
PUBLIC HEALTH RESEARCH

Knowledge, Perception and Practice of Infection Control among Ministry of Health staff during COVID-19 Outbreak in Malaysia

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ABSTRACT

Received	8 October 2020
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Introduction	Coronavirus Disease 2019 (COVID-19) was declared a pandemic in the middle of March as the disease is highly contagious and spread very quickly throughout the world. Understanding the knowledge and practice among healthcare staff is also crucial, especially among the frontlines staff, as they need to protect themselves and facilitate in educating their patients and public regarding disease prevention measures. This study's objective is to assess knowledge, practice, and perception on the effectiveness of the preventive measures taken by Ministry of Health (MOH) staff to prevent transmission of the disease and measures they would take should they develop symptoms of the disease on COVID-19 disease. (TPB).
Methods	We conducted a cross-sectional online survey from 30th March 2020 to 6th April 2020 among the Ministry of Health staff. 1719 staff completed the survey.
Results	The overall correct rate of knowledge was 46.6%. Most participants held good perceptions (range from 77.8% to 98.4%) and good practices (range from 88.8% to 99.7%) towards COVID-19 preventive measure. Meanwhile, the preventive measures practices if they develop symptoms of COVID-19 range from 89.8% to 99.7% and for the perception, it ranges from 85.5% to 98.9%.
Conclusions	There are also still some lower percentages of perceptions and practices than expected. Additional education intervention and campaigns are required to provide the Ministry of health staff with adequate knowledge towards COVID-19 main symptoms, general knowledge and transmission route of COVID-19, and increase some of the perceptions and practices on COVID-19 preventive measures.
Keywords	COVID-19 - Ministry of Health Malaysia healthcare workers - knowledge - perception - practice.

INTRODUCTION

Coronavirus Disease 2019(COVID-19) was declared a pandemic on 11th March 2020 by World Health Organization (WHO) as the disease is highly contagious and spread very quickly throughout China and to many countries.¹ At the time of this writing (14th February 2021), based on WHO, the outbreak has affected at least 108,246,992 confirmed cases of COVID-19, including 2,386,717 deaths globally.² More than half of the world's population was under movement control order by early April.

In Malaysia, the first reported positive COVID-19 case was on 24th January 2020 and currently (14th February 2021), there were about 261,805 total confirmed cases with 958 total deaths.³ Over 600 healthcare workers in Malaysia being infected by COVID-19 since February 2020.⁴

There is still no treatment available yet for the disease; thus, good hygiene and other public health measures are important to prevent and control it. Apart from the public health measures, the number of cases and death continue to increase with no end in sight. These public health measures alone are not enough.⁵ The vaccination against COVID-19 is necessary to reduce the probability of contracting the virus and protect the surrounding community. The combination of vaccination and public health measures are the best protection from COVID-19.⁵

To date, there are two hundred and forty-two COVID-19 currently in development and of which sixty-six vaccines in various clinical phases.⁶ The WHO has approved two vaccines for emergency use, developed by Pfizer/BioNTech and AstraZeneca/Oxford⁷. In Malaysia, only Pfizer/BioNTech's vaccine is approved by Malaysia's Drug Control Authority and are scheduled to arrive end of February 2021. The other vaccines are still under evaluation and will arrive upon approval in batches.⁸

Since healthcare workers are the frontlines against this disease, the staff must understand the knowledge and have correct perception and practice of preventive measures of COVID-19. Apart from having a higher susceptibility to infectious disease, they also pose a threat as a transmission source in the community if they were to be infected.

