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# Practices of Infection Prevention and Control among Primary Healthcare Workers and Associated Factors: A Cross-Sectional Study

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**ABSTRACT**

**Background and Objective:** Poor infection prevention and control (IPC) practices predispose healthcare workers (HCWs) to an increased risk of contracting infections. This study aimed to assess IPC practices and associated factors among primary healthcare workers in Calabar Municipal LGA, Cross River State. **Materials and Methods:** A cross-sectional descriptive study design was adopted for the study using a structured questionnaire to elicit information from 359 primary healthcare workers. Data were analyzed using SPSS version 23, associations were tested using Chi-square statistics. **Results:** The majority respondents (67.3%) had a good level of IPC practice and (83.3%) reported the availability of IPC protocol. Perceived factors influencing compliance with IPC guidelines are lack of resources (78.6%), inadequate training (76.6%) and lack of support (72.7%). An association was found between experience and level of IPC practice (p = 0.000). The level of good practice increased with years of experience. An association was also found between personnel type and level of IPC practice (p = 0.001) with Poor IPC practices being more prevalent among the nurses. **Conclusion:** Despite the observed level of good practice, compliance with available IPC guidelines should be strictly monitored by administrators of primary healthcare facilities. There is also a need for regular training of health workers to facilitate their compliance with IPC guidelines.

**KEYWORDS**

Practice, infection prevention and control, primary healthcare, workers, associated factors



## INTRODUCTION

Healthcare-acquired infections (HAIs) affect the quality of healthcare and are responsible for the most adverse healthcare outcomes. The impact of HAIs is well established, as they pose significant threats to patient and healthcare workers' safety and can result in increased morbidity and mortality levels[1].

The US Centers for disease control and prevention identifies that nearly 1.7 million hospitalized patients annually acquire HCAIs while being treated for other health issues and that more than 98,000 patients (one in 17) die due to these[2]. A prevalence rate of 18.63 percent was reported for HAIs in a tertiary hospital in North-Western Nigeria[3]. Also in Calabar Metropolis of Cross River State, George *et al.*[4] reported prevalence rates up to 22.2 and 29.7% in General and Infectious Disease Hospitals, respectively.

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Nurses and other healthcare professionals face an increased risk of exposure to new and re-emerging infectious diseases[5]. As the first line of defense in the fight against an outbreak, healthcare workers are particularly vulnerable to infection. Consequently, all reasonable precautions must be adopted to prevent the transmission of infections to staff, first by identifying the risk factors of infection and then by adopting suitable measures to limit these risks[6]. Overcrowding, lack of isolation rooms and pollution of the environment are all known risk factors for the spread of HAIs[7]. An infectious illness can impact nurses' attitude and action in ways that directly increases patient risk of infection[8].

Major reasons for non-compliance with IPC protocol are unavailability of IPC protocol, equipment and materials. Dan-Jumbo *et al.*[9] carried out a cross-sectional study to assess the availability of IPC protocol in Primary and Secondary Health Care Facilities in Rivers State, Nigeria. Results revealed that twenty (20.2%) facilities had IPC programs with clearly defined objectives and activity plans. A copy of the IPC guidelines was available in 56 (56.6%) facilities, however, only 13 (13.1%) monitored the implementation of the guidelines. Forty (40.4%) facilities had healthcare workers that were trained based on updated IPC guidelines. Supply of personal protective equipment was adequate in 29 (29.3%) facilities and a mixed method of healthcare waste disposal was practiced in 46 (46.4%) facilities. Overall, 56 (56.6%) of the facilities had scores within the basic IPC level of practice while 43 (43.4%) had scores within the intermediate level of IPC practice. Findings from this study indicate that IPC committees should be set up in all healthcare facilities with the obligation of updating IPC guidelines, training healthcare personnel and implementing IPC activities in respective healthcare facilities. Alhassan *et al.*[10] assessed the availability of infection prevention and control (IPC) protocol among healthcare workers at the surgical department of Tamale Teaching Hospital (TTH). The study was conducted using a descriptive cross-sectional survey of 156 participants plus an observational study of forty healthcare providers and 45 operation room cases. Results revealed that IPC materials were 78.9% always not available, 14.7% sometimes available and 6.4% were always available. The Majority of the respondents reported that IPC materials were not always available. The major predictor of IPC compliance was IPC materials availability, followed by the occupation of respondents and the age of the respondents. Across many of the findings, healthcare workers pointed to the importance of including all staff, including cleaning staff, porters, kitchen staff and other support staff when implementing IPC guidelines. In a study, Alhassan *et al.*[10], sought to determine the barriers against the effective practice of infection prevention and control (IPC) among healthcare workers at the surgical department of Tamale Teaching Hospital (TTH). The study adopted a descriptive cross-sectional design which was conducted on 156 participants. The study also adopted an observational technique with forty healthcare providers and 45 operation room cases. The subjects for the study were stratified and randomly selected for the study. Data were analyzed with Statistical Package for the Social Sciences (SPSS) version 20 Results revealed that factors associated with knowledge level were: Educational level ($p = 0.0001$), occupation ($p = 0.0001$), marital status ($p = 0.0300$) and age ($p = 0.030$). Occupationtion was the only factor associated with the attitude level ($p = 0.0480$). The factors associated with IPC compliance level were: Occupation ($p<0.0010$), educational level ($p = 0.0010$), age ($p = 0.0090$), IPC materials availability level ($p = 0.0010$), IPC knowledge level ($p = 0.0010$) and attitude level towards IPC ($p = 0.0010$). IPC materials were 78.9% always not available, 14.7% sometimes available and 6.4% were always available.

