Factors Influencing Healthcare Workers' Knowledge of COVID-19: A Cross-Sectional Study in Malaysia

Nurmasitah Mohamad Nazri[1,2], Mohd Azri Mohd Izhar[1], Nur Athirah Diyana Mohammad Yusof[1], Khairul Hazdi Yusof [2]

[1] *Razak Faculty of Technology and Informatics, University of Technology Malaysia, Kuala Lumpur, 54100, Malaysia*

[2] *Occupational Safety and Health Unit, Universiti Kebangsaan Malaysia Medical Centre, Kuala Lumpur, 56000, Malaysia*

[1,2]*abirah99@gmail.com*, [1]*mohdazri.kl@utm.my*, [1]*nurathirahdiyana@utm.my*, [2]*hazdi@ppukm.ukm.edu.my*

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*Corresponding author
abirah99@gmail.com

Abstract

As frontline defenders against the COVID-19 pandemic, healthcare workers (HCWs) play a pivotal role in infection prevention and control (IPC). This cross-sectional study aimed to assess the factors influencing healthcare workers' (HCWs) knowledge of COVID-19 in a Malaysian healthcare setting. A cross-sectional survey was conducted in a tertiary hospital, involving 353 *HCWs who completed a self-administered questionnaire. The study assessed HCWs' knowledge, attitudes, and practices (KAP) related to COVID-19 IPC. Statistical analysis, including logistic regression, was employed to identify factors influencing HCWs' knowledge. The study found that* 79.9% *of HCWs possessed a commendable level of knowledge,* 86.4% *held positive attitudes toward COVID-19 IPC measures, and an impressive* 95.8% *demonstrated safe practices in IPC. Factors significantly influencing HCWs' knowledge included level of education and participation in specialized IPC training programs. To effectively curb the spread of COVID-19, strategies should prioritize regular training, particularly for vulnerable HCW groups, while addressing identified risk factors for infection.*

Keywords: knowledge, attitude, practice, COVID–19, Malaysia

1. Introduction

The World Health Organization (WHO) classifies the Severe Acute Respiratory Disease Coronavirus (SARS-CoV-2) virus as an infectious disease that causes a global pandemic Coronavirus Disease 2019 (COVID–19). As of March 2022, 474.8 million COVID–19 cases worldwide and 6.1 million deaths were reported [1]. HCWs were identified as another high-risk group for contracting the virus [2]. Besides being one of the most vulnerable populations, they can also transmit the virus to patients to whom they provide care. Moreover, the infection of COVID–19 among HCWs will result in diminished medical manpower and suboptimal patient care [3]. HCWs as the frontline who are serving the patients have to implement IPC

* *Corresponding author. arbirah99@gmail.com*

practices since it is a systematic effort or process of placing a barrier between susceptible hosts and microorganisms [4].

In Malaysia, the first COVID–19 pandemic wave began on January 24, 2020, and ended on February 16, 2020. The second wave began on February 27, 2020, with no apparent end date until the third wave was announced on October 8, 2020. As of August 2021, 7,599 HCWs, or 3.05 %, were infected with the COVID–19 virus reported during the periodic screening [5]. Many studies look at the KAP of HCWs [6]–[10] and the public [7], [11]–[16] in different countries when it comes to universal precautions in COVID–19 IPC. However, there is none has been conducted at any hospital in Malaysia. Therefore, assessing HCWs' understanding is vital to identify knowledge gaps and boost the continuing preventative effort. In this study, we aimed to assess the factors influencing healthcare workers' (HCWs) knowledge of COVID-19 in Malaysia. To the best of the authors' knowledge, there is no similar study has been conducted at any hospital in Malaysia.

2. Methods

This institutional-based cross-sectional study was conducted from November to December 2021. The study site was one of the tertiary hospitals which are located in Kuala Lumpur, Malaysia. The study population consists of HCWs who are involved in patient care. Doctors, nurses, allied health, and clinical support professionals were randomly sampled by occupation. After excluding 44 respondents who said they were not willing to participate, the total sample size was 353 and the response rate was 88.9%. Ethics approval was granted with project code HTM − 2021 − 027.

A self - administered questionnaire was used to gather data and was constructed by evaluating prior literature and modifying a South African study assessing KAP toward COVID–19 IPC [17]. The first section was sociodemographic information, and the second was 17 items of knowledge questions. Following, the attitude and practice sections had 10 items and 15 items, respectively. Responses were recorded on an eight-point Likert scale. The respondents scored each question from 1 (totally disagree) to 8 (absolutely agree). A pilot study was undertaken to examine the reliability of each component to obtain the instrument's reliability coefficient (Cronbach's alpha > 0.7). The Google form questionnaire was organized based on the 50 pilot study respondents' responses.

The data were analyzed using SPSS version 26 (IBM, Armonk, NY, USA). Descriptive analysis was used to find the variables' frequency, percentage, mean, and standard deviation. The total KAP scores of participants were categorized into moderate and good based on the mean scores: moderate KAP with a score < 5.67 and good KAP with a score ≥ 5.67. The chi-square and multivariable analysis were used to find the relationship of demographic factors with the level of knowledge of COVID–19 IPC at a significant level of $p < 0.05$.

