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Transmission Based Precaution Practices among Nurses in Edo State, Nigeria during COVID-19 Pandemic

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Abstract

The novel covid-19 pandemic is a highly infectious disease without known specific treatment and vaccine. Transmission based precautions are important in the fight against the virus. This study investigated the level of transmission-based precautions practiced, the predictors of correct practices, and the challenges experienced by nurses in public health facilities in Edo State during the outbreak of the Covid-19 pandemic. The study employed a descriptive cross-sectional survey to elicit responses from 367 front line nurses using a Google online questionnaire. Data analysis involved descriptive statistics and logistic regression analysis. The majority 314(85.6%) of the respondents maintained a good level of transmission-based precautions practice. Hand hygiene was performed by 327(89.1%) of the respondents. Academic qualification was a significant predictor of good practice in favour of respondents with a degree in nursing. Challenges identified were lack of financial motivation, fear of infecting family members and fear of contracting the virus (93.5%). It was concluded that nurses in Edo State Nigeria have good transmission-based practices in relation to covid-19 however efforts should be made to ensure 100% compliance and sustain practices. *(Afr J Reprod Health 2020 (Special Edition); 24[2]: 98-107).*

Keywords: Covid-19, Health facilities, Nurses, Practice, Transmission based precautions, Edo State, Nigeria

Résumé

La nouvelle pandémie de covid-19 est une maladie hautement infectieuse sans traitement ni vaccin spécifiques connus. Les précautions liées à la transmission sont importantes dans la lutte contre le virus. Cette étude a examiné le niveau de précautions fondées sur la transmission pratiquées, les prédicteurs de bonnes pratiques et les défis rencontrés par les infirmières dans les établissements de santé publique de l'État d'Edo pendant l'éclosion de la pandémie de Covid-19. L'étude a utilisé une enquête transversale descriptive pour obtenir des réponses de 367 infirmières de première ligne à l'aide d'un questionnaire en ligne de Google. L'analyse des données impliquait des statistiques descriptives et une analyse de régression logistique. La majorité 314 (85,6%) des répondants ont maintenu un bon niveau de pratique des précautions fondées sur la transmission. L'hygiène des mains a été pratiquée par 327 (89,1%) des répondants. La qualification académique était un prédicteur significatif des bonnes pratiques en faveur des répondants titulaires d'un diplôme en sciences infirmières. Les défis identifiés étaient le manque de motivation financière, la peur d'infecter les membres de la famille et la peur de contracter le virus (93,5%). Il a été conclu que les infirmières de l'État d'Edo au Nigéria ont de bonnes pratiques fondées sur la transmission par rapport à la covid-19, mais des efforts devraient être faits pour assurer une conformité à 100% et maintenir les pratiques. *(Afr J Reprod Health 2020 (Special Edition); 24[2]:98-107).*

Mots-clés: Covid-19, Health facilities, Nurses, Practice, Transmission based precautions, Edo State, Nigeria

Introduction

The novel COVID-19 is a highly infectious disease with the causative agent identified as severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2)[1]. The disease which broke out in Wuhan, China in December 2019 has crossed borders infecting people in all the six World Health Organization (WHO) regions[2]. The WHO (2020) declared the outbreak of the disease a Public Health Emergency of International Concern (PHEIC), and a pandemic with high morbidity and mortality rates[3]. The U.S. Centre for Disease Control and Prevention identified the common symptoms of the disease as fever, cough, dyspnea, fatigue, sore throat, muscle pain, loss of smell, and abdominal discomfort[4]. The majority of cases may experience mild to moderate symptoms; others

progress to viral pneumonia and multi-organ failure[5]. The gravity of the disease is higher among the aged and individuals with underlying medical problems like chronic respiratory diseases, cardiovascular disease, diabetes and cancers[1]. The incubation period is typically about five days; however, the range is from 2 to 14 days[6]. There is presently no specific treatment and vaccine for the disease, but patients are treated symptomatically in designated isolation centres with supportive care and experimental measures[2]. Health education about the virus, the spread and prevention of disease can also save people from being infected.

