 0.71 to 0.82 were reported in the Turkish validity and reliability study^[24].

In the original validation study, higher confidence scores were positively associated with vaccination behavior, whereas higher complacency and constraints scores were negatively associated with vaccination behavior; calculation and collective responsibility were not independent predictors in that sample. The calculation subdimension reflects individuals' tendency to seek and evaluate information regarding the risks and benefits of vaccines^[22].

Statistical Analysis

Data analysis was performed using the Statistical Package for the Social Sciences for Windows (version 27.0; Armonk, NY: IBM Corp., USA). Descriptive statistics are presented as frequencies, percentages, means, and standard deviations. The normality of numerical variables was assessed using skewness and kurtosis values. Categorical variables were compared using the Pearson chi-square test, and Fisher's exact test was used when the minimum expected cell count was less than five. Student's t-test and one-way analysis of variance were used

to compare normally distributed numerical variables, and the Bonferroni test was used for post-hoc pairwise comparisons. For comparisons of the 5C subdimensions, professions were categorized into three groups: physicians, midwives/nurses, and other healthcare personnel (health officers, medical secretaries, workers, and others). For the binary logistic regression analysis, professions were dichotomized as physicians and non-physician healthcare workers. Sex, profession, and the behavior of recommending influenza vaccination, all of which were significant in univariable analyses, were entered into the primary multivariable binary logistic regression model using the enter method. Model fit was assessed using the omnibus test of model coefficients, the Hosmer–Lemeshow goodness-of-fit test, and the Nagelkerke R^2 value. Odds ratios (ORs) were presented with 95% confidence intervals (CIs). Statistical significance was set at $p < 0.05$.

Results

A total of 181 of the 222 eligible healthcare workers completed the questionnaire, corresponding to a response rate of 81.5%. The participants had a mean age of 38.1 ± 7.2 years (range, 23–63 years), and 75.1% ($n = 136$) were women. A university degree or higher was reported by 77.9% ($n = 141$) of the participants. Of the participants, 17.1% ($n = 31$) were physicians or specialist physicians, 23.8% ($n = 43$) were midwives or nurses, and 59.1% ($n = 107$) belonged to other occupational groups. In addition, 60.8% ($n = 110$) were married, and 50.3% ($n = 91$) had children.

Overall, 33.1% ($n = 60$) of the healthcare workers had received an influenza vaccine at least once, whereas only 16.6% ($n = 30$) had received the seasonal influenza vaccine during the 2025–2026 season. A COVID-19 vaccine had been received by 96.1%

($n = 174$) of the participants.

Participants who had received an influenza vaccine at least once ($n = 60$) were compared with those who had never been vaccinated ($n = 121$) (Table 1). The proportion of women was significantly higher among participants who had been vaccinated at least once than among those who had never been vaccinated (85.0% vs. 70.2%, $p = 0.031$). Similarly, the proportions of physicians (28.3% vs. 11.6%, $p = 0.005$) and participants who recommended influenza vaccination to their close contacts (90.0% vs. 49.6%, $p < 0.001$) were significantly higher in the previously vaccinated group. No significant differences were observed between the two groups in age, educational level, marital status, having children, presence of chronic disease, presence of chronic disease in a first-degree relative, receipt of vaccination training, COVID-19 vaccination status, or completeness of vaccinations among their children and/or first-degree relatives.

When the same characteristics were compared according to influenza vaccination status during the 2025–2026 season, no statistically significant association was observed with sex, educational level, marital status, having children, occupational group, presence of chronic disease, presence of chronic disease in a first-degree relative, or receipt of vaccination training (Supplementary Table 1). In contrast, participants who recommended influenza vaccination to their close contacts were significantly more likely to have received the influenza vaccine during the 2025–2026 season ($p < 0.001$). Furthermore, participants who had previously received an influenza vaccine at least once were significantly more likely to have received the vaccine during the 2025–2026 season than those who had never been vaccinated ($p < 0.001$). The 5C sub-dimension

Table 1. Comparison of participants' sociodemographic and vaccination-related characteristics according to history of influenza vaccination.

Characteristic	Never vaccinated ($n = 121$)	Vaccinated at least once ($n = 60$)	p
Age (years)*	38.7 ± 7.3	36.8 ± 6.9	0.081
Female	85 (70.2)	51 (85.0)	0.031
University degree or higher	92 (76.0)	49 (81.7)	0.390
Married	70 (57.9)	40 (66.7)	0.253
Having children	62 (51.2)	29 (48.3)	0.713
Physician/specialist physician	14 (11.6)	17 (28.3)	0.005
Presence of chronic disease	28 (23.1)	12 (20.0)	0.632
Chronic disease in a first-degree relative	81 (66.9)	39 (65.0)	0.795
Received vaccination training	18 (14.9)	12 (20.0)	0.383
Recommends influenza vaccination to close contacts	60 (49.6)	54 (90.0)	<0.001
Received COVID-19 vaccine†	115 (95.0)	59 (98.3)	0.428
Vaccinations complete for children and/or first-degree relatives‡	115 (95.0)	56 (93.3)	0.732

Data are presented as n (%) unless otherwise indicated. *, Mean $\pm$ standard deviation, compared using Student's t-test; †, Fisher's exact test; ‡, all other categorical comparisons were performed using the Pearson chi-square test.

scores according to participant characteristics are presented in Table 2. No statistically significant differences were observed between women and men or between participants with different educational levels for any of the five subdimensions.

