Original Article

Knowledge, Perception and Practices regarding COVID-19 among frontline Nurses at Selected Hospitals in Sri Lanka during COVID-19 Pandemic

Herath HMNK[1], Ilankoon IMPS[2], Kisokanth G[3]

[1] National Institute of Infectious Diseases, Angoda, Sri Lanka,

[2] Department of Nursing and Midwifery, Faculty of Allied Health Sciences, University of Sri Jaywardenapura, Sri Lanka

[3] Department of Clinical Nursing, Faculty of Nursing, University of Colombo, Sri Lanka

Corresponding author:

Prof. G Kisokanth

Professor in Clinical Nursing,

Head, Department of Clinical Nursing,

Faculty of Nursing,

University of Colombo, Sri Lanka.

Tel.: 0094772228330

E-mail: kiso@dcn.cmb.ac.lk

ORCID ID:https://orcid.org/0000-0002-5956-4463

ABSTRACT

Introduction: The World Health Organization confirmed the COVID-19 epidemic situation as a public health emergency and is an emerging public health problem that has threatened millions of lives worldwide. Since COVID-19 has significantly affected the healthcare system globally, it is essential to update healthcare workers especially frontline nurses on the best practices for the proper management of the disease. The study aimed to assess Knowledge, Perceptions, and Practices regarding COVID-19 among frontline nurses at the National Institute of Infectious Diseases, National Hospital of Sri Lanka, and Base Hospital Mawanella in Sri Lanka.

Methods: This cross-sectional study was conducted among 257 frontline nurses from main three hospitals in Sri Lanka from June 2020 to December 2021. A validated, pre-tested self-administered questionnaire was used for data collection. Kruskal Wallis test and Chi-square test were applied to find significant factors associated with good knowledge, using SPSS version 25.

Results: The average age of the 257 participants was (31.8 ± 6.6) years and most (95%) of them were female. Of them, 79.4% had good knowledge, and the knowledge level of the nurses was significantly associated with their marital status (p=0.04) and their participation in the COVID-19 management workshop or lecture (p ≤0.001). There was a statistically significant median score difference between participants' knowledge, and three hospitals (p<0.05).

Conclusion: The findings demonstrated that the nurses had overall good knowledge, positive perception, and good practice on COVID-19. This study highlighted the factors influencing knowledge about COVID-19 that must be addressed in future education, awareness, and preparing the programs.

Keywords: COVID-19, Knowledge, Nurses, Perception, Practice, Sri Lanka

Introduction

COVID-19 has significantly affected the healthcare system globally and continuous evidence shows that the update of healthcare workers on the best practices for the proper management of the disease is essential. Caring in times of pandemics is extremely stressful for healthcare workers (HCWs), especially for nurses.[1,2] Nurses are the first contact in most instances and are required to provide immediate care under life-threatening conditions even in any pandemic. In addition, as the patient's family cannot be present at the patient's bedside due to many restrictions, nurses stand in for family members and facilitate access and communication between patients and their loved ones.[3]

Low levels of knowledge, negative perceptions, and poor practices towards COVID-19 among healthcare workers directly lead to late diagnosis,

Int. J. Occup. Safety Health, Volume 14, No 1 (2024), 51-59

https://www.nepjol.info/index.php/IJOSH

51

poor adherence to infection control, and a faster spread of the disease.[4] Further, stigmatization by society due to the contagious nature of the illness, nurses may refuse to care for patients which leads to a most complex dilemma concerning a mindset of patient avoidance and a preference for caring for infectious patients.[5]

COVID-19 infection among HCWs can be common at the initial stage of the disease outbreak. Further, knowledge is crucial for establishing positive perceptions and preventive strategies that can reduce the infection rate among nurses. Zhang et al. (2020) reported that the lack of knowledge among frontline HCWs is the causative factor for the transmission of infection.[6] Similarly, a study from Greece found that a high level of knowledge among HCWs was significantly associated with a positive attitude and practice toward preventive health measures.[7]