COVID-19 is a disease widely spread through direct contact with small droplets of the infected during sneezing, coughing or talking[1,7,8]. Droplets produced during breathing fall on surfaces and to the ground; people may become infected through touching infected surfaces and then their faces[8]. There are various recommended measures outlined to prevent infection transmission: frequent washing of hands with soap and water or alcohol-based (70%) sanitizer, maintaining a physical distance of about two metres, the practice of respiratory hygiene such as the use of tissue or inner elbow during coughing and sneezing and keeping hands away from the face[9]. The use of masks by everybody is also practised in most countries to curtail the disease. However, the recommendation for its use varies within and between countries[10].

Standard Precautions are infection prevention practices that apply to all patients irrespective of their presumed health status and diagnosis[11]. They are designed to enhance infection prevention and control among patients and health care professionals when practised consistently at all times. Transmission Based Precautions (TBPs) involve specific precautions taken in the care of patients with highly infectious diseases. It involves patients managed in isolation and complemented with standard precautions[12]. The major component of transmission-based precaution is personal protective equipment (PPE)[13]. Some other components of transmission-based precautions are isolation of patients, hand hygiene, respiratory protective equipment, and facial hood[12]. The precautions taken are normally dependent on the causative microorganisms and the mode of transmission of infection[14]. COVID-19 is an infection with more than one mode of spread involving contact and droplet routes[15]. Therefore, there is a need for strict adherence to transmission-based precautions.

Nurses as frontline health care professionals play vital roles in the prevention of infections, clinical management of infected persons, and the application of prevention control measures in health facilities. Healthcare-associated infections (HCAIs) abound globally. Studies have revealed that during the MERS-CoV outbreak in 2012, health care facilities served as sources of infection for patients and health care professionals[16,17]. Other past studies relate noncompliance to standard precautions to poor knowledge of standard precautions among health care professionals, excess work overloads, lack of training, poor working environment, and limited resources[18,19]. In a related study on adherence to standard precautions, the specific socio-demographic related risk factors implicated with noncompliance were age, sex, marital status, job category, work experience and factors related to health facility[20].

Some studies in developing countries have shown that the practice of standard precautions among health care professionals is low[21-24]; while factors associated with compliance with the standard practice were availability and accessibility of PPE, management support, workplace safety climate and feedback on safety practices. However, a study in Pakistan regarding COVID-19 revealed that the majority of respondents had good practices of washing hands with soap or cleaning with sanitizers[25]. Also, in Saudi Arabia a study revealed that self-reported infection control practices compliance with hand hygiene was moderate with about two-thirds of health care workers (HCWs) practising regular hand washing after patient contact of which nurses had the higher percentage[26]. Moreover, in Nigeria it was found that there was a good practice of standard precautions among health care professionals[27]. In the same vein, overall median percentage practice of standard precautions score in a Nigerian study was 50.8% across professionals[28]. According to results from many

institution based studies, the practice of standard precautions is selectively adhered to, with hand washing being the most important one practised and the use of gloves[22,28,29]. Some challenges to effective practice of standard precautions were identified in a study in Ethiopia as lack of appropriate resources, lack of regular training on infection control, lack of infection prevention and control committee and excess workload[30].

Nurses are primarily involved in caring for the patients amidst this highly contagious virus, and protection of nurses and prevention of transmission of the disease are an essential aspect in pandemic response. Therefore, understanding the transmission-based precaution practices among nurses during the COVID-19 pandemic is essential for preventing infection of patients, health care professionals, and the community. To the knowledge of the researchers, no study to assess transmission-based precautions among health workers has been done in Edo State with regard to covd-19 pandemic. This study was undertaken to investigate the transmission-based precaution practices, the challenges experienced by nurses in Edo State, Nigeria during the COVID-19 Pandemic, and the association between socio-demographic characteristics of respondents and the level of practice.

