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## ■ Original Article

# Knowledge and attitude towards the acceptance of vaccination against COVID-19 among healthcare professionals in Morocco

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## ABSTRACT

**Objectives:** To assess the knowledge and acceptance of health professionals in the southern region of Morocco in relation to the anti-COVID-19 vaccines.

**Methods:** This cross-sectional observational study will make it possible to assess the state of knowledge and acceptance of the vaccine against COVID-19 among health personnel in the prefecture of Agadir Idaoutanane, and to determine the factors influencing them, thanks to a self-administered questionnaire. Vaccine acceptance was determined by individuals who opted for vaccination willingly.

**Results:** A total of 390 health professionals participated in this study. According to the results, there is a predominance of the female sex with a percentage of 63.2% and a sex ratio equal to 0.57. In addition, more than half of the health personnel participating in this study were between the ages of 20 and 30. 365 health professionals (93.3%) were vaccinated against COVID-19 of which 53.1% chose to be vaccinated of their own free will. Multivariate analysis revealed that age, and the question of the development of immunity to COVID-19 are significantly associated with vaccine acceptance.

**Conclusions:** These observations are worrying insofar as health personnel have frequent and prolonged contact with patients. Hence the importance of improving their state of knowledge and positively impacting their acceptance of anti-COVID-19 vaccines in order to influence the attitude of their patients and the rest of the population.

**Keywords:** health professionals, knowledge, acceptance, vaccine, COVID-19

## INTRODUCTION

In Wuhan Province of China in December 2019, the novel coronavirus 2019 (COVID-19) caused a severe damage to the lower respiratory tract characterized by dry cough, progressive dyspnea and fever [1, 2]. Subsequently, the virus (SARS-CoV-2) caused a pandemic that was considered as a life-threatening disease [1].

As a result, countries have been forced to impose regulations to restrict contact between individuals, in order to slow the spread of the virus and reduce the risk [3]. Various preventive measures have been implemented, such as hand hygiene and regular disinfection, social distancing, quarantine, confinement and the use of masks ... etc. All of these preventive control measures have only flattened the disease curve, while the pandemic continues to grow and mutate with different variants of the virus [4].

Invading every country in the world, it has been found that the end point of this pandemic is either herd immunity or the widespread availability of an effective vaccine [5]. Several COVID-19 vaccines with outstanding safety and efficacy characteristics have been approved for emergency use to prevent the acquisition, spread and halting of severe cases of the virus [6].

Currently, there are thirteen different corona vaccines approved to prevent the spread of the virus [7]. These vaccines can be divided by type (technology) and developers (manufacturers). European Medicines Agency (EMA) and European Commission have approved Pfizer-BioNTech vaccine, Moderna vaccine, AstraZeneca vaccine, Janssen vaccine, Novavax vaccine, and Valneva vaccine in European countries [8].

Despite the diversity and availability of COVID-19 vaccines, the greatest challenge facing vaccines after their development is their acceptance, as vaccine reluctance has been a barrier to vaccination due to doubts about the efficacy and safety of vaccines [9]. World Health Organization (WHO) has considered vaccine hesitancy as one of the top-10 health threats worldwide. In this sense, health professionals are considered as effective vaccine promoters whose willingness to be vaccinated is the key to collective immunity [10].

In many countries, however, a considerable fraction of these professionals are affected by reluctance to be vaccinated, fostered by a lack of confidence in the health authorities. Most health care professionals are not truly experts on immunization: they may share uncertainties about the

benefits and safety of vaccines with laypersons, which may negatively affect their own adherence to vaccines that are recommended to protect themselves and their patients. It could also lead to a reluctance to vaccinate in the general population. Hence the need of initial training of health professionals in vaccination [11]. Nevertheless, few studies have been carried out in Morocco on the knowledge of medical staff, nurses and health technicians about the coronavirus vaccine, which led us to conduct this study. The purpose of this study is to evaluate the state of knowledge and acceptance of the COVID-19 vaccine among health personnel in the prefecture of Agadir.

## METHODS

### Study Design & Setting

Cross-sectional observational study aimed at descriptive, which was carried out at the level of health establishments in the prefecture of Agadir Idaoutanan and which was spread over a period of three months from 1 March 2022 until 30 June 2022.