3. Results

3.1. Demographic information

Table 1 shows that, among 353 respondents, there was a predominance of 264 (74.8%) females participants, and 165 (46.7%) were in the age group of 30 to 39 years old. In terms of the professional backgrounds of the respondents, 187 (53.0%) were nurses, 56 (15.9 %) were doctors, 71 (20.1%) allied health professionals, and 39 (11.0%) were clinical support staff among the participants. More than half of the sample (51%) consisted of HCWs who worked at a location related to COVID – 19. The respondents were divided into two groups based on their history of training in infection prevention and control, with 162 (45.9%) in the trained group and 191 (54.1%) in the not trained group. Regarding COVID-19 infection, 126 (35.7%) were not infected, while 227 (64.3%) were infected. Furthermore, 83 (23.5%) had never been in close contact with a COVID-19 case, while 270 (76.5%) had been in close contact.

3.2. KAP of HCWs Towards COVID–19

Table 2 illustrates the number of questions, range, scores, and levels of KAP regarding COVID-19. Our analysis of HCWs' KAP towards COVID-19 IPCs revealed interesting patterns. While overall levels of KAP were promising, with the majority of HCWs displaying good knowledge (79.9%), positive attitudes (86.4%), and safe practices (95.8%) towards COVID-19 IPCs, it is essential to delve deeper into these findings. Knowledge scores, as measured by our study, were relatively high, with a mean score of 6.24 ($\pm$0.62) out of a maximum of 8. However, the mean scores for attitudes (6.56 $\pm$ 0.76) and practices (7.38 $\pm$ 0.74) were even higher, indicating a more favorable disposition and adherence to IPCs among HCWs. These findings suggest that while HCWs may possess adequate knowledge, they exhibit positive attitudes and strong adherence to recommended practices, which is crucial in the context of infectious disease control.

Table 1. Socio-demographic and characteristics of respondents

Characteristic (N)	Categories	n	Percent (%)
Gender (N = 353)	Male	89	25.2
	Female	264	74.8
Age (N = 353)	<30 y/o	64	18.1
	31-40 y/o	165	46.7
	41-50 y/o	106	30.0
	51-60 y/o	18	5.1
Education (N = 353)	Secondary	46	13.0
	Diploma	188	53.3
	University	119	33.7
Occupation (N = 353)	Doctor	56	15.9
	Nurse	187	53.0
	Allied health	71	20.1
	Clinical support	39	11.0
Work Location related to COVID-19 (N = 353)	No	180	51.0

	Yes	173	49.0
Trained in infection prevention and control (N = 353)	No	191	54.1
	Yes	162	45.9
Infected with COVID-19 (N = 353)	No	126	35.7
	Yes	227	64.3
Ever been a COVID-19 close contact (N = 353)	No	83	23.5
	Yes	270	76.5

Table 2. Number of questions, range, scores, and levels of KAP regarding COVID-19

Variable	**Number of Questions**	**Level**	**Range score**	**Total Score (mean ±SD)**	**Level (%), *N=353***	
					Moderate	**High**
Knowledge	17	Low	1.00 – 3.33	6.24 ± 0.62	20.1	79.9
		Moderate	3.34 – 5.66			
		High	5.67 – 8.00			
Attitudes	10	Low	1.00 – 3.33	6.56 ± 0.76	13.6	86.4
		Moderate	3.34 – 5.66			
		High	5.67 – 8.00			
Practices	15	Low	1.00 – 3.33	7.38 ± 0.74	4.2	95.8
		Moderate	3.34 – 5.66			
		High	5.67 – 8.00			

3.3. Factors Associated with Knowledge Level Towards COVID – 19 IPC

As shown in Table 3, gender, education, occupation, and prior IPC training history were found to have a significant association with a high level of COVID-19 knowledge ($p < 0.05$). Conversely, age, work location related to COVID-19, a history of COVID-19 infection, and previous close contact with COVID-19 cases did not exhibit a significant association with knowledge level.

Table 3. Association of the demographic variable with knowledge of HCWs

Characteristics	Categories	Knowledge				χ2	P
		Moderate		High			
		n	%	n	%		
Gender	Female	46	17.4	218	82.6	4.71	0.03
	Male	25	28.1	64	71.9		
Age	<30 y/o	12	18.8	52	81.3	4.24	0.24
	31-40 y/o	37	22.4	128	77.6		
	41-50 y/o	16	15.1	90	84.9		
	51-60 y/o	6	33.3	12	66.7		
Education	Secondary	26	56.5	20	43.5	51.25	0.00
	Diploma	37	19.7	151	80.3		
	University	8	6.7	111	93.3		
Occupation	Doctor	2	3.6	54	96.4	30.25	0.00
	Nurse	29	15.5	158	84.5		
	Allied health	25	35.2	46	64.8		
	Clinical support	15	38.5	24	61.5		
Work Location related to COVID-19	No	37	20.6	143	79.4	0.05	0.83
	Yes	34	19.7	139	80.3		
Trained in IPC	No	50	26.2	141	73.8	9.53	0.00
	Yes	21	13.0	141	87.0		
Infected with COVID-19	No	29	23.0	97	77.0	1.03	0.31
	Yes	42	18.5	185	81.5		
Ever been a close contact	No	17	20.5	66	79.5	0.01	0.92