Population and Methods

Research design and setting

A descriptive cross-sectional survey design was used for the study. All nurses in the designated public health facilities in Edo State involved in the care of patients with COVID -19 formed the population for the study. These were 1,150 nurses. Edo State is one of Nigeria's 36 federating states located in the south-south region of the country. It has a population of nearly 4 million persons, and has its administrative headquarters in Benin City, a cosmopolitan city about 300km northeast of Lagos**.** The study was carried out in the six designated hospitals which are managing the COVID-19 pandemic in Edo State; Stella Obasanjo Hospital, Benin City; Irrua Specialist Teaching Hospital (ISTH), Irrua; University of Benin Teaching Hospital (UBTH), Benin City; Edo Central Hospital, Benin City; Edo Specialist Hospital, Benin City, and Auchi General Hospital, Auchi.

Inclusion criteria

These were nurses working in the six hospitals where COVID-19 patients were managed and nurses who were in online platforms of WhatsApp groups in the designated hospitals.

Sampling technique and sample size

Conservatively, the total number of nurses that were active members in the WhatsApp groups was 523. This constituted the sample size for the study. They were invited to participate in the web-based online survey. The achieved sample size was determined by the number of respondents who filled and submitted the online Google survey form within two weeks. These were 367 respondents.

The instrument

The instrument used for this study was a self-structured questionnaire developed by the researchers and was subjected to validation. The item used to measure these precautions was consistent with the guidelines issued by the WHO, NCDC, and the Edo State task force for COVID-19 pandemic. The questionnaire had three sections. Section A was on the demographic characteristics such as age, qualification and years of experience. Section B covered questions on transmission-based precaution practices. It consists of 12 items with the options of 'Never', 'Sometimes' 'Often' and 'Always'. Some of the items include: 'hand hygiene is performed after all procedures' 'PPE is used for every patient at the first contact' and 'control of number of visitors around a patient'. Section C consists of 15 items on perceived challenges faced with the management of COVID-19. They are closed ended questions with options of 'No' or 'Yes. Some of the items include 'shortage of instrument and supply,' and 'availability of PPE'.

Validity and reliability

The instrument was validated by two experts in public health and one in measurement and

evaluation. Reliability of the instrument was ensured by administering the questionnaire to 20 purposively selected nurses working in the clinical facilities who were excluded from the study. Data generated were analyzed using split half reliability test and the reliability values obtained for sections B and C, respectively were 0.79, and 0.85.

Method of data collection

An online data collection tool was designed and executed using Google form (via docs.google.com/form). The Google form link to the questionnaire was sent to the online nurses' platform (WhatsApp) of these various health care facilities after permission and consent were obtained from administrators of these platforms. Nurses who were on these platforms that were willing to participate were then given a time frame of two weeks to complete the forms. Multiple participations were controlled through the goggle form. After the expiration of the time frame the form was withdrawn and deactivated for analysis.

Method of data analysis

In the data analysis, Sections A, B, and C were initially analyzed with frequencies. Section B responses were assigned scores of Always = 3, Sometimes = 2, Often = 1, Never = 0. Thereafter, an index of practice was generated for section B by summating the scores of the items making up the section. The level of practice based on a scale of 100 was classified into poor (0 < 50), moderate (50 ‹ 70) and high (70-100). The hypothesis was tested using bivariate and multivariate logistic regression at 5% level of significance with the index of practice as criterion. The statistical Package of the Social sciences (SPSS) version 20.0 was employed in all analyses.

Results

The anticipated number of respondents was 523. However, the number of respondents who returned usable questionnaire was 367. This gave a returned rate of 70.2%. From Table 1, modal age range was 40-44 years (19.6%), closely followed by the range 35-39 years (19.1%). The categories with lowest frequencies were 20-24 years (1.6%) and 25-29 years (9.8%). There were more married respondents (84.2%) than single respondents (15.8%). The modal qualification was Diploma in Nursing/Midwifery (55.6%); respondents with at least a degree were 162 (44.1%). In terms of status, there were 114 (31.0%) Nursing officers and Senior Nursing Officers 79 (21.5%) were more than all other categories. Respondents of the status of Chief Nursing Officers were 75 (20.4%).

