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Original Article

Influenza vaccine hesitancy among healthcare workers in a university hospital in Turkiye: a cross-sectional study

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Abstract

Introduction: This study aimed to evaluate influenza vaccine hesitancy among healthcare workers (HCWs) at Istanbul Okan University Hospital and also explore the factors influencing their decision to get the influenza vaccine.

Methodology: A cross-sectional questionnaire was conducted with 428 HCWs, and a 94% response rate was achieved. The questionnaire included demographic data, knowledge assessments about influenza, and vaccination history.

Results: Only 22% of participants reported receiving the influenza vaccine in 2024, while 78% did not. The main reasons for hesitancy were distrust in vaccine efficacy (32%), fear of side effects (32%), and distrust of vaccine manufacturers (31%). Among those who were vaccinated, the key motivations included self-protection (19%) and being part of a risk group (15%). Interestingly, 91% of respondents had received the coronavirus disease 2019 (COVID-19) vaccine, citing similar reasons for acceptance or refusal.

Conclusions: Despite well-documented evidence of the influenza vaccine's role in reducing morbidity and mortality, hesitancy remains prevalent, reflecting certain trends also observed in the literature. Educational and health promotion campaigns, on-site vaccination programs, and awareness initiatives emerged as potential strategies that would improve the vaccine uptake. This study highlights the critical need for targeted interventions to address vaccine hesitancy among HCWs. Building trust, providing accurate information, and ensuring easy access to vaccines are essential steps to boost influenza vaccination rates and enhance public health outcomes.

Key words: vaccination hesitancy; influenza, vaccines; COVID-19; healthcare workers.

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Introduction

Vaccines are developed against common infectious agents with high morbidity and mortality, and are one of the greatest contributions of modern medicine to public health and preventive health services [1]. The benefits of vaccines to individual and public health are a fact that is widely accepted by health authorities. Vaccine coverage must be maintained at a constant high level in order to provide community immunity [2]. While morbidity and mortality from vaccine-preventable diseases have reached record lows, the effectiveness of vaccination has paradoxically led to the reemergence of anti-vaccine sentiment. Since the rate of vaccine-preventable diseases has decreased in many developed countries, the value of certain vaccines and the usefulness of vaccination have started to drop — they have lost their importance. Adverse health events linked to specific vaccines were perceived to be more common than the diseases they were supposed to prevent us from. In a way, some vaccines can be considered victims of their own successes [3].

According to the World Health Organization (WHO), vaccine hesitancy, defined as the delay or refusal to accept safe vaccines despite the availability of vaccination services, is one of the 10 biggest global threats to public health [4]. Vaccine hesitancy is also considered to be one of the serious barriers to achieving herd immunity against important infectious diseases [5]. Anti-vaccination sentiment was further fueled during the coronavirus disease 2019 (COVID-19) pandemic, and has become more visible [6]. Negative attitudes supporting vaccine hesitancy and incomplete or incorrect information reduce vaccination rates and herd immunity. Vaccine refusal among healthcare workers (HCWs) remains a paradox. However, there has recently been an increase in vaccine hesitancy and refusal among HCWs. HCWs are the most effective and reliable sources of information about vaccination services, and their attitudes towards vaccination strongly impact the process of vaccination and its success [7].

Determinants of vaccine hesitancy include factors that affect individuals' behavioral decisions such as accepting, delaying, or refusing vaccination. Determinants of vaccine hesitancy are examined under three categories: contextual effects; individual and

group effects; and vaccine-specific effects. Contextual effects originate from communication/media; vaccine lobbies; influential leaders; and religious, cultural, geographical, social, political, and economic factors. Perceptions regarding the pharmaceutical industry, effects of social environment and peer circle, experiences regarding vaccination, beliefs and attitudes regarding health, knowledge and awareness, the perceived risk regarding vaccination, social norms regarding vaccination, trust in the health system, and health professionals are within the scope of individual and group effects. Vaccine-specific effects include benefit/cost, introduction of a new vaccine formulation, implementation method and management of the vaccination program, and attitudes of health professionals and strength of their recommendations [8,9].

