

# Vaccination attitudes and practices of physicians and nurses in adult oncology settings

Nesligul OZDEMIR-AYDURAN <sup>1\*</sup>, Burak Y. AKTAS <sup>2</sup>, Saadettin KILICKAP <sup>3\*</sup>, Aygin BAYRAKTAR-EKINCIOGLU <sup>4\*</sup>

<sup>1</sup> Department of Clinical Pharmacy, Faculty of Pharmacy, Inonu University, Malatya, Türkiye.

<sup>2</sup> Department of Medical Oncology, Faculty of Medicine, Hacettepe University, Ankara, Türkiye.

<sup>3</sup> Department of Medical Oncology, Faculty of Medicine, Istinye University, Istanbul, Türkiye.

<sup>4</sup> Department of Clinical Pharmacy, Faculty of Pharmacy, Hacettepe University, Ankara, Türkiye.

\* Corresponding Author. E-mail: [nesligul.ozdemir@inonu.edu.tr](mailto:nesligul.ozdemir@inonu.edu.tr) (N.O.A.); Tel. +90 536 978 72 51

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**ABSTRACT:** This study aimed to assess the opinions and clinical practices of oncologists and nurses about vaccination recommended for both healthcare workers and cancer patients. A cross-sectional survey study was conducted among physicians and nurses working in adult oncology settings between September 2019 and February 2022. An online survey was sent to the participants via e-mails, with two reminders at 4-week intervals for non-respondents. A total of 80 physicians and 84 nurses completed the survey. The highest vaccination rates for physicians and nurses were reported for hepatitis B, diphtheria-tetanus, and influenza vaccines. Considering the previous influenza season, only 31.25% of the physicians and 22.62% of the nurses had the influenza vaccine. Eighty-seven percent (n=70) of physicians and 57.14% (n=48) of nurses recommended adult vaccines to cancer patients. Influenza, pneumococcal, and hepatitis B vaccines were the most recommended vaccines. Thirty-seven percent of physicians and 44.05% of nurses encountered anti-vaccine attitudes among the patients. Seventeen percent of the physicians had no opinion on the timing of vaccination during conventional cytotoxic chemotherapy. Forty percent, 28.17%, and 18.31% of physicians recommended vaccination 'just before treatment', 'between treatment cycles', and 'immediately after the end of treatment', respectively. Vaccination rates of physicians and nurses working in oncology practice and the recommendation of vaccination to cancer patients are still lower than desired levels. It appears that HCPs have limited knowledge regarding vaccination time schedules in cancer patients.

**KEYWORDS:** attitudes; cancer; healthcare professionals; oncology; vaccination; schedule.

## 1. INTRODUCTION

Healthcare professionals' vaccination attitudes and beliefs are one of the determinant factors that affect vaccination coverage as well as patients' beliefs. It has been shown that the willingness of healthcare professionals (HCPs) to be vaccinated and their recommendations to vaccinate may influence the vaccination behaviors of patients [1-3]. In general, flu vaccination in adults is highly accepted/acknowledged by the population worldwide, this appreciation moved towards the coronavirus vaccine in the last few years due to the COVID-19 pandemic. Therefore, many studies evaluated the attitudes and behaviors of both patients and healthcare workers towards vaccines [4-6].

It has been known that healthcare workers are at risk of both contracting and transmitting diseases such as influenza, hepatitis B, measles-mumps-rubella, varicella, and zoster [7-10]. Since they may become the source of infection for patients at high risk, it is important to prevent healthcare workers from being a vector that spreads an infectious disease is to be vaccinated against these diseases. In fact, there are studies evaluating the attitudes and behaviors of healthcare professionals towards different vaccines [11-15] and most of them were conducted among family physicians [12-14]. Although the impact of physicians in primary care on vaccination is tremendous, attitudes and behaviors of the specialists towards vaccination in specific patient groups also affect the vaccination behaviors of patients. Cancer patients are one of the vulnerable patient groups for infections that require more attention for vaccination, however, few studies have evaluated vaccination attitudes and behaviors of healthcare professionals working with cancer patients [16-19].

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The timing of vaccine administration for different types of vaccine in cancer patients varies according to the treatment regimens, as a result, immunization in cancer patients can be more complex and confusing for HCPs than in other patients. Therefore, it is important that oncologists and nurses, who are in close contact with cancer patients throughout the entire treatment process, have sufficient knowledge and affirmative attitudes about vaccination in cancer patients in order to guide patients or caregivers appropriately. This study aimed to assess the opinions and clinical practices of oncologists and nurses about vaccinations recommended for both healthcare workers and cancer patients.