Table 2a shows that a majority of the respondents always practised transmission based precautions such as Hand hygiene performed after all procedures 327(89.1%), PPE is always used for COVID patients requiring healthcare facility admission and with aerosol-generating procedure as agreed by 305(83.1%) of the respondents. Provision of waste receptacle to dispose tissue after use 331(90.2%), Provide resources for performing hand hygiene in or near waiting area 325(88.6%), control of number of visitors around a patient 305(83.1%) were also indicated by the respondents.

Table 2b shows that a majority 314(85.6%) of the respondents maintained good level of transmission-based precaution practices, 45(12.3%) displayed fair level while 8(2.2%) were poor in the level exhibited.

Challenges experienced by nurses in designated hospitals in Edo State

Figure 1 shows that a majority (93.5%) of the respondents agree that each of lack of motivation/hazard allowance, fear of infecting family members, and fear of contracting the virus was major challenge. Among other challenges experienced are inadequate testing materials, delay in receiving results (84.5%) and shortage of staff (81.5%).

Table 3 shows the association between socio-demographic characteristics and transmission-based precautions practice. It showed that age (χ^2 = 10.053, df= 2, p= 0.007), professional status (χ^2 = 5.850, df= 1**,** p=0.007) and years of experience (χ^2 = 8.896, df =1, p=0.003) were significantly related to good practice.

Table 4 shows that the respondents aged <30years are 63% less likely (OR = 0.37; p=0.181.

Table 1: Socio-Demographic Characteristics of nurses in COVID-19 designated hospitals in Edo State, Nigeria

	Frequency	Percentage
Age (Years)		
20 – 24	6	1.6
25 – 29	36	9.8
30 – 34	51	13.9
35 – 39	70	19.1
40 – 44	72	19.6
45 – 49	51	13.9
50 – 54	42	11.4
>54	39	10.6
Marital status		
Married	309	84.2
Single	58	15.8
Qualifications		
BNSc	102	27.8
Diploma in Nursing/Midwifery	204	55.6
Post Basic Nursing	69	18.8
Higher degree	60	16.3
Professional Status		
NO, I	50	13.6
NO II	64	17.4
SNO	79	21.5
ACNO	57	15.5
CNO	75	20.4
ADNS and above	42	11.4
Years of Experience		
≤5	70	19.1
6 – 10	85	23.2
11 – 15	77	21.0
16 – 20	51	13.9
21- 25	12	3.3
26 – 30	72	19.6

Key: NO- Nursing officer, SNO- Senior Nursing Officer, ACNO- Assistant Nursing Officer, CNO- Chief Nursing Officer, ADNS- Assistant Director of Nursing. BNSc – Bachelor of Nursing Science

CI=0.09-1.59) to have good transmission-based practice than those 40years and above. Nurses with <5years experiences are 42% less likely (OR=0.58; p=0.286; CI=0.22-1.57) to have good transmission-based practice than those 5years and above. Married nurses are 31% more likely (OR=1.31; p=0.524; CI=0.57-3.05) to have good transmission-based practice than nurses that are single. Nurses with Diploma in Nursing/Midwifery Only (OR=3.05, p=0.007; CI=1.35-6.89), Diploma in Nursing/Midwifery/Post Basic Nursing (OR=3.15, p=0.041; CI=1.05- 9.46), and BNSc (OR=3.22, p=0.019; CI=1.21-8.53) are each thrice more likely to have good transmission based precaution practices than those with other qualifications. The only socio demographic characteristic that is statistically significant ($p<0.05$) in the logistic regression is qualification of the respondents, while other variables are not statistically significant.

