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Analyzing Nurses Use of Protective Devices and Challenges Faced During Healthcare Delivery in COVID-19 Units in Bamenda Municipality, Cameroon

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Abstract

Introduction: Pandemic related crisis has caused enormous negative impacts on health globally and thousands of people suffered from the current COVID-19 pandemic. The World Health Organization (WHO) guidelines in the use of protective devices to mitigate the virus has become a challenge both physically and psychologically to nurses and this appears to be the main reason why contamination rate keeps increasing for nurses

Purpose: This study was designed to examine nurses' use of protective devices and challenges faced during healthcare delivery in COVID-19 unit.

Methodology: This was a hospital based descriptive survey and recruited nurses using the convenience sampling technique involved in the care of patients in the COVID-19 treatment unit, in Bamenda Municipality. The study was conducted from January 2022 to February 2022. Data was obtained using a self-administered structured questionnaire analyzed using SPSS version 26.0.

Findings: All the nurses admitted using at least one type of protective devices to reduce the transmission of COVID-19 during their clinical activities. The findings revealed that personal protective devices including medical masks (96.7%), gloves (78.8%), hand sanitizer (60.5%) and eye protection (48.9%). Challenges reported by the nurse's included unavailability of hand sanitizer (64.4%), medical masks (60.0%), glove usability or donning (8.9%), eye protection acceptability (44.4%), gown inappropriateness (27.9%) respirator inadequacy (25.5%) and difficulties in doffing of apron (5.5%). Evidently it was concluded that nurses used protective devices during clinical activities in the COVID-19 centers although they indicated a range of challenges faced in using these devices.

Unique Contribution to Theory, Practice and Policy: This study recommends continues compulsory training sessions be organized to enable nurses use personal protective equipment (PPE) correctly and without been limited.

Keywords: *Nurses, COVID-19, protective devices, protective approach, challenges*

INTRODUCTION AND LITERATURE REVIEW

Throughout human history, pandemics have occurred with the most recent being COVID-19 pandemic(1). The Novel-coronavirus disease is currently a global health threat and public health emergency of international concern (2). From the onset of the pandemic in late 2019 until present, healthcare providers globally have been at the forefront of managing infected cases of the deadly disease(3). By the end of January 2020, the novel coronavirus had spread through the Western Pacific, South-East Asia, USA, Canada, Europe, and Eastern Mediterranean countries**.** This spread constituted a Public Health Emergency of International Concern (PHEIC). Globally, on the 13th of January 2021, COVID-19 confirmed cases were reported to be 90335008 including 1954336 deaths. As of June 9, 2020, there were 7 039 918 confirmed cases with 404 396 deaths and 3 596 972 that recovered(4). The WHO situation reports of June 9, 2020, showed a cumulative total of 140 498 reported cases and 3352 deaths related to COVID-19 across 47 countries and territories in the African Region. The most affected African countries in the WHO situation report were South Africa (50 879 cases), Nigeria (12 801 cases), Algeria (10 265 cases), Ghana (9 910 cases), and Cameroon (8 060 cases)(4).

Since the first case of COVID-19 was reported in China in December 2019, medics, nurses, and other frontline workers had to ensure the disease's mitigation before it caused massive havoc(5)**.** While patients suffer the pain and illness brought about by the disease, health workers equally suffer to meet the needs of patience and prevent the spread. The loss of a patient comes as a burden to the health workers and especially nurses(6)**.** Health workers also face exhaustion, psychological trauma as they have to watch the patients for long periods given the novelty of the disease. However, in Cameroon as protective devices especially the recommended PPE by WHO guidelines according to settings, personnel and type of activity has become a rare commodity. The medical staff and other non-infected patients face a severe risk of being exposed to the disease and have to make precise movements and decisions in and around the hospitals(7).

In the attempt to prevent the spread of a viral infection from patients to healthcare workers and from healthcare workers to the population, the effective use of protective devices became key and the Cameroonian center for disease control from WHO measures implemented the protective devices and measures for nurses, and patients(8). The use of gloves, masks, respirators, goggles, face shields, and gowns, closed work shoes. Considerations during severe shortages by WHO 2019 following the interim guidance for the rational use of personal protective equipment for coronavirus, PPE that was once omnipresent and easily available in the hospital environment became scarce and precious(9).

