Vaccination against COVID-19 in Bangladesh: Perception and Attitude of Healthcare Workers in COVID-dedicated Hospitals

Article *in* Mymensingh Medical Journal · July 2021

CITATIONS
0

READS
185

9 authors, including:

Morshed Nasir
Holy Family Red Crescent Medical College
47 PUBLICATIONS **106** CITATIONS
SEE PROFILE

Rawshan Ara Perveen
Holy Family Red Crescent Medical College
30 PUBLICATIONS **61** CITATIONS
SEE PROFILE

Sultana Parvin
Sheikh Russel National Gastroliver Institute and Hospital
12 PUBLICATIONS **1** CITATION
SEE PROFILE

Original Contribution

Vaccination against COVID-19 in Bangladesh: Perception and Attitude of Healthcare Workers in COVID-dedicated Hospitals

***Nasir M[1], Perveen RA[2], Saha SK[3], Nessa A[4], Zaman A[5], Nazneen R[6], Ferdous J[7], Farha N[8], Majumder TK[9], Hossian MJ[10], Parvin S[11], Chowdhury MR[12], Begum H[13], Ahmed F[14]**

Healthcare professionals are the crucial and influencing source of information for vaccines and their communication among patients and communities that can accelerate successful vaccination in a country. This cross-sectional study was one of the first and foremost ones in Bangladesh to observe the basic perception and attitudes towards vaccination against COVID-19 among the healthcare workers (HCWs) - doctors, interns, nurses, ward boys, cleaners, and medical technologists of major COVID-dedicated hospitals. The cross-sectional questionnaire-based study was conducted in February 2021 among 550 HCWs to assess the perception and attitude towards vaccination against COVID-19. The study participants were targeted as the priority group for COVID-19 vaccination, working in two major COVID-dedicated hospitals, Holy Family Red Crescent Medical College Hospital (HF-center), and Sheikh Russel National Gastro-liver Institute and Hospital (SR-center) in Dhaka, Bangladesh during the pandemic. The questionnaire was structured with a three-point scale of responses from 'true', 'false', and 'do not know'. The responses were calculated on point-score as +1 for the correct response, -1 for the wrong response, and 0 for 'do not know' with an overall highest and the lowest possible score of +5 to -5. Absolute (*n*) and relative frequencies (%) were presented for qualitative variables, while quantitative variables were presented as mean (± standard deviation). Chi-square test was done for univariate analysis of qualitative variables and Student's *t*-test for quantitative variables. With the 95.27% response rate, including 204 males and 320 were female and the male: female ratio was 1: 1.56. The majority of the participants were doctors (45.8%) followed by nurses (27.9%), and MLSS (26.3%) respectively. The respondents were between 18 to 64 years of age with a mean of 36.17±10.94 years. Most of the respondents (95.99%) responded correctly about the cost-free availability of a vaccine against COVID-19 in the country, 87.40% preferred vaccination as safe and effective. Again 29.77% HCWs think the vaccine might not be safe or effective due to emergency authorization. Only 38.93% of respondents could respond correctly about the necessity of vaccines for children, 31.10% think the vaccination was not required instead of natural immunity. The positive perception and attitude of the frontline HCWs in COVID-dedicated hospitals in Bangladesh are crucial which will positively influence motivation and wide acceptance among the general population for the attainment of the nationwide vaccination program, and adopt effective strategic modification to minimize the gaps for a low-middle income country like Bangladesh with its resource constrain.

[Mymensingh Med J 2021 Jul; 30 (3):808-815]

Key words: Vaccination, COVID-19, Healthcare workers, Perception, Attitude, Bangladesh

Introduction

COVID-19 is a novel type of coronavirus that emerged from Wuhan, China. From the first case reported in late 2019 to 12th February, of this year, 103,391,516 confirmed cases and approximately 23,80,436 deaths were identified over 213 countries around the world[1]. This large number of infected patients with a global mortality rate of 4.15% demonstrates that the coronavirus disease is extremely contagious. In March 2020, World Health Organization (WHO) announced a COVID19 pandemic. Near the time of this announcement, the first case of Severe Acute Respiratory Syndrome Corona Virus-2 (SARS-CoV-2) was reported in Bangladesh on 8th March 2020. From then to 12th February 2021, 5,39,975 confirmed cases and 8,253 deaths were reported in Bangladesh[2]. This pandemic situation has a significant impact on this densely populated country, not only the health sector but also the economy. It is widely recognized that vaccination has an important role in controlling outbreaks and pandemics of infectious diseases.

