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Knowledge and Compliance on Infection Prevention and Control Among Healthcare Professionals in Teaching Hospital, Pahang Malaysia During Pandemic Covid-19: A Cross Sectional Study

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ABSTRACT

Introduction: The European Centre for Disease and Prevention Control and World Health Organization (WHO) had established the guidelines for infection prevention and control (IPC) in managing possible and confirm cases of COVID-19. WHO has enforced an interim guideline for public and healthcare services for COVID-19 to be used together with the existing core component of IPC.

Objective: To investigate the level of knowledge on COVID-19 and IPC and its compliance among healthcare providers (HCPs) in one of teaching hospitals, Sultan Ahmad Shah Medical Centre (SASMEC@IIUM).

Methods: A quantitative cross-sectional study with convenience sampling was conducted among 114 HCPs by using self-reported questionnaire from May 2021 to July 2021. Descriptive and correlation statistical analysis were employed in this study. The data was analysed using IBM SPSS Statistic version 20.

Results: Majority of the respondents (N=114) reported have good knowledge and 84.2% have good compliance on COVID-19, IPC There is a moderate positive correlation between level of knowledge on COVID-19 and knowledge on IPC, respectively (r=0.616, r=0.601), but fair correlation between knowledge on COVID-19 and compliance on IPC (r=0.374). There is a moderate positive correlation between knowledge on IPC and IPC compliance (r=0.601).

Conclusion: HCPs in SASMEC@IIUM have good knowledge on COVID-19 and IPC as well as good compliance on IPC. This indicates regular training on IPC among HCPs provide great impact to the teaching hospital.

Keywords: COVID-19; Infection; Prevention and control; Knowledge; Compliance

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INTRODUCTION

Coronavirus Disease 2019 (COVID-19) has become the most highlighted issues around the world in 2020 since it first public reported in November 2019(1). The transmission of the virus which involves air-borne, close contact as well as droplet makes it challenging to control and reduce the transmission in particular the healthcare services. The spike of the daily cases in Malaysia urges the researchers to come out with possible intervention and solution (2). The COVID-19 vaccination program showing some improvement in combating the seriousness of COVID-19 infection but still requires other complement intervention. Therefore, the reinforcement on infection prevention and control (IPC) in healthcare settings become the most critical defense mechanism against the virus. This is parallel with WHO initiative that emphasized on an active action and cooperation by the healthcare professionals (HCPs) to abide by the provided precautionary measure to end this pandemic (3).

Many studies reported the compliance of IPC among HCPs varied across the globe. There is an unclear pattern of IPC compliance among HCPs. Studies in Lower Manya Krobo District of Ghana and Northern Regional Hospital Tamale, Ghana showed that the HCPs have poor compliance on IPC (4,5). However, their level of knowledge on IPC contradicts which is poor in District of Ghana and good in Hospital Tamale. It also mentioned that only half of the respondents reported using protection during blood and body fluid exposure. In contrast, a study in Jordan reported that the compliance on IPC among HCPs is high which favorable among nurses compared to the doctors despite their poor knowledge on IPC (6). These studies create research gap in other region of the country. Furthermore, these studies were conducted before the pandemic COVID-19. This study aims to assess the level of knowledge regarding COVID-19 and IPC and compliance on IPC among HCPs in SASMEC@IIUM. It will also further explore on the association between knowledge of COVID-19, IPC and compliance on IPC among HCPs in SASMEC@IIUM. It is hoped to give a meaningful contribution to the organization in order to improve the effectiveness of the IPC implementation by empowering the compliance on IPC among HCPs.