Understanding nurse's IPC practices might assist in anticipating the effect of planned behaviors among them. recent research in under-developed countries has found a low level of compliance with appropriate infection control procedures and basic precautions, while in developed countries, lack of proper control methods, resources and regulations have been noted as a large and significant issue that created a race towards infection management[11]. A descriptive cross'-sectional study and observational study by Alhassan *et al.*[10] were carried out to determine the level of infection prevention and control (IPC) practice among healthcare workers at the surgical department of Tamale Teaching Hospital (TTH). The study was conducted on healthcare providers and operation room cases. Out of the 156 participants who responded,

22 (14.1%) were Doctors, with 107 (68.6%) Nurses, 12 (7.7%) Anesthetics and 15 (9.6%). Approximately, 50.6% of the respondents were knowledgeable with regards to IPC, 55.1% of the respondents had a good attitude towards IPC and 58.3% had good compliance towards IPC. More than half the respondents reported having good knowledge, good attitude and good compliance towards IPC. HAI prevention does not get enough attention in developing countries, including Nigeria, especially in the study area where the burden of infectious diseases is very high. Currently, there is a dearth of information on healthcare workers' practices regarding IPC practices in primary healthcare facilities in Calabar Municipal Local Government Area, Cross River State, thus this study aimed at assessing IPC practices and associated factors among primary healthcare workers in Calabar Municipal LGA, Cross River State.

## MATERIALS AND METHODS

**Study duration:** This study was carried out between November 2022 and January 2023.

**Study area:** Calabar municipality is a local government in Cross River State, Nigeria. Its headquarters are in the city of Calabar. It has an area of 141,33 $km^2$ and an estimated population of 179,392 at the 2006 and 276218, 2014 censuses[12]. The postal code of the area is 540. Calabar Municipality LGA plays a dual role apart from being the capital city of Cross River State, it's the headquarters of the southern senatorial district. There are ten wards in the local government. Two ethnic groups make up the indigenous population, which are the Quas and the Efik. However, because of its cosmopolitan status, there abound people from all parts of the state and Nigeria in the city. It embraces all types of ethnic groups as it's a Christian city with few Muslims and traditional religious groups. It is mainly occupied by civil servants, businessmen and traders. There are three levels of healthcare facilities in the local government area, comprising 62 primary healthcare facilities, 36 secondary and 2 tertiary healthcare facilities including private and public sectors. The city also has industries and establishments such as an airport, export processing zone, Naval and Army base, Tinapa business center, Museum, Marina Resort NNPC deport, cement factories, etc. Calabar Municipality can also be seen as a peace-loving disposition rich in cultural heritage and warm hospitality.

**Study design:** A descriptive cross-sectional design was adopted for this study.

**Study population:** The study population comprised healthcare Workers-Doctors, Nurses, Midwives, Laboratory scientists, Community health workers and Cleaners in the selected primary healthcare facilities in Calabar Municipality LGA.

