THE IMPACT OF THE LEVEL OF EDUCATION OF HEALTH PROFESSIONALS ON THE ATTITUDE AND PRACTICE OF USING PROTECTIVE EQUIPMENT IN PANDEMIC CONDITIONS AS AN ELEMENT OF RISK MANAGEMENT

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Abstract: The goal of complete risk management in health care institutions is to protect health care providers from unfortunate events, incidents. The practice of healthcare professionals related to protective equipment is one of the crucial steps in risk management. And practice is expressed in relation to knowledge and education about a disease.
The aim of this research is to analyze the attitude and practice of the use of protective equipment in relation to the level of education of health professionals.
For the purpose of conducting the research, 604 respondents were surveyed, health professionals of all profiles, who work in health institutions in the Sarajevo Canton. A survey questionnaire was used as a research instrument, the modification of which was created on the basis of three questionnaires. The created questionnaire was created on the basis of the following questionnaires: *COVID 19 Health Worker's Perception Survey*, *Surveillance questionnaire for SARS-CoV-2 infection among health workers*, *Questionnaire on Risk Perception and Behavior of Public Health Emergencies*. The research was conducted in the period from 30.11.2021 to 31.05.2022.
Out of 604 subjects, 82.3% were women. The majority of respondents, 34.1%, were aged 41-50 years. In relation to the level of professional qualification, 324 respondents (53.6%) had a secondary education (SSS), and 36 (5.96%) respondents had a higher education and 244 (40.4%) had a university degree. Of the total number, 373 (62.8%) attend discussions related to the SARS-CoV-2 virus, while 221 (37.2%) respondents do not. Overall, the average number of points in specific knowledge was 9.27±1.35 for respondents with secondary education, 9.33±0.68 for respondents with university education and 9.31±1.28 for respondents with university education. No significant statistical difference was found (F=0.303; p=0.739). Gloves were used by 88.7% of respondents in their daily work, masks by 98.5% of respondents, disposable covers/suits/aprons were used daily by 80.2% of respondents, eye protection was used by 64.5% of respondents. Increased hand hygiene was carried out by 98.9% of respondents, and an N95 mask or FFP3 was used by 58.7% of respondents.
In this study, no statistical difference in knowledge was observed in relation to professional qualifications. The practice of using personal protective equipment was high, but the attitude did not follow the practice, and we explain this gap by the additional need for education of health workers of all levels of professional qualifications.
Keywords: attitude, practice, education, protective equipment, COVID-19 pandemic

1. INTRODUCTION

Since December 2019, the global coronavirus (COVID-19) pandemic has been spreading. Most countries on all continents have introduced strict epidemiological measures aimed at preventing the spread of the virus (Kim et al. 2020).When patients with infectious diseases (ID) present to the hospital, emergency department (ED) clinicians are at risk of exposure, especially before a diagnosis is made. (Mary V. et al. 2024). Personal protective equipment (PPE) refers to protection clothing, helmets, gloves, face shields, goggles, facemasks, and other equipment designed to protect the wearer from injury and halt the spread of infection.(Bizuayehu At Ataro et al. 2024).

The attitude and practice of healthcare professionals on protective equipment is one of the crucial steps in risk management. Insufficient education of staff, unavailability of protective masks, poor compliance of health professionals with personal protection practices, inadequate disinfection and sterilization of equipment, lack of monitoring mechanism of health workers are cited as potential predictors (Abolfotouh M. A. et al.2021).An

example is a study from China, which is also the first country to report the spread of COVID-19 infections. A recent study from Wuhan linked direct work with COVID-19 patients, long working hours and suboptimal hand hygiene as possible risk factors for COVID-19 infection of healthcare workers, and the infection arose due to insufficient knowledge about the novel coronavirus (Mariangela et.al., 2020) An example of the importance of educating healthcare professionals can be found in the study on personal protective equipment against Ebola. A significant reduction in errors in putting on and taking off personal protective equipment was demonstrated after only one hour of theoretical instruction in combination with three simulation practical exercises, which were repeated after 72 hours. (Arslanca et al, 2021).