### Study Population

This is a cross-sectional study included healthcare workers (physicians and nurses) at the level of health establishments in the prefecture of Agadir Idaoutanan using both convenient and snowball sampling techniques.

### Data Collection

The questionnaire consisted of 60 questions in French divided into two parts; socio-demographic characteristics and state of knowledge and acceptance of the anti-COVID-19 vaccine. Socio-demographic characteristics include gender, age, marital status, number of children, profile, number of years of experience, place of work, smoking status, existence of a chronic disease. The second part includes several questions to assess the level of knowledge of health personnel concerning the anti-COVID-19 vaccine as well as attitudes towards the acceptance of vaccination. The development of the questionnaire was based on a review of the literature and questionnaires used in previous similar studies. Vaccine acceptance was determined by individuals who opted for vaccination willingly.

### Statistical Analysis

Quantitative variables were expressed as mean (M)  $\pm$  standard deviation (SD). The qualitative variables are presented in tables of numbers and frequencies.

Univariate and multivariate logistical regression analyzes were conducted to identify factors associated with the vaccination decision. All independent variables with a  $p$ -value $<0.250$  in the univariate analysis were considered in the multivariate logistic regression analysis.  $P$ -values $<0.050$  were considered to indicate statistical significance.

Data management and statistical analysis were performed using the SPSS package for Windows (ver. 13.0; SPSS Inc., Chicago, IL, USA).

## RESULTS

A total of 390 health professional participated in the study. According to the results, there is a predominance of the female sex with a percentage of 63.2% and a sex ratio equal to 0.57. In addition, more than half of the health personnel participating in this study were between the ages of 20 and 30 (**Table 1**). Regarding the profile of respondents, 67.9% were nurses and health technicians, and 32.1% physics. Among 390 health personnel, 52.0% suffer from a chronic illness (13.4%) and 61.6% have already been infected with COVID-19. More than 25.6% declared that one of their relatives has been hospitalized in the intensive care unit following the attack of the virus. Majority said they had not received any training on anti- COVID-19 vaccines (**Table 1**).

The results of the present study revealed that the majority of healthcare personnel perceive the coronavirus as a serious illness (70.8%), and that 287 assume that COVID-19 is more dangerous than influenza (**Table 2**). The purpose of vaccination differs according to the level of knowledge of every health professional; 44.2% assume that it is intended to reduce the risk of developing the disease, 47.8% for the purpose of protection against serious forms. In addition, 59.1% stated that the vaccine cannot interact with DNA.

Despite the appearance of virus variants, more than half of the staff affirmed that it is important to be vaccinated with a percentage of 69.6. However, 246 of the respondents declare that the vaccine does not completely protect against the COVID-19 virus. In addition, 45.8% declare that the information's received about the vaccines are not reliable and that the third dose is not currently necessary. Compared to pregnant women, almost half of health professionals perceived that it is dangerous to have them vaccinated (**Table 2**).

In the present study, the vaccination rate is very high, 365 participants has been vaccinated against COVID-19, which represents a percentage of 93.3%, more than half of whom said it was by vocation and not by summons, with a percentage of 53.1% (**Table 2**). The following study found

**Table 1.** Sociodemographic & general information of participants

Variables	Distribution: n (%)
Age	
20-30	273 (69.8)
31-40	58 (14.8)
41-50	31 (7.9)
>50	28 (7.2)
Gender	
Female	247 (63.2)
Male	143 (36.6)
Profession	
Physician	125 (32.1)
Nurses & health technicians	265 (67.9)
Marital status	
Single	270 (69.2)
Married	114 (29.2)
Others	6 (1.5)
Experience (years)	
0-5	256 (65.5)
6-10	49 (12.5)
>10	85 (21.7)
Chronic disease	
Yes	53 (13.5)
No	337 (86.4)
Previously worked in COVID-19 isolation wards*	
Yes	81 (20.7)
No	306 (78.3)
Previously infected with COVID-19*	
Yes	241 (61.6)
No	147 (37.6)
Family member or friend infected with COVID-19*	
Yes	307 (78.5)
No	82 (21)
One of your family or friends hospitalized in COVID-19 resuscitation	
Yes	100 (25.6)
No	289 (73.9)
Already followed a training on anti-COVID-19 vaccines*	
Yes	106 (27.1)
No	276 (70.6)

Note. \*Questions with missing answers

very similar results regarding the perception of COVID-19 vaccines; 33.8% of participants suspect the effectiveness of vaccines and 33.5% expect them to be effective in protecting against disease, while 31.5% had no information.

