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Knowledge, attitude, and practices toward COVID-19 and infection prevention and control among tertiary level hospital labor and delivery room healthcare workers in time of pandemic: A cross-sectional survey

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Abstract:

BACKGROUND: In our recent times, COVID-19 is an evolving, rapidly changing global health challenge affecting all sectors. Health-care workers (HCWs) are not only the first in defense against this highly contagious infectious disease but also are directly or indirectly affected by it, and the likelihood of acquiring this disease is higher among HCWs compared to the overall population. It is of utmost importance, therefore, that HCWs have adequate knowledge about all aspects of the disease from clinical manifestation, diagnosis, proposed treatment, and established prevention strategies. In this present study, we assessed the knowledge, attitudes, and practices (KAP) among HCWs toward the COVID-19 and infection prevention during the ongoing pandemic.

METHODOLOGY: A KAP and infection prevention and control (IPC) questionnaire was adapted and was administered to the recruited labor and delivery room HCWs involved in the COVID-19 response at a tertiary-level hospital. Clinical characteristics, prevention, and management of COVID-19 consisted of the knowledge questionnaire. Knowledge questionnaire on IPC consisted of questions regarding nosocomial infections, hand hygiene, and universal precautions. Assessment on attitudes and practices toward COVID-19 included questions on behavior and change in practices made toward COVID-19 response while attitude and practice assessment on IPC included questions on guidelines, conducts, and trainings. Knowledge scores were considered and associated by demographic characteristics and their attitude and practices.

RESULTS: The study included 114 HCWs with a median age of 30 years (range: 22–72), dominated by females, 85.09% versus 14.91%. The majority of the respondents attained doctorate (44.55%) and bachelor (43.56%) degrees. These HCWs mostly assume 8–16 h tour of duty (62.28%). The mean knowledge score of the HCWs on COVID-19 was 87.48 ± 14.17. The correct overall rate of the knowledge questionnaire was 80.7%. The mean attitude was 3.32 ± 0.55. More than half contemplated that the country is not on a good position to contain COVID-19 spread (54.39%) and only 38.60% are confident that they can manage patients with signs and symptoms of the disease when present to them. As for their current health practices, the past 14 days before the time of data gathering, 63.16% admitted that they have never gone to any crowded places. They always wore their masks when contact with patients (99.12%), refrained from doing handshakes (80.70%), cautiously washed their hands before and after handling patients (99.12%), and avoided patients with signs and symptoms suggestive of COVID-19 (82.46%). Overall, up to 97.4% of the participants had good practices. Based on the study findings, it was evident that HCWs are knowledgeable in IPC. The mean score for knowledge among nurses in IPC was 86.7.

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The mean scores for attitude and practices among nurses in IPC were 4.06 and 2.69, respectively. Therefore, nurses had positive attitudes and good practice toward IPC.

CONCLUSION: Our findings suggest that labor and delivery room HCWs have adequate knowledge, and possess good preventive practice to contain the transmission of SARS-COV-2 during the amount of the COVID-19. They even have adequate knowledge and positive attitude and apply appropriate practice on IPC. However, their attitude was less optimistic toward COVID-19 even with better knowledge. Health education schemes geared toward improving COVID-19 knowledge are helpful for encouraging an optimistic attitudes and maintaining safe practices. Continued professional education is suggested among HCWs to enhance the knowledge of HCWs, hence averting negative attitudes and promoting positive preventive and therapeutic practices.

Keywords:

Attitude and practices, COVID-19, knowledge

Introduction

Infection prevention could be a systematic effort or process of placing barrier between susceptible host and therefore the microorganisms.[1] Standard and universal precautions (UPs) are utmost important in terms of infection prevention to patients and to health-care workers (HCWs) also, so it should be followed without fail for every and each procedure. It should be used considering every source as infectious and no matter what the patient's diagnosis. Compliance to those precautions will protect HCWs by reducing the danger of infection.[2,3] Infection prevention and control (IPC) is the practical regulation concerned with preventing health-care-associated infection. IPC is an important a part of the health-care infrastructure.[4]

In our recent time, an emerging public pathological state threatening the lifetime of over 34 million people globally is coronavirus disease 2019 (COVID-19) caused by novel human coronavirus (SARS-COV-2) previously referred to as 2019-nCov.[5] COVID-19 is a communicable disease caused by a strain of coronavirus. This novel virus was not known before the outbreak began in Wuhan, China, in December 2019. On January 30, 2020, the Philippines Department of Health reported the primary case of COVID-19 within the country with a 38-year-old female Chinese national.[6] On March 7, the first local transmission of COVID-19 was confirmed.

According to the World Health Organization (WHO), HCWs are at the frontline of COVID-19 pandemic response and are exposed to dangers such as pathogen exposure, long working hours, psychological distress, exhaustion, work-related burnout and stigma, and physical violence.[7] Poor understanding of HCW of the disease can result in delayed identification and treatment leading to swift increase of infections. Over 2000 health workers have already lost their lives to COVID-19, a tragedy to the world and an obstacle to battle against the disease.[8] Guidelines for HCWs and online courses have been developed by the WHO, Centers for Disease Control and Prevention, and various governmental organizations in various countries to boost the knowledge and prevention strategies.