Lack of knowledge, attitudes and behaviours is a form of unpreparedness of health workers against the pandemic, leading to failures, roles and responsibilities that affect the control of measures (Xiao et al., 2020). Knowledge is influenced by several factors, including level of education, awareness, culture of continuing education, and past experiences (Fisher D. et al 2020).Lessons learned from previous viral outbreaks have helped some countries such as China and Saudi Arabia to cope with and respond to the current challenges of the COVID-19 pandemic (Kaul et al, 2021).However, this is not always the case: some countries that rank high in pandemic preparedness as assessed by the Global Health Security Index have shown inconsistency and cannot be satisfied with their actual performance during the current COVID-19 pandemic (Chen et al, 2021).

The aim of this research is to analyze the attitude and practice of the use of protective equipment in relation to the level of education of health professionals.

2. SUBJECTS AND WORKING METHODS

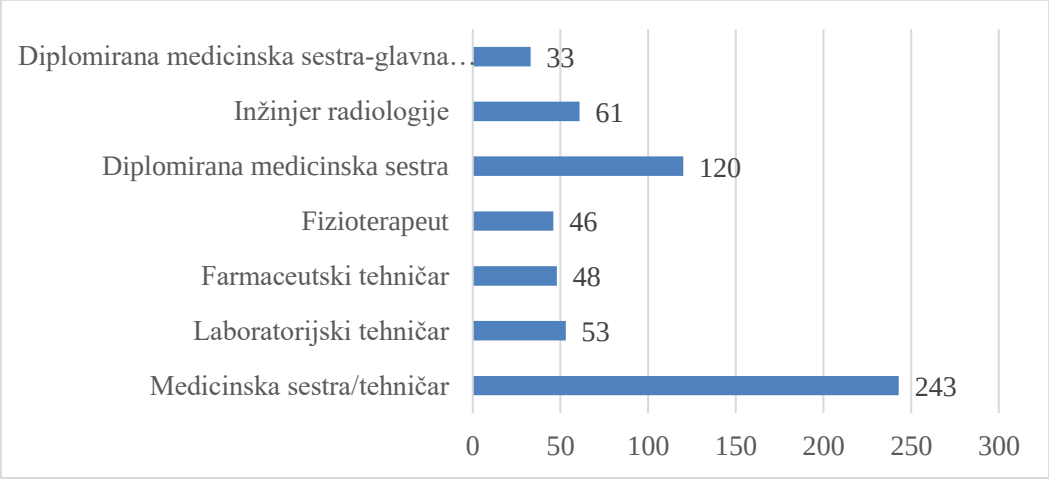
For the purpose of conducting the research, 604 respondents were surveyed, health professionals of all profiles, who work in health institutions in the Sarajevo Canton. The research included health professionals of both sexes, employed in health institutions of primary, secondary and tertiary level of health care who have more than one year of service. After obtaining the consent of the competent Chambers, the questionnaires were electronically distributed to the respondents in Google Forms. A survey questionnaire was used as a research instrument, the modification of which was created on the basis of three questionnaires. The created questionnaire was created on the basis of the following questionnaires: *COVID 19 Health Worker's Perception Survey*, *Surveillance questionnaire for SARS-CoV-2 infection among health workers*, *Questionnaire on Risk Perception and Behavior of Public Health Emergencies*. The research was conducted in the period from 30.11.2021 to 31.05.2022.

After conducting research with the help of Google Forms, the collected data was entered into an electronic database created in Microsoft Office Excel 365. The statistical program IBM SPSS Statistics 27.00 (IBM Corporation, Armonk, New York) was used for statistical data processing.

3. RESULTS

Of the 604 respondents, 82.3% were women. The majority of respondents, 34.1%, were aged 41-50 years. Most of the respondents, 40.2% of them, worked as nurses. Graduate nurses accounted for 19.9% of the sample. In relation to the level of professional qualification, 324 respondents (53.6%) had a secondary education (SSS), and 36 (5.96%) respondents had a higher education and 244 (40.4%) had a university degree.