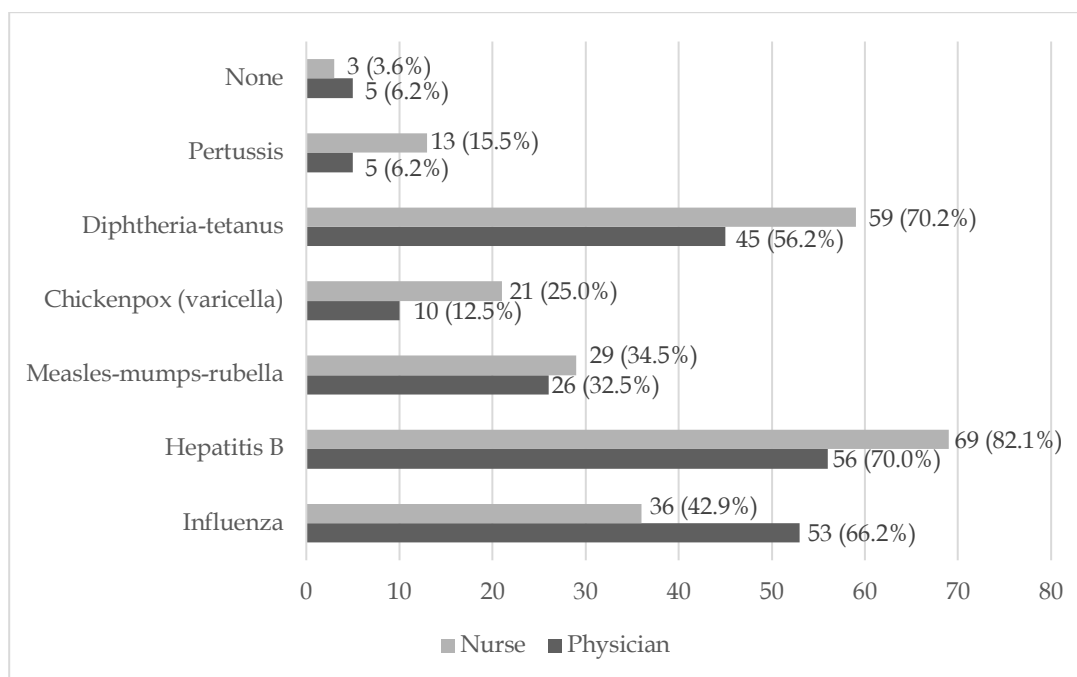
## 2. RESULTS

A total of 80 physicians (53.3%) and 84 nurses (15%) completed the survey. The demographics of participants are summarized in Table 1. Among physicians 43.1% were physicians in specialty training, 23.7% were specialists and 35% were assistant professors or professors. For the nurses, 33.3% had postgraduate education degrees.

**Table 1.** Demographics of physicians (n=80) and nurses (n=84).

	Physicians n (%)	Nurses n (%)
<b>Gender</b>		
Female	44 (55.0)	77 (91.7)
Male	36 (45.0)	7 (8.3)
<b>Age (years)</b>		
20-30	33 (41.3)	30 (35.7)
31-40	24 (30.0)	31 (36.9)
41-50	16 (20.0)	19 (22.6)
51-61	7 (8.8)	4 (4.8)
<b>Practice setting</b>		
University/Training and Research		
Hospital	68 (85.0)	54 (64.3)
Public hospital	2 (2.5)	16 (19.0)
Private hospital/clinic	10 (12.5)	14 (16.7)
<b>Work experience (years)</b>		
<1	23 (28.7)	16 (19.0)
1-5	25 (31.3)	33 (39.3)
6-10	16 (20.0)	12 (14.3)
>10	16 (20.0)	23 (27.4)

Physicians and nurses were asked about their current vaccination status in accordance with the guideline-recommended vaccines for healthcare professionals, and it was observed that most of the physicians and nurses had hepatitis B (70% and 82.1%) and diphtheria-tetanus (56.2% and 70.2%) vaccines, respectively (Figure 1).