To curb the rate of infection amongst health workers, there was the introduction of the protection model a guideline by WHO which is a policy that target at-risk populations(9), yet the guideline on the use of protective devices became difficult because nurses found it challenging. They identified the use of PPE as one of the biggest physical and psychological challenges experienced by clinicians while responding to COVID-19(10)**.** Physical burdens related to PPE included repeated donning and doffing of equipment, extended hours wearing uncomfortable gowns, masks and respirators, while psychological burdens included challenges communicating with peers and patients when wearing PPE and operating under changed practice standards.

Nurse Callista Roy's adaptation model was used as the theoretical foundation for this article and it is based four Meta paradigms common to other nursing theories: the person, the environment, health, and nursing. Effective protection must consider these key dimensions and

therefore in the context of the Coronavirus pandemic (COVID-19), the correct management of focal stimulus is necessary, covering the signs and symptoms of respiratory infection, such as fever, dry cough, fatigue, among other symptoms that signal to worsen of the case, such as severe dyspnea. The main objective of this study was to investigate the responses of nurses on the use of protective devices/approaches and the challenges they face during care in the COVID-19 centers in the Bamenda Municipality.

Statement of Problem

One of the major challenges during pandemics is how frontline workers can ensure disease's mitigation from spreading from one person to another and even affecting the health workers. During pandemics, the numbers of deaths, the heavy workload, the need for overtime work, pressure from patients and caretakers put most health workers under intense pressure. Yet they are expected to institute quality care and safe medical practices. For COVID-19, one of the major ways have always been the use of PPE by health workers and their use come with challenges. The responses on the use are problematic, the approaches and challenges have not been previously examined especially in Bamenda Municipality. It is against this backdrop that this paper analyzed nurses' responses in the use of protective devices and challenges faced during healthcare delivery in COVID-19 units in Bamenda Municipality-Cameroon.

Research Question

The questions that guided this paper are:

- What are nurses' responses on the use of protective devices?
- What are the Approaches of use of protective devices by nurses?
- What challenges are faced by nurses in the use of protective devices?

Objectives

The main objective of this paper was to identify how nurses use PPE, the approaches they adopt and the challenges they faced in the use of protective devices.

MATERIALS AND METHODS

This study used the descriptive survey design involving 45 nurses working in the COVID-19 units of a faith-based hospital (Mbingo Baptist Hospital), and two (2) public hospitals **(**Bamenda Regional Hospital/Nkwen Health District**)** and data were collected using questionnaires administered to nurses January 2022 to February 2022. The inclusion criterion was nurses that had rendered face to face care to patients in the COVID-19 unit from the outbreak of COVID-19. The obtained data were analyzed using basic descriptive statistics and chi square test. The study ensured all ethical considerations were taken into account such as voluntary participation, anonymity of participants, and confidentiality of information among others.

RESULTS

Demographic Information of Nurses

From the sample of 45 shown on table 1, 33(73.3%) were females and 12(26.7%) males. All were Christians (100.0%) with most of them (82.2%) aged 21-40 years. In terms of marital status, 48.9% were married. About 84.4% had attained tertiary level of education. Also, 46.7% had State Registered Nurse/Higher National Diplomat (SRN/HND) qualification while 57.7% of nurses had worked in the COVID-19 unit for a period greater than 15 months.

Table 1: Demographic Information of the study participants (N=45)

Items	Options	Freq (N=45)	Percentages (%)
Gender	Male	12	26.7%
	Female	33	73.3%
Religion	Christianity	45	100%
Age	21-40 years	37	82.2%
	41-60 years	8	17.8%
Marital-status	Single	23	51.1%
	Married	22	48.9%
Educational	Primary/secondary	7	15.5%
	Tertiary	38	84.4%
Professional qualification	Nurse Assistants	7	15.5%
	SRN/HND	21	46.7%
	Bachelor Degree	13	28.9%
	Masters/Doctorate	4	8.9%
Longevity	< 4 Months	8	17.8%
	5-9 Months	6	13.3%
	10-14 Months	5	11.1%
	> 15 Months	26	57.7%

Nurses' Responses on the Use of Protective Devices

Figure 1 revealed that top protective devices used by nurses in the COVID-19 unit, 96.7% medical masks followed by 78.8% who identified gloves, 60.5% hand sanitizer, 48.9% eye protection and 31.1% apron and the rest score relatively low usage.

