KNOWLEDGE, ATTITUDE AND PRACTICE OF COVID-19 INFECTION PREVENTION AND CONTROL AMONG HEALTHCARE WORKERS IN RIVERS STATE, NIGERIA

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ABSTRACT

***Introduction**:*

Knowledge gaps in addition to poor attitudes and practice towards COVID-19 infection prevention and control (IPC) measures have reportedly contributed to the spread of SARS Corona virus type 2 (SARS CoV-2) among frontline healthcare workers. This study sought to assess the

knowledge, attitude, and practice (KAP) of COVID-19-related IPC measures among frontline health workers in Rivers State, Nigeria.

***Methods**:*

This was a cross-sectional study carried out among frontline health workers in Rivers State. The study tool was an online pretested questionnaire disseminated through WhatsApp and email. Blooms cutoff of 70% was used to determine good knowledge, positive attitude and good practice. Associations between variables (knowledge, attitude and practice) and demographics of respondents were also analyzed. All analyses were done at a 95% confidence interval and a p-value < 0.05 was considered significant.

***Results**:*

A total of two hundred and twenty-four health workers responded. 87(38.8%) respondents had 11-20 years' work experience while 23(10.3%) had worked for over 30years. Overall, 46.0% had sufficient knowledge and 42% expressed positive attitude; however, an overwhelming majority (90.2%) reported poor practice of COVID-19 IPC measures. Medical doctors had better knowledge of COVID-19 IPC measures while good practice was reported mostly by respondents with 11-20 years of work experience.

***Conclusion**:*

Knowledge, attitude, and practice of COVID-19 IPC among health care workers in Rivers state is largely poor. Considering that these measures are useful for the prevention of a large variety of infections including those with the potential to assume outbreak proportions, we strongly recommend incorporation of IPC training into undergraduate, postgraduate, and continuing medical education programs of all specialties and for all cadres of health workers. Measures

should also be instituted to encourage its practice for a safe and healthy healthcare workforce and environment.

***Key words**: COVID-19, Health workers, SARS CoV-2, Infection prevention and control*

INTRODUCTION

Over the past twenty years, the world has witnessed multiple outbreaks involving respiratory viruses. Recent outbreaks have involved emerging Corona viruses; the severe acute respiratory syndrome (SARS); the Middle Eastern respiratory syndrome (MERS) and currently Corona virus disease of 2019 (COVID-19) which is a major threat to global health.[1,2] The term COVID-19 refers to a group of highly infectious, emerging viral diseases caused by the SARS Cov-2 virus, which originated in Wuhan, China in 2019[3] and has become a pandemic affecting more than 44 million people worldwide as at the end of October 2020.[4]

The corona viruses are spread by infectious droplets therefore close contacts of patients are at high risks of contracting the viruses.[5,6] Health workers, whilst providing care, could be considered close contacts of patients and are particularly at risk of infections during outbreaks of infections caused by these emerging viruses.[1,5,7,8] The infection of health workers during outbreaks, usually occur in health care facilities and involve transmission either from patient to health care worker or healthcare worker to healthcare worker.[1,9] During the SARS crises in 2003, several outbreaks were reported in healthcare settings with over 20% of probable cases involving health workers globally.[10] There were also high rates of infections among health workers during the MERS outbreak with 19.1% of cases involving health workers in Saudi Arabia and 13.44% of same in south Korea.[1]

The COVID-19 pandemic is an ongoing public health challenge and as the numbers of

confirmed cases continue to rise, the number of infections among healthcare workers continue to increase. About six months into the outbreak, it was reported that health workers accounted for about 10% of COVID-19 cases globally[11] and in Nigeria, 812 health care workers were infected.[12] While various factors including overcrowding, excessive work, fatigue and poor healthcare systems may be responsible for such high numbers, suboptimal institutional infection control practices are mostly responsible for these high rates of infection in healthcare settings.[8,13] Studies have shown that poor knowledge of a disease by health workers may promote incorrect attitudes and practice and these may lead to increase in infection rates.[14] This may also apply to infection prevention and control (IPC) as suggested by studies in China which reported that a major reason for high rates of COVID-19 infections among health workers was the non-implementation of effective personal protection by health workers. This was said to be caused by poor understanding of the pathogen and the equally poor awareness of personal protection among frontline workers.[8,13] It can, therefore be inferred that knowledge of the pathogen and perception of the disease and/or IPC measures have a direct impact on the implementation of appropriate IPC measures.