Statistically significant differences were observed among occupational groups in the confidence, complacency, constraints, and collective responsibility sub-dimension scores ($p=0.002$, $p<0.001$, $p=0.002$, and $p=0.022$, respectively). Post-hoc comparisons showed that complacency and constraints scores were significantly higher among other healthcare personnel (health officers, medical secretaries, workers, and others) than among both physicians and midwives/nurses. In contrast, confidence scores were significantly lower among other healthcare personnel than among midwives/nurses. Although the overall analysis of variance for collective responsibility was statistically significant, none of the pairwise comparisons reached statistical significance after Bonferroni correction.

Participants who had received the influenza vaccine during the 2025-2026 season had lower constraints scores (4.9 ± 2.3 vs. 6.8 ± 3.5 , $p=0.006$) and higher calculation scores (18.4 ± 2.9 vs. 16.8 ± 3.8 , $p=0.030$) than those who had not received the vaccine (Table 2).

When collective responsibility sub-dimension scores were examined according to seasonal influenza vaccination status in previous seasons, the mean score was significantly higher among participants who had been vaccinated at least once than among those who had never been vaccinated (17.8 ± 3.8 vs. 16.7 ± 3.6 , $p=0.045$). No statistically significant differences were observed between the two groups in the remaining four subdimensions.

Participants who recommended the influenza vaccine to their close contacts had higher confidence scores (17.1 ± 3.8 vs. 14.4 ± 4.2 , $p<0.001$) and collective responsibility scores (18.2 ± 2.7 vs. 15.1 ± 4.2 , $p<0.001$) and lower complacency scores (7.1 ± 3.2 vs. 8.5 ± 3.6 , $p=0.009$) than those who did not recommend the vaccine (Table 2).

The mean collective responsibility sub-dimension score was 17.2 ± 3.6 among participants who had received a COVID-19 vaccine and 13.4 ± 4.5 among those who had not ($p=0.008$). Similarly, the mean complacency sub-dimension scores were 7.5 ± 3.4 and 10.6 ± 3.1 , respectively ($p=0.020$); only seven participants had not received a COVID-19 vaccine. In addition, participants who reported that their children's and/or first-degree relatives' vaccinations were complete had higher confidence and collective responsibility sub-dimension scores and lower complacency scores (all $p<0.001$). Ten participants reported that these vaccinations were not complete (Table 2).

In univariable analyses, female sex, being a physician, and recommending influenza vaccination were significantly associated with having received an influenza vaccine at least once. Sex, profession, and vaccine recommendation were entered into the primary multivariable model (Table 3). Participants who recommended influenza vaccination had 7.7-fold higher odds of having received an influenza vaccine at least once than those who did not (adjusted OR: 7.677; 95% CI, 3.024-19.490; $p<0.001$). Female sex (adjusted OR: 2.852; 95% CI, 1.115-7.296; $p=0.029$) and being a physician (adjusted OR: 2.904; 95% CI, 1.160-7.272; $p=0.023$) were also independently associated with vaccination. The model was statistically significant (omnibus test, $p<0.001$), demonstrated adequate goodness of fit (Hosmer–Lemeshow test, $p=0.849$), and explained 27.8% of the variance (Nagelkerke $R^2=0.278$; -2 log likelihood = 189.541).

Discussion

In this study, which included 181 healthcare workers employed in primary healthcare services, participants' attitudes toward the seasonal influenza vaccine and the factors affecting their vaccination behaviors were evaluated within the framework of the Psychological Antecedents of Vaccination (5C) model. The findings indicate that influenza vaccine acceptance among healthcare workers cannot be explained solely by sociodemographic characteristics; rather, psychological antecedents and behavioral factors are also associated with vaccination behavior.

Healthcare workers are at high risk for seasonal influenza infection because of their occupational exposure. However, despite recommendations from health authorities and the free provision of the vaccine in Türkiye, influenza vaccination rates among healthcare workers remain below desired levels^[11]. In our study, the influenza vaccination rate during the 2025-2026 season was 16.6%, whereas 33.1% of participants had received an influenza vaccine at least once.