Based on the results of the multivariable analysis, there was a significant correlation observed between educational status and the completion of infection prevention training. This study found that HCWs with a secondary school education were fifteen times more inclined $(\text{AOR: } 15.84;\ 95\%\ \text{CI: } 6.23 - 40.29)$ to possess limited knowledge. Furthermore, HCWs who had not received infection prevention training were also twice as likely $(\text{AOR: } 1.87;\ 95\%\ \text{CI: } 1.03 - 3.40)$ to exhibit lower levels of knowledge. This observation may be attributed to the fact that a majority of HCWs with a secondary school education background belonged to the clinical support staff category, which typically receives less comprehensive training in infection prevention. The results are shown in Table 4.

Table 4. Multivariable analysis of factors affecting low knowledge towards COVID – 19 IPC

4. Discussion

	Variable	Categories	B	P	OR	95% CI	
						Lower	Upper
Knowledge	Education	Secondary	2.762	0.001	15.839	6.227	40.285
		Diploma	1.224	0.003	3.400	1.524	7.586
		University			1		
	Trained in IPC	No	0.626	0.041	1.870	1.027	3.404
		Yes			1		

This study aimed to assess the factors influencing HCWs' knowledge of COVID -19 in Malaysia. For this, this study quantified the knowledge, attitudes, and practices of healthcare workers related to COVID-19 IPC. This provides a valuable baseline for understanding how healthcare workers perceive and respond to the pandemic, contributing to the theoretical understanding of their role in infection control. There were several key demographic and professional characteristics that may impact their KAP towards COVID-19 IPCs.

Our study identified several factors significantly associated with HCWs' knowledge levels regarding COVID -19 IPCs. Gender, education, occupation, and history of training in IPCs emerged as factors that influence the level of knowledge. Supported by another study by [12], [6], and [11] that female gender, high level of education and occupation (doctors, nurses) have a significant association with a high level of knowledge. Specifically, female HCWs tended to have better knowledge scores compared to their male counterparts. Educational status also played a significant role, with HCWs holding secondary school education being significantly less knowledgeable. This discrepancy may be attributed to the fact that clinical support staff, who are typically less trained in infection prevention, make up a substantial proportion of individuals with secondary school education. Furthermore, HCWs who had received training in infection prevention displayed significantly higher knowledge levels. Similarly, a study by [18] and [19] trained in IPCs influenced the level of knowledge. This highlights the importance of continuous education and training programs in equipping HCWs with the necessary knowledge and skills to combat infectious diseases effectively. There were no significant association between age, work location related to COVID-19, infected with COVID-19, and ever been a COVID-19 close contact with the level of knowledge. This suggests that these factors may not be significant predictors of knowledge of COVID-19 IPCs among HCWs.

Overall, this study revealed the significant factors of HCWs' knowledge of COVID-19 infection prevention and control, are the level of education and

participation in specialized IPC training programs. This theoretical contribution helps to elucidate the key determinants of healthcare workers' knowledge in the context of infectious disease control. The study findings may be useful to inform organisation the need for targeted training programs for HCWs, especially those with lower levels of education, to improve their knowledge of COVID-19 IPCs. This also can be a valuable source of data for policymakers who are developing educational materials to address specific knowledge gaps among the populations [20].

Furthermore, further research is vital to investigate the effectiveness of IPC training programs for HCWs and the impact of HCWs' KAP on patient outcomes. The inclusion of HCWs from different professional backgrounds and work locations related to COVID-19, increase the generalizability of the study's findings, and provide a comprehensive understanding of HCWs' KAP towards COVID-19 IPCs in Malaysia. Some limitations of this study should be mentioned. This is cross-sectional study, which limits the ability to establish causality, and the use of self-reported data, which may be subject to bias. Future studies could address these limitations by using interview and observational data.

5. Conclusion

In conclusion, our study sheds light on the factors influencing healthcare workers' knowledge of COVID-19 IPCs in Malaysia. While a substantial proportion of HCWs demonstrated good knowledge, attitudes, and practices towards COVID-19 IPCs, there are still areas for improvement. Targeted interventions, especially for HCWs with lower educational backgrounds, are warranted to bridge knowledge gaps and enhance the overall effectiveness of infection prevention and control measures among HCWs. Additionally, ongoing training programs are vital to ensure that HCWs remain well-informed and capable of responding effectively to emerging infectious threats like COVID-19. These findings contribute to the understanding of the preparedness of healthcare workers in managing infectious diseases and underscore the importance of investing in their education and training to safeguard public health. Further research and interventions in this area are essential to ensure the safety of healthcare workers and the communities they serve.

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Statement of Competing Interests

The Author(s) declare(s) that there is no conflict of interest in producing this research article

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