Inadequate knowledge, improper practices, and negative perceptions can directly affect the patient's care and would increase the risk of infection among both the nurses and patients as well as nurses' willingness to work during any pandemic.[8] According to the available data, knowledge, perception, and practices regarding COVID-19 among HCWs especially among frontline nurses in Sri Lanka have not been studied up to date in Sri Lanka. Thus, this study aimed to assess the knowledge, perception, and practices regarding COVID-19 among frontline nurses at selected main three hospitals in Sri Lanka during the COVID-19 pandemic.

Methods

A descriptive cross-sectional study was conducted among frontline nurses in three hospitals in Sri Lanka as National Institute of Infectious Diseases (NIID), Angoda, National Hospital of Sri Lanka (NHSL), and Base Hospital, Mawanella (BHM). The study was carried out from June 2020 to December 2021. A total of 320 male and female frontline nurses who had been directly involved in the management of COVID-19 in all three selected hospitals were included and those who were on long-term leave (maternity leave, wedding leave) and were not willing to participate in the study were excluded. A pre-tested, validated, self-administered questionnaire (SAQ) was used to collect data on sociodemographic details, and knowledge, perceptions, and practices regarding COVID-19. SAQ was designed by the researcher

after an intensive literature review and expert advice from the supervisors. This SAQ was validated judgementally by experts in the fields of Medicine, Microbiology, and Nursing. The experts were invited to check the relevance and suitability of the SAQ for the Nurses in the Sri Lankan setting. All experts made some overall changes, especially in the wording and the understanding of the local language. These changes were corrected by the researcher. The SAQ was prepared in English language and a back-to-back translation process was used to translate it into Sinhala and Tamil language to assess the accuracy of the information. A score of "one" was given for every correct answer and a score of "zero" was given for every incorrect answer or no answer in the knowledge section of the SAQ.[9] The total score was converted into percentages and interpreted as follows; Good Knowledge - 76% - 100%, Adequate Knowledge - 50% - 75%, and Poor /Inadequate Knowledge - 0% - 49%.[10]

The SAQ was pre-tested for acceptability and comprehension and to assess the clarity and suitability of the wordings used in the questions, at Homagama Base Hospital, and modifications were made to the questionnaire by improving the clarification of questions, dropping some questions, and changing some words. The administration of the SAQ for the collection of data was carried out by the researcher. Following the formal introduction, the importance of the study and the nature of the study were explained onsite by using an information sheet at the selected hospitals among frontline nurses, and an email address was obtained from nurses who were willing to participate in the study. Initially, an informed consent form was emailed to each participant who fit for inclusion criteria. Once the consent was obtained from them, the SAQ was distributed via a Google form. Each participant was instructed to fill in the Google form during their free time to enhance compliance without disturbing their routine activities. SAQ was administered among 320 nurses. However, only 257 participants responded and returned the

questionnaire. Data analysis was done by using the statistical software SPSS version 25. Descriptive statistics were applied to obtain percentages and means with standard deviation and relevant inferential statistics was performed to interpret the findings. Kruskal-Wallis test was used to assess the median knowledge score between three unrelated groups (three hospitals) based on the non-normal distributions. A p-value of < 0.05 was considered statistically significant in all tests.

Ethical approval was obtained from the Ethics Committee of the Faculty of Nursing, KAATSU International University, and the National

Hospital of Sri Lanka. Permission to conduct the study was obtained from the Director, the National Institute of Infectious Diseases, the National Hospital of Sri Lanka, and Base Hospital Mawanella. Privacy, confidentiality, and anonymity of the subjects were ensured during data collection.

Results

The mean age of the participants was 31.87 (±6.67) years. Most of them were female [245, (95%)], and 94(66%) of them had less than 5 years of experience in their current working hospital. Nearly two-thirds [164(64%)] of participants were married and 224 (87%) had a nursing diploma as the highest education level (Table 1).