An understanding of the knowledge, perception and practice of COVID-19-related infection prevention and control measures among Nigerian health workers is therefore necessary to identify areas of need and provide recommendations for improved knowledge, attitude and practice for COVID-19 and related IPC among health workers. This study which was carried out at the initial phase of community transmission of COVID-19 in Rivers state, aimed to assess the level of knowledge, attitude and practice related to COVID-19 infection prevention and control

measures among health workers in Rivers state, one of the worst hit states in Nigeria.

METHODS

This was a cross-sectional study carried out between May and June 2020, among frontline health care workers practicing in both private-owned and public health facilities in Rivers State. Rivers State is located in the oil-rich Niger Delta region in the South-South zone of Nigeria. The first laboratory confirmed case in Rivers State was recorded about one month after the first case of COVID-19 in Nigeria. Rivers state is home to two tertiary health institutions which are both equipped to carry out laboratory diagnosis and management of COVID-19. Frontline health workers were defined as all hospital staff (medically qualified and allied health workers) that come in direct contact with patients.

Data was collected using an online structured questionnaire which was designed using Google Forms. The questionnaire was pretested among 30 health workers of different professions and cadres. Questionnaires were self-administered after dissemination using a link via social media (WhatsApp messenger, one of the most widely used social media platforms in the health care setting in Nigeria) and emails to health workers across the state. Questionnaires were distributed to five hundred and eighty health workers with two hundred and twenty-four responses. Each respondent filled the questionnaire online on Google Forms. The questionnaire had five sections: participant information and consent, demographic data, knowledge of COVID-19 and IPC, attitude towards COVID-19 IPC and practice of COVID-19 related IPC measures. Demographic data included age, gender, occupation and years of service, place of service and point of service. Knowledge of COVID-19/IPC was assessed in terms of knowledge of its transmission, minimum personal protective equipment and

other IPC measures recommended for use at points of healthcare and knowledge of availability and content of National and institutional guidelines. Each correct answer was weighted one point with a maximum of 18 points attainable by each respondent. Therefore, total knowledge score was computed based on the number of correct answers given for each respondent. Attitudes were assessed using a set of 8 questions; a 5-point Likert scale was employed with respondents expected to select either strongly agree, agree, uncertain, disagree or strongly disagree. Other close-ended questions addressed practice of hand hygiene and the use of minimum recommended personal protective equipment by health workers interviewed.

Fully completed questionnaires were extracted from Google Forms and exported to Microsoft Excel 2016 for cleaning and coding. The cleaned data was exported to SPSS version 25 for analyses. Socio-demographic data were described in terms of frequencies and percentages. Bloom's cut-off of >70% was used to determine sufficient knowledge; positive attitude and good practice The Analysis of Variance (ANOVA) was used to compare differences in the mean scores for knowledge, attitude, and practice. All analyses were done at a 95% confidence interval and a p value < 0.05 was considered significant.

RESULTS

A total of two hundred and twenty-four health care workers responded. Their median age was 45.5 (35.5 - 49.6) years, and most respondents were female (n=134, 59.8%). One hundred and thirty-three (59.4%) respondents were medical doctors; 27 (12.1%) medical laboratory scientists; 23 (10.3%) nurses while other professionals i.e., community health officers, pharmacists, scientific officers, medical records officers, and optometrists made up 18.3%. Respondents' median number of working

years was 15.5 (7.5 -16.7) years and a vast majority (n=198, 88.4%) worked in the public sector.

Table 1: Socio-demographic data of respondents

	Frequency (n=224)	Percent
Age-Group		
20 - 30 years	21	9.4
31 - 40 years	76	33.9
41 - 50 years	87	38.8
51 - 60 years	31	13.8
>60 years	9	4.0
Gender		
Female	134	59.8
Male	90	40.2
Occupation		
Optometrist	1	0.4
Medical record	4	1.8
Scientific Officer	5	2.2
Pharmacist	12	5.4
Community Health Officer	19	8.5
Nurse	23	10.3
Laboratory Scientist	27	12.1
Medical Doctor	133	59.4
Place of Work		
Private	26	11.6
Public	198	88.4
Duration of service		
< 5 years	36	16.1
5 - 10 years	48	21.4

11 - 20 years	87	38.8
21 - 30 years	30	13.4
> 30 years	23	10.3

Notably, majority of respondents (n=136, 61%) worked at service delivery points in health care facilities (outpatient clinics, emergency rooms) where first contact with patients tend to occur (Figure 1).