Amid the current pandemic, the WHO has issued several strategies and guidelines and started training sessions to raise mindfulness and preparedness regarding prevention and control of COVID-19 among HCWs. In this study, we aim to determine the knowledge, attitudes, and practices (KAP) of HCWs toward COVID-19 and toward infection control and prevention.

Research objectives

General objective

1. To determine the KAP of hospital staff in the labor room and delivery room toward COVID-19 and IPC.

Specific objectives

1. To evaluate the knowledge of tertiary-level hospital among labor room and delivery room health-care staff on the following:
   a. Signs and symptoms of COVID-19
   b. Transmission of COVID-19
   c. Prevention of transmission of COVID-19.
2. To determine the attitudes of tertiary-level hospital labor room and delivery room health-care staff on the following:
   a. Pandemic response by the hospital
   b. Pandemic response by the government.
3. To determine the practices of tertiary-level hospital labor room and delivery room health-care staff on the following:
   a. Handwashing
   b. Physical distancing
   c. Personal protective equipment
   d. Health promotion
   e. Work shifts.

Methodology

Study design and setting

This is a cross-sectional descriptive study design that underwent validation and pretesting of a KAP

questionnaire for COVID-19 and infection control and prevention among HCWs at the labor and delivery room (LR-DR) at a tertiary-level hospital. Afterward, a survey proper was conducted in a tertiary-level hospital. The study protocol has been approved by the investigational review board.

Study population

Inclusion criteria

Labor and delivery room HCWs at tertiary-level hospital OB-GYN consultants:

- OB-GYN residents in training
- Interns
- Nurses
- Nursing aids
- Pharmacists
- Medical technologists
- Orderly.

Exclusion criteria

- HCWs who are on leave
- Those who are severely ill to answer survey forms
- Those who would refuse to participate.

Adaptation and validation of a KAP questionnaire on COVID-19 and infection and prevention control

A validation and pretesting of the questionnaire prior to the survey proper was done.

Phase 1: Tool development

In item development and selection, we have three sources of information: literature, expert opinion, and patient input.

Literature search

The search strategy used is provided in Table 1. To ensure a comprehensive literature search, multiple Medical Subject Headings and free text search terms were used. The literature search has no restrictions on year, language, type of access, nor type of article. From the yield of articles, ascendant and descendant search strategies were utilized using the top 5–10 most relevant articles as index articles. We utilized local, regional, and international health research search sites, engines, and bibliographic databases, also enumerated in Table 1.

Drafting of the survey questionnaire

After the literature search, we decided on whether we proceed with development of a new tool or adapt existing tools. Specifically, we selected potential questionnaires, if any, that cover:

- Items on knowledge and/or awareness on COVID-19
- Attitude toward COVID-19
- Practices
- Infection and prevention.

Table 1: Search strategies on knowledge, attitude, and practices on coronavirus disease 2019 and infection prevention and control of health-care workers

Initial search terms**	Search sites/engines
1. Knowledge AND COVID-19	1. Herdin
2. (Knowledge OR attitude) AND COVID-19	2. PubMed/Medline
3. (Knowledge OR attitude OR COVID-19) AND health-care workers	3. Google Scholar
3. (Knowledge OR attitude OR practices OR COVID-19) AND health-care workers	4. Cochrane library/central
4. Infection AND (prevention OR control)	5. Accessss federated search
	6. IMSEAR
	7. WPRIM
	8. APAMED central

**Search strategy is expected to evolve depending on the common keywords and MeSH terms used. IMSEAR: Index Medicus Southeast Asia Region, WPRIM: Western Pacific Regional Index Medicus, APAMED: Asia Pacific Association of Medical Journal Editors

The authors discussed the items that they commonly observed in the local setting that may not have been covered by international literature.

On this study, we adapt and modified the questionnaire developed by Olum *et al*. (2020) about COVID-19 and by Chitimwango (2017) about IPC.

Phase 2: Translation of the questionnaire

For this phase, the target groups of respondents are anticipated to be able to understand the English language, so translation was not required.

Phase 3: Validation and testing

Content validity

A minimum of three experts (ideally 8–12 experts) were requested to review the adapted questionnaire. These experts were multidisciplinary, professionals who work with the field, such as doctors, nurses, and nursing aides. To fully assess for content validity, the questions shown in Table 2 will be asked from the expert panel, based on the COSMIN criteria for content validity.

Plan of analysis

Item-level content validity index (I-CVI); the proportion of experts who agree that the item is quite or highly relevant; items with higher than I-CVI 0.80 will be accepted, while those lower will be subject to discussion by the expert panel and the investigators.