**Figure 1.** Current vaccination status of physicians (n=80) and nurses (n=84).

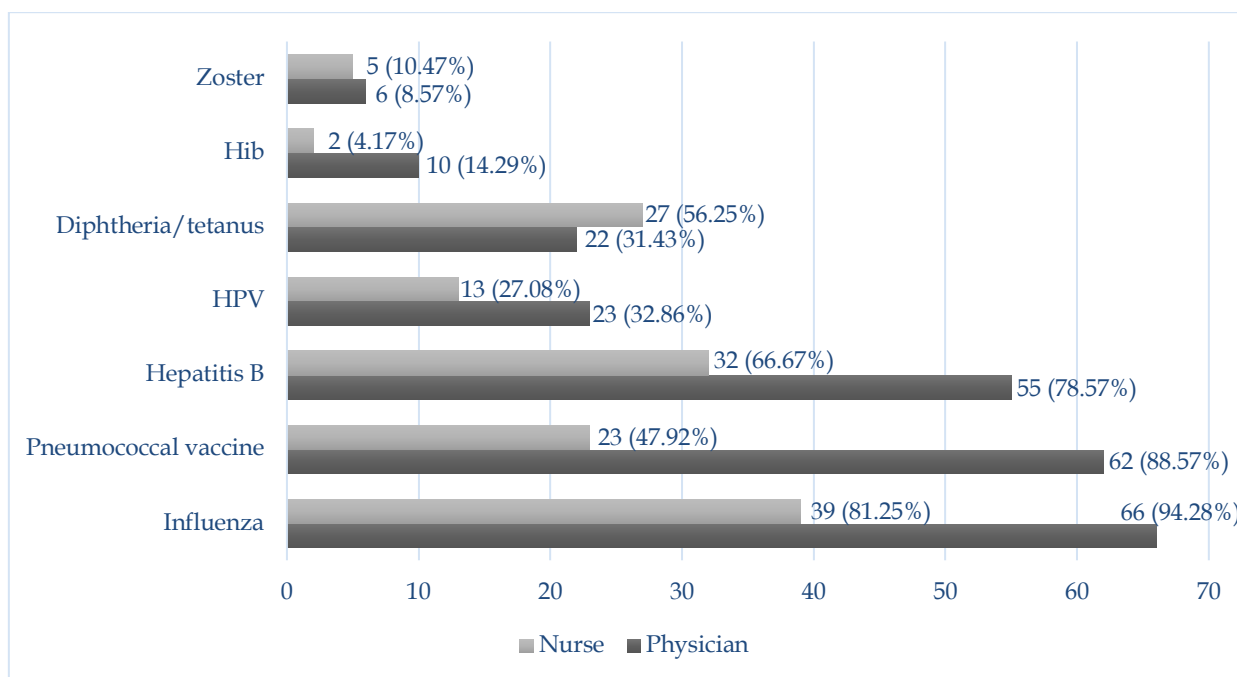
Considering the previous influenza season, only 31.25% (n=25) of the physicians and 22.62% (n=19) of the nurses have had the influenza vaccine ( $p=0.284$ ). Among physicians, the reasons for not having the vaccine were reported as follows; not having time (n=28, 50.91%), not needing the vaccine (n=25, 45.45%), believing that the vaccine is ineffective (n=6, 10.91%), and fear of side effects (n=1, 1.82%). The reasons for not having the influenza vaccine indicated by nurses were not needing the vaccine (n=32, 49.23%), believing that the vaccine is ineffective (n=29, 44.62%), fear of side effects (n=12, 18.46%) and not having time (n=3, 4.62%). Among the indicated reasons, beliefs about vaccines being ineffective ( $p<0.001$ ) and fears about side effects ( $p=0.007$ ) were higher among the nurses, whereas a lack of time was more likely to be indicated by physicians ( $p<0.001$ ).

For the upcoming influenza season, 38 (47.50%) physicians and 20 (23.81%) nurses stated that they were considering getting the influenza vaccine ( $p=0.005$ ), however, 10% and 19% were not sure about their intentions, respectively.

Vaccination behaviors of physicians (n=80) and nurses (n=84) for influenza vaccine did not differ by gender and age ( $p>0.05$ ). However, physicians ( $p=0.021$ ) and nurses ( $p=0.025$ ) working in university hospitals, physicians had 1-5 years of experience ( $p=0.007$ ), and nurses with bachelor's degrees ( $p=0.016$ ) had higher rates of influenza immunization. Once the intention of having vaccination is considered, gender ( $p=0.034$ ), age ( $p=0.012$ ), education level ( $p=0.004$ ), practice setting ( $p=0.009$ ), and previous influenza vaccination status ( $p<0.01$ ) differed among the nurses. Nurses who were female, at the age of 31-40 years, had a pre-bachelor's degree, worked in a university hospital, and had influenza vaccination before, were more likely to be vaccinated. For physicians, only the previous influenza vaccination status differed, those who had influenza vaccination before were more likely to have influenza vaccination in the next season ( $p<0.01$ ).