The same goes for the reliability of vaccines; 129 participants appreciated this reliability (33.0%), and 126 do not appreciate it at all (32.2%). However, 49.6% said they have not vaccinated their children against COVID-19. Finally, more than half of respondents said they recommend people to be vaccinated against COVID-19 (**Table 2**).

## Factors Associated with Vaccination Decision

According to univariate logistic regression analysis: age; marital status; perceived vaccine reliability; perceived vaccine efficacy; concern about side effects; and the issue of COVID-19 immunity were significantly associated with the

**Table 2.** Knowledge & attitudes on anti-COVID-19 vaccination

Variables	Distribution: n (%)
Corona is not a serious illness?*	
Yes	110 (28.1)
No	277 (70.8)
Corona is more dangerous than influenza	
Yes	278 (71.3)
No	52 (13.2)
No answer	
Vaccine against COVID-19 is intended for	
Reduce number of new cases	173 (44.2)
Protect against serious forms	187 (47.8)
No answer	30 (8.0)
Vaccine interact with our DNA	
Yes	125 (31.9)
No	231 (59.1)
No answer	34 (9.0)
It is important to get vaccinated even if there are variants	
Yes	272 (69.6)
No	114 (29.2)
No answer	5 (1.3)
Vaccination is important for public health?	
Yes	290 (74.2)
No	23 (5.9)
No answer	65 (16.6)
Do you think that vaccines against COVID-19 can have serious long-term adverse effects?	
Yes	190 (48.6)
No	59 (15.1)
I do not know	139 (35.5)
You will find information received on anti-COVID-19 vaccine is reliable?	
Yes	96 (24.5)
No	179 (45.8)
I do not know	115 (29.7)
Immunity better after a COVID-19 vaccine or after a natural infection with COVID-19?*	
After vaccine	132 (33.8)
After infection	247 (63.2)
Do you think vaccines against COVID-19 are effective?*	
Yes	131 (33.5)
No	132 (33.8)
I do not know	123 (31.5)
Do you think anti-COVID-19 vaccine is reliable?*	
Yes	129 (33.0)
No	126 (32.2)
I do not know	131 (33.5)
Do you feel fully protected against infections of COVID-19 & its variants after receiving vaccine?	
Yes	62 (15.9)
No	246 (62.9)
I do not know	82 (21.2)
Have you ever been vaccinated against COVID-19?	
Yes	365 (93.4)
No	25 (6.4)
Your vaccination was by	
Summons	183 (46.9)
Vocation	207 (53.1)
Are you worried about side effects of COVID-19 vaccine?	
Yes	266 (68.2)
No	77 (19.7)
No answer	47 (12.1)

**Table 2 (Continued).** Knowledge & attitudes on anti-COVID-19 vaccination

Variables	Distribution: n (%)
Have you vaccinated your children?	
Yes	80 (20.5)
No	194 (49.6)
Have you recommended vaccination against COVID-19 to your relatives & patients?*	
Yes	244 (62.4)
No	141 (36.1)

Note. \*Questions with missing answers

decision to be vaccinated against COVID-19 among health workers.

In multivariate analysis, only age and the question of development of COVID-19 immunity were significantly associated with the decision to vaccinate against COVID-19 among healthcare workers (**Table 3**).

## DISCUSSION

Vaccination against COVID-19 is still a subject of a global debate, especially among health professionals. The latter play a key role in the success of vaccination programs against COVID-19, because they constitute a high-risk population and immunity within this group will reduce the transmission of the virus within and outside the health care institutions. Moreover, they are considered as a reliable source of information about the vaccines for the general population. Moreover, their attitude towards vaccination will have a direct impact on the attitudes of other individuals.

Based on the analysis of the data collected, the majority of study participants are women (n=247). The dominant age group is between 20 and 30 years old (n=273). Most of them are single (n=270), and more than half of the participants are nurses 67.9%.