**Sample size:** The sample size for this study was determined using the Fishers formula cited by Bluman[13] for sample size calculation which is given as:

$$N = \frac{z^2(p \times q)}{d^2}$$

Where:

N = Desired sample size
z = Standard score corresponding to the given confidence interval of 1.96 at (95%)
p = As 29.7% = 0.3 Proportion of IPC practice among HCWs
q = Probability of non-occurrence is (1-p) which is 1-0.3 = 0.7
d = Acceptable margin of error or degree of accuracy is 5% (i.e. 0.5)

$$N = \frac{1.96^2 \times 0.3 \times 0.7}{0.5^2}$$

$$= \frac{0.806736}{0.0025} = 322.69 \text{ approximately } 323$$

To account for non-response, the sample size was increased by 10%. This gave a final sample size of 359.

**Sampling procedure:** Multi-stage sampling techniques were used:

- **Stage 1: Selection of primary healthcare facility:** There are nine core primary health care facilities in Calabar Municipality Local Government Area, Calabar, Cross River State. The nine Primary healthcare facilities were used for the study
- **Stage 2: Selection of department/units:** There are four departments were randomly selected from each of the nine primary healthcare facilities. This gave a total of 36 departments
- **Stage 3: Selection of respondents:** There are ten respondents were conveniently selected from each of the four selected departments. These include, doctors, nurses, midwifery, cleaners and community health workers

**Instrument (s) for data collection:** The researcher developed a checklist and a structured questionnaire was drafted and designed to elicit data from the respondents. The checklist was used to observe the availability of IPC practice, while the questionnaire was administered to sample respondents' opinions on practices of infection prevention and control among primary healthcare workers who have consented to participate in the study. The questionnaire comprises four sections.

**Instrument (s) for data collection/method:** A structured self-administered questionnaire comprising four Sections-Section A: Socio-demographic characteristics, Section B: Availability of IPC guidelines, Section C: IPC practices of primary healthcare workers and Section D: Factors influencing compliance with IPC guideline.

**Statistical analysis:** The quantitative data was generated, entered and analyzed with the aid of IBM Statistical Product and Service Solutions (SPSS) software version 25. The result was expressed in percentages (%) and presented in tables, charts, graphs, figures and frequencies. Chi-square statistics were used to test associations. For the categorization of the level of IPC practice, a respondent who selected the 'always' option a for specific practice was regarded as having a good practice level while anyone who selected the 'sometimes' or 'never 'options for any practice was regarded as having poor practice.

**Ethical consideration/informed consent:** Before the commencement of data collection, a letter of introduction was obtained from the Head of the Department of Public Health, University of Calabar. This letter was used to seek and obtain ethical approval from the ethical committee in the state's Ministry of Health. Thereafter, informed consent was obtained from participants that were willing to participate in the study.

## RESULTS

**Socio-demographic characteristics:** A total of 359 copies of the questionnaires were distributed and all were retrieved giving a response rate of 100.0%. Most of the respondents, 108 (30.1%) were male while 251 (69.9%) were female. About 23 (6.4%) of the respondents were within the age range of less than 20 years, 199 (55.4%) were within 21-40 years, 119 (33.1%) were within 41-60 years, while 18 (5.0%) were

above 60. The majority of the respondents were within the 21-40 years' age group. About 13 (3.6%) of the respondents had acquired primary education, 47 (13.1%) secondary education, while the majority of respondents 299 (83.3%) had attained tertiary education. Most of the respondents, 196 (54.6%) were married, 137 (38.2%) were single, while 26 (7.2%) were divorced/widowed. Distribution of respondents based on their roles in the facility shows that 53 (14.8%) were nurses, 46 (12.8%) were midwives, 21 (5.8%) were doctors, majority of primary health care workers 172 (47.9%) were community health workers, 39 (10.9%) were laboratory technicians, 21 (5.8%) were cleaners, while 7 (1.9%) have other roles in the facility. Majority of the respondents, 357 (99.4%) were Christian, while 2 (.6%) were Islam. Distribution of respondents based on years of experience shows that 86 (24.0%) had 1-5 years years of experience, 117 (32.6%) had 6-10 years, 85 (23.7%) had 11-16 years, 37 (10.3%) had 16-20 years, while 34 (9.5%) had above 20years of experience. Distribution of respondents based on their departments 103 (28.7%) were outpatient department, 67 (18.7%) are laboratory technicians, 72 (20.1%) were in family planning, while the majority of respondents 117 (32.6%) were in antenatal clinic department (Table 1).