Our findings are consistent with the limited but growing body of national evidence. In a study of 370 healthcare workers at two hospitals in Türkiye, 36.1% reported having received an influenza vaccine at least once, a proportion similar to the 33.1% observed in our study^[11]. In a more recent cross-sectional study of 428 healthcare workers at a university hospital in Türkiye, only 22% had received the influenza vaccine for the 2024 season, whereas 91% had received a COVID-19 vaccine^[25]. A similar contrast was observed in our sample, in which 96.1% of participants had received a COVID-19 vaccine, compared with only 16.6% who had received the influenza vaccine during the current season. A recent national survey of adults in

Türkiye likewise reported an influenza vaccination rate of 28%, with being a healthcare worker identified as an independent predictor of vaccination^[26]. Regional evidence points in the same direction: in a multinational study of 721 healthcare providers led from Türkiye, 28% were classified as hesitant regarding their own vaccination^[27]. International figures vary considerably, ranging from a median of 32% across European countries reporting healthcare worker vaccination coverage^[14] to 76.3% among healthcare personnel in the United States^[16].

The recent experience of England provides an example of a multicomponent, institution-level strategy implemented in a setting where healthcare worker influenza vaccination uptake subsequently increased. During the 2025-2026 season, seasonal influenza vaccine uptake among frontline healthcare workers in National Health Service trusts in England reached 45.0% (523,410 of 1,162,139 staff), representing a 7.5-percentage-point increase from the 37.5% recorded in the previous season and the first national increase after four consecutive seasons of decline^[28]. The national campaign preceding this

Table 2. Comparison of 5C psychological antecedents of vaccination sub-dimension scores according to participant characteristics.

Characteristic		Confidence	Complacency	Constraints	Calculation	Collective responsibility
Sex	Male (n = 45)	15.6 ± 4.2	8.3 ± 3.5	6.5 ± 3.2	17.5 ± 4.1	16.4 ± 3.7
	Female (n = 136)	16.3 ± 4.2	7.4 ± 3.3	6.5 ± 3.5	16.9 ± 3.6	17.3 ± 3.7
	p	0.324	0.138	0.945	0.353	0.156
Educational level	Vocational school or below (n = 40)	15.1 ± 4.6	8.3 ± 3.8	6.7 ± 3.2	17.2 ± 3.5	16.2 ± 3.7
	University degree or above (n = 141)	16.4 ± 4.0	7.5 ± 3.3	6.4 ± 3.5	17.0 ± 3.8	17.3 ± 3.7
	p	0.091	0.179	0.672	0.750	0.118
Profession	Physician (n = 31)	17.1 ± 5.0 ^{a,b}	6.1 ± 2.0 ^a	5.5 ± 2.7 ^a	16.3 ± 5.1	17.9 ± 4.3
	Midwife/nurse (n = 43)	17.6 ± 3.0 ^b	6.6 ± 3.4 ^a	5.4 ± 2.8 ^a	17.5 ± 2.7	18.0 ± 2.8
	Other healthcare personnel (n = 107)	15.2 ± 4.1 ^a	8.5 ± 3.5 ^b	7.2 ± 3.7 ^b	17.1 ± 3.6	16.4 ± 3.7
	p	0.002	<0.001	0.002	0.341	0.022
Received vaccination training	Yes (n = 30)	16.8 ± 3.9	6.7 ± 3.0	5.6 ± 2.6	17.8 ± 3.5	18.2 ± 3.6
	No (n = 151)	16.0 ± 4.2	7.8 ± 3.5	6.7 ± 3.5	16.9 ± 3.8	16.8 ± 3.7
	p	0.300	0.100	0.116	0.274	0.055
Vaccinated during the 2025-2026 season	Yes (n = 30)	16.2 ± 4.6	7.9 ± 3.5	4.9 ± 2.3	18.4 ± 2.9	18.1 ± 3.0
	No (n = 151)	16.1 ± 4.1	7.6 ± 3.4	6.8 ± 3.5	16.8 ± 3.8	16.8 ± 3.8
	p	0.860	0.601	0.006	0.030	0.080
Influenza vaccination in previous seasons	Vaccinated at least once (n = 60)	16.2 ± 5.0	7.4 ± 3.7	6.8 ± 4.0	16.9 ± 4.3	17.8 ± 3.8
	Never vaccinated (n = 121)	16.1 ± 3.7	7.7 ± 3.3	6.4 ± 3.1	17.2 ± 3.5	16.7 ± 3.6
	p	0.810	0.576	0.520	0.557	0.045
Recommends influenza vaccination	Yes (n = 114)	17.1 ± 3.8	7.1 ± 3.2	6.2 ± 3.2	17.3 ± 3.5	18.2 ± 2.7
	No (n = 67)	14.4 ± 4.2	8.5 ± 3.6	7.0 ± 3.7	16.8 ± 4.2	15.1 ± 4.2
	p	<0.001	0.009	0.130	0.376	<0.001
Received the COVID-19 vaccine	Yes (n = 174)	16.2 ± 4.2	7.5 ± 3.4	6.6 ± 3.4	17.1 ± 3.6	17.2 ± 3.6
	No (n = 7)	13.4 ± 4.0	10.6 ± 3.1	4.7 ± 2.4	17.7 ± 6.8	13.4 ± 4.5
	p	0.083	0.020	0.160	0.650	0.008
Vaccinations complete for children and/or first-degree relatives	Yes (n = 171)	16.5 ± 3.8	7.4 ± 3.2	6.3 ± 3.1	17.1 ± 3.6	17.4 ± 3.4
	No (n = 10)	9.3 ± 5.2	11.3 ± 4.6	10.3 ± 6.0	16.0 ± 5.8	11.8 ± 5.1
	p	<0.001	<0.001	0.065	0.347	<0.001