Face validity

From subjects

We recruited 10 HCWs, ideally doctors, nurses, nursing aides, etc., as our target respondents. They reviewed the following:

a. Description of the survey questionnaire: Are the title and instructions clear and easy to follow?
b. For each item: The respondents will be asked the following questions, using the "think aloud testing" technique:
    i. Do you have difficulty answering each question?

ii. If yes, how will you restate them?
iii. Are the responses difficult to understand?
iv. If yes, how will you restate them?
v. Are the questions relevant to your condition?
vi. Are the questions offensive/upsetting to you?
vii. If yes, how will you restate them?

Plan of analysis

Feedback was organized according to themes. Major remarks regarding face validity were noted and modifications have been applied to the draft survey.

Table 2: Content Validity

Item	Question
1	Relevance
	Are the items relevant for the construct of interest (KAP on COVID-19/KAP on disease infection and prevention)?
2	Are the items relevant for the target population of interest (KAP on COVID-19/KAP on disease infection and prevention among health-care workers)?
3	Are the items relevant for the context of use of interest?
4	Are the response options appropriate?
5	Are there other issues that need to be addressed?
6	Comprehensiveness
	Are there any missing key concepts on COVID-19/ disease infection and prevention for this research paper?
	Comprehensibility
7	Are the instructions clear and understandable?
8	Are the questions clear and understood as intended?
9	Are the items appropriately worded (i.e., neutral and nonoffensive)?
10	Do the response options match the questions?

COVID-19: Coronavirus disease 2019, KAP: Knowledge, attitudes, and practices

Table 3: Draft content validity questionnaire

Sample question items	Item relevance rating			
	Not relevant	Somewhat relevant	Quite relevant	Highly relevant
Question 1	-	-	-	-
Question 2	-	-	-	-
Overall	-	-	-	-

From experts

The content experts reviewed the latest draft of the questionnaire. They reviewed the following:

a. Description of the survey questionnaire: Are the title and instructions clear and easy to follow?
b. For each item: Did you have any difficulty understanding this question? Do you think that the question reflects the construct of interest? Is the question relevant?
c. For response options: Are the options suitable for the questions?
d. How can we improve this survey? What did you find difficult to understand?

Plan of analysis

Feedback was organized according to themes. Major remarks regarding face validity were noted and modifications have been applied to the draft survey.

Phase 4: Survey proper

Sampling frame

We employed purposive sampling, recruiting labor and delivery room health-care staff at the tertiary-level hospital.

Sample size

- Content validity: Minimum of 3 (Polit and Yang)[19]
- Face validity: Minimum of 10 (Fayers and Machin)[20]
- Survey proper: Minimum of 151.

A minimum of 151 HCWs are required for this study based on a level of significance of 5%, proportion of HCWs with sufficient knowledge on COVID-19 equal to 89% with a desired width of confidence interval of 10% [Table 4].

Legend:

n = minimum sample size

P = proportion of HCWs with sufficient knowledge = 69%

Table 4: Minimum sample size at 0.05 level of significance

	Proportion (%)	Sample size
Olum 2020		
Sufficient knowledge	69	329
Positive attitude	21	255
Good practices	74	296
Zhang 2020		
With sufficient knowledge of COVID-19	89	151
Followed correct practices regarding COVID-19	89.7	142
Saadatjoo 2020		
Good practices regarding COVID-19	44	379
Sharma 2020		
Adequate knowledge, correct attitude, and proper practices among HCWs involved in COVID-19 pandemic	16	207
Assumed	50	385

COVID-19: Coronavirus disease 2019, HCWs: Health Care Workers

d = absolute error/precision (+0.05) = 0.10

$Z_{\alpha} = 1.96$

Sample size formula:[3]

$$n \geq \frac{Z^2_{\alpha} \times 4 \times P \times (1-P)}{d^2}$$

$$n \geq \frac{1.96^2 \times 4 \times 0.89 \times (1-0.89)}{0.10^2}$$

$$n \geq 151$$

Study variables

- Independent variables: Demographic details which include sex, age, academic qualification, highest level of education, and sources of knowledge on COVID-19
- Dependent variables: Knowledge, attitude, and practices toward COVID-19 and IPC.

The questionnaire was adapted from Olum *et al*. for COVID-19[15] and Chitimwango.[27]

Knowledge was assessed employing an 11-item questionnaire, each correct response weight 1 point and 0 for incorrect responses. The upper the points, the more knowledgeable the HCW. It is modified to suit HCWs and was about clinical presentations, transmission, prevention, and control.

Attitudes were assessed using five Likert-item questions that are adopted and modified appropriately. Strongly disagree, disagree, neutral, agree, and strongly agree each weighing 1–5, respectively, for every positive statement are the responses. Some questions were reversed to eliminate biases of giving similar response in all items.

Practices were assessed using five Likert-item questions that are developed from the WHO-recommended practices for prevention of COVID-19 transmission, i.e., handwashing, avoiding crowded places, keeping social distance, avoiding touching of face, and avoiding handshakes. Always, occasional, and never are the responses each weighing 3, 2, and 1 point, respectively, for a good practice.