Sufficient knowledge, good practice and positive attitude towards COVID-19 was defined as a Bloom's score of >70%. Overall, 46.0% of respondents had sufficient knowledge, 42% had positive attitudes while 90.2% of respondents reported poor practice relating to COVID-19 (Figure 2).

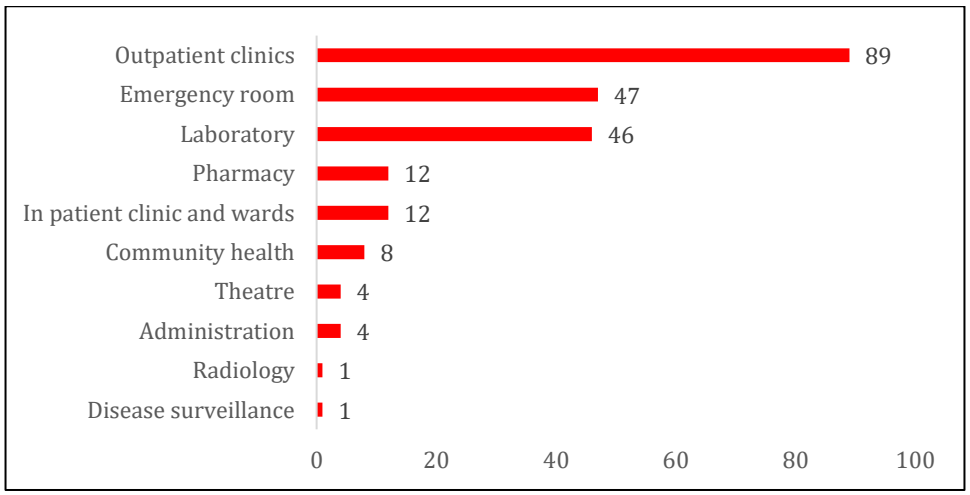

Figure 1: Distribution of Point of Service

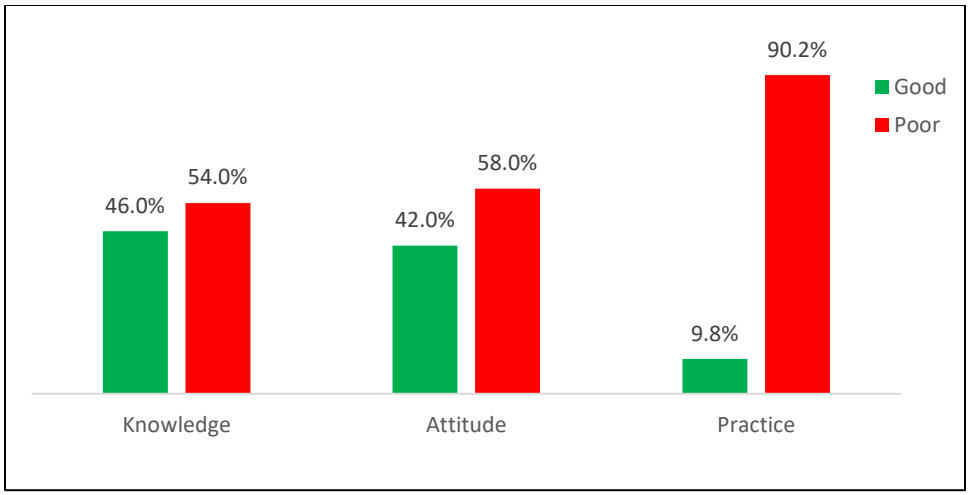

Figure 2: **Overall measure of level of knowledge, attitude and practice regarding COVID-19 and related IPC measures**

Knowledge

Eighty-seven percent of respondents were aware of the NCDC guidelines (Figure 3)

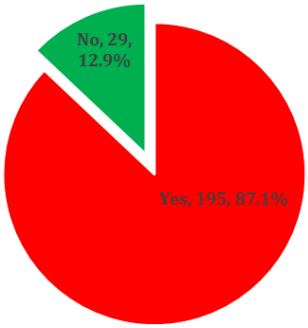

Figure 3: Knowledge of NCDC IPC guideline for COVID-19

while eighty-eight percent reported that their institutions had COVID-19 institutional IPC guidelines (Figure 4).