**Availability of infection prevention and control program guidelines:** Majority of respondents 299 (83.3%) existing protocols in their facility. More than half of the respondents 224 (62.4%) reported having IPC nurses. The majority of the respondents' 197 (54.9%) reported having an IPC department. The majority of the respondents 209 (58.2%) reported having an IPC team in their facility. Most of the

Table 1: Socio-demographic characteristics of respondents

| Variable | Frequency (n = 359) | Percentage |
|---|---|---|
| **Age** | | |
| < 20 | 23 | 6.4 |
| 21-40 | 199 | 55.4 |
| 41-60 | 119 | 33.1 |
| Above 60 | 18 | 5.0 |
| **Gender** | | |
| Male | 108 | 30.1 |
| Female | 251 | 69.9 |
| **Marital status** | | |
| Male | 108 | 30.1 |
| Female | 251 | 69.9 |
| **Level of education** | | |
| primary education | 13 | 3.6 |
| secondary education | 47 | 13.1 |
| Tertiary education | 299 | 83.3 |
| **Religion** | | |
| Christianity | 357 | 99.4 |
| Islam | 2 | 6 |
| **Role in facility** | | |
| Nurse | 53 | 14.8 |
| Midwife | 46 | 12.8 |
| Doctor | 21 | 5.8 |
| Community health worker | 172 | 47.9 |
| Lab technologist/technicians | 39 | 10.9 |
| Cleaner | 21 | 5.8 |
| Others | 7 | 1.9 |
| **Years of experience** | | |
| 1-5 years | 86 | 24.0 |
| 6-10 years | 117 | 32.6 |
| 11-15 years | 85 | 23.7 |
| 16-20 | 37 | 10.3 |
| 20 above | 34 | 9.5 |
| **Department** | | |
| Outpatient department | 103 | 28.7 |
| Laboratory technicians/technologists | 67 | 18.7 |
| Family planning | 72 | 20.1 |
| Antenatal clinic | 117 | 32.6 |

Table 2: Availability of infection prevention and control program guidelines

| Variable | Frequency ( n = 359) | Percentage |
|---|---|---|
| **Existing protocol** | | |
| Yes | 299 | 83.3 |
| No | 60 | 16.7 |
| **Infection prevention control nurses** | | |
| Yes | 224 | 62.4 |
| No | 135 | 37.6 |
| **IPC department** | | |
| Yes | 197 | 54.9 |
| No | 162 | 45.1 |
| **IPC team in the facility** | | |
| Yes | 209 | 58.2 |
| No | 150 | 41.8 |
| **Receiving specific training related to new or updated IPC guidelines introduced in the facility** | | |
| Yes | 315 | 87.7 |
| No | 44 | 12.3 |
| **IPC team in the facility includes both doctors and nurses** | | |
| Yes | 218 | 60.7 |
| No | 141 | 39.3 |

respondents 315 (87.7%) reported having had specific training related to new or updated IPC guidelines introduced in the facility, most respondents 218 (60.7%) reported that the IPC team in their facility includes both doctors and nurses (Table 2).

**Practices of infection prevention and control among primary health care workers:** The majority of the respondents 227 (63.2%) reported always practicing hand-washing before interacting with patients. The majority of the respondents 247 (68.8%) routinely use alcohol-based hand rubs after interacting with patients and 214 (59.6%) of the respondents sometimes wear masks and goggles when performing invasive and body fluid procedures sometimes. The majority of respondents 206 (57.4%) always remove jewelry like rings before performing hand-washing. Most of the respondents 164 (45.7%) always shave surgical sites with razors. The majority 310 (86.4%) discard needles into sharp bins. The majority 161 (44.8%) always recap needles before disposal. About 163 (45.4%) respondents reported that vaccination is sometimes provided to healthcare staff. The majority 267 (74.4%) always wash their hands with soap under running water. The majority 221 (61.6%) always wash their hands before wearing gloves. The majority 325 (90.5%) always wash their hands after removing gloves. Most of the respondents 134 (37.3%) always wear goggles before an invasive procedure. Most respondents 228 (63.5%) said each staff is always responsible for the safe disposal of sharps. The majority of the respondents 298 (83.0%) always follow the 7 steps of hand washing. The majority of respondents 327 (91.1%) always wear gloves for stool and urine disposal. The majority 318 (88.6%) always wear a face mask to protect oral and nasal mucosa if the procedure might induce splashing of blood, body fluid, secretion, or excretion. The majority 277 (77.2%) of respondents always make use of sterile gloves. The majority 308 (85.8%) said they wash their hands over 5 times while at work. The majority 199 (55.4%) said they have received IPC training in the past 3 years. More than half 160 (44.6%) of respondents reported having not received any training on IPC in the last 3 years, majority 291 (81.1%) reported having not had HAI within the past 3 years. Table 3(a-b). Summarily, IPC practice among respondents was categorized into good and poor practices. The study showed that 68 (67.3%) had good practice levels while 32 (32.1%) had poor IPC practice levels. (Fig. 1).