Discussion

The study assessed the level of transmission-based precaution practices among nurses in Edo State Nigeria. Findings from this study revealed that there was a good level of practice of transmission-based precautions consistent with guidelines among the nurses. The prevalence of the good practices with respect to COVID-19 in this study is similar to that obtained among healthcare professionals from other studies on standard precautions and infection control conducted in Nigeria, China, and Uganda[27,31,32]. However, some other studies on knowledge and practice of standard precautions in Nigeria and Saudi Arabia yielded results which were at variance as they indicated poor practice[23,26,33]. Health care professionals are at the frontline of the fight against this highly infectious disease; they are also affected by the disease and more susceptible to the virus compared to other members of the community[34]. It is therefore paramount that the rationale and consistent practice of transmission-based precautions in the care of patients with COVID-19 is internalized by the nurses in the prevention of infections. The good practice revealed in this study may have been due to the training, seminars and conferences which nurses were exposed to that may have included Transmission Based Precautions. The majority of nurses have internalized the knowledge that through these practices, there is the possibility of not infecting self and others. The practice of most of the recommended transmission-based precautions for coronavirus was generally adequate except for the use of PPE with all patients at the health facility. These practices include hand washing, use of PPE for patients on admission, respiratory hygiene, wearing of face mask, clinical triage, control of visitors and health education on the disease.

Table 2a: Transmission based precaution practices by nurses in COVID-19 designated hospitals in Edo State, Nigeria

Transmission based precaution practices	Never (0)	Sometimes (1)	Often (2)	Always (3)
Hand hygiene is performed after all procedures	14 (3.8)	8 (2.2)	18 (4.9)	327 (89.1)
PPE is used for COVID patient requiring healthcare facility admission and with aerosol-generating procedure	12 (3.3)	17 (4.6)	33 (9.0	305 (83.1)
PPE is used for every patient at first contact	56 (15.3)	126 (34.3)	51 (13.9)	134 (36.5)
Covered mouth and nose with a tissue when coughing or sneezing	9 (2.5)	42 (11.4)	12 (3.3)	304 (82.8)
Provision of waste receptacle to dispose tissue after use	3 (0.8)	9 (2.5)	24 (6.5)	331 (90.2)
Offer of mask to symptomatic patient on arrival in the ward	20 (5.4)	45 (12.3)	21 (5.7)	281 (76.6)
Offer of mask to asymptomatic patients on arrival to the ward	41 (11.2)	60 (16.3)	36 (9.8)	230 (62.7)
Provide resources for performing hand hygiene in or near waiting area	3 (0.8)	9 (2.5)	30 (8.2)	325 (88.6)
Educate patient about the disease	2 (0.5)	15 (4.1)	30 (8.2)	320 (87.2)
Perform clinical triage for patients on admission	8 (2.2)	36 (9.8)	29 (7.9)	294 (80.1)
Physical distancing of patients and staff at least 6ft apart	24 (6.5)	89 (24.3)	55 (15.0	199 (54.2)
Control of number of visitors around a patient	6 (1.6)	32 (8.7)	24 (6.5)	305 (83.1)

Table 2b: Classification of transmission-based precautions practised by respondents

Classification	Range of Scores	Frequency	Percentage
Poor	0 ‹ 50	8	2.2
Fair	50 ‹ 70	45	12.3
Good	70-100	314	85.6
Total		367	100.0

These are essential practices specific for the control of coronavirus disease. The poor use of PPE for all patients encountered at the health facility is a global problem due to shortage. PPE shortages are presently creating a tremendous challenge globally to the health care delivery system because of coronavirus pandemic[7].

The respondents in this study indicated that they are saddled with numerous challenges which could affect their compliance to transmission-based precautions. Among these are fear of contracting the disease, poor working environment and resources. Work overload and lack of training were other major challenges reported in the study. This is in agreement with the study which identified work overload due to staff shortage, lack of training, poor working environment and limited resources as factors responsible for non-compliance to precautionary measures[19]. However, another study identified poor knowledge as a reason for noncompliance[18]. Challenges such as fear of contracting the virus reported by the respondents is not surprising bearing in mind the nature of the disease that has no known cure at present; Nigerian has limited intensive care units (ICU), limited ventilators, limited critical care clinicians, and suboptimal personal protective equipment (PPE) for health workers which is in agreement with other finding[35].