Categorical data were summarized as frequencies and proportions. Bloom's cutoff of 80% was used to determine sufficient knowledge (≥80%), positive attitude (≥4), and good practice (≥2.4).

Results

The study included 114 HCWs with a median age of 30 years (range: 22–72), dominated by females, 85.09% versus 14.91%. Top respondents were nurses (34.21%), interns (23.68%), and resident doctors (14.04%). The majority of the respondents attained doctorate (44.55%) and bachelor (43.56%) degrees. Most admitted that they obtain information about infection control and prevention of COVID-19 via social media (91.23%), mainstream media – news (90.35%), and government site and media (85.96%). These HCWs mostly assume 8–16-h tour of duty (62.28%) [Table 5].

The mean knowledge score for COVID-19 was 87.48% (SD: 14.17). Eight percent (n = 92) of the participants scored 80% or more and were considered to have sufficient knowledge. The mean attitude score 3.32 (SD: 0.55). Overall, there was poor attitude among HCWs toward COVID-19. Only 12.3% (n = 14) of the participants had a good attitude toward COVID-19. Overall, up to 97% (n = 111) of the participants had good practices (mean score ≥2.82) [Table 6].

The subjects had identified the fever (97.37%), cough (92.92%), sore throat (88.60%), loss of taste (85.96%), and anosmia (85.09%) as the top 5 main clinical symptoms of COVID-19 [Table 7.1].

Upon inquiry of the respondents' knowledge on the possible source and methods of transmission of the disease, 35.96% believe that consumption or contact with the wild animals can result to infection by the virus. Majority 95.61% believe that the virus spreads via respiratory droplets of infected individuals. On the contrary, 88.60% disagreed with the statement that "if the patient has no fever, they will not transmit the virus." Most (97.37%) also agreed that not all persons with the disease would progress into severe cases, but the elderly, obese, and those with chronic diseases are more likely to have these severe cases. As for the disease management, 97.37% said that there is no effective cure for COVID-19 is available currently and it is the supportive and symptomatic treatment that helps most the patients to recover from the disease. They also agree that individuals who have contact with a COVID-19-positive patient should be directed to the isolation area and be quarantined for 14 days (86.84%). Moreover, all participants believe that isolation and treatment of patients with COVID-19 virus are the effective ways to reduce disease spread. With this context, they believed that wearing of surgical masks (97.37%) and avoiding crowded places (98.25%) can help prevent the virus spread. Moreover, they do not agree children and young adults do not need to do any necessary measures of prevention and precautions to avoid contacting the infection (90.35%) [Table 7.2].

As for the respondents' attitude toward COVID-19, 35.09% strongly disagree that the Filipino race is protective toward the disease. More than half also contemplated that the country is not on a good position

Table 5: Characteristics of health-care workers (*n*=114)

	Mean±SD; median (range); Frequency, *n* (%)
Age (years)	30 (22-72)
Sex	
Male	17 (14.91)
Female	97 (85.09)
Qualification	
Specialist	15 (13.16)
Resident doctor	16 (14.04)
Nurse	39 (34.21)
Nursing aid	4 (3.51)
Pharmacist	2 (1.75)
Orderly	11 (9.65)
Intern	27 (23.68)
Educational attainment	
PhD	13 (11.40)
Doctorate	45 (44.55)
Bachelors	44 (43.56)
Certificate	12 (11.88)
Source of information	
Government site and media	98 (85.96)
Social media	104 (91.23)
News media	103 (90.35)
Journals	59 (51.75)
Others	20 (17.54)
Duty	
<8	26 (22.81)
8-16	71 (62.28)
24-32	2 (1.75)
>32	15 (13.16)

SD: Standard deviation

Table 6: Knowledge, attitudes, and practices scores on coronavirus disease 2019 questionnaire (*n*=114)

	Mean±SD	Median (range)	Respondents with sufficient or good KAP
Knowledge	87.48±14.17	94 (33.33-100)	92 (80.7)
Attitudes	3.32±0.55	3.2 (1.4-4.6)	14 (12.3)
Practices	2.82±0.21	2.8 (2-3)	111 (97.4)

SD: Standard deviation, KAP: Knowledge, attitudes, and practices

Table 7.1: Knowledge on main clinical symptoms of coronavirus disease 2019 (*n*=114)

	Frequency		I do not know
	Yes, *n* (%)	No, *n* (%)	
Cough	105 (92.92)	9 (7.89)	0
Fever	111 (97.37)	3 (2.63)	0
Sore throat	101 (88.60)	13 (11.40)	0
Runny nose	79 (69.30)	35 (30.70)	0
Myalgia (muscle pain)	87 (76.32)	27 (23.68)	0
Diarrhea	89 (78.07)	25 (21.93)	0
Anosmia	97 (85.09)	17 (14.91)	0
Loss of taste	98 (85.96)	16 (14.04)	0

to contain its spread (54.39%). Congruent with the information gathered about their knowledge on how to protect oneself against the disease, large percentage strongly agree that wearing well-fitting masks and handwashing, 69.53% and 79.82%, respectively, prevent COVID-19 transmission. However, only 38.60% are confident that they can manage patients with signs and symptoms of the disease when present to them [Table 8].

