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Preventive practice, vaccine acceptance, and knowledge toward coronavirus disease-19: An online cross-sectional questionnaire-based report in Iranian dentists

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Abstract:

BACKGROUND: The coronavirus disease (COVID) is predicted to cause serious mental health problems among healthcare providers (HCPs) especially dentists. Also understanding the influencing factors of the acceptance of COVID-19 vaccination among HCPs are important aspects in the design of effective strategies to improve the vaccine coverage rate. Therefore, this study aimed to assess the knowledge, vaccination acceptance, fear, and obsession, as well as the preventive practice behaviors of Iranian dentists and dental students in late 2020 toward COVID-19.

MATERIALS AND METHODS: A descriptive, web-based cross-sectional survey was conducted among Iranian dental students and dentists (general practitioners and specialists). All Iranian dentists and dental students living in the Islamic Republic of Iran regardless of their city and workplace were invited to participate in the study. The total number of dentists in Iran was estimated to be 54,927. The sample size was calculated 380. The questionnaires used in this study were adapted from previously published studies based on the authors' permission. The questionnaire consisted of four sections that sought to collect information on the respondents' vaccination acceptance, knowledge, preventive practice, fear, and obsession toward COVID-19. The relationship between the study variables was assessed using Pearson's correlation coefficient and also multiple linear regression tests.

RESULTS: Overall, 394 dentists were filled the questionnaire (65 dental students, 151 general dentists and 178 specialists). There were no differences in terms of vaccination acceptance, knowledge and also fear score in different designation groups. Dentists had significantly higher obsession and also preventive practice scores than other designation groups ($P < 0.05$). The majority of respondents had good knowledge (more than 9), acceptable preventive practice (more than 19), low fear-obsession (< 2.7), and high acceptance of COVID-19 vaccination (more than 8.8).

CONCLUSIONS: Although obsession and fear scores were low in all designation groups, dentists had higher obsession and also preventive practice scores than other designation groups. More than half of respondents preferred imported COVID-19 vaccines. Finally, organizations such as the World Health Organization and the Ministry of Public Health in Iran should increase vaccine convenience and accessibility in terms of vaccine importing, distribution, supply, and immunization service.

Keywords:

Coronavirus disease-19, dentist, fear, health, knowledge, prevention, vaccination

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Introduction

According to the Iran's Ministry of Health, coronavirus disease-2019 (COVID-19) was first detected in two people residing in Qom (central Iran) on February 19, 2020. More cases were reported in other cities of Iran including Tehran (capital of Iran).^[1] Healthcare providers (HCPs) are the front line defense in treating patients with COVID-19 and are more susceptible to this infection and the rate of transmission to health professionals is 29%.^[2] The World Health Organization (WHO) on July 27, 2020, estimated that approximately 10% of all COVID-19 cases (nearly 1.5 million cases) were related to HCPs. However, this is possibly underestimated since no systematic reporting were accomplished at that time.^[3]

Dental care in Iran is largely provided by private practitioners and although affected patients are not supposed to receive routine dental treatments, undiagnosed infected subjects without or with very mild symptoms might be eligible for dental treatment in emergency cases.^[4] Dental treatment procedures which involve the use of rotary dental and surgical instruments such as hand pieces or ultrasonic scalers and air water syringes are a direct route for virus spread.^[5-8] Therefore, the risk of infection transmission during the dental practice is higher than that in a supermarket.^[4,9,10]

Although the government launched programs to educate the public about the spread of CoV disease and reduce the public mental stress in the community, this disease, like other pandemics, is predicted to cause serious mental health problems such as stress, fear, and also obsession among communities and HCPs^[11-14] Some human resource management strategies implementations would increase mental well-being, satisfaction, productivity, motivation, and health safety at the workplace but being private offices closed during epidemic periods also increased the likelihood of fear and obsession.^[15-17] During the COVID-19 pandemic, it has been found that the health-care workers are encountering more emotional problems than the general population.^[18] It is clear that managing the mental health and psychosocial well-being of healthcare workers during the outbreak is as important as managing their physical health.^[17,19] Further, most developing countries like Iran suffer from limited testing capacity, critical shortage in health care supplies, such as personal protective equipment (PPE)^[20] and these shortages might cause dangers for HCPs.^[21]