In the present study, the majority of health professionals perceive COVID-19 disease as a serious disease (n=277), and more serious than influenza (n=278). More than 70.0% of participants declare the importance of vaccination against the virus despite the appearance of the different variants of the virus and that the majority foresee vaccination as being important for public health in the measure of control and prevention at the pandemic level. This is also the case in a recent study, where the majority of participants said that vaccines are generally safe tools for protecting public health [12].

In the present study, the vaccination rate is very high, 365 participants has been vaccinated against COVID-19, which represents a percentage of 93.3% of which 210 (53.1%) were

**Table 3.** Factors influencing acceptance of anti-COVID-19 vaccines

Variable	OR (CI 95%)	p-value	aOR (CI 95%)	p-value
<b>Participant profile</b>				
Physicians	0.970 (0.633 -1.485)	0.887		
Nurses	1	-		
<b>Gender</b>				
Male	0.725 (0.481-1.104)	0.321		
Female	1	-		
<b>Age</b>				
20-30	3.860 (1.510-9.810)	0.005	5.627 (1.496-21.160)	0.011
31-40	2.580 (0.910-7.340)	0.074	2.300 (0.620-8.490)	0.210
41-50	2.640 (0.830-8.360)	0.970	3.200 (0.790-12.920)	0.100
>50	1	-	1	-
<b>Marital status</b>				
Single	0.150 (0.016-1.390)	0.096	0.162 (0.015-1.742)	0.130
Married	0.250 (0.028-2.260)	0.218	0.142 (0.013-1.567)	0.110
Others	1	-	1	-
<b>Chronic disease</b>				
Yes	1.126 (0.626-2.027)	0.692		
No	1	-		
<b>Previously infected with COVID-19</b>				
Yes	1.190 (0.788-1.797)	0.407		
No	1	-		
<b>Already followed a training on anti-covid vaccines</b>				
Yes	1.130 (0.722-1.769)	0.594		
No	1	-		
<b>Do you think anti-COVID-19 vaccine is reliable?</b>				
Yes	0.615 (0.373-1.012)	0.056	0.664 (0.342-1.280)	0.220
No	1.744 (1.063-2.862)	0.028	1.516 (0.802-2.863)	0.200
I do not know	1	-	1	-
<b>Do you think vaccines against COVID-19 are effective?</b>				
Yes	0.814 (0.494-1.340)	0.418	1.124 (0.580-2.170)	0.730
No	1.577 (0.962-2.586)	0.071	1.129 (0.590-2.130)	0.700
I do not know	1	-	1	-
<b>Are you worried about side effects of COVID-19 vaccine?</b>				
Yes	1.847 (0.962-3.547)	0.065	1.674 (0.828-3.384)	0.150
No	1.562 (0.735-3.323)	0.246	1.912 (0.848- 4.310)	0.110
No answer	1	-	1	-
<b>Immunity better after a COVID-19 vaccine or after a natural infection with COVID-19?</b>				
After vaccine	0.421 (0.271-0.655)	0.001	0.478 (0.297-0.772)	0.002
After infection	1	-	1	-

Note. CI: Confidence interval; %: Percentage; OR: Odds ratio (95% CI); & aOR: Adjusted odds ratio (95% CI)

vaccinated voluntarily, which indicates a high acceptance of the vaccine among health professionals in the prefecture of Agadir.

These results are identical to two previous studies carried out in Greece and a recent study in Morocco [9, 12, 13]. Contrary to the results of a study carried out in the Republic of Congo, which revealed a very low rate of acceptance of the vaccine (27.7%) among the 613 health personnel [14].

The current study found similar results between participants regarding the perception of COVID-19 vaccines; 33.8% of participants doubt the effectiveness of vaccines and 33.5% expect them to effectively protect against disease, while 31.5% have no information. The same goes for the reliability of vaccines, 129 participants appreciate this reliability (33.0%), and 126 do not appreciate it (32.2%). With the same idea, several previous studies have assessed the perception of the effectiveness and reliability of anti-COVID-19 vaccines. The results revealed a great regional variability [15-17]; high-

income countries were the least sure about the effectiveness of vaccines. Large percentage of respondents in Northern Europe and North America agreed that vaccines are safe, however a lower rate identified in Eastern Europe (50.0%), and Western Europe (59.0%). However, the majority of people in low-income areas agreed that the vaccines are safe and effective, with the highest proportions seen in East Africa (92.0%) and South Asia (95.0%) [16]. The same study shows that more than 63.0% of participants felt that the immunity provided by natural infection is greater than that acquired against COVID-19 disease by vaccination. A contradictory sentiment was reflected in a survey conducted in France, Belgium and Canada, which found that 89.1% of participating healthcare workers opted for vaccine-induced protection over immunity acquired through natural infection [18].