The measurement tools developed and adapted for vaccine hesitancy and vaccine attitude are specific to certain vaccines, such as influenza [10]. According to the 3C model used in the examination of vaccine hesitancy, vaccine hesitancy is not only due to simple individual factors. The model addresses vaccine hesitancy in three dimensions: confidence, complacency and convenience. Confidence includes trust in the effectiveness of vaccines, health services, and professionals; and the motivations of policymakers who make vaccination decisions. In cases where the risks of vaccine-preventable diseases are low and vaccination is not seen as a necessary preventive action, vaccine complacency exists. The success of vaccination programs also affects vaccine complacency. Vaccine convenience includes factors such as physical availability, affordability, willingness to pay, geographical accessibility, and health literacy level [9,11]. In addition, terms such as "vaccine hesitancy scale" can be found in the literature, which was developed by the WHO SAGE Working Group and adapted to Turkish situations to measure the hesitancy of HCWs regarding influenza vaccination [12]. The research questions of the current study were developed based on the vaccine hesitancy scale and the 3C model.

Although the WHO and the United States Centers for Disease Control and Prevention (CDC) state that HCWs should be regularly vaccinated against seasonal influenza, there was still influenza vaccine hesitancy among HCWs [13,14]. The first aim of this study was to determine the influenza vaccine hesitancy among HCWs in a university hospital. The second aim was to assess the factors of influenza vaccine hesitancy, and the influenza knowledge level of HCWs.

Methodology

This descriptive, single centered, cross-sectional questionnaire study was approved by the institutional ethics committee of a university medical school (approval nr. 22, date 11.12.2024). Informed consent forms were received from all individuals. The survey form consisting of 16 questions was developed after a literature review with search words "influenza vaccine", “healthcare worker”, and "hesitancy". The questions were mostly based on the 3C model and vaccine hesitancy scale. The first part of the form included questions about demographics and professional characteristics. The second part contained true/false questions about influenza knowledge. The third part of the questionnaire had questions about respondents’ influenza vaccine history (Supplementary File 1).

All physicians and non-physician staff working in the hospital were invited to participate voluntarily in this study. Individuals who declined to participate were excluded. The questions were first pilot tested for any misunderstandings with a sample of 20 HCWs in the hospital, and after that, the questionnaires were distributed to the head of various departments in the university hospital. When the questionnaires were completed, they were handed over by the department heads.

Statistical analysis

The answers were analyzed using Excel spreadsheets (Microsoft Corporation, Redmond, WA, USA). Mean, standard deviation, median, minimum, maximum value frequency, and percentage were used for descriptive statistics. SPSS 28.0 (IBM Corp, Armonk, NY, USA) was used for statistical analyses. No statistical comparisons had been made as this was a descriptive study.

Results

Of the 452 questionnaire recipients who worked in the university hospital, 428 (94%) completed the survey form. The median (IQR 25,75) age of the respondents was 27 (24,42) and 340 (79%) of them were women. Of 428, 192 (45%) were married and 201 (47%) were non-smokers. Most of the respondents (85%) did not have any chronic condition, and 65 respondents had reported as diagnosed with chronic disease such as the following: respiratory (asthma and chronic obstructive respiratory disease (COPD)) (5%), cardiac (hypertension (HT), coronary artery disease (CAD)) (4%), thyroid (3%), diabetes mellitus (1%), migraine (1%), and other (celiac, multiple sclerosis, cancer). 11% (n = 45) of the respondents were medical doctors, 42%

(n = 181) were nurses and 47% (n = 202) were auxiliary health personnels. Almost two-third of the respondents (n = 281, 65%) had a university degree. The median (IQR 25, 75) time of respondents' professional experience were 5 (2, 10) years. The median (IQR 25, 75) number of patients encountered daily was 15 (10, 40). The demographic variables of respondents are provided in Table 1.

In response to the questions regarding the influenza vaccine, only 22% of the respondents indicated that they received the influenza vaccine during September–December 2024, and 78% decided not take the influenza vaccine. Out of 363 respondents with no chronic conditions, only 77 (21%) (n = 363) received the influenza vaccine; while out of 65 respondents who had a chronic condition, only 15 (23%) received the influenza vaccine in 2024. 61% of those who were vaccinated said they received the influenza vaccine at the hospital. The questionnaire included a question for assessing the reason for deciding to receive the influenza vaccine in 2024. The respondents were asked to provide more than one answer if applicable. The list of responses are provided in Table 2. The most frequent response was "protecting myself and my environment" (19%), followed by "being in a risk group" (15%). When the reasons for the decision to not receive the influenza jab in 2024 were assessed, the most frequent responses were "distrust of vaccine efficacy" (32%), followed by "fear of vaccine side effects" and, "distrust of vaccine companies" (31%) (Table 2).