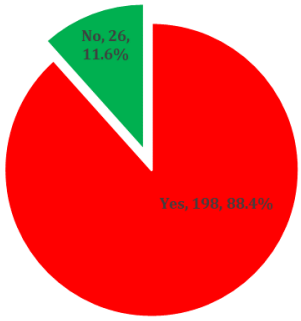

Figure 4: Availability of institutional IPC guidelines for COVID-19

Overall responses to specific questions on knowledge are shown in Table 2. Occupation was significantly associated with sufficient knowledge, this being most common among medical doctors (mean knowledge score 12.8± 1.8, p =0.027). The highest proportion was recorded among those with 11-20 years of practice; however, it was not statistically significant

Table 2: Association between knowledge, attitude, practice, and socio-demographic variables of respondents

Socio-demographic variables	Sufficient Knowledge n=105(%)	Knowledge Score Mean ± sd	Positive Attitude n = 94(%)	Mean Attitude Score Max = 32	Good Practice n= 24(%)	Mean Practice Score Max = 13
Age-Group						
20 - 30 years	10 (9.5)	12.3 ±2.3	6 (6.4)	21.5 ±5.2	0 (0.0)	7.7 ±2.2
31 - 40 years	35 (33.3)	13.0 ±1.6	33 (35.1)	21.8 ±5.6	2 (8.3)	6.5 ±2.4
41 - 50 years	37 (35.2)	12.3 ±2.0	38 (40.4)	22.2 ±5.0	6 (25.0)	6.7 ±2.4
51 - 60 years	17 (16.2)	11.5 ±2.1	12 (12.8)	21.3 ±5.3	10 (41.7)	6.7 ±1.9
>60 years	6 (5.7)	11.7 ±2.6	5 (5.3)	24.8 ±3.7	6 (25.0)	7.0 ±1.4
ANOVA (p-value)		**0.501**		**0.816**		**0.054**
Gender						
Female	62 (59.0)	12.2 ±2.0	60 (63.8)	21.5 ±5.2	16 (66.7)	6.8 ±2.2
Male	43 (41.0)	12.6 ±2.0	34 (36.2)	22.6 ±5.2	8 (33.3)	6.7 ±2.4
ANOVA (p-value)		**0.218**		**0.647**		**0.394**
Occupation						
Community Health Officer	11 (10.5)	12.5 ±2.5	14 (14.9)	25.8 ±4.5	4 (16.7)	8.1 ±2.5
Lab Scientist	10 (9.5)	13.4 ±2.2	7 (7.4)	21.2 ±6.2	1 (4.2)	7.6 ±1.9
Medical Doctor	60 (57.1)	12.2 ±1.8	55 (58.5)	21.6 ±5.1	14 (58.3)	6.4 ±2.2
Medical Record	0 (0.0)	14.0 ±2.2	3 (3.2)	26.0 ±4.5	1 (4.2)	9.5 ±2.5
Nurse	11 (10.5)	12.4 ±1.9	8 (8.5)	22.5 ±5.2	2 (8.3)	6.1 ±2.0
Optometrist	0 (0.0)	12.0 ±0.1	0 (0.0)	20.0 ±0.1	0 (0.0)	8.0 ±0.1
Pharmacist	9 (8.6)	11.4 ±1.9	4 (4.3)	19.8 ±4.5	1 (4.2)	6.1 ±2.0
Scientific Officer	4 (3.8)	11.6 ±1.3	3 (3.2)	20.4 ±1.3	1 (4.2)	10.0 ±0.1
ANOVA (p-value)		**0.020***		**0.027***		**0.173**

Place of Work						
Private	15 (14.3)	11.7 ±2.2	7 (7.4)	22.4 ±5.2	1 (4.2)	6.4 ±1.9
Public	90 (85.7)	12.5 ±1.9	87 (92.6)	21.9 ±5.2	23 (95.8)	6.8 ±2.3
ANOVA (p-value)		**0.682**		**0.252**		**0.426**
Duration of service						
< 5 years	19 (18.1)	12.7 ±2.1	11 (11.7)	22.3 ±5.3	4 (16.7)	7.4 ±2.0
5 - 10 years	26 (24.8)	13.0 ±1.5	22 (23.4)	22.5 ±5.4	4 (16.7)	6.3 ±2.6
11 - 20 years	32 (30.5)	12.3 ±1.8	36 (38.3)	21.3 ±4.9	7 (29.2)	6.8 ±2.4
21 - 30 years	16 (15.2)	12.1 ±2.1	13 (13.8)	22.2 ±5.4	4 (16.7)	6.8 ±1.7
> 30 years	12 (11.4)	11.6 ±2.7	12 (12.8)	22.5 ±5.8	5 (20.8)	6.5 ±2.1
ANOVA (p-value)		**0.101**		**0.587**		**0.002***