1. **Professor Morshed Nasir, Professor and Head of Pharmacology, Holy Family Red Crescent Medical College (HFRCMC), Dhaka, Bangladesh; E-mail: morshed@hfrcmc.edu.bd*
2. *Dr. Rawshan Ara Perveen, Assistant Professor of Pharmacology, HFRCMC, Dhaka, Bangladesh*
3. *Professor Shyamal Kumar Saha, Principal, Sheikh Hasina Medical College, Jamalpur, Bangladesh*
4. *Professor Akhtarun Nessa, Vice-Principal & Head of Physiology, MMC, Mymensingh, Bangladesh*
5. *Dr. Md Anisuzzaman, Associate Professor and Deputy Director (Admin), Holy Family Red Crescent Medical College Hospital (HFRCMCH), Dhaka, Bangladesh*
6. *Dr. Rumana Nazneen, Associate Professor and Deputy Director (Medical), HFRCMCH, Dhaka, Bangladesh*
7. *Dr. Jannatul Ferdous, Assistant Professor of Microbiology, HFRCMC, Dhaka, Bangladesh*
8. *Dr. Nadia Farha, Assistant Professor of Pharmacology, HFRCMC, Dhaka, Bangladesh*
9. *Professor Touhidul Karim Majumder, Professor and Head of Gastroenterology, Sheikh Russel National Gastro-liver Institute and Hospital (SRNGIH), Dhaka*
10. *Dr. Mir Jakib Hossian, Associate Professor of Gastroenterology, SRNGIH, Dhaka, Bangladesh*
11. *Dr. Sultana Parvin, Assistant Registrar of Gastroenterology, SRNGIH, Dhaka, Bangladesh*
12. *Dr. Moshfiqur Rahman Chowdhury, Registrar of Gastroenterology, SRNGIH, Dhaka, Bangladesh*
13. *Dr. Hasina Begum, Associate Professor and Head, Radiology & Imaging, SRNGIH, Dhaka, Bangladesh*
14. *Professor Faruque Ahmed, Professor and Director, SRNGIH, Dhaka, Bangladesh*

**for correspondence*

In general, the process of vaccine development is critical and time-consuming and has to go through rigorous checks for potency, efficacy, and safety, particularly in human trials (phase-II and phase-IV) including high-risk individuals, elderly, pregnant, lactating women, and people with co-morbidities, and immune-compromised conditions[3,4]. From the very first day of this pandemic to date 66 vaccine candidates are in the clinical trial and more than 20 vaccines are in Phase III trials[5]. From the beginning of the COVID-19 pandemic, health care workers are working as the front line fighter despite the higher chance of getting infected and die. They have demonstrated professional dedication with a fear of becoming infected not only themselves but also infecting their patients and family members[6]. Moreover, health professionals are an important source of information for vaccines and their communication among patients and communities can accelerate vaccination recommendations[7]. Thus, the role of healthcare workers becomes particularly important for their role modeling behavior[8].

But one of the major threats to the COVID-19 vaccine implementation is vaccine hesitancy, even among the health professionals about getting vaccinated against COVID-19[9]. Workers are more sensible in their consumption of information. Especially women in health care have reasonable fears that the vaccines could harm their babies during pregnancy. Some front liners thought that they have developed protective antibodies due to infected multiple times with the virus[10]. But the longevity of the immune response following the vaccination and its effectiveness to limit the asymptomatic spread remained unresolved in the clinical trials[11]. Above all of that, the speed of COVID-19 vaccine development and approval within less than one year has raised many questions over their safety, even with health care workers. These are several factors that reflect the vaccine refusal within the healthcare professionals, which have a huge impact on the general public's decision throughout the world[12,13,14].