As for their current health practices the past 14 days before the time of data gathering, 63.16% admitted that they have never gone to any crowded places. They always wore their masks when contact with patients (99.12%), refrained from doing handshakes (80.70%), cautiously washed their hands before and after handling patients (99.12%), and avoided patients with signs and symptoms suggestive of COVID-19 (82.46%) [Table 9].

In general, the HCWs have a sufficient knowledge, positive attitude, and good practice on infection control and prevention. The mean knowledge score for was 86.7% (SD: 11.51). Seventy-nine percent (n = 91) of the participants scored 80% or more and were considered to have sufficient knowledge. The mean attitude score 4.06 (SD: 0.34). Overall, there was a positive attitude among HCWs toward infection control and prevention. Only 69.3% (n = 79) of the participants had a good attitude. Overall, up to 96% (n = 110) of the participants had good practices (mean score ≥2.69) [Table 10].

In an in-depth inquiry on their knowledge on infection and prevention, 97.37% were confident that they know how to prevent and control hospital-acquired infections. In relation to this, 82.46% claimed that they are familiar with the hospital-acquired infection guidelines, and most (89.47%) knew the "5 moments of hand hygiene" of the WHO.

About 90.35% acknowledge that both patients and HCWs are potentially infectious. Most (97.37%) agree that standard precautions apply to all patients, regardless of their diagnosis. Most (89.47%) do not believe that even if there are limited beds available, that patients with communicable diseases may be admitted in the same ward with other patients. Most respondents (85.96%) did not believe that nosocomial infection is an infection that patients come with from home.

Most (92.11%) believe that hospital-acquired infections can be transmitted by medical equipment such as syringes, needles, catheters, stethoscopes, thermometers, among others. While most respondents (49.12%) said that they believe that some instruments can be stored in an antiseptic solution for up to 36 h, some respondents (37.72%) were not sure.

Most (85.96%) do not believe that microorganisms are destroyed by using clean water. Most (96.49%) do not think that one can handle body fluids with their bare

Table 7.2: Knowledge on coronavirus disease 2019 among tertiary-level hospital labor and delivery room health-care workers (*n*=114)

Question number	Frequency		
	True, *n* (%)	False, *n* (%)	I do not know, *n* (%)
2. There is currently no effective cure for COVID-19, but early symptomatic and supportive treatment can help most patients recover from the infection	111 (97.37)	2 (1.75)	1 (0.88)
3. Not all persons with COVID-19 will develop severe cases. Those who are elderly, have chronic illnesses, and are obese are more likely to have severe cases	111 (97.37)	2 (1.75)	1 (0.88)
4. Eating or contacting wild animals would result in the infection by the COVID-19 virus	41 (35.96)	57 (50.00)	16 (14.04)
5. Persons with COVID-19 cannot transmit the virus to others when a fever is not present	13 (11.40)	101 (88.60)	0
6. The COVID-19 virus spreads via respiratory droplets of infected individuals	109 (95.61)	5 (4.39)	0
7. Wearing surgical masks can prevent one from acquiring infection by the COVID-19 virus	111 (97.37)	3 (2.63)	0
8. It is not necessary for children and young adults to take measures to prevent the infection by the COVID-19 virus	11 (9.65)	103 (90.35)	0
9. To prevent spread and infection by COVID-19, individuals should avoid going to crowded places such as malls, avoid big gatherings, and avoid taking public transportations	112 (98.25)	2 (1.75)	0
10. Isolation and treatment of people who are infected with the COVID-19 virus are effective ways to reduce the spread of the virus	114 (100)	0	0
11. People who have contact with someone infected with the COVID-19 virus should be immediately isolated in an isolation center. In general, the observation period is 14 days	99 (86.84)	15 (13.16)	0

COVID-19: Coronavirus disease 2019

Table 8: Attitudes toward coronavirus disease 2019 prevention and management of tertiary-level hospital labor and delivery room health-care workers (*n*=114)

Question number	Frequency				
	Strongly disagree, *n* (%)	Disagree, *n* (%)	Neutral, *n* (%)	Agree, *n* (%)	Strongly agree, *n* (%)
12. Filipino race is protective toward COVID-19 disease	40 (35.09)	29 (25.44)	32 (28.07)	10 (8.77)	3 (2.63)
13. Wearing a well-fitting surgical mask is effective in preventing COVID-19	6 (5.26)	0	1 (0.88)	38 (33.33)	69 (60.53)
14. Handwashing can prevent COVID-19	5 (4.39)	0	1 (0.88)	17 (14.91)	91 (79.82)
15. When a patient has signs and symptoms of COVID-19, I can confidently participate in the management of the patient	4 (3.51)	13 (11.40)	36 (31.58)	44 (38.60)	17 (14.91)
16. Philippines is in a good position to contain COVID-19	62 (54.39)	17 (14.91)	28 (24.56)	6 (5.26)	1 (0.88)