In the present study and following the multivariate analysis, only age and the belief that the acquisition of immunity against COVID-19 through natural infection or by the vaccine were factors significantly associated with the decision to be vaccinated against COVID-19 among healthcare workers. However, in a recent study the only factors that remained significant were the following: being a parent (odds ratio [OR]=4.19,  $p=0.003$ ), being a physician (OR=2.79,  $p=0.040$ ), and treating confirmed/suspect COVID-19 patients (OR=2.87,  $p=0.036$ ). The deterioration of the economic situation during the pandemic did not affect the results (OR=1.12,  $p=0.820$ ) [9]. In another study the factors associated with a stronger intention to get a COVID-19 vaccine were younger age, stronger trust, lower complacency and collective responsibility [19]. While another recent study showed that the decision-making process regarding vaccination acceptance may be influenced by perceptions of the risk posed by COVID-19 [20]. The present study did not reveal gender as a predictor of the intention to accept vaccination, however several previous studies observed a positive association between male gender and vaccine acceptance [21-24], which could be due to a predominance of the female sex in our sample.

## CONCLUSIONS

The main limitation of this study is the potential selection bias in the sample, with a majority of nurses compared to physicians. Despite the acceptance of vaccines by health professionals estimated by the number of vaccinated by vocation, the effectiveness of the vaccine is questioned. This may be due to the large number of professionals not trained in anti-COVID-19 vaccines. In this sense, continuing education sessions are strongly recommended to improve the knowledge of health professionals. Additionally, further

research on knowledge and acceptance of COVID-19 vaccination among the general population is needed to identify potential issues that could affect the achievement of collective immunity against COVID-19 in Morocco.

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**Declaration of interest:** The authors declare no competing interest.

**Data sharing statement:** Data supporting the findings and conclusions are available upon request from the corresponding author.

## REFERENCES

1. Rothan HA, Byrareddy SN. The epidemiology and pathogenesis of coronavirus disease (COVID-19) outbreak. *J Autoimmun.* 2020;109:102433. (doi:10.1016/j.jaut.2020.102433).
2. Zhou P, Yang X-L, Wang X-G, et al. Discovery of a novel coronavirus associated with the recent pneumonia outbreak in humans and its potential bat origin. *Nature.* 2020;579(7798):270-3. (doi:10.1038/s41586-020-2012-7).
3. López L, Rodó X. The end of social confinement and COVID-19 re-emergence risk. *Nat Hum Behav.* 2020;4:746-55. (doi:10.1038/s41562-020-0908-8).
4. Alqudeimat Y, Alenezi D, AlHajri B, et al. Acceptance of a COVID-19 vaccine and its related determinants among the general adult population in Kuwait. *Med Princ Pract.* 2021;30(3):262-71. (doi:10.1159/000514636).
5. Shahcheraghi SH, Ayatollahi J, Aljabali AA, et al. An overview of vaccine development for COVID-19. *Ther Deliv.* 2021;12(3):235-44. (doi:10.4155/tde-2020-0129).
6. Al-Sanafi M, Sallam M. Psychological determinants of COVID-19 vaccine acceptance among healthcare workers in Kuwait: A cross-sectional study using the 5C and vaccine conspiracy beliefs scales. *Vaccines (Basel).* 2021;9(7):701. (doi:10.3390/vaccines9070701).
7. Bouhon F, Jousten A, Miny X, Slautsky E. L'État belge face à la pandémie de COVID-19: Esquisse d'un régime d'exception [The Belgian State facing the COVID-19 pandemic: Outline of an exceptional regime]. *CRISP Week Mail.* 2020;2020(1):5-56. (doi:10.3917/cris.2446.0005).