Anthony Fauci, the chief medical advisor of President Biden for the Covid-19 pandemic, expressed the concern and consequence to healthcare providers. Moreover, 60% of nursing-home staff in Ohio State haven't decided to take the vaccine, in New York, Governor Andrew Cuomo said that state officials expect 30% of healthcare workers offered the vaccine will ultimately turn it down[15]. Considering all those consequences and variable status of perception of HCWs irrespective of developed and developing countries, this cross-sectional questionnaire-based study is the first to reveal the basic perception and attitudes of different categories of HCWs serving in COVID-dedicated hospitals, towards the vaccine against COVID-19 in Dhaka, Bangladesh, a densely populated country with resource constrain and low-middle income economy.

Methods

The cross-sectional questionnaire-based study was conducted in February 2021 among 550 HCWs to assess the perception and attitude towards vaccination against COVID-19. The study participants were targeted as the priority group for COVID-19 vaccination, working in two major COVID-dedicated hospitals, Holy Family Red Crescent Medical College Hospital (HF-center), a 525-bed non-government tertiary care hospital and Sheikh Russel National Gastro-liver Institute and Hospital (SR-center), a 250-bed government hospital in Dhaka, Bangladesh during the pandemic. The convenient sampling was applied, participation was voluntary, and anonymously informed consent was obtained. The study was adopted and modified from a previously published survey on HCWs in France, Belgium, and Canada[16] to capture more information pertinent to the Bangladeshi population. The questionnaire was translated into the local language (Bengali) for better understanding and pre-tested for clarity, length, and face validity in two hospitals among a separate group of 26 HCWs not included in the study. The data were collected anonymously on basic demographics, the value, effectiveness, safety, acceptability of vaccines against COVID-19, without any personal identifying information. The study protocol was approved by the Institutional Ethics Review Board (IERB/34/Sur/Feb/2021/10/hf) of Holy Family Red Crescent Medical College.

Total 524 responses were included as completed valid data and were grouped into three broad categories as doctors (consultants, medical officers, intern doctors), nurses (matrons, staff nurses, student nurses), and MLSS (member of lower subordinate staff, cleaners, ward boys, medical technologists) and tabulated using the SPSS 21.0 software. The questionnaire was

structured with a three-point scale of responses from 'true', 'false', and 'do not know'. The responses were calculated on point-score as +1 for the correct response, -1 for the wrong response, and 0 for 'do not know' with an overall highest and the lowest possible score of +5 to -5. Absolute (*n*) and relative frequencies (%) were presented for qualitative variables, while quantitative variables were presented as mean (± standard deviation). Chi-square test was done for univariate analysis of qualitative variables and Student's *t*-test for quantitative variables.

Results

A total of 550 healthcare workers participated, 524 of whom completed the study questionnaire (95.27% response rate), including 204 (38.93%) male and 320 (61.06%) were female. The male: female ratio was 1:1.56. The majority of the participants were doctors (n=240, 45.8%) followed by nurses (n=146, 27.9%), and MLSS (n=138, 26.3%) respectively (Figure 1). Among the 524 respondents, 316 (60.3%) were from a non-government hospital (HF-center) and 208 (39.7%) from a government hospital (SR-center), both were located in the capital city Dhaka, designated COVID-dedicated tertiary care hospital during the study period. The respondents were between 18 to 64 years of age with a mean of 36.17 ±10.94 years. Most of the respondents were in the age group of 20-39 years (320, 61.07%), doctors 148 (61.66%), nurses 83 (56.85%), MLSS 89 (64.49%) (Table I).