Although great progress has been made, there are still important challenges regarding future immunization against COVID-19, one of which is the uncertainty about the public acceptance of COVID-19 vaccination.^[22,23] Reports on the acceptance of pandemic vaccines, such as

for the 2009 H1N1 pandemic, have shown unsatisfying results, as the willingness to receive the 2009 H1N1 pandemic vaccine among the general public ranged from 17% to 67%.^[24] Recent articles have found that some impact factors on vaccination acceptance helped to explain vaccination hesitancy or vaccination delay behavior, and the cultural, social, or political differences across countries should also be considered in the vaccination decision-making process.^[25,26] Therefore, understanding the influencing factors of the acceptance of COVID-19 vaccination and identifying common barriers and facilitators for vaccination decisions among HCPs are important aspects in the design of effective strategies to improve the vaccine coverage rate.^[27,28]

Lack of proper related knowledge among dentists, can make them overestimate the danger, increase their fear and obsession level, and may interrupt the quality of their treatments.^[29,30] In our country, Iran, as one of the top 10 countries that have the highest incidence of infection,^[31] most of the dentists preferred to lower their work hours and decrease dental treatments to emergency situations until the end of the pandemic.^[32] However, studies on the probability of experiencing fear, obsession, and COVID-19 knowledge and vaccination acceptance level of dentists and dental students, who have to stay at home during the epidemic, are limited. Therefore, this study aimed to assess the vaccination acceptance, knowledge, fear, and obsession, as well as the preventive practice behaviors of Iranian dentists and dental students in late 2020 towards COVID-19.

Materials and Methods

Study design and setting

A descriptive, web-based cross-sectional survey was conducted among Iranian dental students and dentists (general practitioners and specialists).

Study participants and sampling

All Iranian dentists and dental students living in the Islamic Republic of Iran regardless of their city and workplace were invited to participate in the study. They were asked to participate in the study via the internet (Social media: Instagram, WhatsApp, and Telegram). The respondents were encouraged to forward the survey to other dentists or dental students who may be interested in participating in the study as well.

According to informal verbal information from the Ministry of Public Health in Iran, the total number of undergraduate dental students was 14,302 and postgraduate students were 1241 on the December 27, 2020. The total number of dentists (general dentists: 34,469 and specialists: 4915)^[33,34] and dental students in Iran was estimated to be 54,927. The sample size was calculated

by Morgan table.
$$n = \frac{X^2 \times N \times P \times (1 - P)}{(ME^2 \times [N - 1]) \times (X^2 \times P \times [1 - P])}$$

Based on the estimated population $N = 45,000$ and response distribution of 50%, $P = 0/50$, Chi-square for the specific confidential level = 5 and desire margin of error $ME = 0.05$, the required sample size was 380.

Data collection tool and technique

The questionnaires used in this study were adapted from previously published studies based on the authors' permission.^[24,35] We informed all participants about the aim of the study by sending them a text to attend the study. On average, the survey was completed within approximately 6 min.

The questionnaire consisted of 4 sections that sought to collect information on the respondents' vaccination acceptance, knowledge, preventive practice, fear, and obsession toward COVID-19.

- Preventive practice section: This section included 11 questions to evaluate the actual compliance and application of various preventive measures. Practice scale is scored 2, 1, and 0 for "always," "occasional," and "never," respectively. Participants with scores >80% were classified as having acceptable preventive practice, while those with scores <80% were considered having an unacceptable preventive practice^[35]
- Vaccination acceptance section: This part included 9 questions about vaccination history (such as seasonal influenza vaccination in the past season), acceptance, attitude, vaccination preferences for future COVID-19 vaccination, and the importance of identified impact factors on the respondents' vaccination decision-making, such as vaccine price, convenience and doctor's recommendations. All questions were closed-ended, with tick boxes provided for responses^[24]
- Knowledge section: This consisted of 14 questions (true, false, and do not know) and was aimed to assess and evaluate the general knowledge of dentists/dental students about the route of transmission, signs and symptoms, risk factors, treatment, precautionary measures, prevention and source of information. A correct answer was assigned 1 point and an incorrect/do not know answer was assigned 0 points. The total knowledge score was 14 ranged from 0 to 14, with a higher score indicating a better knowledge. Respondents with knowledge score above 60% were regarded as having good knowledge, while those who scored below 60% were considered having poor knowledge^[35]
- Fear and obsession section: The last section included 8 questions to assess the fear and obsession scores among dentists/dental students regarding COVID-19

and 1 question to evaluate their perception toward the actions implemented by the Iranian order of dentists to fight the disease.^[35] The obsession total scores ≥ 7 optimally classified people as having dysfunctional COVID-19 thinking patterns.^[36]