Chart 1. Number of respondents in relation to the level of education

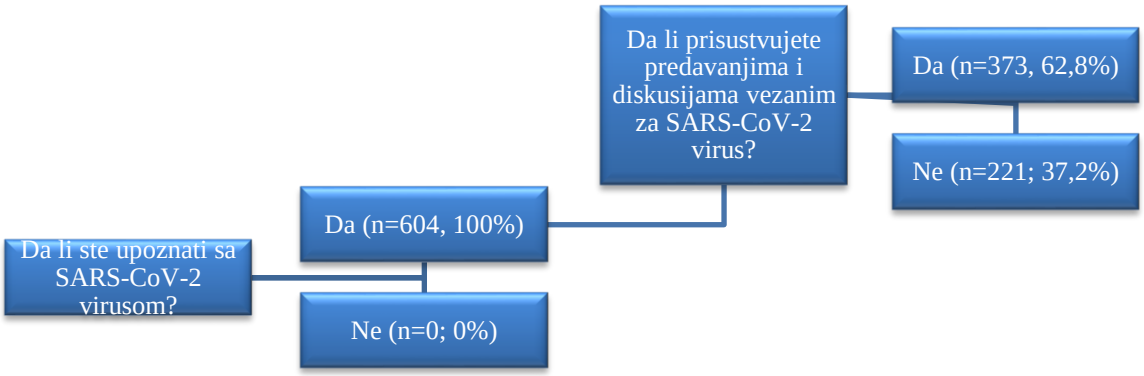


Source: Authors' research

Graph 1 shows the respondents in relation to their professional qualifications, where it is evident that the majority of respondents, 243 of them, work in the position of nurse technicians, or 40.2% of all respondents.

There were 214 (35.5%) subjects with a university degree, of which 153 (25.40%) were registered nurses, of which 33 were registered nurses as head nurses of a hospital or department. There were 61 radiology engineers (10.10%). The study included 46 (7.60%) physiotherapists, 48 (7.90%) pharmacy technicians, and 53 (8.80%) laboratory technicians.

Chart 2. Knowledge of SARS-CoV-2 and attendance at continuing education



Source: Authors' research

Out of 604 respondents, all respondents (100%) stated that they were aware of the SARS-CoV-2 virus. Of the total number, 373 (62.8%) attend discussions related to the SARS-CoV-2 virus, while 221 (37.2%) respondents do not.

Table 1. Analysis of responses on specific knowledge in relation to the level of professional qualification