Based on the previous studies, there was evidence that healthcare staff had a lack of knowledge and practice towards infectious diseases such as SARS and MERS-CoV.⁹ Therefore, based on a relationship between knowledge with attitude and practice, the staff must adhere to these preventive and control measures of COVID-19. It could determine the effectiveness of these measures in reducing the number of cases.⁹

There are many misunderstandings regarding the virus, the symptoms of the diseases, the transmission routes and the correct preventive measures practice shared via social media. Based on

the media report, certain places were still crowded, and some of them did not apply the correct preventive measures such as good hygiene and social distancing. To overcome this matter, WHO recommended that the public follow the healthcare staff's advice and national and local public health authority as they will have the most updated information on COVID-19 in the local setting. They are the best people to advise the public with regards to the preventive measures.¹⁰ Therefore, a well-informed health care staff will protect themselves, provide optimal care, and educate the public regarding disease preventive measures.¹¹

The COVID-19 preventive measures based on WHO guideline include frequent hand hygiene (handwashing with soap and water or alcohol-based sanitizer, in particular at the beginning of the workday, before and after touching residents, after using the toilet, before and after preparing food, and before eating), physical distancing for at least 1 meter between anyone who is coughing or sneezing, appropriate used tissue disposal and to seek medical attention if having symptoms of fever, cough and difficulty breathing.¹² Other measures include postponing or reducing mass gatherings that bring people together and have the potential to amplify disease, restrict sharing of personal devices, the use a medical mask as much as possible if being infected by COVID-19 to prevent the spread of infectious droplets from an infected person to someone else and potential contamination of the environment by these droplets and advice against the application of travel or trade restrictions to countries experiencing COVID-19 outbreaks.¹²⁻¹⁴

It is important to understand staff's habits, especially the healthcare staff in the Ministry of Health, in protecting themselves against this outbreak. Understanding the local level of knowledge on COVID-19 and health practice is important to reduce the risk of infection during this outbreak. Besides, this will also help improve the protection of the healthcare staff by the Ministry of Health.

Objective

To our knowledge, there is no study done on the knowledge, practice and perception of COVID-19 preventive measures among staff (which include the clinical and non-clinical staff) working under the Ministry of Health Malaysia. Thus, this study aimed to provide data and evidence to the Ministry of Health Malaysia (MOH) regarding knowledge, practice and perception on the effectiveness of the preventive measures taken by staff to prevent transmission of the disease and measures they would take should they be infected or should the develop symptoms of the disease on COVID-19 disease.

METHODOLOGY

Study Design and Population

A cross-sectional study was conducted from 30th March 2020 to 6th April 2020 through an online survey Google Form platform. All the Ministry of Health staff who have valid formal e-mail address were invited to join the survey.

Ethical Approval

Medical Research Ethics Committee, National Institute of Health Malaysia, Ministry of Health, Malaysia has approved our study (NMRR-20-571-54388). Respondent's anonymity and confidentiality were ensured.

Sample Size

The minimum sample size requirement after considering the non-response rate of 30% is 490.

Sampling method

Universal sampling was used to collect the data. All Ministry of health staff, who have a valid official e-mail address, was invited to join the survey through the uniform resource link (URL) shared in the e-mail. The e-mail was sent out using the Ministry of Health Malaysia postmaster, an administrator who handles all the staff's official e-mail address.

Recruitment Procedure

During the movement control order (MCO) period, it is impossible to conduct a systematic nationwide sampling procedure; thus, the researchers have chosen to use the online survey platform using Google Form.

We utilized several strategies to reach as many respondents as possible, including the official Ministry of Health Malaysia portal, the official e-mail account of the Ministry of health staff and WhatsApp. A standardized general description of the survey was given in the WhatsApp message/social media postings before the link was provided to both English and Malay language versions of the questionnaire.

When respondents first received the e-mail and clicked on the URL to the online web-based survey, the survey's information, the procedure for using the collected data, and personal information protection were displayed. Invitation to answer the questionnaire was given to those who agreed and consented. If the respondent completed the online web-based survey, the available survey results are saved once the respondent submitted the answer to the server via the "Submit" button. If the respondent refused, all the respondent's details and any response is given would not be saved.

Study Instrument

The questionnaire was developed and used to collect responses anonymously. The questionnaires used were tested for content validity among the National

Institutes of Health (NIH) Malaysia staff before the survey. A total of 20 staff were interviewed randomly to determine the content validity and changes made per the pilot study respondents' feedback for clarity, relevance, and acceptability.