Validity and reliability the items were forward and backward translated and adapted to the Persian language by translators. An independent committee consisting of 6 experts with an expertise in dental practice reviewed in depth the first draft of the questionnaire to check the clarity of all items and they did not report any problems in understanding the questionnaire. A consensus was reached, and a final version of the questionnaire was developed. Six experts with a background in dentistry were invited to participate in assessing the content validity of the questionnaire items. The quantitative part involved the estimation of the eigenvalues of all items. In this regard, if an eigenvalue was higher than 1.5, it was retained in the questionnaire. Finally, 42 items were identified as appropriate in terms of intelligibility, and no item was removed from the analysis. The content validity was also evaluated qualitatively, and the necessary modifications were administered.^[37] In the quantitative part, given that our panel consisted of eight specialists, the minimum acceptable CVR for the Lowsheh table was calculated as 0.75.^[38] The results revealed that all items obtained the minimum required score. According to the index developed by Waltz and Bassel and after calculating the Content Validity Index (CVI) by summing up the scores of each item, the items with the CVIs >0.78 were regarded as appropriate, and consequently were accepted.^[39] The reliability of the questionnaire items was based on a pilot study that included 20 participants, and the reliability was tested. Cronbach's alpha coefficient of the questionnaire was 0.71.

Statistical analysis

The The Statistical Software for Social Sciences (IBM SPSS), version 21.0 (SPSS, Chicago, IL) was used in the analysis of the collected data. Descriptive analyses using mean values and standard deviations for continuous variables and the count and percentages for the dichotomous or categorical variables were used in describing the data. The relationship between the study variables was assessed using Pearson's correlation coefficient and also multiple linear regression tests. A $P < 0.05$ (two-tailed) with a 95% confidence interval was reported as significant for the correlation analysis.

Ethical consideration

Approval of the Ethics Committee of Shahid Beheshti University of Medical Sciences-Iran was obtained before conducting the study (Ethical code: IR.SBMU.DRC.REC.1399.120). Furthermore, personal details of the participants were not recorded on the questionnaire.

Results

A total of 768 dentists and/or dental students viewed and read the questionnaire, and 394 (65 dental students, 151 general dentists, and 178 specialists) answered that. This study was conducted from December 16, 2020, 6 pm to January 4, 2021, 11 am and the response acceptance was closed (January 4, 2021, 11 am) after 20 days when the required sample size was achieved [Table 1].

Approximately 2/3 of them (63.2%) were above 36-year-old. Less than half of the participants (47.7%) had < 10 years of dental experience. Among all the participants, 202 (51.3%) were male, 192 (48.7%) were female, 290 (73.6%) were married, and 104 (26.4%) were single. 87.1% of the participants live in center of province. Baseline professional characteristics of the study participants showed in [Table 1].

There were no differences in terms of vaccination acceptance, knowledge, and also fear score in different designation groups. General dentists had significantly higher obsession and also preventive practice scores than other designation groups ($P < 0.05$) [Table 2].

Vaccination acceptance scores among the Iranian dental students/dentists were more than 8.80. Most

Table 1: Baseline professional characteristics of the study participants (n=394)

Variable	n (%)
Clinical experience (years), mean±SD	12.59±9.79
Designation?	
Student	65 (16.5)
General dentist practitioner	151 (38.3)
Specialist	178 (45.2)
Completing training course on COVID-19?	
No	333 (84.5)
Yes	61 (15.5)
Treating COVID-19 patients in dental clinics?	
No	325 (82.5)
Yes	69 (17.5)
Source of information?	
WHO	33 (8.4)
MOPH	10 (2.5)
TV	11 (2.8)
Social media and internet	85 (21.6)
Iranian order of dentists	4 (1)
CDC	5 (1.3)
Others	9 (2.3)
Multiple sources	237 (60.2)
Actions/policies against COVID-19?	
Inappropriate	19 (4.8)
Insufficient	100 (25.4)
Appropriate	275 (69.8)

SD=Standard deviation, WHO=World Health Organization, MOPH=Ministry of public health, CDC=Centers for disease control

of the participants stated that they intended to receive COVID-19 vaccination if it was developed successfully and approved for listing in the future. Among respondents dental students – more than dentists and specialists-believed that vaccine price was an influencing factor in vaccine acceptance ($P = 0.001$) More than half (62%) of respondents wanted to delay the vaccination until they confirmed the vaccine's safety and preferred imported COVID-19 vaccines [Table 3].