Table 1. Socio-demographic and work-related characteristics of the study participants

Characteristics	Frequency (%)
Age in years	
<30	147 (57.2)
30-40	86 (33.5)
≥40	24 (9.3)
Gender	
Male	12 (4.7)
Female	245 (95.3)
Marital status	
Married	164 (63.8)
Unmarried	93 36.2)
Highest educational Level	
Diploma	224 (87.2)
Graduate	32 (12.5)
Postgraduate	1 (0.3)
Working hospital	
NIID	120 (46.7)
NHSL	86 (33.5)
B.H.Mawanella	51 (19.8)
Working experience in hospital	
<1 year	75 (29.2)
1-5 year	94 (36.6)
6-10 year	57 (22.2)
≥10 year	31 (12.0)
Attended any workshop on COVID-19	
Yes	169 (65.9)
No	88 (34.1)
Working experiences in COVID-19 Management units	
<6 months	79 (30.7)
6-9 months	35 (13.6)
≥ 9 months	143 (55.7)
Maximum hours of work in COVID-19 unit/shift	
<1	17 (6.6)
1-3	37 (14.4)
≥ 3	203 (79.0)

In addition, 118(46%) of the participants were aware of the incubation period of COVID-19 and 244 (95%) mentioned that COVID-19 can be transmitted through air/droplets. Further, 251

(98%) of them stated that pneumonia is the main complication of COVID-19 and supportive care is the main treatment strategy available in Sri Lanka for the management of COVID-19 (Table 2).

Table 1: Knowledge of disease COVID-19

Knowledge related question	n (%)
Incubation period (correctly mentioned)	118 (45.9)
Symptoms of COVID-19 infection	
Headache	243 (94.6)
Fever	251 (97.7)
Cough	245 (95.3)
Sore throat	203 (79.0)
Skin rash	65 (25.3)
Mode of transmission	
Air/Droplets	244 (94.9)
Skin contact	185 (72.0)
Feco-oral route	222 (86.4)
Complications of COVID-19	
Pneumonia	251 (97.7)
Respiratory failure	245 (95.3)
Death	222 (86.4)
Available treatment of COVID-19 in Sri Lanka	
Antiviral therapy	144 (55.3)
Supportive care	234 (91.4)
Vaccination	6 (2.3)

Table 2: Knowledge about COVID-19, its management, and preventive measures

Statements	Yes n (%)	No n (%)	Don't know n (%)
COVID-19 is a viral disease	248 (96.5)	9 (3.5)	0 (0)
COVID-19 is transmitted by direct contact with infected persons	238 (92.6)	12 (4.7)	7 (2.7)
COVID-19 is transmitted by dealing with domestic animals	113 (44.0)	42 (16.3)	102 (39.7)
Vaccines are available for COVID-19	227 (88.4)	23 (8.9)	7 (2.7)
Antibiotics are the drug of choice in treating COVID-19	193 (75.1)	47 (18.3)	17 (6.6)
The virus may be more dangerous for the elderly	245 (95.3)	9 (3.5)	3 (1.2)
The virus may be more dangerous for patients with chronic diseases	249 (96.9)	6 (2.3)	2 (0.8)
Healthcare workers are more prone to COVID-19	223 (86.8)	26 (10.1)	8 (3.1)
COVID-19 always causes death	224 (84.7)	31 (12.4)	2 (0.8)
COVID-19 is transmitted through eating contaminated food of COVID -19 patient	87 (33.9)	120 (46.7)	50 (19.5)
COVID-19 is transmitted by arthropods	161 (61.6)	15 (5.8)	81 (31.5)
COVID-19 leads to pneumonia, respiratory failure, and death	237 (92.2)	19 (7.4)	1 (0.4)
Persons with COVID-19 cannot infect the virus others if they have no symptoms	205 (79.8)	40 (15.6)	12 (4.7)
Using a hand sanitizer with 70% alcohol is better than washing hands with soap and water	188 (73.2)	52 (20.2)	17 (6.6)
Preventive Measures			
Wash hands with soap and water or sanitizer	257(100)	0 (0)	0 (0)
Avoid touching eyes, nose, and mouth always	257(100)	0 (0)	0 (0)
Wearing facemask	257(100)	0 (0)	0 (0)
Covering the nose and mouth while coughing	254 (98.4)	3 (1.2)	0 (0)
Avoiding crowded public places	256 (99.6)	1 (0.4)	0 (0)
Frequency cleaning and disinfecting surfaces	254 (98.8)	2 (0.8)	0 (0)
Keep at least one-meter distance between people	245 (95.3)	11 (4.3)	1 (0.4)
Washing nose with a salty solution	187 (72.8)	22 (8.6)	48 (18.7)
Avoid direct conduct with colleagues	198 (77.0)	42 (16.3)	17 (6.7)