The daily estimated R_0 in Malaysia is 1.05. The government aim to achieve the R0 below 1.0. R naught, R0 is defined as an average number of people infected from one other person (2). As frontliners, HCPs have to give their best to break the transmission chain of COVID-19 by maintaining compliance on IPC in their routines (7). During the first wave of pandemic COVID-19, a government hospital become as the main referral center for COVID-19 in Pahang, Malaysia. However, the Emergency Proclamation Guideline as announced by the Prime Minister Office of Malaysia in 2021 requires all private sectors involve in treating COVID-19 patients and this include teaching hospital, SASMEC@IIUM (8). Thus, the community of the hospital is also at risk and cooperation from everyone is vital in adhering IPC practices during delivery of care. The level of compliance on IPC among HCPs in SASMEC@IIUM as well as to their level of knowledge regarding COVID-19 and IPC need to be evaluated. This study will look into the correlation between the level of knowledge regarding COVID-19 and IPC and the level of IPC compliance among HCPs in SASMEC@IIUM.

The high demand for empowerment of great IPC compliance among HCPs in battling COVID-19 justifies the need to observe the evaluation on the existing implementation of IPC practices (9). A theory on Health Belief Model (HBM) suggest that one belief and understanding of an issue related to health and its recommended action directly portrayed to the outcome of his or her action or behavior (10). It also based on fundamental components where they have the desired to prevent the illness and have specific believe that one action can cure or prevent the illness. Referring to this theory, there is relationship between one's knowledge and outcome behavior. This is relevant to this study as it proposed to reveal the level of knowledge on COVID-19 and IPC and compliance on IPC among HCPs in SASMEC@IIUM. This study had contributed to the healthcare setting, considering that infection prevention control compliance has to be seen thoroughly in delivering healthcare services during this pandemic. This will also give huge impact on the control of infection transmission in healthcare setting as well as to break the chain of COVID-19.

METHODS

This cross-sectional study was conducted among 114 HCPs from various disciplined working in SASMEC@IIUM by using an online Google Form or self-reported questionnaire distributed between May 2021 and July 2021. The questionnaire distributed to all HCPs who meet the criteria assisted by their immediate supervisors. HCPs who participated in this study should at least had six months working experienced in SASMEC@IIUM except for those in administration unit and also on study leave or maternity leave. A questionnaire consists of 37 items divided into four sections. Section A consist of 6 items on sociodemographic of participant such as gender, age, occupation, level of education, years of working experience and their attendance in reeducation of IPC training organized by the hospital. Section B had 11 items on the knowledge on COVID-19, such as transmission mode, symptom of COVID-19, COVID-19 vaccine, preventive measure and high-risk population. The level of knowledge and its compliance is rated on a 5-points Likert scale from 1-5 (Strongly disagree=1, Disagree=2, Neutral=3, Agree=4, Strongly Agree=5). Total score 1-18 indicate poor knowledge, 19-37 indicate moderate knowledge and 38-55 indicate good knowledge. Questions in this section was adopted from a study on Knowledge and Attitude on COVID-19 among Healthcare Worker at District 2 Hospital, Ho Chi Minh City in Vietnam (11). Section C and D consist of 10 items respectively on HCPs knowledge and their compliance on IPC. The items cover five moments of hand hygiene, the use of disposable protective glove, the application of PPE based on type exposure, injection and blood sample, disinfection of reusable equipment and waste segregation. Total score 1-16 indicate poor knowledge or compliance, 17-33 indicate moderate knowledge or compliance and 34-50 indicate good knowledge and compliance. These sections were adapted from previous study by Bedoya et al in 2017 (12) and the Infection Prevention and Control Orientation Checklist established by SASMEC@IIUM in 2020 (13).

The questionnaire was reviewed by Clinical Management Unit, SASMEC@IIUM and research team regarding its simplicity and full content. The questionnaire was revised and questions on COVID-19 vaccination was included as recommended by the expert team. A pilot study was conducted among 50 HCPs in SASMEC@IIUM and the Cronbach's alpha value was 0.79. This test was conducted on the instrument to maximize the reliability of the questionnaire (14).