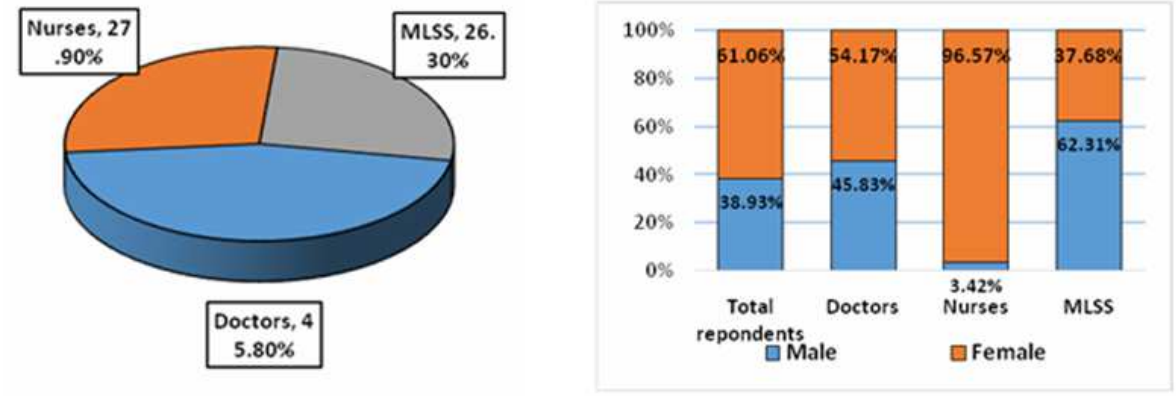

Figure 1: Distribution of healthcare workers responded to vaccine

Table I: Frequency distribution of HCWs according to age groups

Age groups	Study centers	Total (n=524)	Doctor (n=240)	Nurse (n=146)	MLSS (n=138)
		n (%)	n (%)	n (%)	n (%)
0-19 years	HF (n=316)	00 (00.00)	00 (00.00)	00 (00.00)	00 (00.00)
	SR (n=208)	09 (04.33)	00 (00.00)	00 (00.00)	09 (4.33)
Total		09 (01.72)	00 (00.00)	00 (00.00)	09 (1.72)
20-39	HF (n=316)	150 (47.47)	117 (62.57)	12 (16.67)	21 (36.84)
years	SR (n=208)	170 (81.73)	31 (58.49)	71 (95.94)	68 (83.95)
Total		320 (61.07)	148 (61.66)	83 (56.85)	89 (64.49)
40-59	HF (n=316)	159 (50.31)	64 (34.20)	59 (81.94)	36 (63.16)
years	SR (n=208)	29 (13.94)	22 (41.51)	03 (04.05)	04(04.94)
Total		188 (35.88)	86 (35.83)	62 (42.46)	40 (28.98)
> 60 years	HF (n=316)	07 (02.21)	06 (03.21)	01 (01.39)	00 (00.00)
	SR (n=208)	00 (00.00)	00 (00.00)	00 (00.00)	00 (00.00)
Total		07 (1.33)	06 (02.50)	01 (0.68)	00 (00.00)

Out of five major domains of the question, most of the respondents (503, 95.99%) responded correctly about the cost-free availability of a vaccine against COVID-19 in the country, 87.40% preferred

vaccination as safe and effective. Again 29.77% HCWs think the vaccine might not be safe or effective due to emergency authorization. Only 38.93% of respondents could respond correctly about the necessity of vaccines for children, 31.10% think the vaccination was not required instead of natural immunity (Table II). A significant difference of correct responses ($p<0.05$) among the doctors, nurses, and MLSS was found regarding the safety and effectiveness of a vaccine, and perception about the need for a vaccine for children. The difference of correct responses about the safety and efficacy of the vaccine and its requirement over natural immunity was also found highly significant ($p<0.001$).

Table II: Frequency distribution of correct responses among the different groups of HCW

Questions	Doctors (n=240)	Nurses (n=146)	MLSS (n=138)	Overall correct responses	p value*
	n (%)	n (%)	n (%)	n (%)	
I prefer vaccination for COVID-19, because it is safe and effective					
Correct response	203 (84.58)	124 (84.93)	131(94.92)	458 (87.40)	0.008
Incorrect response	037 (15.41)	022 (15.06)	007 (05.07)	066 (12.59)	
COVID-19 vaccine is available free of cost					
Correct response	231 (96.25)	142 (97.26)	130 (94.20)	503 (95.99)	0.407
Incorrect response	009 (03.75)	004 (02.73)	008 (05.79)	021 (04.00)	
Children do not need to be vaccinated for COVID-19					
Correct response	79 (32.91)	57 (39.04)	68 (49.27)	204 (38.93)	0.007
Incorrect response	161 (67.08)	89 (60.95)	70 (50.72)	320 (61.08)	
Vaccine against COVID-19 may not be reliably safe and effective due to pandemic emergency					
Correct response	186 (77.50)	104 (71.23)	78 (56.52)	368 (70.22)	<0.001
Incorrect response	054 (22.50)	42 (28.76)	60 (43.47)	156 (29.77)	
Vaccination for COVID-19 is not required, because immunity can be achieved naturally					
Correct response	193 (80.41)	96 (65.75)	72 (52.17)	361 (68.89)	<0.001
Incorrect response	047 (19.58)	50 (34.24)	66 (47.82)	163 (31.10)	