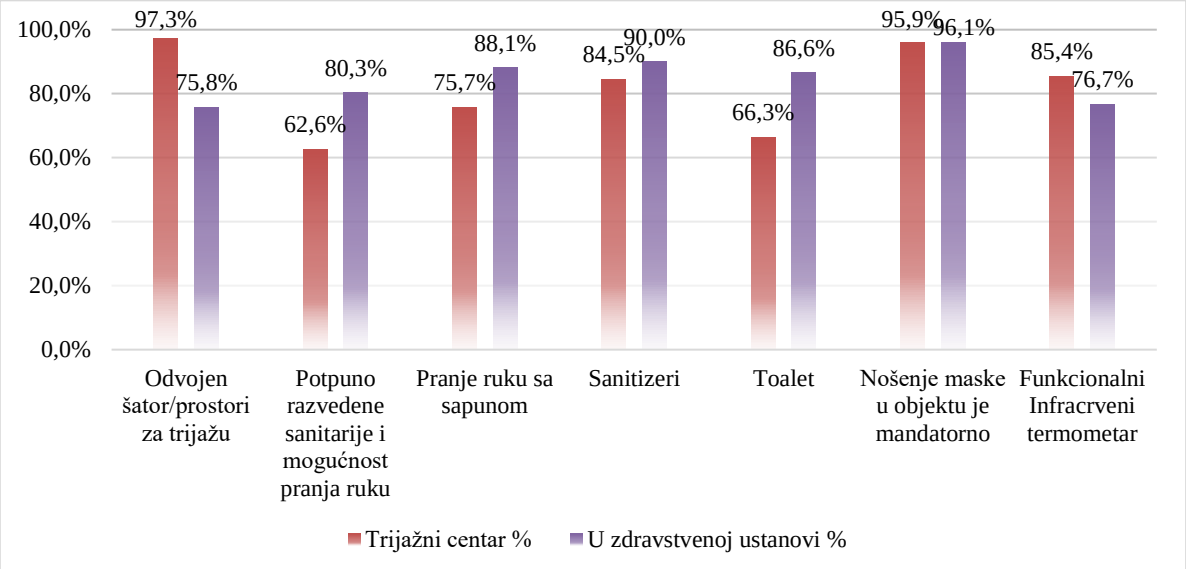
Chapter 2 - Which Claims Are True?		**SSS**		**College of Applied Sciences**		**VSS**		***x2***	**P**
		N	**%**	**N**	**%**	**N**	**%**		
Covid-19 is different from the flu	False	27	8.3	3	8.3	27	11.2	1.654	0,437
	Exactly	297	91.7	33	91.7	217	88.8		
There is no specific therapy, but it is symptomatic	False	61	18.9	8	24.2	63	26.0	5,253	0,072
	Exactly	263	81.1	25	75.8	181	74.0		
Symptoms include fever, fatigue, dry cough, and shortness of breath	False	9	2.9	2	5.6	4	1.6	0,882	0,643
	Exactly	315	97.1	34	94.4	240	98.4		
Most have mild to moderate symptoms, and some severe cases die	False	19	6.0	3	8.3	6	2.4	3,777	0,151
	Exactly	305	94.0	33	91.7	238	97.6		
COVID-19 is transmitted from person to person	False	18	5.7	1	2.8	11	4.5	0,899	0,638
	Exactly	306	94.3	35	97.2	233	95.5		
The SARS-CoV-2 virus is transmitted by droplet breathing	False	15	4.5	3	8.6	6	2.5	2,863	0,239
	Exactly	309	95.5	32	91.4	238	97.5		
Avoiding crowds reduces the risk of getting sick	False	21	6.5	0	0.0	16	6.4	2,463	0,292
	Exactly	303	93.5	36	100.0	228	93.6		
Wearing masks in public spaces reduces the possibility of infection	False	14	4.2	0	0.0	15	6.1	4,073	0,130
	Exactly	310	95.8	36	100.0	229	93.9		
Frequent hand washing reduces the possibility of infection	False	11	3.3	0	0.0	10	4.1	2,762	0,251
	Exactly	313	96.7	36	100.0	234	95.9		

It is necessary to detect the virus early, in order to prescribe adequate therapy, with measures of self-isolation	False	17	5.1	0	0.0	13	5.3	2,710	0,258
	Exactly	307	94.9	36	100.0	231	94.7		
Sum of points of specific knowledge	Mean ± SD	9,30±1,30		9,33±0,68		9,31±1,28		0,562	0,570
Relative Assessment of Specialist Knowledge	%	93,46%		94,22%		92,99%			

Source: Authors' research

Table 1 shows the answers to specific knowledge questions. It was found that 297 (91.7%) respondents with SSS know that COVID is different from influenza, as well as 33 (91.7%) respondents with higher education. The same is true of 217 (88.5%) respondents with a college degree. No significant statistical difference was found (x2=1.654; p=0.437). That there is no special therapy, but that it is symptomatic, was correctly answered by 263 (80.2%) respondents with SSS, 25 (69.4%) subjects with university studies and 181 (74%) subjects with higher education. No significant statistical difference was found (x2=5.253; p=0.072). Knowledge of the symptoms of COVID-19 disease was shown by 315 (97.2%) subjects with SSS, 34 (94.4%) with college and 240 (97.1%) with college (x2=0.882; p=0.643). The majority of patients with mild to moderate symptoms were considered by 305 (94.1%) subjects with SSS, 33 (91.7%) subjects with university studies and 238 (97.1%) subjects with higher education. However, no significant statistical difference was found (x2=3.777; p=0.151). Also, no significant differences were found in the transmission of COVID-19 from person to person (p=0.638), and the knowledge of the transmission of the virus by droplets (p=0.239). That avoiding crowds reduces the risk of disease was correctly answered by 93.5% of respondents with SSS, 100% of respondents with university and 93.6% of respondents with higher education. That the virus needs to be detected early in order to administer adequate therapy was considered by 307 (94.9%) subjects with SSS, 36 (100.0%) subjects with college and 231 (94.7%) subjects with college. No significant statistical difference was found. Overall, the average number of points in specific knowledge was 9.27±1.35 for respondents with secondary education, 9.33±0.68 for respondents with university education and 9.31±1.28 for respondents with university education. No significant statistical difference was found (F=0.303; p=0.739).