n = Frequency
*Statistically significant

Attitude

Positive attitudes towards COVID-19, defined as a Bloom's score of >70% was achieved in forty-two percent (n=94) of respondents (Figure 2). Of these, 60(63.8%) were female and 34(36.2%) were male (Table 3). Their attitudes towards COVID-19 were significantly associated with their occupation but not age, gender, place of work or duration of service (Table 2).

Ninety percent (n=203) of respondents believe that their job puts them at high risk for COVID-19. While one hundred and fifty-five (69.1%) respondents believe their current training has equipped them to make a proper diagnosis of COVID-19, 102 (45.5%) reported that they do not have sufficient training to offer treatment to confirmed COVID-19 patients (Table 3).

Practice

Ninety percent of respondents generally reported poor practice relating to COVID-19 (Figure 2). Regarding compliance with the five moments of hand hygiene, 91% of

respondents always performed hand hygiene after performing aseptic procedures compared with 84.2% after patient contact, 82.6% before performing aseptic procedures and 65% before patient contact (Table 3). Only 45% wore surgical masks during patient care (Table 3). Good practice of IPC measures was significantly associated with duration of service (ANOVA p-value, 0.002). A larger proportion of health workers who reported good level of practice relating to COVID-19 IPC had 11 to 20 years of work experience (29.2%). This was followed closely by those with over 30 years' experience (20.8%) (Table 2).

Table 3: **Knowledge, attitude, and practice of health workers towards COVID-19/ IPC**

	Responses (N=224)		
KNOWLEDGE	**Yes**	**No**	**I don't know**
	n, (%)	**n, (%)**	**n, (%)**
COVID-19 disease is spread by			
Droplets	223 (99.6)	0 (0.0)	1 (0.4)
Contacts with body fluids	142 (63.4)	75 (33.5)	7 (3.1)
Ingestion of infected food	51 (22.8)	143 (63.8)	30 (13.4)
Fomites	130 (58.0)	59 (26.3)	35 (15.6)
Airborne route	137 (61.2)	59 (26.3)	28 (12.5)
Minimum Recommend PPE for attending to patients			
Hand gloves	213 (95.1)	7 (3.1)	4 (1.8)
Surgical Masks	206 (92.0)	11 (4.9)	7 (3.1)
Paper face mask	50 (22.3)	160 (71.4)	14 (6.3)
Respirators	69 (30.8)	142 (63.4)	13 (5.8)
Eye goggles	139 (62,1)	74 (33.0)	11 (4.9)
Face shield	141 (62.9)	71 (31.7)	12 (5.4)
Hazmat suit/gowns	100 (44.6)	112 (50.0)	12 (5.4)
Recommended IPC Measures			
Hand washing with soap and water	222 (99.2)	1 (0.4)	1 (0.4)
Alcohol based hand sanitizers only for visibly soiled hands	51 (22.8)	170 (75.9)	3 (1.3)
Alcohol based hand sanitizers only for non-visibly soiled hands	167 (74.6)	56 (25.0)	1 (0.4)
Maintain physical distance of at least 2M	224 (100.0)	0 (0.0)	0 (0.0)
Respiratory Hygiene Cough Etiquette	223 (99.6)	1 (0.4)	0 (0.0)
The following are part of NCDC guidelines for IPC of COVID-19			

Ensure triage, early recognition, and source control	191 (98.0)	2 (1.0)	2 (1.0)
Application of standard precautions for all patients at all times	192 (98.5)	1 (0.5)	2 (1.0)
Contact and droplet precautions for all patients	190 (97.4)	3 (1.5)	2 (1.0)
Implementing administrative control	167 (85.6)	16 (8.2)	12 (6.2)
Use Engineering Controls	77 (39.5)	67 (34.4)	51 (26.2)
Environmental Infection Control	183 (93.8)	6 (3.1)	6 (3.1)