Furthermore, 248(97%) participants mentioned that the COVID- 19 is a viral disease, and 237(92%)

of them stated that COVID-19 leads to pneumonia, respiratory failure, and death. Only, 227 (88%) of them stated that vaccines are available for COVID-19. Further, 193 (75%) of them stated that antibiotics are the drugs of choice in treating COVID-19 and 224 (85%) of them mentioned that COVID-19 is the cause of death. Nearly, 223 (86%) of participants mentioned that HCWs are more prone to develop COVID-19. In addition, all participants stated that washing hands with soap and water, avoiding touching eyes, nose, and mouth, and wearing a facemask are correct preventive measures against COVID-19 spread. Further, 245 (95%) of participants mentioned that keeping at least a one-meter distance between

people is a preventive measure for COVID-19 infection (Table 3).

Overall, 204 (79.4%) had a good level of knowledge and 6 (2.3%) had a poor level of knowledge, and the mean knowledge score was 78.11(±8.62). Further, the knowledge level of the participants was significantly associated with their marital status (p=0.04) and their participation in the COVID-19 management workshop or lecture (p=0.00) (Table 4). There was a statistically significant median difference of knowledge score across all three hospitals (p = 0.00) with a median of 78.0 (75.6-85.4) for NIID, 78.0 (73.2-80.5) for NHSL and 82.9 (78.0-85.4) for BH Marawilla (Kruskal-Wallis test).

Table 3: Factors associated with knowledge level among all participants

Socio-Demographic Characteristics	Poor Knowledge n (%) n=6	Adequate knowledge n (%) n=47	Good Knowledge n (%) n=204	p-value*
Gender				0.79
Male	0 (0)	2 (4.3)	10 (4.9)	
Female	6 (100)	45 (95.7)	194 (95.1)	
Marital Status				0.04
Married	4(66.7)	20(42.6)	140(68.6)	
Unmarried	2(33.3)	27(57.4)	64(31.4)	
Educational level				0.36
Diploma	6 (100)	44(93.6)	174(85.3)	
Graduate	0 (0)	3(6.4)	29(14.2)	
Postgraduate	0 (0)	0 (0)	1(0.5)	
Experience in COVID-19 management (months)				0.40
<6	1(16.7)	22(46.8)	56(27.4)	
6-9	1(16.7)	6(12.8)	28(13.7)	
>9	4(66.6)	19(40.4)	120(58.9)	
Maximum hours working with COVID-19 patients				0.78
<1	0 (0)	4(8.5)	13(6.4)	
1-3	0 (0)	8(17.0)	29 (14.2)	
>3	6 (100)	35 (74.5)	162 (79.4)	
Attended lectures on COVID-19				0.00
Yes	0 (0)	35(74.5)	134 (65.7)	
No	6 (100)	12 (25.5)	70 (34.3)	

*- Chi-square test

Only 229(89%) of participants stated that they would get COVID-19 and only 10 (3.9%) of participants were not worried about being a nurse in the health sector in the present situation. Approximately 135 (52%) of the participants stated that transmission of COVID-19 can be prevented by frequent hand washing. Nearly, 184(82%) of participants agreed to vaccinate against COVID-19 and 185 (72%) were agreeable

to taking more responsibility for infection control in their unit/ward in the present situation. However, 15(6%) of the participants mentioned that COVID-19 is not a preventable disease and nearly 219 (85%) of participants stated that standard precautions can protect them against COVID-19 (Table 5).