In terms of interactions between healthcare professionals and patients, 87.50% (n=70) of physicians and 57.14% (n=48) of nurses reported recommending adult vaccines to cancer patients ( $p<0.01$ ); however, 37.5% of physicians and 44.05% of nurses encountered anti-vaccine attitudes among the patients ( $p=0.394$ ). It was determined that physicians who did not encounter an anti-vaccine attitude (62.50%) made more vaccination recommendations than physicians who did (42.86%) ( $p=0.011$ ).

The vaccines recommended by healthcare professionals for cancer patients are shown in Figure 2.

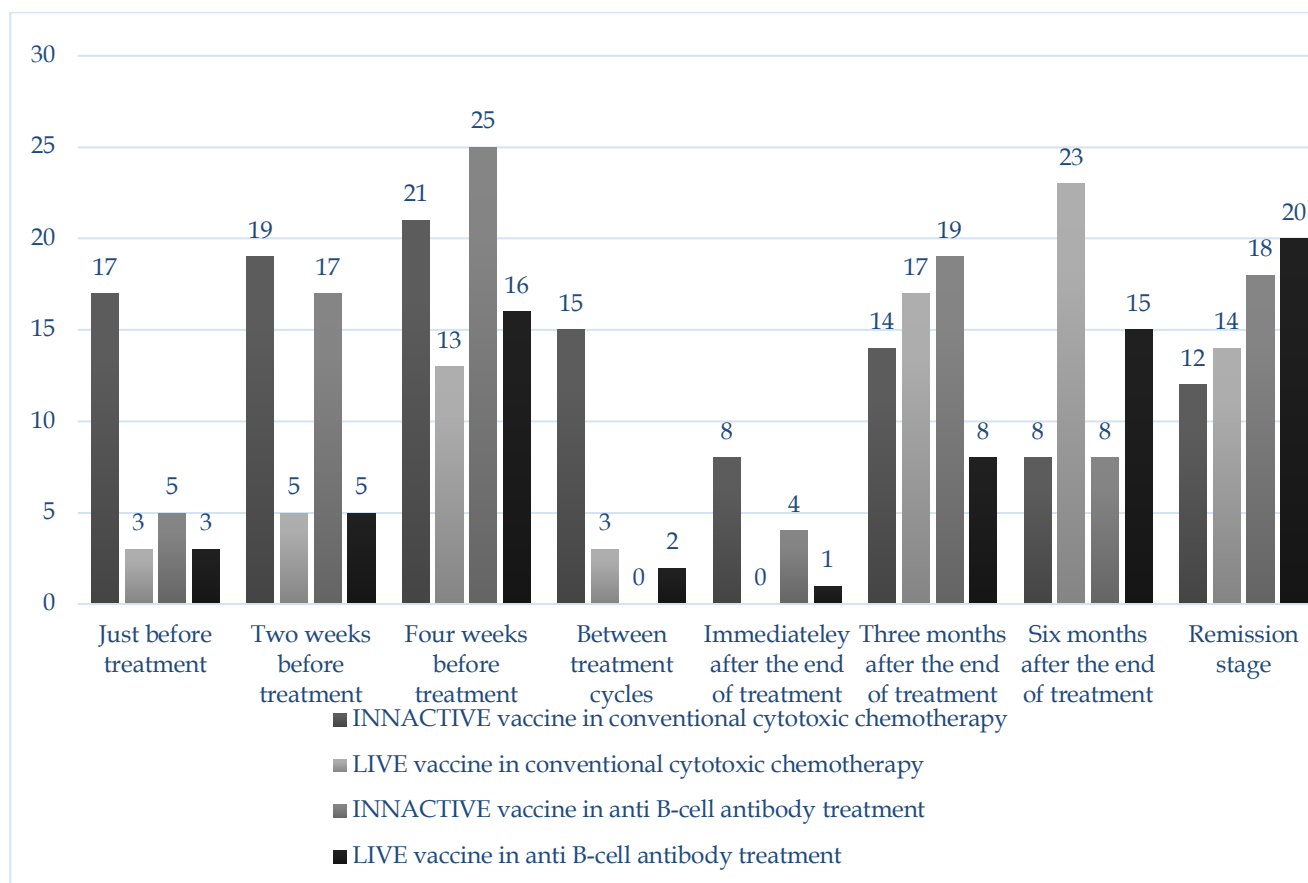


Hib: Haemophilus influenzae tip b, HPV: Human Papillomavirus

**Figure 2.** Vaccines recommended by physicians (n=70) and nurses (n=48) for adult cancer patients.

Even though more than 45% of the participants agreed that patients should be informed about vaccines by healthcare professionals (such as physicians, pharmacists, or nurses), only 7 physicians and 3 nurses agreed on the provision of information by a 'physician or pharmacist'. In regards to patient education, 17.28% (n=14) of physicians and 42.85% (n=36) of nurses had indicated not to provide detailed information about vaccines; but among the healthcare professionals who provided information to the patients, 72.84% (n=59) of physicians and 46.43% (n=39) of nurses provided only verbal information, and 1 physician and 3 nurses provided information upon the patient's request.

On the other hand, 28.75% (n=23) of physicians and 32.14% (n=27) of nurses stated that vaccination recommendation should be done by a 'physician or nurse'. The presence of other chronic diseases (n=63, 90%), age (n=61, 87.14%), chemotherapy administration schedule (n=54, 77.14%), and cancer diagnosis (n=53, 75.71%) were considered by the physicians while recommending vaccines for cancer patients. Furthermore, physicians indicated to have different preferences for the type of vaccines and vaccine administration time in accordance with the type of chemotherapy that patients receive (Figure 3). In regard to administration time, physicians had no opinion on the timing of vaccination during conventional cytotoxic chemotherapy (17.25%) and anti-B cell antibody treatment (21.25%). Although clinical guidelines do not recommend administering the vaccines for the following timing schedule; vaccination was recommended 'just before the treatment' (39.44%), 'between the treatment cycles' (28.17%), and 'immediately after the end of the treatment' (18.31%) by the physicians.



**Figure 3.** Timing preferences of physicians (n=71) to recommend inactivated and live vaccines to cancer patients according to the type of treatment.

### 3. DISCUSSION

In this study, the vaccination status of physicians and nurses working in the field of oncology and their opinions on vaccination for cancer patients were evaluated.