COVID-19: Coronavirus disease 2019

Table 9: Practices on coronavirus disease 2019 prevention of tertiary-level hospital labor and delivery room health-care workers (*n*=114)

Question number	Frequency		
	Always, *n* (%)	Occasional, *n* (%)	Never, *n* (%)
17. In the past 14 days, have you gone to any crowded place	4 (3.51)	38 (33.33)	72 (63.16)
18. In the past 14 days, I have worn a mask when in contact with patients	113 (99.12)	1 (0.88)	0
19. In the past 14 days, I have refrained from shaking hands	92 (80.70)	13 (11.40)	9 (7.89)
20. In the past 14 days, I have washed my hands before and after handling each patient	113 (99.12)	1 (0.88)	0
21. In the past 14 days, I have avoided patients with signs and symptoms suggestive of COVID-19	94 (82.46)	15 (13.16)	5 (4.39)

COVID-19: Coronavirus disease 2019

hands even if gloves are not available. Most (84.21%) believe that bathing every day is a UP [Table 11].

Most respondents said that they strongly disagreed about the following statements on infection and prevention: not having to wash their hands if they used gloves (78.07%), and that it was not their responsibility to comply with hospital-acquired infection guidelines (76.32%). Most respondents said that they agreed about the following statements: that the workload affects their ability to apply infection prevention guidelines (43.86%), and that the infection control policies and guidelines are enough in the hospital (57.89%). Most respondents said that they strongly agreed about the following statements: that the policies and procedures on infection control should be adhered to at all times (78.95%), that they should attend in-service trainings or workshops related to IPC regularly (62.28%), that they are aware that patients

expect them to wash hands before touching them and after touching them (59.65%), that infection prevention guidelines are important to this hospital (79.82%), that following the prevention guidelines will reduce the rates of hospital-acquired infection (72.81%), and that they should follow the procedure guidelines of the DR-OR complex (83.33%). While most respondents said that they agreed with the statement about having enough time to comply with the infection prevention guidelines (44.74%), some respondents (43.86%) strongly agreed [Table 12].

Most respondents said that they never did the following practices on infection and prevention: thought that infection prevention does not improve patient outcomes (77.19%), and shook linen out to release the dust from the linen (73.68%). Most respondents said that they occasionally attended in-service trainings or workshops related to IPC yearly (57.02%). Most respondents said that they always did the following practices: always washing hands before and after direct contact with patients (92.98%), always putting on a mask and face shield when performing invasive and body fluid procedures (99.12%), and wearing personal protective equipment when handling linen (62.28%).

Most respondents said that in their hospital, the practices on infection and prevention were always done: monitoring the knowledge of IPC (80.7%), using the latest infection and prevention guidelines, which date is between 2013 and 2015 (70.18%), screening patients to detect colonization even if there is no evidence of infection (77.19%), and monitoring patients with urinary catheters for urinary tract infection and giving feedback on urinary tract infection rates (72.81%). Most respondents also said that their hospital always provides vaccination to staff (95.61%), and that personal protective equipment are always accessible (92.11%)

While half of the respondents said that surgical operation sites are always shaved with razors, nearly a third (32.46%) said that this is only done occasionally [Table 13].

Table 10: Knowledge, attitudes, and practices scores on infection and prevention (*n*=114)

	Mean±SD	Median (range)	Percentage respondents with good KAP, *n* (%)
Knowledge	86.70±11.51	83.33 (50-100)	91 (79.8)
Attitudes	4.06±0.34	4.09 (2.73-4.64)	79 (69.3)
Practices	2.69±0.16	2.69 (2.15-3.00)	110 (96.5)

SD: Standard deviation, KAP: Knowledge, attitudes, and practices

Discussion

COVID-19 is an evolving, rapidly changing worldwide health challenge affecting all sectors.[21,22] HCWs are not only at the forefront of the battle against this highly contagious communicable disease but also are directly or indirectly suffering from it and therefore the likelihood of acquiring this disease is higher among HCWs compared to the overall population.[14] It is therefore of supreme importance that HCWs have adequate knowledge about all aspects of the disease from clinical manifestation, diagnosis, proposed treatment, and established prevention strategies.