*Chi square test

The mean of point-scores was calculated and compared between respondents of two centers among the HCWs. The higher mean score was found among the doctors (3.85±1.11), nurses (3.88±1.33), and MLSS (3.53±1.23) from SR center with a significant difference with HF center among the doctors ($p<0.026$), highly significant among nurses ($p<0.001$), and also MLSS ($p<0.001$) as presented in Table III.

Table III: Comparison of mean of different HCW between two centers

HCW category	Place	n	Mean	Std. Deviation	Statistical differences	
					t	P
Doctors	HF	187	3.30	1.662	-2.243	0.026
	SR	53	3.85	1.116		
Nurses	HF	72	2.92	1.371	-4.296	<0.001
	SR	74	3.88	1.334		
MLSS	HF	57	2.63	1.358	-4.040	<0.001
	SR	81	3.53	1.236		

The mean score of responses on all five domains of perception about efficacy, safety, availability, necessity, and cost of vaccination against COVID-19 shows no significant differences among the HCWs.

The one-way ANOVA revealed that there was no remarkable difference in overall perception regarding vaccine between doctors versus nurses (p=0.893), doctors versus MLSS (p=0.093), nurses versus MLSS (p=0.164) as presented in Table IV.

Table IV: Comparison of overall mean score between the different groups of HCW

	Occupation group (I)	Occupation group (J)	Mean difference (I – J)	SE	p value*	Lower	Upper
Score on vaccine	Doctor	Nurse	0.021	0.155	0.893	-0.28	0.33
		MLSS	0.266	0.158	0.093	-0.04	0.58
	Nurse	Doctor	-0.021	0.155	0.893	-0.33	0.28
		MLSS	0.245	0.176	0.164	-0.10	0.59
	MLSS	Doctor	-0.266	0.158	0.093	-0.58	0.04
		Nurse	-0.245	0.176	0.164	-0.59	0.10

*One way ANOVA

Discussion

HCWs are considered to be one of the most dependable sources of vaccine-related information for the motivation of patients and the public. In Bangladesh, there are an estimated 3.05 physicians and 1.07 nurses per 10,000 populations (estimates based on MoHFW-HRD 2011). Also, there is a severe gap between sanctioned and filled health worker positions[17]. In the present study, most of the HCWs (61.06%) were in the age group of 20 to 39 years, and among the respondents, doctors were 1.64 times more than nurses in both government (SR center) and non-government (HF center), which was lower compared to the overall status (2.4 times) of Bangladesh[18]. The number of female HCWs was highest among nurses (96.57%), almost equal among doctors (54.17%), but lowest among MLSS (37.68%) categories of the respondents.

The overall perception and attitude towards vaccination against COVID-19 varied across different domains of questions and categories of HCWs. Our study demonstrates that very positive perception and attitude (87.40%) for efficacy and safety of vaccination against COVID-19 among the doctors, nurses, and MLSS in the Bangladeshi study population. This figure was substantially higher in comparison to the similar studies among Nepalese (81.5%)[19], Greek (80%)[20], Indian (49.2%)[21], Nigerian (78.3%)[22], Uganda (74%)[23] during May 2020 to February 2021 respectively. However, much higher positive responses (90.0%) were observed among HCWs in Ho Chi Minh City[24].

Almost all the HCWs (95.99%) were aware that the vaccine was available free of cost in the country. Among them, only 29.77% of HCWs were not optimistic about the reliability of vaccines developed during the pandemic emergency. They were not sure or preferred to wait to review safety data, which might be because an average time for a new vaccine takes 10-12 years to develop after several phases of trials[25]. The exemplary practice of emergency authorization and repurposing use of remdesevir[26], favipiravir[27], ritonavir, lopinavir, and other drugs in pharmacotherapy[28] against COVID-19 and its indefinite efficacy might have predisposed the negative perception. This finding was much more prominent in several studies in the United States (56%)[8], Poland (52.4%)[29], and in a survey in France (45.15%), Belgium (36.30%), Canada (38.97%)[16] where HCWs have a belief that the development time of developing COVID-19 vaccine was too short or as they were studied separately and differed in timing, geographical regions.