Table 1. Demographic variables of respondents, including age, gender, and years of work experience.

Variables	Total (n = 428)
Age, year (min, max)	27 (24, 42)
Gender	
Female	340 (79%)
Marital status	
Married	192 (45%)
Single	236 (55%)
Smoking status	
Non-smoker	201 (47%)
Active smoker	176 (41%)
Ex-smoker	51 (12%)
Chronic disease	
None	363 (85%)
Respiratory (Asthma+ COPD)	23 (5%)
Cardiac (HT+ CAD)	19 (4%)
Thyroid	11 (3%)
Diabetes mellitus	4 (1%)
Migraine	3 (1%)
Other	5 (1%)
Education	
University	281 (65%)
High school	89 (21%)
Primary school	58 (14%)
Profession	
Medical doctor	45 (11%)
Nurse	181 (42%)
Auxiliary health personnel	202 (47%)
Profession experience, year (min–max)	5 (2,10)
Number of patients contacted daily (min–max)	15 (10,40)

COPD: chronic obstructive pulmonary disease; HT: hypertension; CAD: coronary artery disease.

Table 2. Questions about the respondents' influenza vaccine history.

Questions	Yes n (%)	No n (%)
Have you taken the influenza vaccine in 2023?	92 (22)	336 (78)
Where was the 2023 influenza (flu) vaccine administered?		
Hospital	85 (92)	
Pharmacy	7 (8)	
Reasons for the decision to take the influenza vaccine in 2023		
Protecting myself and my environment	79 (19)	
Being in a risk group	66 (15)	
Having someone in the household in the risk group	38 (9)	
Having sufficient information about the vaccine	25 (6)	
Information provided by the hospital	21 (5)	
Earlier exposure to the consequences of influenza	16 (4)	
Doctor's advice	10 (2)	
People around me getting vaccinated	1 (1)	
Reasons for the decision of <u>not taking</u> the influenza vaccine in 2023		
Distrust of vaccine efficacy	136 (32)	
Fear of vaccine side effects	136 (32)	
Distrust of vaccine companies	134 (31)	
Being undecided	65 (15)	
Lack of information on the time of vaccine	55 (13)	
Disbelief that flu is a serious illness	31 (7)	
Not having enough ınformation about the vaccine	28 (7)	
Getting sick after previous vaccine	28 (7)	
Not recommended by a doctor	18 (4)	
Knowing that the vaccine is paid	13 (3)	
Needle phobia	8 (2)	
Have you taken the influenza vaccine between 2018–2022?	118 (28)	310 (72)
How many times have you taken an influenza vaccine between 2017–2022?		
I	47 (40)	
II	33 (28)	
III	27 (23)	
IV	6 (5)	
V	5 (4)	
Have you been vaccinated for COVİD-19?	391 (91)	37 (9)
Which COVİD-19 vaccine did you take?		
Sinovac	161 (41)	
mRNA	101 (26)	
Turkovac	2 (1)	
Sinovac + mRNA	127 (33)	
Reasons for deciding to take the COVID-19 vaccine		
Being in a risk group	312 (73)	
Protecting myself and my environment	252 (59)	
Having someone in the household in the risk group	129 (30)	
People around me getting vaccinated	53 (12)	
Information provided by the hospital	84 (20)	
Earlier exposure to the consequences of COVİD-19	49 (11)	
Doctor's advice	31 (7)	
People around me getting vaccinated	26 (6)	
Reasons for the decision <u>not taking</u> COVİD-19 vaccine		
Fear of vaccine side effects	29 (7)	
Distrust of vaccine effectiveness	20 (5)	
Lack of information on the time of vaccine	6 (2)	
Disbelief that COVİD-19 is a serious illness	1 (1)	
Needle phobia	1 (1)	
Not having enough information about the vaccination period	0 (0)	
Getting sick after previous vaccine	0 (0)	
Not recommended by a doctor	0 (0)	
Being undecided	0 (0)	
Knowing that the vaccine is paid	0 (0)	

Table 3. Thoughts on actions that could encourage getting the influenza vaccine.