According to the WHO, 2021, preventing COVID-19 infections in health workers requires an integrated approach of IPC actions. Health-care facilities should institute and implement IPC programs with protocols that ensure health worker safety and prevent infections with COVID-19 in the work environment.[26]

There are limited studies that document KAP among HCWs worldwide. In the present study, we were able to demonstrate that about 8 in 10 of the HCWs had sufficient knowledge about COVID-19 and IPC. From

Table 11: Knowledge on infection and prevention among tertiary-level hospital labor and delivery room health-care workers (*n*=114)

Question number	Frequency		
	True, *n* (%)	False, *n* (%)	I do not know, *n* (%)
1. Hospital-acquired infection can be transmitted by medical equipment such as syringes, needles, catheters, stethoscopes, and thermometers	105 (92.11)	9 (7.89)	0
2. Nosocomial infection is an infection that the patient comes with from home	14 (12.28)	98 (85.96)	2 (1.75)
3. I know the worlds health organization's moments of hand hygiene	102 (89.47)	5 (4.39)	7 (6.14)
4. Some instrument can be stored in an antiseptic solution for up to 36 h	56 (49.12)	15 (13.16)	43 (37.72)
5. If there are limited beds available, patients with communicable diseases may be admitted in the same ward with other patients	7 (6.14)	102 (89.47)	5 (4.39)
6. Microorganisms are destroyed using clean water	14 (12.28)	98 (85.96)	2 (1.75)
7. Bathing every day is a universal precaution	96 (84.21)	16 (14.04)	2 (1.75)
8. Standard precautions apply to all patients regardless of their diagnosis	111 (97.37)	3 (2.63)	0
9. I am familiar with hospital-acquired infection guidelines	94 (82.46)	3 (2.63)	17 (14.91)
10. All health-care workers and patients should be considered potentially infectious	103 (90.35)	11 (9.65)	0
11. You can handle body fluids with bare hands if gloves are not available	4 (3.51)	110 (96.49)	0
12. I know how to prevent and control hospital-acquired infections	111 (97.37)	3 (2.63)	0

Table 12: Attitudes toward infection and prevention among tertiary-level and delivery room health-care workers (*n*=114)

Question number	Frequency				
	Strongly disagree, *n* (%)	Disagree, *n* (%)	Neutral, *n* (%)	Agree, *n* (%)	Strongly agree, *n* (%)
13. I do not have to wash hands if I used gloves	89 (78.07)	24 (21.05)	0	0	1 (0.88)
14. Policies and procedures on infection control should be adhered to at all times	3 (2.63)	2 (1.75)	1 (0.88)	18 (15.79)	90 (78.95)
15. I should attend in-service training/workshop related to infection prevention and control regularly	1 (0.88)	2 (1.75)	5 (4.39)	35 (30.70)	71 (62.28)
16. The workload affects my ability to apply infection prevention guidelines	6 (5.26)	21 (18.42)	14 (12.28)	50 (43.86)	23 (20.18)
17. I am aware that patients expect me to wash hands before touching them and after touching them	2 (1.75)	3 (2.63)	2 (1.75)	39 (34.21)	68 (59.65)
18. I feel that infection control policies and guidelines are enough in the hospital	3 (2.63)	4 (3.51)	28 (24.56)	66 (57.89)	13 (11.40)
19. It is not my responsibility to comply with hospital-acquired infection guidelines	87 (76.32)	21 (18.42)	0	4 (3.51)	2 (1.75)
20. Infection prevention guidelines are important to this hospital	2 (1.75)	1 (0.88)	1 (0.88)	19 (16.67)	91 (79.82)
21. I have enough time to comply with infection prevention guidelines	1 (0.88)	1 (0.88)	11 (9.65)	51 (44.74)	50 (43.86)
22. I believe that following the prevention guidelines will reduce rates of hospital-acquired infection	0	2 (1.75)	1 (0.88)	28 (24.56)	83 (72.81)
23. I should follow the procedure guidelines of the DR-OR complex	3 (2.63)	0	0	16 (14.04)	95 (83.33)

DR: Delivery Room, OR: Operating Room

Table 13: Practices on infection and prevention among tertiary-level labor and delivery room health-care workers (*n*=114)

Question number	Frequency (%)		
	Always, *n* (%)	Occasional, *n* (%)	Never, *n* (%)
24. I always wash hands before and after direct contact with the patients	106 (92.98)	8 (7.02)	0
25. I always put on a mask and face shield when performing invasive and body fluid procedures	113 (99.12)	1 (0.88)	0
26. Knowledge of infection prevention and control is being monitored in the hospital	92 (80.70)	22 (19.30)	0
27. I attend in-service training/workshop related to infection prevention and control yearly	42 (36.84)	65 (57.02)	7 (6.14)
28. Surgical operation sites are shaved with razors	57 (50.00)	37 (32.46)	20 (17.54)
29. The latest infection and prevention guideline date is between 2013 and 2015	80 (70.18)	21 (18.42)	13 (11.40)
30. Screening of patients is being done to detect colonization even if no evidence of infection	88 (77.19)	24 (21.05)	2 (1.75)
31. Vaccination is provided to staff	109 (95.61)	5 (4.39)	0
32. Personal protective equipment are always accessible	105 (92.11)	9 (7.89)	0
33. Our hospital monitors patients with urinary catheters for urinary tract infection and gives feedback on urinary tract infection rates	83 (72.81)	25 (21.93)	6 (5.26)
34. Infection prevention does not improve patient outcome	7 (6.14)	19 (16.67)	88 (77.19)
35. We wear personal protective equipment when handling linen	71 (62.28)	37 (32.46)	6 (5.26)
36. We shake linen out to release dust from the linen	13 (11.40)	17 (14.91)	84 (73.68)

this study, a mean knowledge score of 87.5 and 86.7 was obtained on questions about knowledge indicating good knowledge in COVID-19 and infection control, respectively, among labor and delivery room HCWs in a tertiary-level hospital.