Some of the participants (31.10%) in our study believed that the immunity against the SARS-CoV-2 virus could be acquired naturally by subsequent exposure or infection, most of which are clinically mild, and therefore the vaccination against COVID-19 might not be required. However, this wrong perception was predominant among the MLSS, and a highly significant difference (p<0.001) was found compared to the doctors and nurses. The perception to acquire possible immunity against infectious diseases

naturally (by having the disease) than by vaccination was found much lower among the HCWs in France (8.22%), Belgium (7.45%), and Canada (12.67%)[16]. One of the most remarkable wrong perceptions of HCWs about the necessity of vaccines against COVID-19 for children was revealed in the present study. More than half of the participants had answered wrong including doctors (67.08%), and nurses (60.95%). As children rarely develop severe forms of COVID-19, and deaths from the disease are rarer[30], school children will likely be encouraged rather than required to get the Covid-19 vaccine once the Food and Drug Administration authorizes. Moreover, the vaccine against COVID-19 has only been tested in children above 16 years of age, and therefore, at this time, WHO does not recommend vaccination of children below 16 years of age, even if they belong to a high-risk group[31]. In the present study, the responses of the HCWs were plotted on the five-point scale to measure the mean scores ranging from the lowest level of perception as 'negative five' (-5) to the maximum 'positive five' (+5) score, and the outcome was compared among the different categories of HCWs between the government hospital and non-government hospital. The mean score of perception was fairly good and almost similar among doctors in both the centers (HF 3.30 vs. SR 3.85). But the overall mean score was significantly higher in HCWs worked in government center (SR) than the non-government (HF) among nurses and MLSS. This might be due to better integration and sharing of information by government database and participation in COVID-related training, webinar, and logistic advantage commonly observed in developing countries like Bangladesh. The non-government hospitals dedicated to COVID-19 treatment had limitations of logistic facilities and access to the national database. But the difference of mean score was not at all different between doctors, nurses, and MLSS. The Oxford-AstraZeneca Covid-19 vaccine arrived in Bangladesh in the period of January 21 - 25, 2021. Vaccination programs around countrywide started on 7th February 2021. Bangladesh prioritizes those at the highest risk of complications, such as the elderly (>55 years), and those at high risk of exposure and transmission, such as HCWs, police, and emergency workers. The present study revealed positive perceptions and attitudes of the majority of HCWs about the efficacy, safety, availability, and reliability of nationwide vaccination against COVID-19. However, specific concerns regarding the vaccination of children and the rapid development of the new vaccine are prevalent.

Limitations

We recognize the limitations of the study for sampling size and technique since our study population might not be representative of all HCWs of Bangladesh. The data presented in the study are partly dependent on the respondent's honesty and might be subject to recall bias. However, the major strength of the study was the involvement and response rate of 95.27% volunteering from two major focal health centers in the country and provided valuable information about the overall perception of HCWs at the commencement of the vaccination against COVID-19 in the country.

Conclusion

This is one of the foremost studies involving HCWs on vaccination against COVID-19 from government and non-government tertiary care COVID-dedicated hospitals ominously contributing to COVID-19 management and treatment in the country. The existing perception and attitude of the frontline HCWs are crucial which will positively influence motivation and wide acceptance among the general population for the attainment of the nationwide vaccination program, and adopt effective strategic modification to minimize the gaps for a low-middle income country like Bangladesh.

Acknowledgment

We thank and gratefully acknowledge the voluntary participation of all the HCWs for providing responsible feedback in the study and the continuous service, dedication, and contribution to the COVID-19 pandemic and vaccination.