Data are presented as mean ± standard deviation. Each sub-dimension score ranges from 3 to 21. Two-group comparisons were performed using Student's t-test and three-group comparisons were performed using one-way analysis of variance. Within the profession block, values that do not share a common superscript letter differ significantly in post-hoc comparisons (Bonferroni test, $p < 0.05$). For collective responsibility, the overall analysis of variance was significant ($p = 0.022$) whereas no pairwise comparison reached significance after Bonferroni correction; therefore, superscript letters are not shown. COVID-19, Coronavirus Disease 2019.

season required each trust to designate a named executive lead responsible for staff vaccination, establish an explicit improvement target of at least five percentage points over the previous year, ensure that an accessible and convenient vaccination offer was available to all staff from October 1 to March 31, and monitor trust-level uptake through a central data platform^[29]. This combination of accountability, a quantified target, convenient access, and routine monitoring is consistent with the broader intervention literature. A systematic review of 86 studies evaluating interventions targeting healthcare workers for influenza vaccination found that incentive-based, nudging, and persuasive communication methods were the most effective, whereas mandates, although effective, were not the most effective approach^[20]. A meta-analysis of 180 studies involving more than two million participants reported an overall relative risk of vaccination of 1.26 (95% CI, 1.21-1.32) for intervention vs. control, with provider-directed interventions showing the largest effect among healthcare workers^[21].

It should be noted that the evidence that vaccinating healthcare workers protects the patients in their care remains uncertain. An updated Cochrane review of four cluster-randomized trials including 8,468 long-term care residents found that offering influenza vaccination to healthcare workers probably reduces all-cause mortality among residents from 9% to 6% but has little or no effect on laboratory-confirmed influenza in residents. The review authors noted that this reduction in all-cause mortality could not be explained by changes in influenza-specific outcomes and considered the effects on influenza-specific outcomes uncertain^[30]. The rationale for vaccinating healthcare workers therefore rests substantially on protecting the workers themselves and reducing workforce losses, alongside their professional role as vaccination advocates^[31,32].

Low influenza vaccination uptake among healthcare workers has been associated with multiple factors, including doubts about vaccine effectiveness, concerns about adverse effects, and practical barriers to vaccination^[33-39]. Although influenza vaccination is provided free of charge to healthcare workers in Türkiye, our study showed that constraints scores were significantly higher among participants who had not been

vaccinated during the current season (6.8 ± 3.5 vs. 4.9 ± 2.3). This finding suggests that barriers to vaccination may extend beyond financial or physical access and may include lack of time, forgetting, failure to prioritize vaccination, and other practical obstacles. A recent study applying the 5C model to 550 nurses, albeit for a different vaccine, likewise found that constraints were the only psychological antecedent independently associated with vaccination status, in addition to the influence of colleagues^[40]. Isolated measures appear insufficient on their own: a randomized trial of mailed educational letters and a single large incentive found no effect on vaccination rates among hospital employees^[41]. Considered together with the experience of England, our findings support the implementation of multicomponent strategies in Türkiye that combine convenient workplace vaccination^[42,43] and reminder systems^[21] with interventions targeting psychological and behavioral determinants.

Our findings indicate that professional roles within healthcare institutions are associated with attitudes and behaviors toward influenza vaccination. In our study, confidence and collective responsibility scores were higher among physicians and midwives/nurses, whereas complacency and constraints scores were higher among other healthcare personnel. Consistent with these findings, physicians had approximately threefold higher odds than non-physician healthcare workers of having received an influenza vaccine at least once in both univariable and multivariable analyses. Recent evidence from Türkiye supports these observations. In a study of 1,712 adults attending family health centers in which the same 5C scale was used, higher confidence and collective responsibility were associated with willingness to be vaccinated, whereas a higher calculation score was associated with hesitancy^[44]. In another recent Turkish study of 374 healthcare workers who were also parents, physicians had significantly lower vaccine hesitancy scores than midwives, nurses, and public health officers^[45]. These findings are also consistent with previous studies reporting that a stronger sense of responsibility for protecting public health among healthcare workers is associated with higher vaccine acceptance and that physicians have more positive attitudes toward influenza vaccination than other

Table 3. Univariable and multivariable binary logistic regression analysis of factors associated with having received at least one influenza vaccination.