In the study done by Olum *et al*., the mean knowledge score on COVID-19 was 82.4% (SD: 11.2). Sixty-nine percent (n = 94) of the population scored 80% or more and were considered to have sufficient knowledge. In this present study, 87.48 (SD 14.17) was the mean knowledge score on COVID-19 and 80% (n = 92) of the participants were considered to have sufficient knowledge. In general, a major group of the HCWs had sufficient knowledge about COVID-19.

In our study, most of the participants used information from social, news, and government media. This means that such media should be commonly used to circulate information on COVID-19. Further education and training through continuous education is essential in improving the knowledge of HCW about COVID 19 in our setting.

As for the respondents' attitude toward COVID-19, 35.09% strongly disagree that the Filipino race is protective toward the disease. More than half also contemplated that the country is not on a good position to contain its spread (54.39%). Congruent with the information gathered about their knowledge on how to protect oneself against the disease, large percentage

strongly agree that wearing well-fitting masks and handwashing, 69.53% and 79.82%, respectively, prevent COVID-19 transmission. Our study reveals that majority of labor and delivery room HCWs have a negative attitude toward COVID-19 which is in congruence with a KAP study by Olum *et al*. but in contrast to a Giao's study where 93% of the respondents have positive attitude on COVID-19.[23] Only 38.60% of the respondents in this study are confident that they can manage patients with signs and symptoms of the disease when present to them. This could be an area of interest to provide adequate training to our HCWs on COVID-19 case managements.

Our study shows that HCWs in labor and delivery room in a tertiary-level hospital have good COVID-19 practices similar to findings by Limbu *et al*.[24] and Ejeh *et al*.[25]

Majority of the HCWs are following IPC practices mandated by the WHO which include regular hand hygiene, social distancing, and wearing a face mask when in high-risk situations. They always wore their masks when contact with patients (99.12%), refrained from doing handshakes (80.70%), cautiously washed their hands before and after handling patients (99.12%), and avoided patients with signs and symptoms suggestive of COVID-19 (82.46%).

Most respondents said that they never did the following practices on infection and prevention: thought that infection prevention does not improve patient outcomes (77.19%), and shook linen out to release the dust from the linen (73.68%). However, most respondents said that they occasionally attended in-service trainings or workshops related to IPC yearly (57.02%). HCWs should update themselves regularly through continuous educational programs, especially in this time of pandemic.

Most respondents said that they always did the following practices: always washing hands before and after direct contact with patients (92.98%), always putting on a mask and face shield when performing invasive and body fluid procedures (99.12%), and wearing personal protective equipment when handling linen (62.28%). These are very vital practices to prevent transfer of COVID-19 and even other infections from patients to patients and to the HCWs themselves.

Limitation of the study

There was no standardized tool for assessing KAP on COVID-19 that has been formerly validated. We have, however, modified a previously published tool for assessment of KAP. These questions have been formulated from the WHO guidelines and reports on COVID-19. Second, only HCWs in labor and delivery room were surveyed and the results of this study may not reflect the KAP of HCWs in the entire hospital. The extent of KAP may also be imprecise due to the limited number of items in the questionnaire. Further investigations are needed to develop upon and determine these issues.

Recommendations

This study may be used to formulate targeted continuing medical education for HCWs and may be enrolled in a hospital survey and training on COVID-19 and IPC. This kind of study may be extended to the community. Future studies could estimate the knowledge and attitude of HCWs on a larger scale to be able to design appropriate interventions on a nationwide level.

Conclusion

Our findings suggest that labor and delivery room HCWs have adequate knowledge, and possess good preventive practice to contain the transmission of SARS-COV-2 during the period of the COVID-19. They also have adequate knowledge and positive attitude and apply appropriate practice on IPC. However, their attitude was less optimistic toward COVID-19 even with good knowledge. Health programs intended on improving COVID-19 knowledge are helpful for inspiring an optimistic attitudes and maintaining safe practices. To improve knowledge of HCWs, hence preventing negative attitudes and promoting positive preventive and therapeutic practices, continued education is advised. In-service trainings regarding IPC should be organized and medical systems should ensure that frontline workers have enough time to rest between shifts, to avoid fatigue and nonconscious inaccuracies during epidemic relief efforts. Hopefully, under the combined efforts of the Institution/Department and Filipino Government, we can win the battle against COVID-19 in the near future.

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Conflicts of interest

There are no conflicts of interest.

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