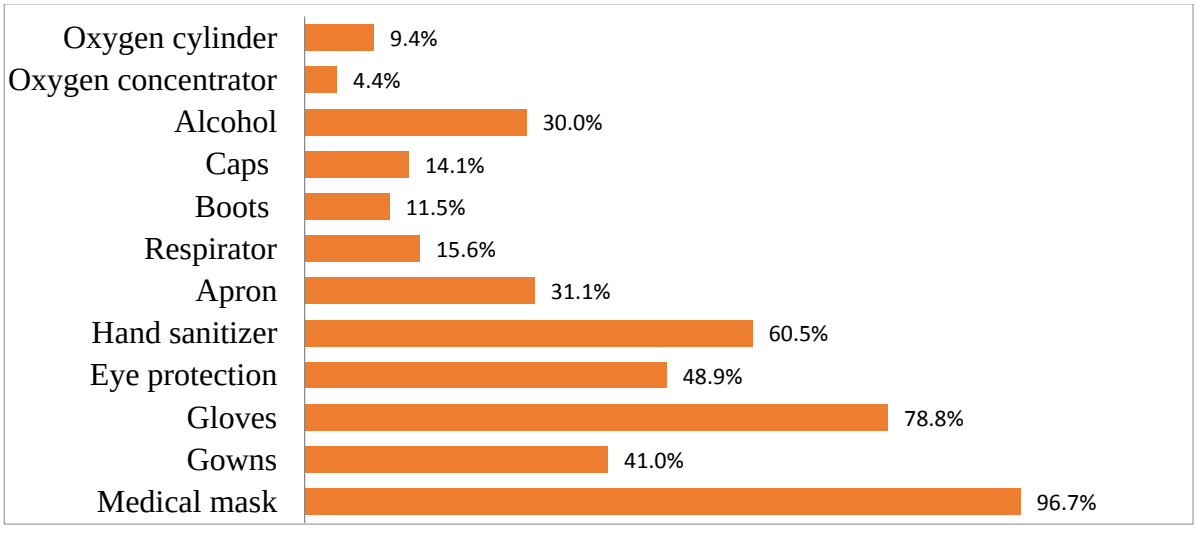

Figure 1: Protective devices used by nurses' in COVID-19 units

Frequency of Protective Equipment use by Nurses in the COVID-19 Unit

Figure 2 indicates that 95.6% of nurses used medical masks always, 91.1% used hand sanitizer/Savon always, 77.8% used gloves always, while 40.0% used gowns always. In

addition, 40.0% of them used gowns sometimes, 40.0% used apron sometimes, and 35.6% used eye protection sometimes. Again, 42.5% of nurses never used caps while 26.7% never used respirator.