It was seen in this study that the vaccination rates of physicians and nurses for hepatitis B, diphtheria-tetanus, and influenza vaccines were higher than the other vaccines recommended for healthcare professionals. In a multicenter study by Genovese et al. [23], the vaccination status of physicians, nurses, and other health workers was evaluated and found that vaccination rates were high for polio, diphtheria-tetanus, and hepatitis B, but low for influenza, meningococcal and pneumococcal in all groups. In another study, influenza vaccination rate was higher among physicians compared to the nurses [12]. In this study, immunization against influenza was found higher among physicians, but this was not statistically significant. However, 50.91% of physicians and 44.62% of nurses indicated main reasons for not being vaccinated as lack of time and beliefs in ineffectiveness respectively. Given the fact that influenza has a high risk of transmission and affects sensitive patient groups such as cancer patients, vaccination rates among healthcare workers should be increased and necessary approaches should be implemented to change misbeliefs and attitudes on vaccination.

In the previous study examining vaccination attitudes of medical oncologists in Turkey has indicated that influenza, pneumococcal and hepatitis B vaccines are the most recommended vaccines [16] which is consistent with our results. Furthermore, it was shown in this study that physicians are more likely to recommend the pneumococcal vaccine, whereas nurses are more likely to recommend the diphtheria-tetanus vaccine for patients with cancer. It has been known that the recommendation of vaccines by healthcare professionals, particularly by physicians, affects patient's actual vaccination behavior [20,21]. Likewise, anti-vaccine attitudes of patients affect healthcare professionals' attitudes toward the recommendation of vaccines to their patients which was highlighted by this study. Therefore, trustworthy interactions between healthcare professionals and patients should be established and maintained through the provision of information regarding the risks and benefits of having vaccination in cancer patients. It was indicated in this study that

healthcare professionals are willing to provide mainly verbal information to cancer patients about the vaccines, however, written educational materials were not considered by a majority of HCPs. Therefore, the provision of written educational materials or involvement of primary healthcare professionals, such as community pharmacists or family physicians, in the chemotherapy process may reinforce patients' affirmative beliefs about the importance of vaccination.

Vaccination practices in cancer patients are more difficult and complex than in other patient groups [24] since it is influenced by cancer diagnosis, stage of the disease, type of treatment received, and administration time of the treatment [21]. In this study, it was observed that physicians generally consider patients' age and other chronic diseases, time of chemotherapy administration, and cancer diagnosis while recommending vaccines. However, about 10% of physicians do not know when to administer inactive and live vaccines for cancer patients receiving conventional cytotoxic chemotherapy and anti-B cell antibody treatment. Although this population is a minority, it reflects the hesitancy among physicians to recommend live vaccines for cancer patients.