Variable	Category	Crude OR (95% CI)	p	Adjusted OR (95% CI)	p
Sex	Female (reference: male)	2.400 (1.069-5.388)	0.034	2.852 (1.115-7.296)	0.029
Profession	Physician (reference: non-physician)	3.022 (1.370-6.664)	0.006	2.904 (1.160-7.272)	0.023
Influenza vaccine recommendation	Recommends (reference: does not recommend)	9.150 (3.662-22.860)	<0.001	7.677 (3.024-19.490)	<0.001

Sex, profession, and vaccine recommendation were entered simultaneously using the enter method. The omnibus test of model coefficients was significant ($\chi^2 = 40.413$, $df = 3$, $p < 0.001$); -2 log likelihood = 189.541, the Hosmer–Lemeshow goodness-of-fit test was $p = 0.849$, and Nagelkerke R^2 was 0.278. The model included 60 events and three covariates (20 events per variable). OR, odds ratio; CI, confidence interval.

healthcare workers^[46,47]. Taken together, influenza vaccination programs in healthcare settings should not be limited to on-site vaccine provision but should also be supported by targeted educational activities and reminder systems aimed at reducing perceived barriers and strengthening motivation and collective responsibility.

In addition, participants who recommended the influenza vaccine to others had approximately 7.7-fold higher odds of having been vaccinated themselves. Personal vaccination behavior may serve not only the purpose of individual protection but also reflect a professional attitude supported by the responsibility to protect public health. Indeed, in our study, collective responsibility sub-dimension scores, which reflect perceptions of herd immunity and societal benefit, were higher among participants who recommended the vaccine. Similarly, participants who had received a COVID-19 vaccine and those who reported that their children's and/or first-degree relatives' vaccinations were complete had higher collective responsibility and lower complacency scores. These findings suggest that vaccine acceptance is not merely a behavior specific to a particular vaccine or disease; rather, it is closely related to individuals' general approach to vaccination, health behaviors, and perceptions of societal protection. Interventions aimed at strengthening awareness of collective responsibility among healthcare workers may therefore increase not only individual vaccination rates but also, through the role-modeling and counseling effects of healthcare workers, vaccine acceptance in the wider community.

In our study, no significant associations were found between sociodemographic variables, such as educational level and marital status, and influenza vaccination status. Female healthcare workers had higher vaccination rates than male healthcare workers. In contrast, the literature reports that older age, male sex, being married, and a higher educational level are associated with higher influenza vaccination rates^[19]. Furthermore, although that study emphasized that physicians working in hospitals had higher vaccination rates than other healthcare professionals, our study similarly found higher vaccination rates among physicians^[19].

Study Limitations

This study has several limitations. First, because of its cross-sectional design, a cause-and-effect relationship cannot be established. This limitation is particularly relevant to the strong association observed between recommending the influenza vaccine and having been vaccinated, as the direction of this relationship cannot be determined from our data. Healthcare workers who are vaccinated may be more inclined to recommend vaccination, while those who recommend vaccination may, in turn, be more inclined to be vaccinated themselves. Second,

the study included primary healthcare workers from a single province, which may limit the generalizability of the findings to other regions and healthcare settings. Third, although the response rate was acceptable, approximately 19% of eligible participants did not complete the questionnaire, raising the possibility of non-response bias. Fourth, vaccination status was self-reported and was not verified against vaccination records, which may have introduced recall or social desirability bias. Fifth, two of the subgroups compared in Table 2—participants who had not received a COVID-19 vaccine ($n=7$) and those who reported that the vaccinations of their children and/or first-degree relatives were incomplete ($n=10$)—were small; therefore, the corresponding comparisons should be interpreted with caution. Despite these limitations, evaluating influenza vaccine acceptance among healthcare workers using the 5C scale and examining psychological antecedents alongside behavioral factors represent important strengths of this study.

Conclusion

The influenza vaccination rate among primary healthcare workers in this study remained well below targeted levels. The findings suggest that vaccination behavior is associated with perceived practical barriers and a sense of collective responsibility rather than with sociodemographic characteristics alone. Participants who were vaccinated during the current season reported fewer constraints and greater information-seeking behavior, whereas those who had received an influenza vaccine at least once demonstrated a stronger sense of collective responsibility. Although confidence was not directly associated with vaccination status, it differed significantly across occupational groups and was markedly higher among healthcare workers who recommended the vaccine to others, suggesting that confidence may influence vaccine uptake indirectly through professional attitudes. To increase vaccination rates, strategies extending beyond informational campaigns alone are warranted. Multicomponent approaches that combine convenient and accessible workplace vaccination, institutional targets and monitoring, reminder systems, and interventions aimed at strengthening collective responsibility may be more effective in promoting influenza vaccination among healthcare workers.

Ethics

Ethics Committee Approval: This study was approved by Istanbul Medipol University Non-Interventional Clinical Research Ethics Committee (decision number: 1391, date: 13.11.2025).

Informed Consent: Written informed consent was obtained from all participants before administration of the questionnaire.