	Completely agree (%)	Agree (%)	No idea (%)	Disagree (%)	Completely disagree (%)
Vaccination of people around	16	28	25	21	10
Studies on raising awareness in the media	20	36	20	16	8
Hospital sending information via mail/SMS/phone	19	41	17	16	7
Hospital providing vaccine-related training	32	42	12	9	5

In response to the question about the reasons for getting the influenza vaccine between 2018–2023, only 28% of respondents indicated that they received the vaccine, and most of the respondents (72%) did not receive it. Forty-percent of the respondents received only 1 influenza vaccine between 2018–2023. Ninety-one percent of the respondents received the COVID-19 vaccine. Sinovac was the more preferred vaccine (41%), compared to mRNA and Turkovac. The respondents were asked about the reasons for getting the COVID-19 vaccine, and "being in a risk group" was the most frequent response. When asked about the reasons for not getting the COVID-19 vaccine, "fear of vaccine side effects" was the most frequent response (9%) (Table 2).

Table 3 summarizes the responses to the questions regarding their thoughts on actions that could encourage them to receive the influenza vaccine. The respondents mostly agreed about actions including "providing vaccine-related training" (74%) and "vaccination of people around" (44%).

Finally, the respondents' knowledge on influenza was assessed with 'true/false' questions. All the statements were reported as 'true', with the exception of "it is not necessary to get vaccinated for influenza every year". Most of the respondents (89%) selected 'true' in response to the statement "HCWs are one of the target populations for influenza vaccine", 82% did so to "influenza vaccination is free for HCWs", and 67% selected 'true' for the statement "the disease known as H1N1 virus is a type of influenza". More than half of the respondents (53%) selected 'false' in response to the statement "It is not necessary to get vaccinated for influenza every year". Eighty-five percent selected 'true' for "Flu can cause serious illness and death". Almost all of the respondents (97%) selected 'true' in response to the statement "HCWs can transmit flu to their families". The influenza knowledge and all the responses provided about influenza is shown in Table 4.

Discussion

The influenza vaccine prevents millions of illnesses and influenza-related physician visits each year. It is estimated that it prevented 7 million illnesses, 3 million outpatient clinic visits, 105,000 hospitalizations, and 6000 deaths during the 2019–2020 seasonal flu season [15]. Studies have shown that the influenza vaccine reduces the severity of the disease in people who are vaccinated but still get sick. Vaccinated adults have 26% lower risk of being admitted to the intensive care unit and 31% lower risk of death compared to unvaccinated adults [16]. A study in New Zealand found that among adults hospitalized with influenza, vaccinated patients were 59% less likely to be admitted to the intensive care unit (ICU) than unvaccinated adults, and vaccinated adults with influenza in the ICU stayed there for an average of 4 days less than unvaccinated adults [17].

The research questions of the current study were developed based on the WHO vaccine hesitancy scale and the 3C model, which implies confidence, complacency, and convenience. This 3C model helps to create new questionnaires that can be adapted to different environments. The survey included only HCWs of a university hospital. Although there is evidence in the literature that shows the advantages of the influenza vaccine, the results of this study indicate that HCWs were hesitant towards receiving the influenza vaccine. 22% of the respondents indicated that they received the influenza vaccine in 2024, and 78% indicated that they did not. Similarly, a study by Cebi and Mandıracıoğlu, reported about influenza vaccine hesitancy among the students of the Vocational School of Health Care. Only 13% of the students received the influenza vaccine in 2022 [18].

Table 4. Influenza knowledge of the respondents.

Questions	True n (%)	False n (%)
Healthcare workers are one of the target populations for influenza vaccine.	382 (89)	46 (10)
Influenza vaccination is free for healthcare workers.	351 (82)	77 (18)
The disease known as H1N1 virus is a type of influenza.	289 (67)	139 (33)
It is not necessary to get vaccinated for influenza every year.	200 (47)	228 (53)
Flu can cause serious illness and death.	362 (85)	66 (15)
Healthcare workers can transmit flu to their families.	417 (97)	11 (3)

In this study, only 4% of the respondents received the influenza vaccine every year between 2018–2023. The results (on receiveing the influenza vaccine annually) are in accordance with those reported by Korkmaz *et al*. who showed that only 6% of HCWs regularly receive the influenza vaccine every year, and those not believing in the 'necessity of the vaccine' are the biggest barrier [19].