References

1. World Metrics. COVID-19 coronavirus outbreak: World Metrics; Available at: https://www.worldometers.k+info/coronavirus
2. World Metrics. COVID-19 coronavirus outbreak: World Metrics; Available at: https://www.worldometers.info/coronavirus/country/bangladesh/

3. Bhartiya S, Kumar N, Singh T, Murugan S, Rajavel S, Wadhwani M. Knowledge, attitude and practice towards COVID-19 vaccination acceptance in West India. Int J Community Med Public Health. 2021; 8: 1170-6. doi: https://dx.doi.org/10.18203/2394-6040.ijcmph20210481.
4. Clinical Trials gov. SCB-2019 as COVID-19 Vaccine. United States National Library of Medicine. https://clinicaltrials.gov/ct2/show/NCT04405908.
5. Chen J. Covid-19 has shuttered labs. It could put a generation of researchers at risk. 4th May, 2020. https://www.statnews.com/2020/05/04/coronavirus-lab-shutdowns-impact-on-scientists-research-delays/
6. Liu Q, Luo D, Haase JE, Guo Q, Wang XQ, Liu S, Xia L, Liu Z, Yang J, Yang BX. The experiences of health-care providers during the COVID-19 crisis in China: a qualitative study. Lancet Glob Health. 2020;8(6):790-798. doi:https://10.1016/S2214-109X(20)30204-7.
7. Riccò M, Gualerzi G, Ranzieri S, Ferraro P, Bragazzi NL. Knowledge, Attitudes, Practices (KAP) of Italian Occupational Physicians towards Tick Borne Encephalitis. Trop Med Infect Dis. 2020:16;5(3):117. doi: https://10.3390/tropicalmed5030117.
8. Shekhar R, Sheikh AB, Upadhyay S, Singh M, Kottewar S, Mir H, Barrett E, Pal S. COVID-19 Vaccine Acceptance among Health Care Workers in the United States. Vaccines. 2021;9(2):119. https://doi.org/10.3390/vaccines9020119.
9. Sun S, Lin D, Operario D. Interest in COVID-19 vaccine trials participation among young adults in China: Willingness, reasons for hesitancy, and demographic and psychosocial determinants. Prev Med Rep. 2021;22:101350. doi: https://10.1016/j.pmedr.2021.101350.
10. Smith TM. Dealing with COVID-19 vaccine hesitancy among health care workers. AMA. MAR 4, 2021. Available at: https://www.ama-assn.org/delivering-care/public-health/dealing-covid-19-vaccine-hesitancy-among-health-care-workers.
11. Baldo V, Reno C, Cocchio S, Fantini MP. SARS-CoV-2/COVID-19 Vaccines: The Promises and the Challenges Ahead. Vaccines. 2021;9(1):21. doi: https://doi.org/10.3390/vaccines9010021.
12. Gagneux-Brunon A, Detoc M, Bruel S, Tardy B, Rozaire O, Frappe P, Botelho-Nevers E. 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: https://10.1016/j.jhin.2020.11.02013.
13. Gadoth A, Halbrook M, Martin-Blais R, Gray A, Tobin NH, Ferbas KG, Aldrovandi GM, Rimoin AW. Cross-sectional Assessment of COVID-19 vaccine acceptance among health Care Workers in Los Angeles. Annals of Internal Medicine. 2021. doi: https://doi.org/10.7326/M20-7580.
14. Kabamba Nzaji M, Kabamba Ngombe L, Ngoie Mwamba G, Banza Ndala DB, Mbidi Miema J, Luhata Lungoyo C, Lora Mwimba B, Cikomola Mwana Bene A, Mukamba Musenga E. Acceptability of Vaccination Against COVID-19 Among Healthcare Workers in the Democratic Republic of the Congo. Pragmat Obs Res. 2020; 11: 103-9. doi: https://10.2147/POR.S271096.
15. Julie Wernau. Wall Street Journal, 31 Jan 2021. Available at: https://www.wsj.com/articles/some-health-care-workers-are-still-saying-no-to-a-covid-19-vaccine-11612089020.
16. Verger P, Scronias D, Dauby N, Adedzi KA, Gobert C, Bergeat M, Gagneur A, Dubé E. Attitudes of healthcare workers towards COVID-19 vaccination: a survey in France and French-speaking parts of Belgium and Canada, 2020. Euro Surveill. 2021 Jan;26(3):2002047. doi: https://doi.org/10.2807/1560-7917.ES.2021. 26.3.2002047.
17. Global Health Workforce Alliance, WHO-2021. Available at: https://www.who.int/workforcealliance/countries/bgd/en/
18. Ahmed SM, Hossain MA, Raja Chowdhury AM et al. The health workforce crisis in Bangladesh: shortage, inappropriate skill-mix and inequitable distribution. Hum Resour Health. 2011;9:3. doi: https://doi.org/10.1186/1478-4491-9-3.
19. Limbu DK, Piryani RM, Sunny AK. Healthcare Workers' Knowledge, Attitude and Practices during the COVID-19 Pandemic Response in a Tertiary Care Hospital of Nepal. PLoS ONE. 2020;15(11):e0242126.