Footnotes

Authorship Contributions

Surgical and Medical Practices: B.A., E.A., Concept: B.A., E.A., Design: B.A., E.A., P.K., Data Collection or Processing: B.A., E.A., P.K., Analysis or Interpretation: B.A., E.A., P.K., Literature Search: B.A., E.A., P.K., Writing: B.A., E.A., P.K.

Conflict of Interest: No conflict of interest was declared by the authors.

Financial Disclosure: The authors declared that this study received no financial support.

Supplementary File: <https://d2v96fxpocvxx.cloudfront.net/cf9d60d6-523c-458a-a2e6-78728d3ffb0/content-images/040d955e-140d-4700-990b-675c7bba2c02.pdf>

Supplementary Table: <https://d2v96fxpocvxx.cloudfront.net/cf9d60d6-523c-458a-a2e6-78728d3ffb0/content-images/5a038ad2-8a25-46f9-88cf-bdcccfd35e15c.pdf>

References

- World Health Organization. Influenza (seasonal) [Internet]. Geneva: World Health Organization; 2025. Accessed 2026 Aug 23. Available from: [https://www.who.int/news-room/fact-sheets/detail/influenza-\(seasonal\)](https://www.who.int/news-room/fact-sheets/detail/influenza-(seasonal))
- Somes MP, Turner RM, Dwyer LJ, Newall AT. Estimating the annual attack rate of seasonal influenza among unvaccinated individuals: a systematic review and meta-analysis. *Vaccine*. 2018;36:3199-207.
- Lafond KE, Porter RM, Whaley MJ, Suizan Z, Ran Z, Aleem MA, Thapa B, Sar B, Proschle VS, Peng Z, Feng L, Coulibaly D, Nkwembe E, Olmedo A, Ampofo W, Saha S, Chadha M, Mangiri A, Setiawaty V, Ali SS, Chaves SS, Otorbaeva D, Keosavanh O, Saleh M, Ho A, Alexander B, Oumzil H, Baral KP, Huang QS, Adebayo AA, Al-Abidani I, von Horoch M, Cohen C, Tempia S, Mmbaga V, Chittaganpitch M, Casal M, Dang DA, Couto P, Nair H, Bresee JS, Olsen SJ, Azziz-Baumgartner E, Nuorti JP, Widdowson MA; Global Respiratory Hospitalizations–Influenza Proportion Positive (GRIPP) Working Group. Global burden of influenza-associated lower respiratory tract infections and hospitalizations among adults: a systematic review and meta-analysis. *PLoS Med*. 2021;18:e1003550.
- Demurtas J, Celotto S, Beaudart C, Sanchez-Rodriguez D, Balci C, Soysal P, Solmi M, Celotto D, Righi E, Smith L, Lopalco PL, Noventa V, Michel JP, Torbahn G, Di Gennaro F, Pizzol D, Veronese N, Maggi S. The efficacy and safety of influenza vaccination in older people: an umbrella review of evidence from meta-analyses of both observational and randomized controlled studies. *Ageing Res Rev*. 2020;62:101118.
- Houser K, Subbarao K. Influenza vaccines: challenges and solutions. *Cell Host Microbe*. 2015;17:295-300.
- Kuster SP, Shah PS, Coleman BL, Lam PP, Tong A, Wormsbecker A, McGeer A. Incidence of influenza in healthy adults and healthcare workers: a systematic review and meta-analysis. *PLoS One*. 2011;6:e26239.
- Gianino MM, Politano G, Scarmozzino A, Stillo M, Amprino V, Di Carlo S, Benso A, Zotti CM. Cost of sickness absenteeism during seasonal influenza outbreaks of medium intensity among health care workers. *Int J Environ Res Public Health*. 2019;16:747.
- Ip DK, Lau EH, Tam YH, So HC, Cowling BJ, Kwok HK. Increases in absenteeism among health care workers in Hong Kong during influenza epidemics, 2004-2009. *BMC Infect Dis*. 2015;15:586.
- Talbot TR, Babcock H, Caplan AL, Cotton D, Maragakis LL, Poland GA, Septimus EJ, Tapper ML, Weber DJ. Revised SHEA position paper: influenza vaccination of healthcare personnel. *Infect Control Hosp Epidemiol*. 2010;31:987-95.