ATTITUDE	**Strongly agree**	**Agree**	**Uncertain**	**Disagree**	**Strongly Disagree**
Does your routine practice put you at high risk for COVID-19	141 (62.9)	62 (27.7)	9 (4.0)	9 (4.0)	3 (1.3)
Do you think you should wear full PPE before attending to all patients during the pandemic	88 (39.3)	66 (29.5)	9 (4.0)	46 (20.5)	15 (6.7)
Do you think confirmed asymptomatic persons should self-isolate at home?	60 (26.8)	73 (32.6)	13 (5.8)	34 (15.2)	44 (19.6)
Do you think confirmed asymptomatic persons should be isolated in a designated treatment center	108 (48.2)	61 (27.2)	16 (7.1)	29 (12.9)	10 (4.5)
Do you think confirmed COVID-19 patients should be managed in a private room within your facility away from other patients	68 (30.4)	51 (22.8)	19 (8.5)	29 (12.9)	57 (25.4)
Do you think your current training/experience is sufficient for you to make a diagnosis of COVID-19	72 (32.1)	83 (37.1)	22 (9.8)	26 (11.6)	21 (9.4)

Do you think your current training/experience is sufficient for you to treat/provide care to a confirmed COVID-19 case	40 (17.9)	62 (27.7)	26 (11.6)	46 (20.5)	50 (22.3)

PRACTICE	**Always n, (%)**	**Never n, (%)**	**Occasionally n, (%)**
How often do you perform hand hygiene at your workplace?			
Before patient contact	146 (65.2)	0 (0.0)	78(34.8)
Before performing an aseptic procedure	185 (82.6)	1 (0.4)	38(17)
After performing an aseptic procedure	204 (91.1)	1 (0.4)	19(8.5)
After patient contact	189 (84.4)	1 (0.4)	34(15.2)
After leaving patient's environment	177 (79.0)	1 (0.4)	46(20.5)
How often do you use PPE while caring for patients at entry points during the pandemic?			
N95	41 (18.3)	55 (24.6)	128(57.1)
Surgical masks	111 (49.6)	6 (2.7)	107(47.8)
Paper masks	34 (15.2)	86 (38.4)	104(46.4)
Goggles	23 (10.3)	86 (38.4)	115(51.3)
Aprons	39 (17.4)	69 (30.8)	116(51.8)
Hazmat suits/gowns	27 (12.1)	102 (45.5)	95(42.4)
Face shield	26 (11.6)	102 (45.5)	96(42.9)

DISCUSSION

COVID-19 is a disease with devastating consequences on all sectors of the country. It is safe to say the health care sector has borne the brunt of it as the health system particularly the healthcare workers are at the forefront of the fight against this disease. Health care workers are directly and indirectly affected as the risk of being infected is higher among this population when compared to the general population.[15] The risk of infection is among other factors, affected by the level of infection prevention and control measures practiced in health care settings.[13] This study set out to assess the level of knowledge, the attitudes and the appropriateness of infection and control practices among health workers especially in the early stages of the COVID-19 pandemic in order to make recommendations for improvement.

From our study, less than half (n=103, 46.0%) of health workers interviewed, had sufficient knowledge of COVID-19 related IPC measures. Wang et al. similarly reported poor knowledge of COVID-19 IPC measures at the beginning of the outbreak in China.[13] Olum et al on the other hand, found that seven out of ten health workers had sufficient knowledge about COVID-19 in Uganda[16] although their study assessed knowledge on all aspects of COVID-19. Poor knowledge of IPC among health workers seems to be a common occurrence at the beginning of outbreaks caused by novel or remerging viruses, where during the West African Ebola epidemic, a study in Ethiopia[17] found low levels of knowledge on Ebola. This is especially worrisome as the IPC measures advocated are usually not novel but rather include standard precautions which every health worker is expected to practice regularly irrespective of the infectious status of the patient and some transmission-based precautions as well. Health workers would therefore benefit from regular

training/education and retraining which should be heightened in the wake of any outbreak.

Our study also found that the majority of respondents were aware of the national guidelines published by the Nigeria Centre for Disease Control (NCDC) and the contents therein. This is probably because national guidelines are easily accessible online. Most institutions also had institutional guidelines. Knowledge of these guidelines however did not translate to practice for many. Further studies are therefore necessary to better understand the reasons for failure of compliance with national and institutional IPC guidelines, to reduce this grave occupational hazard and scourge of health care associated infections.