Furthermore, findings from the study showed that there is a statistically significant correlation between academic qualifications and practise of transmission-based precaution. Respondents with a degree in Nursing are three times more likely to have good transmission-based precautions practice than those with other qualifications. The study corroborates the study that showed a significant correlation between compliance with infection control and a

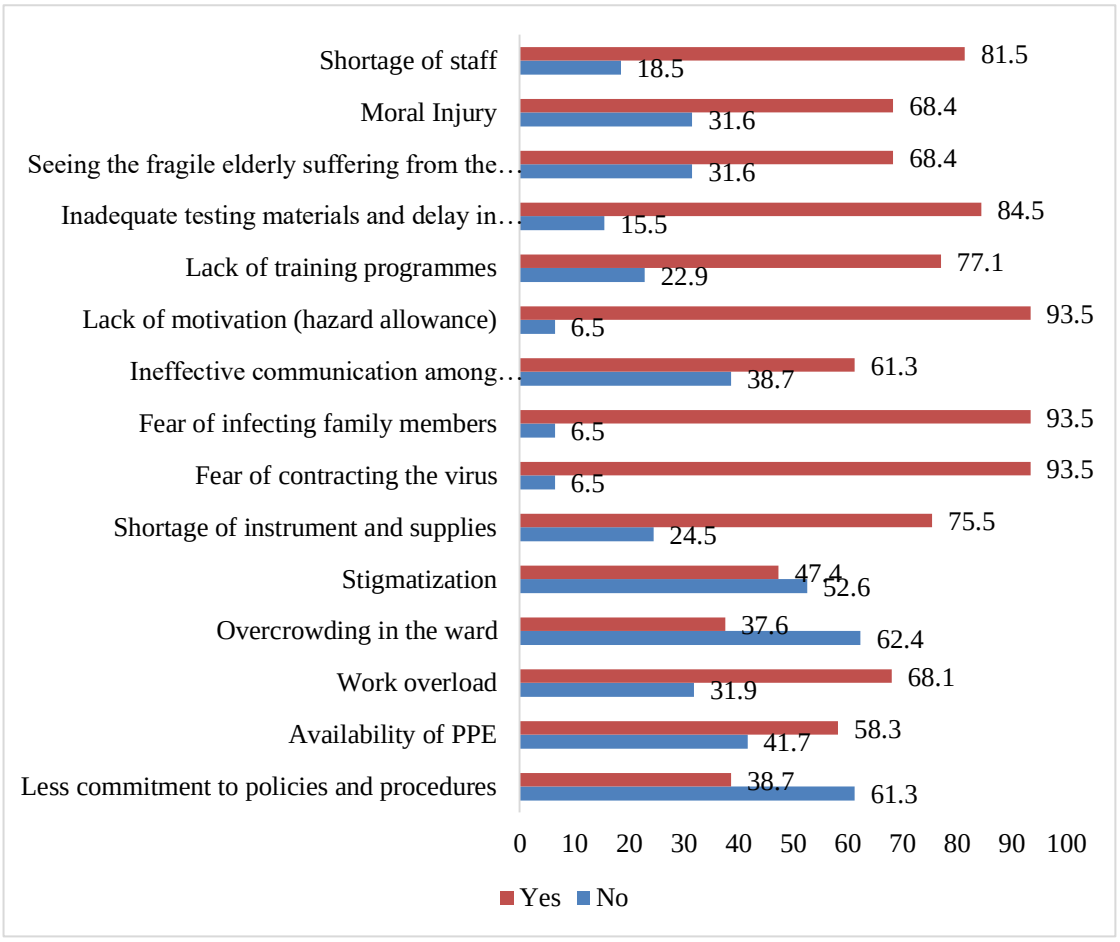

Figure 1: Challenges experienced by nurses in COVID-19 designated hospitals in Edo State, Nigeria

combination of age and length of experience among health care professionals[36]. The COVID-19 pandemic spread is increasing rapidly in Nigeria, especially in Edo State. As of June 6th, 2020, 12,233 cases were confirmed with 342 deaths and 3826 recoveries nationwide and 387 confirmed cases, 19 death and 96 recoveries for Edo State[37]. Community spread is gaining more prominence which is a negative signal to taming this pandemic and one of the ways to reduce this is through strict observance of transmission-based precautions. Therefore, more concerted effort is needed by all stakeholders especially nurses, to ensure that there is strict adherence to practising transmission-based precautions in all health care facilities.