The questionnaires were distributed using online google form assisted by the ward sister, and head of department from each of department. All participants filled out the consent form before proceeding to the questionnaire. All questionnaires were compiled and rechecked by the researchers to isolate incomplete questionnaires. This study was approved by Kulliyyah of Nursing Postgraduate Research Committee (KNPGRC), IIUM Research Ethics Committee (IREC), SASMEC@IIUM Research Committee (SASRC) and Clinical Research Centre (CRC) SASMEC@IIUM. Researchers also attained informed consent from participants and ensured confidentiality prior to data collection.

Data analysis

The descriptive analysis was employed to analyze socio-demographic characteristics of the participants and correlation test was used to analyze for correlation between knowledge on COVID-19, knowledge on IPC and IPC compliance. The p-value at 0.05 (2-tailed) determined significant value. The collected data has been organized, tabulated and statistically analyzed using IBM SPSS Statistic version 20.

RESULTS

Socio Demographic Data

Majority of the HCPs were female (78.1%), nurse (79.8%), and age range from 20-30 years old (73.7%). More than half of the participants were diploma holders (54.4 %) and had between 1 and 5 years (72%) working experience. In this study, 89.5% of the HCPs attended the re-education of IPC training organized by SASMEC@IIUM as summarised in **Table 1**.

Table 1: Socio demographic data (N = 114)

Variables	Frequency (n)	Percentage (%)
Gender		
Male	25	21.9
Female	89	78.1
Age		
20-30	84	73.7
31-40	25	21.9
41-50	3	2.6
51-60	2	1.8
Occupation		
Medical officer	10	8.8
Nurse	91	79.8
Physiotherapist	8	7.0
Pharmacist	5	4.4
Level of education		
SPM	2	1.8
Diploma	62	54.4
Degree	47	41.2
Master/PhD	3	2.6
Working experience		
1-5 years	82	72.0
6-10 years	21	18.4
> 11 years	11	9.6
Attend re-education (IPC training)		
Yes	102	89.5
No	12	10.5

Level of Knowledge on COVID-19

The result in **Table 2** showed level of knowledge on COVID-19 among 114 HCPs in SASMEC@IIUM during pandemic period. The finding showed that 100% of HCPs in SASMEC@IIUM had good level of knowledge on COVID-19.

Table 2: Level of knowledge on COVID-19

Variables	Frequency (n)	Percentage (%)
Knowledge of COVID-19		
Poor (1-18)	0	0
Moderate (19-37)	0	0
Good (38-55)	114	100.0

The Level of Knowledge and its compliance on IPC

Table 3 showed that majority of the participants had good level of knowledge and compliance on IPC with 96.5% and 84.2%, respectively. While, 3.5% (n=4) had a moderate compliance on IPC and none (0%) of the participants had poor compliance on IPC. This finding shows that, though SASMEC@IIUM is new teaching hospital, the level of knowledge and compliance on IPC of their staff was good.

Table 3: Level of knowledge and compliance on IPC (N= 114)

Variables	Frequency (n)	Percentage (%)
Knowledge on IPC		
Poor	0	0.0
Moderate	4	3.5
Good	110	96.5
Compliance on IPC		
Poor	0	0.0
Moderate	18	15.8
Good	96	84.2

Correlation between Level of Knowledge on COVID-19, IPC and its Compliance

Level of knowledge may correlate with compliance in certain performance including in COVID-19 management. The finding from current study showed that a significance correlation between knowledge on Covid 19 with knowledge on IPC (r=0.616) and IPC compliance (r=0.372). Additionally, there is a significance correlation between knowledge on IPC with IPC compliance (r=0.601) (**Table 4**).

DISCUSSION

Majority of the participants were female nurses that ranged between 20-30 years old who are among the fresh graduate. Most of the participants had a diploma and has been working in healthcare setting within 1 and 5 years. The good academic background and clinical experience were the requirement for recruitment at SASMEC@IIUM. Finding from socio-demographic characteristics from this study showed that SASMEC@IIUM's had recruited the staff that had good academic background and experiences in clinical setting (Table I). This study also shown that almost all healthcare professionals had been attending the re-education of IPC training. These findings portrayed that the staffs in SASMEC@IIUM complied to the minimum requirement in secondary care for facility level on infection prevention and control programme where the staffs must receive education and training on IPC upon employment.