Although there was no association between preventive practice score and factors such as vaccination acceptance, fear, obsession, designation, and experience but training courses had significant relation and knowledge showed insignificant association with preventive practice score [Table 3].

Participants, level of knowledge regarding the coronavirus disease-2019 pandemic

The mean of knowledge scores in all designation groups was higher than 9 and this shows that the majority of dental students, general dentists, and specialist had good knowledge. Poor knowledge was more obvious in a question related to "Coronavirus does not infect children."

There was a significant difference in the answers to the question about PPE donning sequence and general dentists had higher knowledge score than dental students and specialists. However, general dentists had insignificant lower knowledge score about the incubation period of coronavirus.

Participants, source of information regarding the coronavirus disease-2019 pandemic

The majority of Iranian dental students/dentists (60.2%) reported multiple information sources. One-fifth of participants reported social media and internet (21.6%) as the main solo source of knowledge and only 8.4% depend on the WHO. The least source was the Iranian order of dentists (1%).

Participants, self-reported preventive practice score toward the coronavirus disease-2019 pandemic

Although dental students/dentists/specialists had acceptable preventive practice, general dentists showed significantly higher self-reported preventive practice score in terms of "Cleaning and disinfecting environmental surfaces," "washing of the operators' hands before and after each procedure," "Providing patients with alcoholic disinfectants and masks in the waiting rooms," "Disinfecting all surfaces, chairs, and doors of the waiting room every 2 h with Chlore solution or any type of sterilizer" and also "Disinfecting the

Table 2: Vaccination acceptance, knowledge, practice, fear and obsession scores according to different designations of respondents

Designation	Vaccination acceptance score	Knowledge score	Preventive practice score	Fear score	Obsession score
Student	9.30±1.8	9.70±1.62	19.03±3.05	2.70±1.10	4.33±2.9
Dentist	8.81±2.28	9.94±1.7	20.11±2.27	2.50±1.15	4.72±3.6
Specialist	8.80±1.7	9.71±1.78	19.41±2.37	2.48±1.27	3.72±3.06
<i>P</i>	0.184	0.44	0.005*	0.422	0.021*

*Significant

Table 3: Results of multiple linear regression on factors associated with dentist preventive practice score toward COVID-19

Factor	Unstandardized β	95% CI	<i>P</i>
Preventive practice score			
Vaccination acceptance score	0.61	-0.066-0.189	0.343
Knowledge score	0.135	-0.007-0.278	0.062
Fear score	0.121	-0.097-0.340	0.276
Obsession score	0.030	-0.049-0.109	0.456
Age	0.324	0.020-0.628	0.037*
Gender	-0.156	-0.678-0.366	0.557
Designation (dental student versus general dentist versus specialist)	-0.171	-0.396-0.055	0.137
Experience	0.008	-0.036-0.051	0.730
Training course	0.916	0.229-1.603	0.009*

*Significant. CI=Confidence interval

patient's chair and light between the patient and the other."

Fear and obsession of dental students/dentists towards coronavirus disease-2019

In this study, although obsession and fear scores were low in all designation groups. Dental students showed significantly higher frequency of the situation that their assistants express their desire to stop work due to fear of infection with the Coronavirus ($P = 0.01$) All of the participants were afraid of the impact of the COVID-19 crisis on dentists' livelihood.

Dentists had significantly higher obsession in terms of Coronavirus than dental students and specialists ($P = 0.01$).