Nearly two-thirds, 218 (85%) of participants mentioned that they know how to wear PPE

correctly. Further, 135 (64%) of participants gave an incorrect percentage of TCL that is used for cleaning linen and nearly 216 (84%) of participants stated that they are willing to attend to a COVID-19 patient (Table 6).

Table 4: Perception regarding COVID-19 among all participants

Questions	Definitely No n (%)	May be n (%)	Most probably n (%)	Definitely Yes n (%)
Do you think you will get COVID-19	11(4.4)	17(6.6)	188(73.0)	41(16.0)
You are worried to be a nurse in the health sector in the present situation	10(3.9)	26(10.1)	41(16.0)	180(70.0)
Transmission of COVID-19 can be prevented by washing hands frequently	15(5.8)	25(9.8)	82(31.9)	135(51.5)
If you get COVID-19, you will agree to be isolated in a health facility	7(2.7)	43(16.7)	31(12.1)	176(68.5)
Will you be afraid of catching COVID-19 when you are giving care to a COVID-19 patient?	22(8.6)	23(8.9)	69(26.8)	143(55.6)
If the COVID-19 vaccine is available, will you have it	13(5.1)	33(12.8)	27(10.5)	184(71.6)
If anyone gets the coronavirus, do you think the possibility of survival is high	19(7.4)	115(44.7)	79(30.7)	44(17.2)
Do you take more responsibility for infection control in your unit/ward in the present situation?	21(8.2)	31(12.0)	20(7.8)	185(72.0)
COVID-19 is a severe disease	16(6.2)	76(29.6)	44(17.1)	121(47.1)
COVID-19 can be prevented	15(5.8)	31(12.5)	79(30.7)	131(51.0)
Standard precautions can protect us against COVID-19	18(7.0)	20(7.8)	35(13.6)	184(71.6)
I am confident that Sri Lanka can overcome COVID-19	16(6.2)	113(44.0)	73(28.4)	55(21.4)
Regulations taken by the government are enough to combat disease	27(10.5)	80(31.1)	93(36.2)	57(22.2)
COVID-19 is currently diagnosed in Sri Lanka	20(7.8)	27(10.5)	40(15.6)	170(66.1)
I am confident that the hospital is treating COVID-19 patients effectively	13(5.1)	57(22.1)	66(25.7)	121(47.1)

Table 5: Practices regarding COVID-19

Statement	Yes/Correct n (%)	No/Wrong n (%)	Not responded n (%)
Do you know how to wear PPE correctly?	218(84.8)	39(15.2)	0 (0)
Do you know how to remove PPE correctly?	214(83.3)	43(16.7)	0 (0)
What percentage of TCL do you use for linen cleaning?	90(35.0)	162(63.0)	5(2.0)
What percentage of TCL do you use for cleaning instruments?	165(64.2)	91(35.4)	1(0.4)
Do you wear a mask in your working area?	241(93.8)	16(6.2)	0 (0)
Frequently you wash your hands at your workplace	110(42.8)	147(57.2)	0 (0)
Will you willingly attend to a COVID-19 patient?	216(84.0)	38(14.8)	3(1.2)