Table 4: Correlation between level of knowledge on COVID-19, IPC and its compliance

Pearson Correlation		Knowledge COVID-19	Knowledge IPC	IPC Compliance
Knowledge COVID-19	Correlation Coefficient	1	.616**	.374
	Sig. (2-tailed)		.001	.001
	N	114	114	114
Knowledge IPC	Correlation Coefficient	.616**	1	.601**
	Sig. (2-tailed)	.001		.001
	N	114	114	114
IPC Compliance	Correlation Coefficient	.374**	.601**	1
	Sig. (2-tailed)	.001	.001	
	N	114	114	114

** Correlation is significant at the 0.05 level (2-tailed)

In this study, the data depicted that 100% of the respondents have good knowledge on COVID-19. The result from this study is similar to a study done by Amalina Anuar et al. in 2020 (14) in Perlis who reported that the level of knowledge on COVID-19 among HCPs is good with 69.7%. In other countries such as Vietnam, China and Italy their level of knowledge on COVID-19 also showed a good result (15–17). This showed that there is an increase in knowledge regarding COVID-19 among HCPs in ASEAN countries and across the world over time despite the rising on number of new cases of COVID-19. The contributing factors may be related to the government's massive awareness campaign through media and within healthcare facilities by infection control team on COVID-19 to reduce the value of R-naught and mortality rate. Moreover, healthcare teams in Malaysia had been fighting with this pandemic for almost two years.

However, it can be seen that there is only 34.2% of the respondents aware that antibiotic is not the first line treatment for COVID-19. According to Ministry of Health Malaysia (2021), the general care for COVID-19 patient should be based on symptomatic treatment such as antipyretic, nutritional and electrolyte maintenance. It is a virus infection. Thus, antibiotic in not compatible to combat this virus. On the other hands, there is no antiviral treatment for COVID-19 infection is currently approved. This result may be due to the rotation schedule on managing COVID-19 cases in SASMEC@IIUM. It creates a significant time gap between two rotations which lead to a longer adjustment in familiarizing with the COVID-19 ward. Besides that, this result may also relate to the diagnosis of a patient who had bacterial infection as their primary diagnosis. So, the main treatment was antibiotic.

The result showed that majority of the respondents have good knowledge on IPC. This result is similar to other studies conducted by Desta et al. (18) in Northwest Ethiopia; Noorasyikin Mohd Noor & Yee, (19) in Middle East, Zhang et al. (20) in China and Saqlain et al (21) in Pakistan. In contrast, studies in Palestin and Ghana revealed a poor knowledge on IPC (22,23). This is because the study conducted before the pandemic COVID-19 worldwide. It can be seen that over the year, there is a positive improvement on knowledge of IPC among HCPs. This is a crucial data to mark the understanding among HCPs regarding IPC especially during this pandemic in order to provide the safest environment for the staffs, patient and visitors as well as to provide the best care. Even though the findings in this study showed that majority of the participants had good knowledge on IPC, it is necessary that education on benefits of standard precaution and IPC training should be organised frequently in order to minimise the risk and maintain the standard healthcare quality. The result in this section was highly congruent to the minimum requirement from the WHO, in which one should have a re-education on IPC upon recruitment.

However, the knowledge on usage of disposable glove in this study marked the average percentage with 69.3% among respondents. The question asked on the usage of gloves for more than one patient as long as they have not been exposed to blood or other body fluids. This result may be due to the

statement of the question where it does not emphasize specifically where the glove already has contact with patient. Thus, it creates some misunderstanding to the respondents. However, it is also good to emphasize on the WHO (24) recommendation that has been clearly stated in Glove Use Information Leaflet: "Do not wear the same pair of gloves for care of more than one patient" (p.2).