- Maltezos HC, Borg M, Botelho-Nevers E, Brantsæter AB, Caplinskas S, Chernyshova L, Cirstea O, Civljak R, Dokova K, Falup-Pecurariu O, Filippova I, Froes F, Vitek MG, Heininger U, Hübschen JM, Josefsdottir KS, Kassianos G, Koliou M, Kyncl J, Lapii F, Ljungman P, Medić S, Molnar Z, Nitsch-Osuch A, Nohynek H, Ortiz de Lejarazu R, Rath B, Tafuri S, Townsend L, Ulbrichtová R, Van Damme P, van Essen GA, von Linstow ML, Wiedermann U, Zavadská D, Poland GA. Vaccination policies for healthcare personnel in Europe, 2026. *Vaccine*. 2026;88:128839.
- Kul G, Korkmaz N. Healthcare workers approach to influenza vaccine. *J Contemp Med*. 2020;10:421-4.
- Giannattasio A, Mariano M, Romano R, Chiatto F, Liguoro I, Borgia G, Guarino A, Lo Vecchio A. Sustained low influenza vaccination in health care workers after H1N1 pandemic: a cross sectional study in an Italian health care setting for at-risk patients. *BMC Infect Dis*. 2015;15:329.
- Dini G, Toletone A, Sticchi L, Orsi A, Bragazzi NL, Durando P. Influenza vaccination in healthcare workers: A comprehensive critical appraisal of the literature. *Hum Vaccin Immunother*. 2018;14:772-89.
- European Centre for Disease Prevention and Control. Survey report on national seasonal influenza vaccination recommendations and coverage rates in EU/EEA countries, 2024/25 [Internet]. Stockholm: European Centre for Disease Prevention and Control; 2025. Accessed 2026 Aug 23. Available from: <https://www.ecdc.europa.eu/en/publications-data/survey-report-national-seasonal-influenza-vaccination-recommendations-and>
- Locatelli G, Luciani M, Fabrizi D, Albanesi B, Conti A, Clari M, Renzi E, Massimi A, Ausili D. Determinants and motivations of vaccination hesitancy and uptake in nurses: a systematic review and meta-analysis. *J Clin Nurs*. 2025;34:4005-37.
- Meghani M, Garacci Z, Razzaghi H, de Perio MA, Laney AS, Kriss JL, Black CL. Influenza and COVID-19 vaccination coverage among health care personnel - United States, 2024-25 respiratory virus season. *MMWR Morb Mortal Wkly Rep*. 2026;75:164-71.
- MacDonald NE; SAGE Working Group on Vaccine Hesitancy. Vaccine hesitancy: Definition, scope and determinants. *Vaccine*. 2015;33:4161-4.
- Petek D, Kamnik-Jug K. Motivators and barriers to vaccination of health professionals against seasonal influenza in primary healthcare. *BMC Health Serv Res*. 2018;18:853.
- Boey L, Bral C, Roelants M, De Schryver A, Godderis L, Hoppenbrouwers K, Vandermeulen C. Attitudes, beliefs, determinants and organisational barriers behind the low seasonal influenza vaccination uptake in healthcare workers - a cross-sectional survey. *Vaccine*. 2018;36:3351-8.
- Bertrand SF, Kok G, Mafi A, Ruiter RAC, Ten Hoor GA. Interventions targeting healthcare worker influenza vaccination: a systematic review. *Hum Vaccin Immunother*. 2025;21:2508564.
- Wang Y, Zhang Y, Wang J, Shi N, Jin H, Jin H. Enhancing influenza vaccination uptake: a systematic review and meta-analysis of intervention strategies. *Expert Rev Vaccines*. 2025;24:807-17.
- Betsch C, Schmid P, Heinemeier D, Korn L, Holtmann C, Böhm R. Beyond confidence: development of a measure assessing the 5C psychological antecedents of vaccination. *PLoS One*. 2018;13:e0208601.
- Eitze S, Felgendreiff L, Horstkötter N, Seefeld L, Betsch C. Exploring pre-pandemic patterns of vaccine decision-making with the 5C model: results from representative surveys in 2016 and 2018. *BMC Public Health*. 2024;24:1205.
- Demir B, Demir S, Doğrul AC. Psychological antecedents of vaccination (5C) scale: Turkish validity and reliability study. *Nesne Psikol Derg*. 2022;10:230-45.