The questionnaire consists of four sections: demographics, knowledge, practice and perception. The survey instrument consisted of participant characteristics (8 items), 3 components on knowledge; [knowledge on COVID-19 main symptoms (5 items; yes or no options), general knowledge on COVID-19 (4 items; yes, no or I don't know options), knowledge on transmission route of COVID-19 (4 items; yes, no or I don't know options)], practice on COVID-19 preventive measure (11 items, yes or no options), perception on COVID-19 preventive measure (11 items, 5-point Likert scale; strongly not effective, not effective, neither effective nor not effective, effective, strongly effective), practice if respondent develops COVID-19 symptoms (12 items, yes or no options) and perception of its effectiveness measures if respondent develops COVID-19 symptoms (12 items, 5-point Likert scale; strongly not effective, not effective, neither effective nor not effective, effective, strongly effective).

Statistical Analysis

Data were analyzed using the Statistical Package for the Social Sciences (SPSS) version 21.0.¹⁵ Descriptive analysis was reported as frequency and percentage for the knowledge, practice and perception towards COVID-19. Chi-square test was used to identify the association between knowledge, perception and practice with occupation (clinical staff versus non-clinical staff).

We compared the knowledge, practice and perception among clinical staff (which include doctors, dentists, pharmacist, nurse/medical assistant) versus non-clinical staff (hospital attendant, administrative, research officers, science officers and others).

The 'adequate' knowledge is measured when the respondent answered correctly 100% for the main symptoms of COVID-19 and answered 'yes' to all the general knowledge of COVID-19, knowledge on transmission route of COVID-19 and knowledge on preventive measure of COVID-19. Meanwhile, 'inadequate' knowledge is measured when the respondent answered correctly, less than 100%. Respondents who answered each question correctly for each knowledge item was reported in percentage.

In term of practice, each item of COVID-19 preventive measures practices and practices if the respondent develops symptoms of COVID-19 were reported in percentage.

If the respondent chose 'Effective' or 'Strongly effective' to rate the effectiveness of the particular COVID-19 preventive measure, and if the

respondent develops COVID-19, it is taken as a positive response for perception. For respondents who answered positively for each question and answered all questions related to the item positively, they were reported in percentage.

RESULTS

A total of 1719 completed the questionnaire. The respondents were from all the states and federal

territories in Malaysia. The respondents mean age was 36.1 ± 7.6 years, ranging from 22 to 59 years old and half of the respondents (53.3%) aged between 30-39 years. Most of the respondents were female. Among the various subgroups were doctors (10.9%), dentists (16.1%), pharmacists (12.3%), nurses or medical assistants (17.2%). The details of the socio-demographic characteristics of the respondents were shown in Table 1.

Table 1 Socio-demographic characteristics of the respondent of the Ministry of Health Malaysia staff(N=1719)

Socio-demographic	Frequency(n)	Percentage (%)
Sex		
Male	404	23.5
Female	1315	76.5
Age		
20-29	276	16.1
30-39	916	53.3
40-49	391	22.7
50-59	136	7.9
Ethnics		
Malay	1292	75.2
Chinese	202	11.8
Indian	88	5.1
Other Bumiputera	136	7.9
Educational level		
Secondary School	287	16.7
Diploma	421	24.5
Degree, Master, PhD	1011	58.8
Occupation		
Doctor	188	10.9
Dentist	277	16.1
Pharmacist	212	12.3
Nurse/MA	296	17.2
Science Officer	82	4.8
Research officer	19	1.1
Hospital Attendant	215	12.5
Health Educator Officer	24	1.4
Administrative	252	14.7

Knowledge about COVID-19

A total of nine questions were used to measure knowledge on the COVID-19. The overall correct answer rate of the knowledge was 46.6%, while the range of correct answer rates for all participants were between 65.3% to 99.8%.

Table 2 shows the overall knowledge on COVID-19 main symptoms, general knowledge and transmission route of COVID-19. Only 46.6% of the total respondents had an 'adequate' knowledge (were able to answer all correctly) on COVID-19 main symptoms, general knowledge and transmission route of COVID-19.