Chart 3. Equipment of premises in health care institutions and triage centers



Source: Authors' research

588 (97.4%) respondents in triage centres had a separate tent/rooms for triage in their health care institutions, i.e. separate rooms in 458 (75.8%) health institutions. 378 (62.6%) respondents had completely divorced sanitary facilities and handwashing facilities in triage centers, and 485 (80.3%) within health care institutions. Hand washing with soap was enabled for 457 (75.7%) patients in the triage center, or 532 (88.1%) subjects in the health care institution. 510 (84.4%) respondents had access to sanitizers in triage centers, while 544 (90.1%) respondents had access to sanitizers in a health institution. Toilets in triage centers were mentioned by 400 (66.2%) respondents, or 523 (86.6%) in a health institution. 579 (95.9%) respondents stated that wearing a mask

is mandatory in triage centers, and 580 (96.0%) respondents in health care institutions. A functional infrared thermometer was present in 516 (85.4%) subjects in triage centers, and in 463 (76.7%) subjects in a healthcare institution.

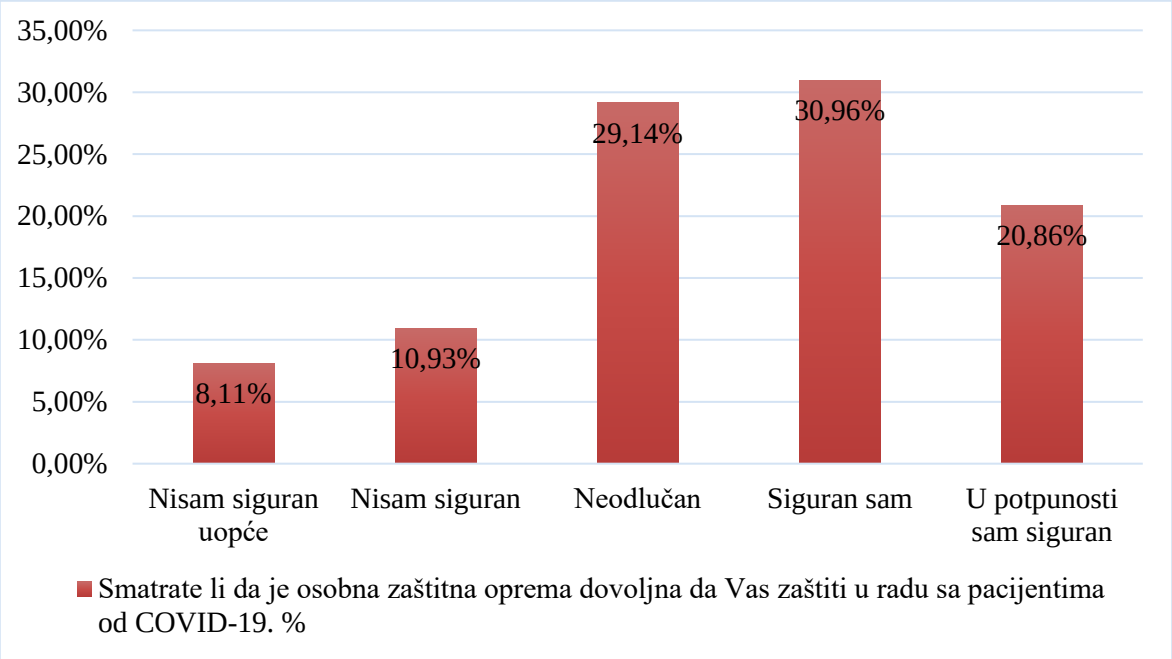
Table 2. Continuous use of equipment

Equipment	Continuous use	N	%
Glove	Not	68	11.3%
	Also	536	88.7%
Mask	Not	9	1.5%
	Also	595	98.5%
Disposable covers/suits/aprons	Not	119	19.8%
	Also	483	80.2%
Eye protection (visor, goggles)	Not	214	35.5%
	Also	389	64.5%
Enhanced hand hygiene	Not	7	1.1%
	Also	596	98.9%
N95 Mask	Not	249	41.3%
	Also	353	58.7%

Source: Authors' research

Gloves were used by 88.7% of respondents in their daily work, masks by 98.5% of respondents, disposable covers/suits/aprons were used daily by 80.2% of respondents, eye protection was used by 64.5% of respondents. Increased hand hygiene was carried out by 98.9% of respondents, and an N95 mask or FFP3 was used by 58.7% of respondents.

Chart 4. Attitude on protective equipment when working with COVID-19 patients



Source: Authors' research

126 (20.86%) respondents are completely sure that protective equipment at work is sufficient to protect patients from infection, and 187 (30.96%) believe that they are safe. 176 (29.14%) respondents were undecided. 66 (10.93%) respondents said they were not sure how much personal protective equipment protects them when working with patients from possible infection, and 49 (8.11%) respondents stated that they were not sure at all.

4. DISCUSSION

The lack of personal protective equipment (PPE) is the most important obstacle to ensuring the safety of healthcare professionals, the lack of which has often forced healthcare professionals to re-use or prolong equipment, putting them directly at risk of infection, but also violating the rules of good clinical practice (Nguyen L.H.2020).