Discussion

The study evaluated the knowledge, perception, and practice regarding COVID-19 among nurses working at main three hospitals in Sri Lanka. Nurses are one of the most important key players in the battle against COVID-19 as HCWs during the pandemic. The knowledge, perception, and practice of nurses towards the COVID-19 pandemic play a very important role in the way they accept patient care, the measures put in place to control its spread, and their willingness to seek and adhere to care.[11] The present study revealed

that most of the nurses (79%) had a good level of knowledge about COVID-19 control and prevention. Nurses may have more opportunities for being counseled or educated on the disease and its management through different means of communication. Similarly, a high level of knowledge was reported from studies done among HCWs in Vietnam, China, and Pakistan.[12] In addition, these findings are consistent with the findings of studies conducted in other countries such as Nepal and Greece.[4,7] Nurses with a good level of knowledge might lead to early diagnosis, proper adherence to infection control, and a slower spread of the disease.

Further, the study showed that most of the nurses were aware of the main symptoms of COVID-19 such as fever (97.7%), headache (94.6%), cough (95.3%), and sore throat (79%). This would enable them to identify patients early and to identify if they get the illness. The majority of the nurses knew that COVID-19 transmission occurs through air/droplets (94.9%), and direct contact (72%). This is quite a contrast to the findings of a study conducted in Ho Chi Minh City Hospital, Vietnam where only less than two-thirds of answers related to the transmission by close contact with an infected person.[13] In addition, the majority of participants (>95%) were aware that patients with underlying chronic diseases are at a high risk of getting an infection and this finding is consistent with some previous studies conducted on COVID-19 in Vietnam and China.[14,15]

Further, the study revealed that the knowledge level of the nurses was significantly associated with their marital status (p=0.04) and their participation in the COVID-19 management workshop or lectures (p=0.00). The plausible justification for the association between workshop attendance and knowledge level is that those who have participated in the workshop may have greater exposure to the experts and educational material on COVID-19 and its management which influences the level of knowledge. However, in contrast to these findings, a study conducted among Egyptians found that knowledge about COVID-19 was significantly associated with age,

education level, and income.[16] Similarly, another study done in Bangladesh found that age and residence were the associated factors of knowledge level.[17]

In addition, the findings revealed that most of the participants had positive perceptions towards COVID-19 control and prevention where more than 80% of nurses mentioned that COVID-19 can be prevented. A similar finding was observed in a study conducted by Wake, 2020.[11] In addition, nearly 70% of participants are worried about being a nurse in the health sector in the present situation, and 55.6% are afraid of catching COVID-19 when they provide care to a COVID-19 patient. However, 71.6% perceived that standard precautions can protect them against COVID-19. These fears were more apparent in studies done in some other countries. A study in Henan, China, found that around 85% of the surveyed HCWs were afraid of becoming infected at work.[6] Similarly, in a study done in Turkey fear of coronavirus among intern dentists was moderate.[18]

Several studies have been conducted to assess practices among nurses and other HCWs regarding COVID-19. The present study revealed that the majority of the participants had positive practices regarding COVID-19 management. The reasons could be because of the success rate in COVID-19 prevention and control in Sri Lanka and this may be due to the acquisition of adequate knowledge and proper practices among nurses. It was stated that individuals with a high knowledge score would practice more preventive measures.[7] In addition, it is noteworthy to report that in the present study, the majority of participants (84%) reported their willingness to attend to care for COVID-19 patients. Similarly, research conducted in Saudi Arabia, Pakistan, and China found that more than 80% of participants had good practices regarding COVID-19 management.[6,19,20] However, in contrast to these findings, a study done in Ethiopia indicated that the general prevalence of good practice was only 25.9%.[21]

However, some gaps in the practice were identified among nurses in the present study. The

practices on cleaning linen and instruments were not satisfactory. Further, only 42.8% of the nurses were washing their hands frequently at their workplace. This finding does not comply with the five times of hand hygiene recommended by the WHO in their daily practice. In contrast to this finding, a study done in Uganda showed a higher percentage (76%) of HCWs comply with frequent hand washing.[22] Frequent awareness needs to be arranged for nurses to address these practice gaps through the support of the administration.