A study evaluated the practice of medical oncologists for vaccine recommendations in cancer patients showed that 50% and 40% of physicians recommend vaccines 'before the treatment' and 'after the treatment', respectively [16]; however, administration times of vaccines according to treatment regimens and vaccine types were not questioned. In this study, physicians generally recommended the administration of inactivated vaccine is 4 weeks before the treatment and of live vaccine is 6 months after the treatment for patients receiving cytotoxic chemotherapy. It has been observed that there were physicians who recommend vaccines 'just before the treatment', 'between the treatment cycles', and 'immediately after the treatment'. The remission period was also preferred as the administration time for both live and inactivated vaccines in patients who received different treatments. Although appropriate administration times were preferred by a majority of physicians, there are also critical time periods, such as 'just before' and 'immediately after' the treatment, preferred by physicians for vaccine administration, which may eventually affect the effectiveness of both vaccine or scheduled treatment in cancer patients. Therefore, evidence-based information on vaccination in cancer patients should be available for healthcare professionals to guide them in oncology clinical practices, where a variety of treatment options are evolving. An establishment of standard, local, or national operational procedures would help to comprise primary and secondary care health professionals in the patient care process for improving preventive healthcare strategies in high-risk patient populations, such as patients with cancer.

The study has inevitable limitations; despite the reminder e-mails, the targeted numbers of participants for physicians and nurses could not be reached. Therefore, the findings cannot be generalized for oncology practices in Turkey. Since the survey questions are mainly informative and descriptive, they may not reflect the actual attitudes or practices of healthcare professionals. Given the fact that the study had a limited number of respondents, data were not adequate to conduct further statistical analysis in order to identify potential factors that affect healthcare professionals' practices on vaccination in cancer patients.

#### 4. CONCLUSION

Vaccination rates of physicians and nurses working in oncology practice and the recommendation of vaccination to cancer patients are still lower than desired levels. It appears that HCPs have relatively limited knowledge regarding vaccination time schedules in cancer patients. In order to increase immunization, ongoing educational activities and awareness campaigns for cancer patients and healthcare professionals should be designed and implemented. Considering that cancer has complex disease cycles and treatment strategies and patients' vaccination attitudes may be influenced by various internal or external factors, vaccination practice can become a burden in the treatment process for healthcare providers. Therefore, mutual, and informative relations between the patients and healthcare professionals should be established at primary and secondary care settings and reinforcement of knowledge on vaccine-preventable diseases should be maintained in order to improve the effectiveness of preventive healthcare activities.

#### 5. MATERIALS AND METHODS

A cross-sectional survey study was conducted to evaluate opinions and practices on vaccination of physicians and nurses working in adult oncology settings between September 2019 and February 2022 (including the COVID-19 pandemic period) in Turkey. The study was approved by the University Non-Clinical Trials Ethics Committee (GO-19-681). Although a part of this study was conducted during the COVID-



19 pandemic, COVID-19 vaccines were not included as the study was initially designed to evaluate other vaccines.

The target population was HCPs who work in adult oncology settings; i) accessible physicians (n=150 medical oncologists) and ii) the nurses who are registered the National Oncology Nurses Association (n=560 members). The medical oncologists and the nurses were accessed via professionals' e-mail groups and national professional organizations, respectively. An online survey was sent to the participants via e-mails, with two reminders at 4-week intervals for non-respondents. The survey was originated and designed on the questions of previous studies [16, 20] and consists of 23 questions on demographics, knowledge, attitudes, and practices of HCPs. Physicians' practice on vaccine recommendation for cancer patients was assessed according to the recommendations of the Infectious Diseases Society of America [21] and the Advisory Committee on Immunization Practices [22].

### 5.1. Statistical analysis

Data were analyzed using IBM SPSS Statistics for MacOS, version 26.0 (IBM Corp, Armonk, N.Y. USA). Categorical variables were presented as numbers and percentages, whereas continuous variables were presented as median with an interquartile range (IQR) or mean with standard deviation (SD) according to the distribution of the data. Pearson chi-square, Fisher exact test, and Yates Continuity correction tests were used to compare categorical variables. For continuous variables, if the data are normally distributed Independent t-test was used to compare the means of two independent groups; if not, the Mann-Whitney U test or Kruskal-Wallis test were used. A p-value of <0.05 was considered statistically significant.

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