A study conducted by Pallivalappil et al. highlights several shortcomings in the implementation of infection prevention and control measures in public and private hospitals of India. Insufficient staff education, unavailability of protective masks, poor compliance of health professionals with personal protection practices, inadequate disinfection and sterilization of equipment, lack of monitoring mechanism for health professionals are cited as potential predictors (Pallivalappil et al., 2020)

In this research, in relation to the level of professional qualification, 324 respondents (53.6%) had a secondary education (SSS), and 36 (5.96%) respondents had a higher education and 244 (40.4%) respondents had a university degree. In this research, the majority of respondents, 243 of them, work in the position of nurse technicians, or 40.2% of all respondents. There were 214 (35.5%) subjects with a university degree, of which 153 (25.40%) were registered nurses, of which 33 were registered nurses as head nurses of a hospital or department.

By analyzing the knowledge in this study, we came to the following data, all respondents (100%) stated that they knew the SARS-CoV-2 virus. Of the total number, 373 (62.8%) attend discussions related to the SARS-CoV-2 virus, while 221 (37.2%) respondents do not. No significant statistical difference was found in the knowledge of the respondents in relation to the level of professional qualification (p=0.739). Overall, the average number of points in specific knowledge was 9.27±1.35 for respondents with secondary education, 9.33±0.68 for respondents with university education and 9.31±1.28 for respondents with university education. A total of 103 health workers, aged 20 to 56, participated in the knowledge assessment survey in Nepal at the beginning of the pandemic. The majority (60.2%) were female. The average score was 10.59±1.12 (range: 7-13) and did not vary significantly when adjusted for demographic characteristics. When looking at the ratio of points, it is observed that the knowledge was consistent with the results of our study (9). In Italy, Moro and his colleagues conducted a large-scale study on 2046 respondents from different hospitals, finding that healthcare staff generally possessed good/satisfactory knowledge. (Limbu et al., 2020). In our study, we observed that the presence of lectures and discussions on SARS-CoV-2 shows only a slight correlation with overall knowledge (p=0.042). Organized education in the workplace also had a slight correlation with the assessment of knowledge (p=0.012), and it is interesting to note that respondents who had organized education in the last two months achieved the best grades. This result differs from Moro's study, where researchers concluded that healthcare professionals with continuous education and regular protocol updates possess more overall knowledge (Moro et al., 2021).