Seventy eight percent (78%) of HCWs did not receive the influenza vaccine in 2024, and the most selected reasons for doing so were: 'distrust of vaccine efficacy and vaccine companies'; and, 'fear of vaccine side effects'. The literature is also consistent with the results, and Korkmaz *et al.* also mentioned that the "distrust of vaccine efficacy" was one of the most reported responses (29%) [20]. Zou *et al.* found that 36% of university students also had a distrust of the influenza vaccine [21].

In the current study, the respondents' vaccine hesitancy was similiar based on the presence of a chronic condition. Only 23% of the respondents with chronic diseases, and 21% of the respondents without any chronic problem received the influenza vaccine in 2024. No significant relationship between the presence of chronic disease and vaccine hesitancy has been reported in literature [18,22].

The most important reason for HCWs to receive the influenza vaccine is to prevent them from transmitting the disease to patients who are at risk of getting a more severe form of influenza [7]. Similar to findings from the literature, the most reported reason for the decision to get vaccinated against influenza in 2024 was "having someone in the household as part of the risk group".

The COVID-19 pandemic has profoundly influenced vaccination attitudes, including a rise in vaccine hesitancy. While the pandemic demonstrated the critical importance of immunization in combating infectious diseases, it also exacerbated both public and HCWs skepticism. Studies indicate that the rapid development and emergency use authorization of the COVID-19 vaccines heightened concerns regarding vaccine safety and efficacy, which negatively influenced public confidence in other routine forms of immunization, including influenza vaccination [23].

Social media has also played a pivotal role in propagating misinformation about certain vaccines during the pandemic. This environment of mistrust has contributed to a decline in vaccine confidence, even among HCWs who are traditionally seen as advocates of vaccination [24]. Additionally, the visibility of rare vaccine side effects during the pandemic directly influenced their fears, and consequently negatively impacted the vaccination process. As highlighted by MacDonald *et al.,* confidence, complacency, and convenience are key dimensions of vaccine hesitancy, all of which were influenced during the COVID-19 pandemic [25].

The findings of this study align with the above observations, as distrust in vaccine efficacy, vaccine companies, and fear of side effects were seen as major barriers to influenza vaccination among HCWs. Addressing this hesitancy in the post-pandemic era requires targeted educational campaigns, transparent communication, and strategies to rebuild trust in both preventative vaccines and the healthcare system.

In this study, 91% of the respondents indicated that they had received the COVID-19 vaccine. In comparison, with the Zou *et al.* questionnaire study that showed a 99% COVID-19 vaccination rate among university students in China, the vaccination rate in this study was low [21].

There were some limitations to this study. The study could not be conducted in all university hospitals in the country because the study team worked in a single university hospital. The main findings around vaccine proficiency and hesitancy need to be supported by further research in this area that will focus across various hospital sites both in terms of numbers and location, as well as other key HCWs, before they can be generalized.

Conclusions

This study identified a significant level of influenza vaccine hesitancy among HCWs, with 78% of them avoiding vaccination in 2024 due to concerns about efficacy and side effects of the vaccine. To reduce hesitancy, hospitals should implement a more robust training program on vaccine safety and effectiveness, alongside more regular awareness campaigns emphasizing the benefits of vaccination. Providing on-site vaccination services and seasonal reminders can also boost participation. Furthermore, establishing a systematic monitoring framework to assess vaccination uptake and related health outcomes in the short, medium and long term at local, regional and national levels would provide valuable insights for improving future immunization strategies.

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Conflict of interest

No conflict of interest is declared.

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Annex – Supplementary Items

The Influenza vaccine survey

Name- Surname: ……. Age:……..

Gender: □ Female □ Male

Marıtal status: □ Marrıed □ Sıngle

Smokıng status: □ Non-smoker □ Actıve smoker □ Ex-smoker

Do you have any chronıc dısesases? □ No □ Yes, please Indıcate: ……..