Limitations

The study was limited by some factors. The study was conducted during the period of lock- down, resulting in adopting online method of data collection thereby limiting the method of data collection to quantitative. Mixed method approach involving observation of nurses might have been useful in substantiating the information. Information collected was self-reported therefore internal validity would be a function of how honest the respondents were.

Ethical Consideration

Permission was obtained from the respective health care facilities. The purpose of the study was explained to the nurses in the online platform, and only those who accepted to participate finally completed the questionnaire. Consent was implied if respondents filled and submitted the questionnaire. Respondents' confidentiality and anonymity was ensured throughout the study as

Table 3: Association between socio-demographic characteristics and transmission-based precaution practices among nurses in Edo State, Nigeria

Classificatory variables	Practice <70	≥70	χ^2	P
Age (years)				
<30	12(28.6)	30(71.4)	10.053	0.007
30 – 39	20(16.5)	101(83.5)		
≥40	21(10.3)	183(89.7)		
Professional Status				
NO, I/II	24(21.1)	90(78.9)	5.850	0.016
Others	29(11.5)	224(88.5)		
Qualifications				
Diploma in Nursing/Midwifery Only	20(12.3)	143(87.7)	4.118	0.249
Diploma in Nursing/Midwifery/ Post Basic Nursing	6(11.8)	45(88.2)		
BNSc	12(14.1)	45(88.2)		
Others[+]	15(22.1)	53(77.9)		
Years of experience				
<5	18(25.7)	52(74.3)	8.896	0.003
≥5	35(11.8)	262(88.2)		
Marital status				
Married	41(13.3)	268(86.7)	2.177	0.140
Single	12(20.7)	46(79.3)		

[+]***Others include nurses with degree outside nursing and, any combination of Diploma in Nursing/Midwifery, Post basic Nursing***

Table 4: Multivariate logistic regression associating socio-demographic characteristics of respondents with good transmission-based precaution practices

Classificatory variables	O.R	P	95% C.I. for O.R
Age (years)			
<30	0.37	0.181	0.09-1.59
30 – 39	0.49	0.129	0.19-1.23
≥40	1.00		
Professional Status			
NO I/II	1.01	0.989	0.35-2.92
Others	1.00		
Years of experience			
<5	0.58	0.286	0.22-1.57
≥5	1.00		
Marital status			
Married	1.31	0.524	0.57-3.05
Single	1.00		
Qualification			
Diploma in Nursing/Midwifery Only	3.05	0.007	1.35-6.89
Diploma in Nursing/Midwifery/Post Basic Nursing	3.15	0.041	1.05-9.46
BNSc	3.22	0.019	1.21-8.53
Others[+]	1.00		

[+]***Others include nurses with degree outside nursing and, any combination of Diploma in Nursing/Midwifery, Post basic Nursing***

they were not required to disclose personal information on the questionnaire. Data was utilized only for the study.

Conclusion

Nurses had good practice of transmission-based precautions except for the use of PPE. The major challenges experienced by nurses were lack of motivation/hazard allowance, fear of contracting the virus, infecting family members, work overload and shortage of instrument and supplies.

Recommendations

The practice of transmission-based precautions should be maintained and improved through continuous training of nurses. The need for government to adequately supply PPE is paramount in protecting patients and health care workers.

Contribution of Authors

Juliana A. Afemikhe: Conceived and designed the study
Roselyd E. Esewe: Designed the study and Collection of data
Christie A. Enuku: Preparation and editing of manuscript
Timothy A. Ehwarieme: Preparation of manuscripts and data analysis
All authors mentioned in the article approved the manuscript.

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