doi: https://doi.org/10.1371/journal.pone.0242126.
20. Papagiannis D, Rachiotis G, Malli F, Papathanasiou IV, Kotsiou O, Fradelos EC, Giannakopoulos K, Gourgoulianis KI. Acceptability of COVID-19 Vaccination among Greek Health Professionals. Vaccines. 2021; 9: 200. doi: https://doi.org/10.3390/vaccines9030200.
21. Kumar H, Khurana MS, Charan GS, Sharma NK. Knowledge and Perception of Health Professionals towards COVID-19. International Journal of Health Sciences and Research. 2020;10(7):123-8. Available at: https://www.ijhsr.org/IJHSR_Vol.10_Issue.7_July2020/21.pdf.
22. Ejeh FE, Saidu AS, Owoicho S, Maurice NA, Jauro S, Madukaji L, Okon KO. Knowledge, Attitude and Practice among Healthcare Workers towards COVID-19 Outbreak in Nigeria. Heliyon. 2020; 6: e05557. doi: https://doi.org/10.1016/j.heliyon.2020.e05557.
23. Olum R, Chekwech G, Wekha G, Nassozi DR, Bongomin F. Coronavirus Disease-2019: Knowledge, Attitude, and Practices of Health Care Workers at Makerere University Teaching Hospitals, Uganda. Front. Public Health. 2020; 8: 181. doi: https://doi.org/10.3389/fpubh.2020.00181.
24. Giao H, Han NTN, Khanh TV, Ngan VK, Tam VV, An PL. Knowledge and Attitude toward COVID-19 among Healthcare Workers at District 2 Hospital, Ho Chi Minh City. Asian Pacific Journal of Tropical Medicine. 2020;13(6):260-5. doi: https://doi.org/10.4103/1995-7645.280396.
25. Gregersen JP. What History Tells Us about Vaccine Time Table? Eureka blog. Available at: https://www.criver.com/eureka/what-history-tells-us-about-vaccine-timetables.
26. Nasir M, Talha KA, Islam T, Saha SK, Selina F, Parveen RA. Use of Remdesivir in the Management of COVID-19: A Systematic Review on Current Evidences. Mymensingh Med J. May 2020; 29(2):481-7. Available at: https://pubmed.ncbi.nlm.nih.gov/32506110/
27. Nasir M, Perveen RA, Saha SK, Talha KA, Selina F, Islam MA. Systematic Review on Repurposing Use of Favipiravir Against SARS-CoV-2. Mymensingh Med J. July 2020;29(3):747-54. Available at: https://pubmed.ncbi.nlm.nih.gov/32844821/
28. Perveen RA, Nasir M, Talha KA, Selina F, Islam MA. Systematic review on current antiviral therapy in COVID-19 pandemic. Med J Malaysia. Nov 2020;75(6):710-6. Available at: http://www.e-mjm.org/2020/v75n6/antiviral-therapy-in-COVID-19.pdf.
29. Rzymski P, Zeyland J, Poniedziałek B, Małecka I, Wysocki J. The Perception and Attitudes toward COVID-19 Vaccines: A Cross-Sectional Study in Poland. Vaccines. 2021; 9: 382. Available at: https://doi.org/10.3390/vaccines9040382.
30. Callaway E. COVID vaccines and kids: five questions as trials begins. Nature. 2021; 592: 670-1. doi: https://doi.org/10.1038/ d41586-021-01061-4.
31. World Health Organization, Newsroom: Feature stories. Pfizer BioNTech COVID-19 vaccine: What you need to know. April 21, 2021. Available at: https://www.who.int/news-room/feature-stories/detail/who-can-take-the-pfizer-biontech-covid-19-vaccine#:~:text=The%20vaccine%20has% 20only%20been, high-risk%20group.