Knowledge was found to be unaffected by age, gender, place of work and years of experience. However, level of knowledge was affected by occupation where medical doctors made up the larger proportion of respondents with good knowledge of COVID-19 (n= 60, 57.1%), followed by nurses and community health workers who showed similar proportions (n=11, 10%). Pharmacists made up only 8.6% of those with good knowledge. This finding was similarly seen in other studies where doctors were shown to be the most knowledgeable about the disease.[18,19] A study however found pharmacists to be the professionals with the highest level of knowledge of COVID-19.[20] IPC trainings should be specially prepared to engage all specialties and cadres of staff, ensuring it is re-enforced by re-trainings and in communication styles that each specialty can fully understand.

Ninety percent (n=203) of respondents believe that their job puts them at high risk of contracting COVID-19. Zhang *et al*, in a study among Chinese health workers, reported that 85% of health workers believed that their job put them at risk for COVID-19.[18] Previous studies have also noted that

positive behaviours and attitudes towards a diseases stems from having sufficient knowledge of a disease.[14,20] Strikingly, in spite of the obvious apprehension towards COVID-19, it did not affect the attitude of our respondents towards care of patients given that, 155 (69.1%) and 106 (47.3%) stated they had sufficient knowledge and experience to make a diagnosis of COVID-19, and to provide medical care to confirmed COVID-19 patients respectively. The perception of risk could be related to poor knowledge of the transmission dynamics of an infectious agent, the lack of appropriate PPE, poor engineering, and inefficient administrative IPC controls.

The practice of infection prevention and control measures among our study respondents was equally poor, with only 9.8% of respondents having good levels of practice of infection prevention and control. Guidelines recommend proper hand hygiene to be performed at various moments during specified moments of patient care in order to decrease spread of COVID-19 and other infectious agents in health care facilities.[21,22] While hand hygiene practice was generally considered fair among respondents with over 60% of them observing at least one moment of hand hygiene amongst five moments; most respondents (91.1%) observed hand hygiene after performing an aseptic procedure and after touching the patient (84%). These are moments which protect the health care worker (HCW) from acquiring infections from their patients but do not prevent these HCW from transmitting disease agents to same or other patients and even colleagues. The least observed moment of hand hygiene was before touching the patient (65% of respondents). This is as important a process in the prevention of transmission of infections as the other moments of hand hygiene[23] and so should not be downplayed. The picture is even bleaker in some other tertiary hospitals in Nigeria as reported by

Agbana et al where less than half of healthcare workers observed hand hygiene with only 44.6% and 52% washing their hands before and after touching patient respectively.[24] These findings are not surprising as a review done by Ataiyero et al on hand hygiene in Sub-Saharan Africa showed that hand hygiene practice among health workers is generally suboptimal.[25] This, they posited is due to high workload and facility/infrastructural barriers. It is therefore necessary to train/retrain health workers on hand hygiene methods and to remove institutional barriers that prevent its proper practice.

Most of our respondents did not use minimum personal protective equipment during patient care as recommended by the national guidelines. This implies that the presence of the guidelines is not enough, health care facilities must develop their own guidelines and ensure the personnel working in such facilities comply. Gross unavailability of PPE was a major contributor as well, just as it was in the rest of the world.

In Rivers State, available IPC specialists seem overwhelmed especially in the face of the recurrent outbreaks in recent times. We strongly believe that a more active approach must be taken concerning IPC in Rivers State through formalized and certificated compulsory training programs at an affordable cost as well as a reward system instituted for compliers and outstanding performers. Certifications or evidence of continuing medical education (CME) in this field could be tied to yearly practicing license permits to ensure all health care personnel undergo regular re-trainings to encourage re-enforcement of knowledge and appropriate IPC practice.

CONCLUSION

Knowledge, attitude, and practice of COVID-19-related IPC among health care workers in Rivers State is largely poor. Considering that these measures are useful for prevention of a

large variety of infections including those with the potential to cause outbreak, we strongly recommend the incorporation of regular IPC training into undergraduate, postgraduate, and continuing medical education programs of all specialties and for all cadres of health workers. Measures should also be instituted to encourage and possibly enforce its practice for a safe and healthy health care workforce and environment.

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