Based on this study, majority of the respondents are greatly complied on IPC. This is significant to the government's requirement on maintaining impressive practice of IPC during this pandemic. This data showed that the SASMEC@IIUM's infection control team had made an incredible effort to make sure every staff adheres to IPC in facing COVID-19 virus. Meanwhile, information and precaution signage were spotted everywhere around SASMEC@IIUM building. The nurse managers also make frequent closed observation in every department. In contrast, Desta et al. (18) and Lobo et al. (25) reported that the poor compliance on IPC in Ethiopia and India, that was associated with in service training, availability of infection prevention supplies, adherence to infection prevention guideline and limitation of healthcare accessibility.

Meanwhile, 66.7% of the respondents in this study reported they always practice 5 moments of hand hygiene which also contradicts to a study conducted by Latha et al. showed the compliance towards IPC practice was good except for hand disinfection (26). This also supported by an observation study conducted during pandemic COVID-19 in Tanzania by Powell-Jackson et al., (27). The data showed that the hand hygiene compliance among Tanzanian HCPs was 6.9% and not associated with facility location as well as its level. This finding indicates that, the additional method of data collection such as observation of the IPC practice and interview of healthcare professionals to make a meaningful in-depth investigation regarding IPC. Lastly, the usage of PPE based on different type of exposure was great with percentage more than 78%. This is complementary to WHO guideline in 2020 on IPC in managing possible and confirm cases of COVID-19. An increasing statistic on the admission of COVID-19 patients to the intensive care unit (ICU) and the reported death among Malaysian during this pandemic highly contributed to the compliance on usage of PPE among HCP.

This study revealed a moderate positive correlation between level of knowledge on COVID-19 and level of knowledge on IPC. It means that the increasing knowledge on COVID-19 will increase the knowledge on IPC. Besides that, there is also a moderate positive correlation between knowledge on IPC and compliance on IPC. This finding can be supported by a study in India showed there is an association between knowledge and practice of IPC (25). This finding also congruent with theory on HBM that suggest on one understanding of an issue related to health directly portrayed to the outcome of his behavior. This study reported that there is a fair positive correlation between knowledge COVID-19 and IPC compliance of which also reflected the theory on HBM. It is important to emphasize that the associating factors such as burnout, lack of medical supplies and huge number of admissions were not being investigated in this study.

Several limitations that could be extracted from this study. First, the instrument included was only self-reported questionnaires not an on-site observation of the particular practices. This limitation will be improved in the future research considering additional method of data collection such as observation of the IPC practice and interview of healthcare professionals. Second, this study was 90% conducted during Enhanced Movement Control Order (EMCO) in Malaysia. Thus, there is restriction to conduct a face-to-face survey at first which lead to a longer process of data collection to take place.

CONCLUSION

This study showed that majority of the participants have good knowledge on COVID-19, good knowledge on IPC, were greatly comply on IPC. There is a significance correlation between level of knowledge on COVID-19 with knowledge on IPC and compliance on IPC. There is also a significance association between knowledge on IPC with compliance on IPC. As part of recommendation, the result of this study indicates the importance of assessing the level of knowledge of COVID-19 and IPC as well as

its compliance from time to time. Besides that, further enforcement related to COVID-19 and IPC should be done by SASMEC@IIUM higher authority to ensure a safe environment for everyone including the staffs, patients and relatives. It is recommended to have re-education on IPC training at least twice per year as well as an efficient and frequent sharing on updated information regarding COVID-19 through approachable medium such as digital platform.

CONFLICT OF INTEREST

The authors declare that they have no competing interests regarding the publication of this paper.

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AUTHOR CONTRIBUTIONS

SHAH, HH & MKCH: preparing and reviewing the manuscript.
WHWM & DSHIH: conducted data collection, analysis and final proofread of the manuscript.

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