25. Açık H, Öztürk S, Akbari AM. Influenza vaccine hesitancy among healthcare workers in a university hospital in Türkiye: a cross-sectional study. *J Infect Dev Ctries*. 2026;20:560-5.
26. Şanlıdağ İşbilen G, Genç S, Pullukçu H, Taşbakan M, Köksal İ. Influenza, COVID-19, and pneumococcal vaccination status among adults in Türkiye. *Turk J Med Sci*. 2026;56:1235-44.
27. Tanriover MD, Vallee-Tourangeau G, Kokorin VA, Larina VN, Maamar M, Harmouche H, Uyaroglu OA, Kutlay DY, Ben Khelil J, Anjorin AA, Rana MS, Jabrayilov J, Al Slail F, Al Kathiry D, Al Harthi H, Ghazy RM, Gahwagi M, Mafi A, Koul P, Al Awaidy S. The vaccination acceptance, confidence, and conviction on influenza in the Middle East, Eurasia, and Africa among healthcare providers (VACCIMENA-HCP) project 2023: determinants of vaccination behavior. *IJID Reg*. 2025;14:100572.
28. UK Health Security Agency. Seasonal influenza vaccine uptake in frontline healthcare workers in England: winter season 2025 to 2026 [Internet]. London: UK Health Security Agency; 2026. Accessed 2026 Aug 23. Available from: <https://www.gov.uk/government/statistics/seasonal-influenza-vaccine-uptake-in-frontline-healthcare-workers-winter-season-2025-to-2026>
29. NHS England. For urgent action: campaign to vaccinate all frontline healthcare staff [Internet]. Publication reference: PRN02095. London: NHS England; 2025. Accessed 2026 Aug 23. Available from: <https://www.england.nhs.uk/long-read/for-urgent-action-campaign-to-vaccinate-all-frontline-healthcare-staff/>
30. Thomas RE, Jefferson T, Lasserson TJ, Earnshaw S. Influenza vaccination for healthcare workers who care for people aged 60 or older living in long-term care institutions. *Cochrane Database Syst Rev*. 2025;2:CD005187.
31. Tian Y, Ma Y, Ran J, Yuan L, Zeng X, Tan L, Chen L, Xu Y, Li S, Huang T, Lu H. Protective impact of influenza vaccination on healthcare workers. *Vaccines (Basel)*. 2024;12:1237.
32. Ito Y, Sumi H, Kato T. Evaluation of influenza vaccination in health-care workers, using rapid antigen detection test. *J Infect Chemother*. 2006;12:70-2.
33. Lehmann BA, Ruiter RA, van Dam D, Wicker S, Kok G. Sociocognitive predictors of the intention of healthcare workers to receive the influenza vaccine in Belgian, Dutch and German hospital settings. *J Hosp Infect*. 2015;89:202-9.
34. Weingarten S, Riedinger M, Bolton LB, Miles P, Ault M. Barriers to influenza vaccine acceptance. A survey of physicians and nurses. *Am J Infect Control*. 1989;17:202-7.
35. Hopman CE, Riphagen-Dalhuisen J, Looijmans-van den Akker I, Frijstein G, Van der Geest-Blankert AD, Danhof-Pont MB, De Jager HJ, Bos AA, Smeets E, De Vries MJ, Gallee PM, Lenderink AF, Hak E. Determination of factors required to increase uptake of influenza vaccination among hospital-based healthcare workers. *J Hosp Infect*. 2011;77:327-31.
36. Looijmans-van den Akker I, van Delden JJ, Verheij TJ, van Essen GA, van der Sande MA, Hulscher ME, Hak E. Which determinants should be targeted to increase influenza vaccination uptake among health care workers in nursing homes? *Vaccine*. 2009;27:4724-30.
37. Siriwardena AN. Healthcare workers and influenza vaccination. Commentary on Canning HS, Phillips J & Allsup S (2005). Healthcare workers beliefs about influenza vaccine and the reasons for non-vaccination - a cross-sectional survey. *Journal of Clinical Nursing* 14, 922-925. *J Clin Nurs*. 2007;16:1186-8.
38. Smedley J, Poole J, Wacławski E, Stevens A, Harrison J, Watson J, Hayward A, Coggon D. Influenza immunisation: attitudes and beliefs of UK healthcare workers. *Occup Environ Med*. 2007;64:223-7.
39. Dorribo V, Lazor-Blanchet C, Hugli O, Zanetti G. Health care workers' influenza vaccination: motivations and mandatory mask policy. *Occup Med (Lond)*. 2015;65:739-45.
40. Li M, Chen Q, Wang F, Ding L. Factors influencing Chongqing nurses' HPV vaccination: a cross-sectional survey based on the 5C model. *Front Public Health*. 2026;14:1789086.
41. Doratotaj S, Macknin ML, Worley S. A novel approach to improve influenza vaccination rates among health care professionals: a prospective randomized controlled trial. *Am J Infect Control*. 2008;36:301-3.
42. Song JY, Park CW, Jeong HW, Cheong HJ, Kim WJ, Kim SR. Effect of a hospital campaign for influenza vaccination of healthcare workers. *Infect Control Hosp Epidemiol*. 2006;27:612-7.
43. To KW, Lai A, Lee KC, Koh D, Lee SS. Increasing the coverage of influenza vaccination in healthcare workers: review of challenges and solutions. *J Hosp Infect*. 2016;94:133-42.
44. Özbaş C, Tokatlı Doğan M, Baran Aksakal FN. Assessing psychological antecedents of vaccination in family health center visitors. *Prim Health Care Res Dev*. 2026;27:e22.
45. Çelik E, Şahin ÇE, Değer MS, Altaş ZM. Vaccine hesitation: attitudes of Turkish health worker parents towards adult and childhood immunisation. *BMC Public Health*. 2025;25:2857.
46. Corace K, Prematunge C, McCarthy A, Nair RC, Roth V, Hayes T, Suh KN, Balfour L, Garber G. Predicting influenza vaccination uptake among health care workers: what are the key motivators? *Am J Infect Control*. 2013;41:679-84.
47. Aguilar-Díaz Fdel C, Jiménez-Corona ME, Ponce-de-León-Rosales S. Influenza vaccine and healthcare workers. *Arch Med Res*. 2011;42:652-7.