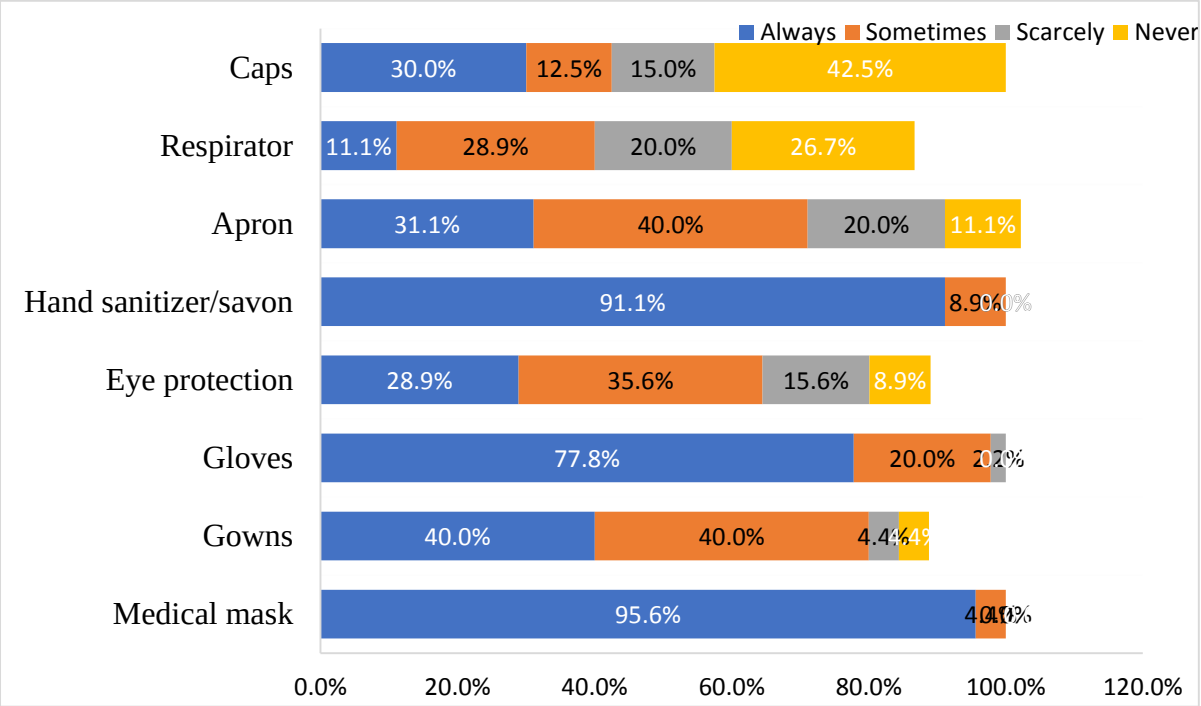

Figure 2: Frequency of protective equipment use by nurses in the COVID-19 unit

Table 2, revealed that 75.6% of nurses reported facing challenges in breathing as one of the physical discomforts experienced in the use of protective equipment, 75.6% stated body heat, 64.4% visual discomfort and 62.2% communication difficulties. This indicates that breathing difficulty was the highest challenges nurses faced in the use of PPE in the Covid-19 unit.

Table 2: The physical discomforts experienced in the use of protective equipment

Physical Discomfort	N	Percentage
Breathing difficulties	34	75.6
Communication difficulties	28	62.2
Pressure injuries	13	28.9
Visual discomfort	29	64.4
Body heat	34	75.6
General malaise	12	26.7
Dizziness	1	2.2

Nurses' Responses on the Approaches of Use of Protective Devices

Table 3 reveals that among the protective approaches used, wearing of medical mask was 57.1%. While 51.1% of nurses used frequent-hand washing, 48.9% maintained physical distancing and protective barriers whereas 44.4% wore gowns/gloves and 42.2% used personal protective equipment. Concerning the area where approaches were used, 48.9% of nurses used these approaches during care in the ward or patient's room. 33.3% used it anytime present in the unit while 30.0% used it at patient screening with symptoms.

Table 3: Nurses' responses on the use of protective approaches

Protective Approaches Used	Percentage
Maintaining physical distancing	48.9%
Use of protective barriers	48.9%
Frequent hand-washing	51.1%
Use of Personal Protective Equipment	57.8%
Use of Eye Protection	37.8%
Wearing of Gowns/gloves	44.4%
Wearing of Apron	33.3%
Use of Respirators Ng5, FFP2 or FFP3	13.3%
Face shield	20.5%

As shown on table 4, regarding the protective approaches used always, the wearing of medical mask was 91.1%, isolation of patients with symptoms 88.9%, frequent hand-washing with soap or hand sanitizer 84.4%. Among those used most often, wearing of gloves was 37.8%, wearing of gowns was 33.3%, and maintaining of physical distancing 31.1%. With respect to those used sometimes, eye protection was 44.4%, provision of face masks to patients was 37.8%. Looking at protective approaches that were almost never used, 26.6% were respirators. For those that were never used, 31.0% were aprons while 23.2% were respirators.