Differences in knowledge scores among clinical staff versus non-clinical staff were assessed using Chi-square. 47.8% of correct responses were

from clinical staff, and 44.6% were from non-clinical staff. Based on the Chi-square test, there was no significant association between knowledge and subgroup of clinical staff and non-clinical staff ($p=0.21$).

The range of correct answer rates were between 65.3% to 99.8% for each item. Most respondents knew that the elderly and people with existing health problems have higher risks of getting severe/serious infection (99.8%), and COVID-19 can cause respiratory tract infections (99.6%). However, there was apparent confusion among respondents regarding the main symptoms of COVID-19. Only 65.3% of the respondents answered correctly regarding the main symptoms of COVID-19. (Table 3).

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Table 2 Overall knowledge on COVID-19 main symptoms, general knowledge and transmission route of COVID-19 among MOH staff

Knowledge on COVID-19, n (%)	Clinical staff n (%)	Non-clinical staff n (%)	Overall n (%)	p-value
Adequate	516(47.8)	285(44.6)	801(46.6)	0.21
Inadequate	564(52.2)	354(55.4)	918(53.4)	

Table 3 Participant knowledge of COVID-19

Question	Knowledge			Overall
	Clinical	Non-Clinical	p-value	
Main Symptoms of COVID-19				
The main symptoms of COVID-19 are fever, cough and shortness of breath	722(66.9)	401(62.8)	0.093	1123(65.3)
General knowledge of COVID-19				
COVID-19 can cause respiratory tract infections	1076(99.6)	626(98.0)	0.001	1076(99.6)
Signs of infection can be seen within 14 days after being infected with a virus	1010(93.5)	605 (94.7)	0.348	1615(93.9)
An individual infected with COVID 19 but doesn't display any symptoms can infect other individuals	1020(94.4)	567(88.7)	<0.001	1587(92.3)
Elderly and people with existing health problems have higher risks of getting severe/serious infection.	1076 (99.6)	639 (100.0)	0.303	1715(99.8)
Transmission route of COVID-19				
Touch or handshake with people having COVID 19 symptoms	1022(94.6)	610(95.5)	0.495	1632(94.9)
Exposed to droplets from cough or sneeze by people having COVID 19 symptoms.	1071(99.2)	632 (98.9)	0.609	1703(99.1)
Touch surfaces or equipment contaminated with the COVID-19 virus, examples: doorknob, elevator button, ladder holder etc.	1065 (98.6)	628(98.3)	0.683	1693(98.5)
Sharing food or drinks with people having COVID-19 symptoms.	943 (87.3)	547 (85.6)	0.340	1490(86.7)

Practice and Perception of COVID-19 Preventive Measure

Overall, the majority of the respondents responded positively toward COVID-19 preventive measures practices. The practices toward COVID-19 preventive measures range from 88.8% to 99.7%. 11.2% of the respondents did not practice wearing face masks in public places. (Table 4)

For the perception of COVID-19 preventive measure effectiveness, most respondents responded positively toward COVID-19 preventive

measures. The perceptions of COVID-19 preventive measure effectiveness range from 77.8% to 98.4%. 22.2% of the respondents had perceptions of not wearing face masks in public places. (Table 4)

There is a significant difference in preventive measure practice and perception between the clinical staff and non-clinical staff on wearing masks at public places. The clinical staff had a lower perception and practice compared to the non-clinical staff.

Table 4 Practice of COVID-19 preventive measures and perception of its effectiveness among MOH staff

COVID-19 Preventive measures	Clinical Staff	Practice, n (%)		Overall	Clinical Staff	Perception, n (%)		Overall
		Non-clinical Staff	p-value			Non-clinical Staff	p-value	
Keep 1-meter distance from people with COVID 19 symptoms	1076(99.6)	637(99.7)	1.00	1713(99.7)	951(88.1)	529(82.8)	0.003	1480(86.1)