In this study, it was found that 588 (97.4%) respondents in triage centers had triage rooms in their health care institutions. 378 (62.6%) respondents had completely divorced sanitary facilities and handwashing facilities in triage centers, and 485 (80.3%) within health care institutions. Hand washing with soap was enabled for 457 (75.7%) patients in the triage center, or 532 (88.1%) subjects in the health care institution. 510 (84.4%) respondents had access to sanitizers in triage centers, while 544 (90.1%) respondents had access to sanitizers in a health institution. Toilets in triage centers were mentioned by 400 (66.2%) respondents, or 523 (86.6%) in a health institution. 579 (95.9%) respondents stated that wearing a mask is mandatory in triage centers, and 580 (96.0%) respondents in health care institutions. A functional infrared thermometer was present in 516 (85.4%) subjects in triage centers, and in 463 (76.7%) subjects in a healthcare institution. Gloves were used by 88.7% of respondents in their daily work, masks by 98.5% of respondents, disposable covers/suits/aprons were used daily by 80.2% of respondents, eye protection was used by 64.5% of respondents. Increased hand hygiene was carried out by 98.9% of respondents, and an N95 mask or FFP3 was used by 58.7% of respondents.

When it comes to the attitude of health workers in this study, the following data were obtained. 126 (20.86%) respondents are completely sure that protective equipment at work is sufficient to protect patients from infection, and 187 (30.96%) believe that they are safe. 176 (29.14%) respondents were undecided. 66 (10.93%) respondents said they were not sure how much personal protective equipment protects them when working with patients from possible infection, and 49 (8.11%) respondents stated that they were not sure at all.

Saqlain et al. showed that health professionals have good knowledge (93.2%), positive attitudes, and good practices (88.7%) regarding COVID-19. As the main obstacles to the fight against COVID-19, health workers felt that they had limited infection control material (50.7%) and poor knowledge of transmission (40.6%). Regression analysis showed that physicians (VSS) were more likely to demonstrate good practice than other healthcare professionals (odds ratio 2.247, 95% confidence interval 1.11–4.55, p=0.025). This study indicates that while healthcare workers in Pakistan generally possess good knowledge of COVID-19, there are certain specific aspects of knowledge that require additional attention to improve overall preparedness (Saqlain, 2020). We find that the attitude is significantly more positive compared to our research.

Bekele produced a review of earlier research in the early stages of the pandemic, up to the end of 2020. Overall, most of the articles that were previously published had good knowledge of transmission modes, clinical presentation, prevention strategy, incubation period, and quarantine use. A study conducted in China found that about 90% and 89.51% of previously published articles had good knowledge. In Nigeria, almost everyone had a good knowledge. The finding of Iran and Qatar showed that about 96% and 79.4%, respectively, had good knowledge of COVID-19.27,29 However, a study conducted in Saudi Arabia and India found that only 51% and 40% of them had good knowledge, respectively.15,24 In the United States, about 71.7% of them knew the symptoms, and 69.8% of them knew the prevention strategy. (Nguyen et al., 2020).

The experience from the Clinic for Infectious Diseases KCUS and the time spent working with COVID patients have shown that education and information are the most important factors in working with Covid-19, and cooperation with other health professionals as well as for social contact with families and the environment. The World Health Organization guidelines on the use of personal protective equipment, which were first published in 2020 and then revised in 2021 were used. Using adequate instructions, by the end of 2020, a very small number of health professionals with Covid-19 were identified. The experiences and information were then transferred from the locations that they presented the most to other health professionals in KCUS and to other levels of health care as online education. However, as the Covid-19 pandemic took hold, so did health professionals.

5. CONCLUSION

In this study, no statistical difference in knowledge was observed in relation to professional qualifications. The practice of using personal protective equipment was high, but the attitude did not follow the practice, and we explain this gap by the additional need for education of health workers of all levels of professional qualifications.

Recognizing the need to educate and inform health professionals, it would be of great importance to highlight the risks in practice and work with Covid-19 patients and the use of protective equipment, so that they can work on preventive activities within their competencies, all with the aim of reducing risk and burnout in the workplace.

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