Educatıon: □ Prımary school □ Hıgh school □ Unıversıty

Professıon: □ Medıcal doctor □ Nurse □ Auxılıary health personnel

Professıon experıence (year): ……

Number of patıents contacted daıly: ……

1. **Did you take the ınfluenza vaccıne ın 2023?**
   □ Yes □ No

2. **If yes, where was ıt admınıstered?**
   □ Hospıtal □ Pharmacy

3. **Reasons for the decısıon to take the ınfluenza vaccıne In 2023.**
   (You can select more than one option)

□ Beıng ın a rısk group
□ Havıng someone ın the household ın the rısk group
□ Protectıng myself and my envıronment
□ Havıng sufficıent ınformatıon about the vaccıne
□ Earlıer exposure to the consequences of ınfluenza
□ Doctor's advıce
□ Informatıon provıded by the hospıtal
□ People Around Me Gettıng Vaccınated

4. **Reasons for the decısıon of not taking the ınfluenza vaccıne ın 2023.**
   (You can select more than one option)

□ Dıstrust of vaccıne effectıveness
□ Dıstrust of vaccıne companıes
□ Fear of vaccıne sıde effects
□ Dısbelıef that flu ıs a serıous ıllness
□ Not havıng enough ınformatıon about the vaccıne
□ Not recommended by a doctor
□ Needle phobıa
□ Gettıng sıck after prevıous vaccıne
□ Beıng undecıded
□ Lack of ınformatıon on the tıme of vaccıne
□ Knowıng that the vaccıne ıs paıd

5. **How many tımes have you taken an ınfluenza vaccıne between 2017–2022?**
   □ Yes □ No

6. **If yes how many tımes? …….**

7. **What are your thoughts on the actıons below, that could encourage gettıng the flu vaccıne?**

	Completely agree	**Agree**	**No idea**	**Dısagree**	**Completely dısagree**
Vaccınatıon of people around					
Studıes on raısıng awareness ın the medıa					

Hospıtal sending information vıa maıl/sms/phone					
Hospital provıdıng vaccıne-related traınıng					

8. Have you been vaccınated for COVID-19? □ **Yes** □ **No**

9. Whıch COVID-19 vaccıne dıd you take?
□ Sınovac □ mRna □ Turkovac □Sınovac + mRna

10. Reasons for decıdıng to take the COVID-19 vaccıne.
(You can select more than one option)
□ Beıng ın a rısk group
□ Havıng someone ın the household ın the rısk group
□ Protectıng myself and my envıronment
□ People around me gettıng vaccınated
□ Earlıer exposure to the consequences of COVID-19
□ Doctor's advıce
□ Informatıon provıded by the hospıtal
□ People around me gettıng vaccınated

11. Reasons for the decısıon not taking the COVID-19 vaccıne
□ Dıstrust of vaccıne effectıveness
□ Fear of vaccıne sıde effects
□ Dısbelıef that COVID-19 ıs a serıous ıllness
□ Lack of ınformatıon on the tıme of vaccıne
□ Not recommended by a doctor
□ Needle phobıa
□ Gettıng sıck after prevıous vaccıne
□ Beıng undecıded
□ Not havıng enough ınformatıon about the vaccınatıon perıod
□ Knowıng that the vaccıne ıs paıd

12. What do you thınk about the ımportance of the flu vaccıne after the COVID-19 pandemıc?
□ More ımportant □ Same □ Less ımportant □ No ıdea

13. Do you recommend that patıents/relatıves you encounter get a flu vaccıne?
□ Yes □ No

14. Do you thınk flu vaccınatıon should be mandatory for healthcare workers?
□ Yes □ No

15. How dıd the COVID-19 pandemıc affect whether you would get ınfluenza and other vaccınes?
□ Affected posıtıvely □ Affected negatıvely □ No effect

16. Please mark the followıng ınformatıon about ınfluenza as true or false.

	True	False
Healthcare workers are one of the target populatıons for ınfluenza vaccıne.		
Influenza vaccınatıon ıs free for healthcare workers.		
The dısease known as H1N1 vırus ıs a type of ınfluenza.		
It ıs not necessary to get vaccınated for ınfluenza every year.		
Flu can cause serıous ıllness and death.		
Healthcare workers can transmıt flu to theır famılıes.		