Limitations

Since this study was conducted only among nurses in three hospitals, the generalizability of these findings may be questioned. As the pandemic is evolving rapidly, the findings may have now changed too. Further, the study participants were only nurses and other HCWs were not included in the study. Thus, findings may not be generalized to all HCWs in Sri Lanka.

Conclusions

The study identified that frontline nurses in three hospitals in Sri Lanka had good knowledge, perception, and practice towards COVID-19 and its management. However, there were a few gaps in the knowledge, perception, and practice. Early attention to such gaps would enable nurses to further improve the care of COVID-19 patients while protecting nurses from getting the infection.

It is important to build the confidence of nurses regarding their practice of COVID-19. Further, more frequent workshops and lectures should be conducted to improve their knowledge, perceptions, and their confidence in practice. In addition, recorded video clips on identified aspects can be distributed among nurses to improve their knowledge and practice on COVID-19.

References

1. Temsah MH, Al Huzaimi A, Alrabiaah A, Alamro N, Al-Sohime F, Al-Eyadhy A, et al. Changes in healthcare workers' knowledge, attitudes, practices, and stress during the COVID-19 pandemic. Medicine (Baltimore). 2021; 7:100(18):e25825. Available from: https://doi.org/10.1097/md.0000000000025825

2. Mo Y, Deng L, Zhang L, Lang Q, Liao C, Wang N, et al. Work stress among Chinese nurses to support Wuhan in fighting against COVID-19 epidemic. J Nurs Manag. 2020;28(5):1002-1009. Available from: https://doi.org/10.1111/jonm.13014

3. Emanuel EJ, Persad G, Upshur R, Thome B, Parker M, Glickman A, et al. Fair Allocation of Scarce Medical Resources in the Time of Covid-19. N Engl J Med. 2020;382(21):2049-2055. Available from: https://doi.org/10.1056/nejmsb2005114

4. Tamang N, Rai S, Dhungana S, Rai P, Sherchan B, Shah B. COVID-19: A National Survey on Perceived Level of Knowledge, Attitude and Practice among Frontline Medical Professionals in Nepal. BMC Public Health. 2020; 20, 1905. Available from: https://doi.org/10.21203/rs.3.rs-40299/v1

5. Choi JS, Kim JS. Factors influencing nurses' ethical problems during the outbreak of MERS-Cov. Nurs Ethic 2018; 25(3): 335–45. Available from: https://doi.org/10.1177/0969733016648205

6. Zhang M, Zhou M, Tang F, Nie H, Zhang L, You G. Knowledge, attitude, and practice regarding COVID-19 among healthcare workers in Henan, China. The Journal of Hospital Infection 2020; 105(2):183-7. Available from: https://doi.org/10.1016/j.jhin.2020.04.012

7. Papagiannis D, Malli F, Raptis DG, Papathanasiou IV, Fradelos EC, Daniil Z, et al. Assessment of Knowledge, Attitudes, and Practices towards New Coronavirus (SARS-CoV-2) of Health Care Professionals in Greece before the Outbreak Period. Int J Environ Res Public Health. 2020;17(14):4925. Available from:

https://doi.org/10.3390/ijerph17144925

8. Upadhyaya DP, Paudel R, Acharya D, Khoshnood K, Lee K, Park JH, et al. Frontline Healthcare Workers' Knowledge and Perception of COVID-19, and Willingness to Work during the Pandemic in Nepal. Healthcare (Basel). 2020;8(4):554. Available from: https://doi.org/10.3390/healthcare8040554

9. Islam SM, Niessen LW, Seissler J, Ferrari U, Biswas T, Islam A, Lechner A. Diabetes knowledge and glycemic control among patients with type 2 diabetes in Bangladesh. Springerplus. 2015; 4:284. Available from: https://doi.org/10.1186/s40064-015-1103-7