Discussion

In this descriptive, web-based cross-sectional survey although dental students/general dentists/specialists had acceptable preventive practice in our study, dentists had higher preventive practice scores than other designation groups ($P < 0.05$) which might be attributed to higher obsession score and also insignificant higher knowledge of general dentists. In addition, Alrubaiee *et al.* (HCPs in Yemen)^[21] and also Taghrir *et al.* (medical students in Iran)^[1] had a high-performance level of preventive behaviors toward COVID-19. It must be stated that standards protective measures in daily dental work are not effective enough to prevent the potential spread of coronavirus especially when a large number of droplets and aerosols are emitted from asymptomatic

cases.^[35] It must be noted that the respondents' level of self-reported preventive behavior significantly differed according to their age and training courses.^[40,41] The poor practice of dental students and specialists was observed in terms of cleaning and disinfecting environmental surfaces, and also providing patients with alcoholic disinfectants and masks in the waiting rooms. These gaps might lead to a further viral spread in the community.^[35] It might be interpreted that policymakers should focus on providing financial help and also PPE for dentists.

The present study reported high acceptance of COVID-19 vaccination among the Iranian dental students/general dentists/specialists during the COVID-19 pandemic and most of the participants stated that they intended to receive COVID-19 vaccination if it was developed successfully and approved. The dental students believed that vaccine price was an influencing factor in vaccine acceptance. Also, a study among the Chinese population reported high acceptance of COVID-19 vaccination and significant factors influencing their vaccination acceptance were gender, marriage status, risk perception, influenza vaccination history, belief of COVID-19 vaccine efficacy, valuing doctor's recommendations, vaccination convenience, or vaccine price.^[24] About influenza vaccination 13% of Australian people stated that they would wait to see if there were any adverse events before agreeing to get vaccinated, while their acceptance rate was as high as 67%.^[42] It is clear that vaccines are prioritized for health workers at high risk of acquiring or transmitting infection^[43] but in our study, more than half (62%) of respondents wanted to delay the vaccination until they confirmed the vaccine's safety and preferred

imported COVID-19 vaccines. Two reasons may explain the vaccine delay observed in this study: first, the vaccine against COVID-19 was still under development during the survey period, and our data collection was terminated after the first vaccination of COVID-19 was accomplished in London and there was no information about vaccine safety for reference. If this study had been conducted before this date, the results may have been different. Second, concerns about using new vaccines during a pandemic were reported to differ from those of established products in a noncrisis situation, as the uncertainties about new vaccines, new emerging infectious diseases, and concerns about the pharmaceuticals would lower the vaccine confidence of the public.^[24,44]

Research efforts have also generated potentially effective strategies to reduce barriers and improve vaccine acceptance and uptake^[45,46] and achieving that goal will depend on the behaviors of other “actors” in the system.^[46] Multiple groups influence uptake of vaccination, including political decision-makers, immunization program managers, community and religious leaders, health workers, civil society organizations, media outlets, and digital platforms.^[47] These actors can facilitate or discourage vaccination by creating more or less enabling environments.^[46] However, the hesitancy that our study reported may be reduced later, when a vaccine becomes available. With such information, health policymakers can make the proper planning^[1] and according to imposed sanctions on the Iranian government, the best policy might be negotiating to finance and budget for importing approved vaccines from valid and reputable international companies as soon as possible. Until that time providing information about that vaccine for HCPs—who play a major goal for encouraging general population to accept vaccination—seems essential.

In our study, the majority of dental students/general dentists/specialists had good knowledge about COVID-19. These findings are consistent with other studies^[31,35,48,49] that healthcare workers in other countries had a high level of knowledge toward COVID-19. It was reported that being a knowledgeable dentist leads to better practice toward COVID-19.^[35]

In this study, although there was insignificant association between knowledge and preventive practice score there was no significant difference between dental students, general dentist, and specialists in terms of knowledge about COVID-19. However, in another study,^[40] the level of knowledge towards COVID-19 differs significantly across different professions.

Fear, apprehension, and anxiety might occur in healthcare professionals during epidemic periods^[19] and

in this study, although obsession and fear scores were low in all designation groups, in another study about the impact of this pandemic on dental practice in Iran, half of the participants had symptoms of depression and anxiety.^[32] In addition, the majority of people in Iran are Muslim and previous studies reported that there is a significant relationship between religious behaviors and anxiety level.^[50,51] Therefore, the low fear level in our study may be related to using prayer by our sample as a method of coping with the COVID 19 outbreak.