Wear masks at public places	932(86.3)	595(93.1)	<0.001	1527(88.8)	803(74.4)	534(83.6)	<0.001	1337(77.8)
Wash hand with water and soap.	1075(99.5)	637(99.7)	1.00	1712(99.6)	1056(97.8)	628(98.3)	0.597	1684(98.0)
Bring along hand sanitizer at public places	949(87.9)	581(90.9)	0.055	1530(89.0)	938(86.9)	569(89.0)	0.197	1507(87.7)
Use hand sanitiser that is provided at public places.	965(89.4)	581(90.9)	0.320	1546(89.9)	829(76.8)	485(75.9)	0.681	1314(76.4)
Avoid sharing food and drinks with people having COVID-19 symptoms.	1037(96.0)	622(97.3)	0.174	1659(96.5)	918(85.0)	554(86.7)	0.355	1472(85.6)
Avoid sharing personal items with people having COVID-19 symptoms.	1063(98.4)	628(98.3)	0.845	1691(98.4)	994(92.0)	594(93.0)	0.512	1588(92.4)
Avoid attending event/gathering. Ex: wedding. Birthday celebrations	1077(99.7)	637(99.7)	1.00	1714(99.7)	1061(98.2)	630(98.6)	0.695	1691(98.4)
Avoid going to a public area such supermarkets, theatre	1050(97.2)	628(98.3)	0.192	1678(97.6)	1033(95.6)	618(96.7)	0.307	1651(96.0)
Avoid travelling	1077(99.7)	633(99.1)	0.086	1710(99.5)	1040(96.3)	621(97.2)	0.407	1661(96.6)

Practice and Perception of its Effectiveness on COVID-19 Preventive Measure if Respondent Develop COVID-19 Symptoms

Table 5 shows that almost all the Ministry of Health staff had effective practices on COVID-19 preventive measures if respondent develops COVID-19 symptoms. The preventive measures practices score range from 89.8% to 99.7%. The lowest practice among the respondents is to wear a mask all the time (89.8%).

For the perception, most of the Ministry of Health staff had answered positively on the

perception of COVID-19 preventive measures, ranging between 85.5% to 98.9%. The lowest perception is throwing the used tissue and face mask in the rubbish bin (85.5%). There is a significant difference in preventive measure practice and perception between the clinical staff and non-clinical staff seeking immediate treatment at clinic/hospital if the respondents develop COVID-19 symptoms. The clinical staff had lower perception and practice to the non-clinical staff.

Table 5 Practice and perception of its effectiveness if respondent develop COVID-19 symptoms among MOH staff.

Preventive measures	Practice				Perception			
	Clinical Staff n (%)	Non-Clinical Staff n (%)	p-value	Overall n (%)	Clinical Staff n (%)	Non-Clinical Staff n (%)	p-value	Overall, n (%)
Immediately seek treatment at clinic/hospital.	1023(94.7)	627(98.1)	<0.001	1650 (96.0)	989(91.6)	612(95.8)	0.001	1601(93.1)
Rest at home and avoid going out	1029(95.3)	612(95.8)	0.719	1641 (95.5)	996(92.2)	601(94.1)	0.174	1597(92.9)
Avoid going out to public places or gathering	1057(97.9)	632(98.9)	0.130	1689 (98.3)	1069(99.0)	631(98.7)	0.641	1700(98.9)
Wear face mask all the time	966(89.4)	577(90.3)	0.622	1543 (89.8)	973(90.1)	574(89.8)	0.868	1547(90.0)
Close mouth and nose with a tissue when coughing or sneezing	1073(99.4)	631(98.7)	0.282	1704 (99.1)	1027(95.1)	610(95.5)	0.815	1637(95.2)
Throw the used tissue and face mask in the rubbish bin.	998(92.4)	602(94.2)	0.169	1600 (93.1)	915(84.7)	555(86.9)	0.229	1470(85.5)
Keep 1-meter distance from people with COVID 19 symptoms like coughing and sneezing	1072(99.3)	638(99.8)	0.166*	1710 (99.5)	1016(94.1)	600(93.9)	0.916	1616(94.0)
Always wash hand with water and soap	1077(99.7)	637(99.7)	1.00**	1714 (99.7)	1053(97.5)	630(98.6)	0.163	1683(97.9)
Bring along and use hand sanitizer	1050(97.2)	629(98.4)	0.136	1679 (97.7)	1012(93.7)	612(95.8)	0.080	1624(94.5)
Avoid sharing a toothbrush, towel, etc. with healthy individuals.	1067(98.8)	633(99.1)	0.812	1700 (98.9)	1029(95.3)	617(96.6)	0.218	1646(95.8)
Avoid sharing food or drinks with healthy individuals.	1049(97.1)	620(97.0)	0.883	1669 (97.1)	997(92.3)	598(93.6)	0.337	1595(92.8)