Table 4: Nurses' responses on the use of protective approaches

Frequency of practice	Always	Most often	Sometimes	Almost never	Never
Maintain physical distancing	31.1%	31.1%	17.8%	8.9%	11.1%
Use protective barrier	35.6%	11.1%	35.6%	8.8%	8.9%
Use of personal protective devices	68.9%	26.7%	4.4%	0.0%	0.0%
Frequent hand-washing with soap or hand sanitizer	84.4%	13.3%	2.3%	0.0%	0.0%
Wearing of medical mask	91.1%	6.7%	2.2%	0.0%	0.0%
Wearing of gloves	46.7%	37.8%	13.3%	0.0%	2.2%
Use of Eye Protection	26.7%	20.0%	44.4%	4.4%	4.5%
Wearing of gown	28.9%	33.3%	28.8%	4.4%	4.6%
Wearing of Apron	26.7%	15.6%	26.7%	0.0%	31.0%
Use of Respirator	11.0%	17.8%	24.1%	26.6%	23.2%
Use of closed work shoes	80.0%	2.2%	4.4%	6.7%	6.7%
Isolate patients with symptoms	88.9%	8.9%	0.0%	2.2%	0.0%
Hand hygiene taught to patients	64.4%	22.2%	11.1%	2.3%	0.0%
Provide face mask to patients	26.7%	20.0%	37.8%	4.4%	11.1%

Nurses' Responses on PPE Approaches

Table 5 shows that up to 88.8% of nurses had been taught the principle that staff should ensure they are bare below the elbows while 60.0% had been taught the principle that healthcare organizations must ensure that a step-by-step process for removal of PPE is developed and

documented. Again, 55.5% had been taught the principle that PPE be worn correctly for the duration of exposure to potentially contaminated areas. Conversely, 57.8% of nurses identified that they had practiced the principle that all personal items should be removed before fitting PPE, followed by 55.6% who had practiced the principle that hair should be securely tied back out of the face and eyes. On the other hand, 37.2% of nurses had received theory and practice on the principle that PPE particularly masks, should not be adjusted during patient care. The chi square test was used to assess and there was a statistically significant relationship between nurses trained as a Covid-19 care nurse and principles such as reception of training and instruction on the fitting and removal process (0.013), reception of training on correct fitting and removal of PPE given sufficient time (0.003), PPE be worn correctly for the duration of exposure to potentially contaminated areas (0.014), healthcare organizations must ensure that a step by step process for removal of PPE is developed and documented (0.008), all personal items should be removed before fitting PPE (0.021). Meaning being train as a COVID-19 care nurse will improve the practice of the principles elaborated on the table above.

Table 5: Chi Square Test to assess association between nurses' responses on principles of protective approaches and training

Responses on Principles	Taught	Practice	Taught & practice	(P-value)
Received training on the fitting and removal process of PPE	40.0%	13.3%	31.1%	0.013*
Received training on correct fitting of PPE, given sufficient time	24.4%	48.9%	26.7%	0.003*
PPE be worn correctly for the duration of exposure to potentially contaminated areas	55.5%	26.7%	11.1%	0.014*
Removal of used PPE is high-risk process that requires a structured and systematic procedure	51.1%	33.3%	15.6%	0.328
PPE must be removed slowly and deliberately in the correct sequence	35.6%	53.3%	11.1%	0.159
Healthcare organizations must ensure that a step-by-step process for removal of PPE is developed	60.0%	24.4%	15.6%	0.008*
All personal items should be removed before fitting PPE	26.7%	57.8%	15.6%	0.021*
Staff should ensure they are bare below the elbows	88.8%	46.7%	8.9%	0.699
Hair should be securely tied, face and eyes	28.9%	55.6%	15.6	0.140

Challenges Faced by Nurses in the use of Protective Devices

Table 6 revealed that 64.4% of nurses identified the challenge of hand sanitizer availability while 60.0% identified the challenge of medical mask availability. Also, 13.5% of nurses identified glove usability or donning while 22.3% identified eye protection acceptability. Again, 27.9% identified gown inappropriateness, 25.5% identified respirator inadequacy while 24.4% identified difficulties in doffing of apron.