8. EMA. COVID-19 vaccines: Authorized. European Medicines Agency; 2022. Available at: <https://www.ema.europa.eu/en/human-regulatory-overview/public-health-threats/coronavirus-disease-covid-19/covid-19-medicines>
9. Pataka A, Kotoulas S, Stefanidou E, et al. Acceptability of healthcare professionals to get vaccinated against COVID-19 two weeks before initiation of national vaccination. *Medicina (Kaunas)*. 2021;57(6):611. (doi:10.3390/medicina57060611).
10. WHO. Ten threats to global health in 2019. World Health Organization; 2019. Available at: <https://www.who.int/news-room/spotlight/ten-threats-to-global-health-in-2019>
11. Verger P, Dubé E. Restoring confidence in vaccines in the COVID-19 era. *Expert Rev Vaccines*. 2020;19(11):991-3. (doi:10.1080/14760584.2020.1825945).
12. Papagiannis D, Rachiotis G, Malli F, et al. Acceptability of COVID-19 vaccination among Greek health professionals. *Vaccines (Basel)*. 2021;9(3):200. (doi:10.3390/vaccines9030200).
13. Khalis M, Hatim A, Elmouden L, et al. Acceptability of COVID-19 vaccination among health care workers: A cross-sectional survey in Morocco. *Hum Vaccin Immunother*. 2021;17(12):5076-81. (doi:10.1080/21645515.2021.1989921).
14. Nzaji MK, Ngombe LK, Mwamba GN, et al. Acceptability of vaccination against COVID-19 among healthcare workers in the Democratic Republic of the Congo. *Pragmat Obs Res*. 2020;11:103. (doi:10.2147/POR.S271096).
15. Wagner AL, Masters NB, Domek GJ, et al. Comparisons of vaccine hesitancy across five low-and middle-income countries. *Vaccines (Basel)*. 2019;7(4):155. (doi:10.3390/vaccines7040155).
16. Sallam M. COVID-19 vaccine hesitancy worldwide: A concise systematic review of vaccine acceptance rates. *Vaccines (Basel)*. 2021;9(2):160. (doi:10.3390/vaccines9020160).
17. Larson HJ, de Figueiredo A, Xiahong Z, et al. The state of vaccine confidence 2016: Global insights through a 67-country survey. *EbioMedicine*. 2016;12:295-301. (doi:10.1016/j.ebiom.2016.08.042).
18. Verger P, Scronias D, Dauby N, et al. Attitudes of healthcare workers towards COVID-19 vaccination: A survey in France and French-speaking parts of Belgium and Canada, 2020. *Euro Surveill*. 2021;26(3):2002047. (doi:10.2807/1560-7917.ES.2021.26.3.2002047).
19. Kwok KO, Li K-K, Wei WI, Tang A, Wong SYS, Lee SS. Influenza vaccine uptake, COVID-19 vaccination intention and vaccine hesitancy among nurses: A survey. *Int J Nurs Stud*. 2021;114:103854. (doi:10.1016/j.ijnurstu.2020.103854).
20. Lin CJ, Nowalk MP, Toback SL, et al. Importance of vaccination habit and vaccine choice on influenza vaccination among healthy working adults. *Vaccine*. 2010;28(48):7706-12. (doi:10.1016/j.vaccine.2010.07.009).
21. Cordina M, Lauri MA, Lauri J. Attitudes towards COVID-19 vaccination, vaccine hesitancy and intention to take the vaccine. *Pharm Pract (Granada)*. 2021;19(1):2317. (doi:10.18549/PharmPract.2021.1.2317).
22. Detoc M, Bruel S, Frappe P, Tardy B, Botelho-Nevers E, Gagneux-Brunon A. Intention to participate in a COVID-19 vaccine clinical trial and to get vaccinated against COVID-19 in France during the pandemic. *Vaccine*. 2020;38(45):7002-6. (doi:10.1016/j.vaccine.2020.09.041).
23. Gagneux-Brunon A, Detoc M, Bruel S, et al. Intention to get vaccinations against COVID-19 in French healthcare workers during the first pandemic wave: A cross-sectional survey. *J Hosp Infect*. 2021;108:168-73. (doi:10.1016/j.jhin.2020.11.020).
24. Ren X, Geoffroy E, Tian K, et al. Knowledge, attitudes, and behaviors (KAB) of influenza vaccination in China: A cross-sectional study in 2017/2018. *Vaccines (Basel)*. 2019;8(1):7. (doi:10.3390/vaccines8010007).