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Wash cooking utensils with water and soap	1073(99.4)	639(99.1)	0.569*	1706 (99.2)	992(91.9)	602(94.2)	0.083	1594(92.7)
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**expected count of cell <5 is more than 20%. Fischer's Exact Test is used for p-value.

DISCUSSION

In general, our study's findings showed that the Ministry of Health staff had inadequate overall knowledge of COVID-19 main symptoms, general knowledge, and transmission route of COVID-19 as only 46.6% had overall correct knowledge. Meanwhile, the correct rates of COVID-19 knowledge range widely between 65.3% to 99.8%. The majority of the respondents had answered correctly on knowledge of each item of COVID-19 except for the knowledge on the main symptoms of COVID-19. Only 65.3% of the respondents answered correctly regarding the main symptoms of COVID-19. The study also found a significant knowledge gap between the clinical staff and the non-clinical staff. This can be seen from the question in the knowledge segment on whether COVID-19 can cause respiratory tract infections. The individual asymptomatic of COVID-19 can infect another individual as the clinical staff answered correctly more than the non-clinical staff.

Several studies were being conducted in Asia, which revealed the high level of COVID-19 knowledge among healthcare workers.¹⁶⁻¹⁷; since the measurement and scoring systems are different, it is impossible to compare knowledge among the studies. Although the Ministry of Health used multiple sources to disseminate the correct information regarding the COVID-19 and its preventive measures, our finding shows that the staff still have inadequate knowledge of COVID-19. The inadequate knowledge was on main symptoms and whether COVID-19 can cause respiratory tract infections and the asymptomatic individual of COVID-19 can infect another individual. The reasons behind inadequate knowledge might be due to inaccurate information being disseminated via social media from unreliable sources other than the Ministry of Health.¹⁸ Understanding the correct knowledge and good practice among staff, especially healthcare workers, is crucial as they are the frontline staff to fight against this disease and need to protect themselves and educate their patients regarding disease prevention measures. The inadequate knowledge and misunderstanding of the disease might result in late detection of the disease and delay in the treatment effort¹⁹. This could cause the rapid spread of infections before it is being detected. For the non-clinical staff, although they did not involve directly with the patient, it is also essential for them to have the correct knowledge as they are also representative of the Ministry of Health to disseminate the information to the public.

Although the overall knowledge about COVID-19 is inadequate, more than 80% of the respondents' practice effectively toward COVID-19

preventive measures. The factors that could contribute to effective practices with inadequate overall knowledge of COVID-19 are that the surrounding environment that continually insists on the importance of preventive measures creates awareness of good perception and practices. Moreover, these good practices might have been contributed by the strict and serious preventive measures applied by the local government, especially the Malaysian National Security Council (NSC). They had introduced the movement control order, which banned public gathering (not going to crowded places).²⁰ Besides, the Ministry of health also keeps stressing physical distancing for at least 1 meter and hand hygiene campaigns (using soap and water or alcohol-based sanitisers).²¹

About four-fifths of respondents (88.8%) practice wearing face masks in public places. The finding revealed that perception and practice among clinical staff are significantly less compared to the non-clinical staff. The practice and perception of wearing a mask at all time if the respondent has symptoms of COVID-19 also lower compared to other practices and perceptions items. During the time of data collection, based on the WHO recommendation, only those with symptoms should wear a mask in public to avoid infecting other people.²² Therefore, the Ministry of Health had announced that the face mask is only applied for those with COVID-19 symptoms and similar illness.²³ This might have contributed to the less practice of wearing a face mask at public places among MOH staff. Moreover, mixed messages were being delivered to the public by the different bodies/organizations on the face mask while in public.²³