10. Kisokanth G, Prathapan G, Indrakumar J, Joseph J. Patients with diabetes mellitus in a tertiary care hospital; their knowledge on disease, treatments and complications. Int J Curr Res. 2014; 6(7):7487-92. Available from: https://www.journalcra.com/sites/default/files/issue-pdf/5724.pdf

11. Wake AD. Knowledge, Attitude, Practice, and Associated Factors Regarding the Novel Coronavirus Disease 2019 (COVID-19) Pandemic. Infect Drug Resist 2020;13:3817-32. Available from: https://doi.org/10.2147/idr.s275689

12. Tien TQ, Tuyet-Hanh TT, Linh TNQ, Phuc HS, Nhu HV. Knowledge, Attitudes, and Practices Regarding COVID-19 prevention among Vietnamese Healthcare Workers in 2020. Journal of Health Services Insights 2021; 14:1-7. Available from: https://doi.org/10.1177/11786329211019225

13. Huynh G, Han NTN, Khanh TV, Ngan VK. Knowledge and attitude toward COVID-19 among healthcare workers at District 2 Hospital, Ho Chi Minh City. Asian Pac J Trop Med. 2020;13(6):260-5. Available from: https://doi.org/10.2147/RMHP.S268876

14. Carlos WG, Dela Cruz CS, Cao B, Pasnick S, Jamil S. Novel Wuhan (2019-nCoV) Coronavirus. Am J Respir Crit Care Med. 2020;201(4):P7-P8. Available from: https://pubmed.ncbi.nlm.nih.gov/32004066/

15. Phan LT, Nguyen TV, Luong QC, Nguyen TV, Nguyen HT, Le HQ, et al. Importation and Human-to-Human Transmission of a Novel Coronavirus in Vietnam. N Engl J Med. 2020; 382(9):872-874.

Available from: https://pubmed.ncbi.nlm.nih.gov/31991079

16. Abdelhafiz AS, Mohammed Z, Ibrahim ME, Ziady HH, Alorabi M, Ayyad M, et al. Knowledge, Perceptions, and Attitude of Egyptians Towards the Novel Coronavirus Disease (COVID-19). J Community Health. 2020;45(5):881-890. Available from: https://doi.org/10.1007/s10900-020-00827-7

17. Ferdous MZ, Islam MS, Sikder MT, Mosaddek ASM, Zegarra-Valdivia JA, Gozal D. Knowledge, attitude, and practice regarding COVID-19 outbreak in Bangladesh: An online-based cross-sectional study. PLoS One. 2020;15(10):e0239254. Available from: https://doi.org/10.1371/journal.pone.0239254

18. Akbulut Y, Onder M, Kutlu G, Durur F, Orhan K. Determining the COVID-19 Knowledge, Awareness and Anxiety Levels of Intern Dentists. International Journal of Occupational Safety and Health. 2023;13(1), 108–18. Available from: https://doi.org/10.3126/ijosh.v13i1.45270

19. Alahdal H, Basingab F, Alotaibi R. An analytical study on the awareness, attitude and practice during the COVID-19 pandemic in Riyadh, Saudi Arabia. J Infect Public Health. 2020, S1876034120305256. Available from: https://doi.org/10.1016/j.jiph.2020.06.015

20. Saqlain M, Munir MM, Rehman SU, Gulzar A, Naz S, Ahmed Z, et al. Knowledge, attitude, practice and perceived barriers among healthcare workers regarding COVID-19: a cross-sectional survey from Pakistan. J Hosp Infect. 2020;105(3):419-423. Available from: https://doi.org/10.1016/j.jiph.2020.06.015

21. Akalu Y, Ayelign B, Molla MD. Knowledge, attitude and practice towards COVID-19 among chronic disease patients at Addis Zemen Hospital, Northwest Ethiopia. Infect Drug Resist 2020; 13:1949–60. Available from: https://doi.org/10.2147%2FIDR.S258736

22. 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. Available from: https://doi.org/10.3389/fpubh.2020.00181