However, in our study, dentists had significantly higher obsession score about COVID-19. The probable reasons for this difference might be the higher patient accepting by dentists in small private offices with lower air ventilation or in too crowded clinics. Almost half of the dentists in Iran believed that dental clinics should be closed until the end of the pandemic.^[32] Moreover, about 75% of dental practitioners are expecting a financial loss of over 70% during the outbreak.^[52] Also, public organizations in Iran did not help the dentists to provide the PPE equipment and they had to buy PPE with a considerably higher price.^[32] Some governments supported businesses including dental practices which have been affected by COVID-19 outbreak and gave COVID-19 business loan ranging between €5000 and €50,000. While this is the situation in high-income countries, only 2% of dentists in Iran received financial help from public organizations^[32] and no significant policy to support dental practices has been put forward by the governments of Iran.^[52] Moreover, one study found that fear of HCPs is associated with poor clinical and treatment performance, and lack of concentration and attention.^[35] We suggest that policymakers should provide PPE and some additional supportive counseling to dentists who are more prone to experiencing fear and obsession. Hence, psychological interventions to improve dentists’ mental health and to enhance confidence in the dentists’ ability to treat patients during the COVID-19 epidemic are needed.

The majority of the Iranian dentists in our study reported that they didn’t get any training on COVID-19 (84.5%). Also in other studies, the majority of the HCPs and dentists had never attended COVID-19 training courses.^[4,21,35] In this study, training courses had significant relation with preventive practice score it means that dentists who attended COVID-19 training courses were more prone to accomplish preventive practices. This result possibly highlights the need to develop educational courses and programs related to COVID-19 for dentists. It must be stated that the lack of educational training courses may be attributed to some barriers imposed by corona pandemic condition such as the inability to conduct educational face-to-face sessions. Online courses should be the alternative solution^[35] and conducting a frequent

web-based and live continuous educational courses and seminars might help dentists to manage their doubts about COVID-19.

In this study, <10% of respondents depend on the WHO as a source of information and the least used source was Iranian order of dentists. Also, Alrubaiee *et al.* showed that only one-fifth of HCPs gained information about COVID-19 from the official websites of the Ministry of Public Health and Population and WHO.^[21] Also, WHO and the Ministry of Health were the most common sources of information about 2019-nCoV in Iranian nurses.^[31] This suggests that health authorities should direct more attention towards encouraging especially dentists to use official websites as an essential and credible source of information about COVID-19.

In our study, one-fifth of participants reported social media and internet (21.6%) as the main solo source of knowledge. Other studies reported that participants usually obtained their information about infectious diseases through the internet and watching TV.^[30,31,53,54] However, utilizing such media can mislead HCPs by spreading fabricated and unverified information such as many fake news^[55-57] which might cause psychological distress.^[14]

Valid information about the disease and its prevention will not only help dentists in providing care to their patients but will also help in preventing the spread of infection. This suggests that health authorities should direct more attention towards encouraging especially dentists to use official websites as an essential and credible source of information about COVID-19. Policymakers should provide PPE for dentists. Moreover, the best policy might be negotiating to finance and budget for importing approved vaccines from valid and reputable international companies as soon as possible.

Limitation and recommendation

The first limitation of this study was the nature of collecting the data. The data in this study were collected via a web-based survey since it was not possible to conduct a face-to-face survey among Iranian dentists during given the uncertainty surrounding the outbreak of the virus and level of contagious. Therefore, the data might be less reliable compared to face-to-face interviews and the lack of a trained interviewer.

Second, collecting the data was challenging, given the availability of respondents and cooperation. Also, it might be interpreted that the participants might have more concerns about the pandemic situation than those who did not participate. Third, the exclusiveness of the study to dentists. Therefore, we suggest that future research involve different communities or populations.

Despite the limitations identified, we believe that the study addresses a major health problem that challenges dentists in Iran for the first time.

Conclusions

The results of this study have demonstrated that the majority of dental students/dentists/specialists in Iran had an adequate level of knowledge, acceptable preventive practice, and also high acceptance of COVID-19 vaccination. Although obsession and fear scores were low in all designation groups, dentists had a higher obsession and also preventive practice scores than other designation groups. More than half of respondents preferred imported COVID-19 vaccines. Finally, organizations such as WHO and the Ministry of Public Health in Iran should increase vaccine convenience and accessibility in terms of vaccine importing, distribution, supply, immunization service.

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Conflicts of interest

There are no conflicts of interest.

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