However, as mentioned by Desai & Aronoff in their recent publication, there is a new guideline that as the COVID-19 possible to be transmitted by the asymptomatic people, a healthy individual should consider wearing a mask in public places²⁴. This applies when physical distancing is impossible such as when people in grocery stores or pharmacies. The purpose of wearing a mask is to limit the spread of someone infected with the virus and someone who does not know their disease status. Meanwhile, people with COVID-19 symptoms need to wear a mask at all time to reduce the risk of other people being infected in public. The recommended mask is the medical mask (which include a surgical face mask). Thus, the Ministry of health needs to emphasize educating their staff regarding the necessity of face mask usage in public.

Another finding is that throwing the used tissue and face mask immediately in the rubbish bin (93.1%) is still low compared to other items. The practice of throwing the used tissue and face mask

in the rubbish bin is essential as the used tissue and mask could be contaminated and spread viruses if kept in the bag or other places¹¹.

Strength and Limitations

To our knowledge, this is the first study that explores the knowledge, perception and practice among the Ministry of Health staff. Therefore, this study will provide data and evidence to the Ministry of Health Malaysia (MOH) regarding knowledge, practice and perception on the effectiveness of the preventive measures taken by staff to prevent transmission of the disease and measures they would take should they be infected or should the develop symptoms of the disease on COVID-19 disease among MOH staff.

Sampling for the study was conducted via convenience sample during the MCO period for those who have an official e-mail account of the Ministry of health; thus, there is a possibility that it might be under representative or over the representative of the latest population of the Ministry of health staff. Therefore, a more systematic sampling method is preferred to improve representativeness and the finding generalization.

The next limitation is related to the instrument used in this study, as only content validity was done. Due to the study's limited time and urgency, practice and perception were measured with only one item each. If given more time, more detailed validity and reliability instrument assessment will produce a better instrument.

CONCLUSIONS

The findings showed that the Ministry of health staff still had inadequate knowledge of COVID-19 main symptoms, general knowledge and transmission route of COVID-19. However, most of the Ministry of health staff had good practices and perceptions on COVID-19 preventive measure and good practices and perceptions if the respondent develops COVID-19 symptoms. There are still some lower perceptions and practices than expected, especially on wearing a face mask in public places and throwing used tissue and face mask in the rubbish bin. Additional education intervention and campaigns are required to provide the Ministry of health staff with adequate knowledge towards COVID-19 main symptoms, general knowledge and transmission route of COVID-19, and increase the perception and practice on some perceptions and practices of the preventive measures.

List of abbreviations

MCO: Movement control order
COVID-19: Coronavirus Disease 2019
MOH: Ministry of Health
WHO: World Health Organization
NSC: National Society Council
SARS: Severe Acute Respiratory Syndrome

MERS-CoV: Middle East Respiratory Syndrome Coronavirus

Ethics Approval and Consent to Participate

Medical Research Ethics Committee, National Institute of Health Malaysia, Ministry of Health, Malaysia has approved this study (NMRR-20-571-54388). Respondent's anonymity and confidentiality were ensured. The study's consent was obtained at the front page of the questionnaire before the respondents agreed to join the survey.

Consent to Publish

This manuscript has obtained the approval for publication from Director-General of Health, Ministry of Health Malaysia.

Availability of Data and Materials

The National Institute of Health, Ministry of Health Malaysia (data ethics committee) has restricted sharing the full dataset due to cases involving researchers manipulating the data. Interested researchers will need to send a formal letter/e-mail to the Director-General of Health Malaysia, together with the data request form and proposal, available at (<http://iku.moh.gov.my/index.php/research-eng/data-request-eng>). The proposal will be reviewed by the Data Repository team from Biostatistics Sector, National Institute of Health Malaysia to ensure no duplication with other projects that have used the study data. The data request flow chart is available on the website and can be accessed here (<http://iku.moh.gov.my/images/IKU/Document/Form/FlowChartforIPHDataApplication.pdf>). The authors also confirm they did not have any special access privileges that others would not have for the study data.

Competing Interests

The authors declare that they have no competing interests.

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