Table 6: Challenges faced by nurses in the use of protective devices

Challenges	Avail-ability	Usability or Donning	Accept-ability	Afford-ability	Inappro-priate	Inade-quate	Doffing
Medical masks	60.0%	8.9%	11.1%	4.4%	2.2%	6.7%	6.7%
Gowns	5.5%	11.1%	13.3%	4.4%	27.9%	20.0%	15.6%
Gloves	57.8%	13.5%	2.2%	6.7%	4.4%	8.7%	6.7%
Eye protection	44.4%	11.1%	22.3%	6.7%	4.4%	8.9%	2.2%
Hand Sanitizer, Savon	64.4%	4.4%	15.5%	11.1%	2.4%	2.2%	0.0%
Apron	26.7%	11.2%	17.1%	8.9%	13.3%	13.7%	24.4%
Respirator	20.0%	5.5%	21.3%	13.3%	8.9%	25.5%	5.5%

DISCUSSION OF RESULTS

A greater proportion of the nurses (88.9%) admitted that protective devices are equipment used in the protection of transmission of infectious disease. This is confirmed by the fact that the PPE is used in the prevention of transmission of infectious disease by WHO. The PPE identified are: medical masks, gloves, hand sanitizer and eye protection and donning double gloves, gown, N95 mask, and eye protection, shoe covers and a surgical mask over the N95 respirator and a controlled-air-purifying respirator was worn prior to entering the operating room(11). This is consistent with the fact that reducing the chances of infection includes staying at home, wearing a mask in public, avoiding crowded places, keeping distance from others, ventilating indoor spaces, washing hands with soap and water often and avoiding touching the eyes, nose, or mouth with un wash hands (12) and a COVID-19 vaccine. As well, in the attempt to prevent the spread of a viral infection from patients to healthcare workers and from healthcare workers to the population, the health community generally relies on the efficacy of protective devices procured and supply in the COVID-19 unit especially the personal protective equipment(9).

This study found that protective devices seldom used by most of these nurses in the COVID-19 unit were gowns, aprons, alcohol and respirators. It might be probable that the supply of these PPEs accounted for such a timid use, considering that during severe shortages despite the mandatory use personal protective equipment for coronavirus, their easily available in the hospital environment became scarce (10).

The frequency of use of these personal protective devices among nurses were found to be very high: medical masks (95.6%), hand sanitizer/savon (91.1%) and gloves (77.8%); use of gowns and aprons (40%), eye protection (35.6%), 42.5% of nurses never used caps and 26.7% never used respirator. This implies that there is adherence to the preventive measures against the spread of COVID-19 and Standard recommendations (13)**.** Also, the Theory of self-care deficit by Nurse Dorothea Orem equally mentioned guidelines requesting that the nurses in offering care should engage in frequent hand washing or when it is impossible to wash, alcohol-based hand sanitizer is preferable; respiratory protocol when sneezing or coughing, covering mouth and nose with tissue paper or with the inner side of the arm; avoid touching the face, especially eyes, nose and mouth; and keep a distance of at least two meters from people who cough or sneeze(9).

Results pertaining to the challenges experienced in the use of these PPEs found that about three quarter of the nurses had breathing difficulties with the physical discomfort experienced in the

use of protective equipment, experienced body-heat, visual discomfort and slightly above half face communication difficulties when using PPE. This is goggle(14) who found nurses complain that the most common adverse health effects expressed in the use of PPEs were headache (73.4%), extreme sweating (59.6%), and difficulty in breathing (36.7%); 91.7% complained about the fogging, although the current study found higher prevalence of the challenges**.** The physical burdens related to PPE included repeated donning and doffing of equipment, extended hours wearing uncomfortable gowns, masks and respirators, while psychological burdens included challenges communicating with peers and patients when wearing PPE and operating under changed practice standards(15).

CONCLUSION

Based on the nurses' responses examined in this study, the study culminated that

- Nurses use PPE devices every day in the face of COVID-19, during working sessions with patients and common PPE were medical masks, gloves, hand sanitizer and eye protection.
- There is enough evidence that nurses in this Municipality have positive view on PPE use and ensure they use to mitigate COVID 19 spreading to workers and non-workers.
- The nurses faced myriad challenges prominent was breathing difficulties, physical discomfort experienced in the use of protective equipment, body heat, visual discomfort communication difficulties when using PPE.

RECOMMENDATIONS

- Training sessions through seminars could be organized to enable nurses use PPEs and how to manage challenges
- While most of the nurses indicated that they use PPE, the approach of use and the frequency was limited. As such, nurses should be taught how to wear the facemask loosely to avoid the breathing challenge and communication difficulties.
- There must be available running water and soap for regular handwashing, but if not, alcohol-based hand sanitizer must be provided for them.

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