**Associations between some socio-demographic and levels of IPC practice:** Chi-square statistics were used to test associations between some of the socio-demographic information and the level of IPC practice. Table 4 shows an association between years of experience and level of IPC practice ($p = 0.000$). The level of good practice increased with years of experience. Similarly, an association was

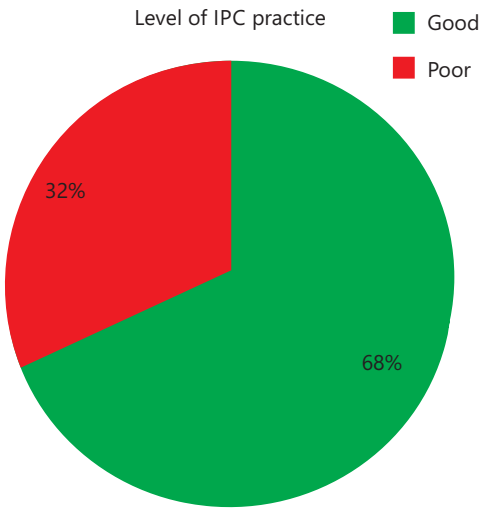


Fig. 1: Pie chart showing the level of IPC practice

Table 3a: Infection prevention and control practices among primary healthcare workers

| Variable | Frequency (n = 359) | Percentage |
|---|---|---|
| **Hand-washing before interacting with the patient** | | |
| Never | 31 | 8.6 |
| Sometimes | 101 | 28.1 |
| Always | 227 | 63.2 |
| **Routine use of alcohol-based hand rub for hygiene after interacting with the patient** | | |
| Never | 10 | 2.8 |
| Sometimes | 102 | 28.4 |
| Always | 247 | 68.8 |
| **Frequency of wearing masks when performing invasive and body fluid procedures** | | |
| Never | 22 | 6.1 |
| Sometimes | 214 | 59.6 |
| Always | 123 | 34.3 |
| **Removing jewelry like rings before hand washing** | | |
| Never | 51 | 14.2 |
| Sometimes | 102 | 28.4 |
| Always | 206 | 57.4 |
| **Shaving surgical sites with razor** | | |
| Never | 39 | 10.9 |
| Sometimes | 156 | 43.5 |
| Always | 164 | 45.7 |
| **Discard needles into sharp bins** | | |
| Never | 21 | 5.8 |
| Sometimes | 28 | 7.8 |
| Always | 310 | 86.4 |
| **Always recap needles before disposal** | | |
| Never | 116 | 32.3 |
| Sometimes | 82 | 22.8 |
| Always | 161 | 44.8 |
| **Vaccination provided to health care staff** | | |
| Never | 50 | 13.9 |
| Sometimes | 163 | 45.4 |
| Always | 146 | 40.7 |

found between personnel type and level of practice (p = 0.001) with poor IPC practices being more prevalent among the nurses. There was no association between educational qualification and level of IPC practice (p = 0.128).

Table 3b: Infection prevention and control practices among primary healthcare workers

| Variables | Frequency (n = 359) | Percentage |
|---|---|---|
| **Washing hands with soap under running water** | | |
| Never | 9 | 2.5 |
| Sometimes | 83 | 23.1 |
| Always | 267 | 74.4 |
| **Washing of hands before wearing gloves** | | |
| Never | 53 | 14.8 |
| Sometimes | 85 | 23.7 |
| Always | 221 | 61.6 |
| **Wearing goggles before an invasive procedure** | | |
| **Each staff is responsible for the safe disposal of sharps** | | |
| Never | 31 | 8.6 |
| Sometimes | 100 | 27.9 |
| Always | 228 | 63.5 |
| **Following 7 steps, palms/backs/in-between fingers/sides/thumbs/fingertips/wrist** | | |
| Never | 22 | 6.1 |
| Sometimes | 39 | 10.9 |
| Always | 298 | 83.0 |
| **Wearing gloves for disposal of stool and urine** | | |
| Never | 7 | 1.9 |
| Sometimes | 25 | 7.0 |
| Always | 327 | 91.1 |
| **Wearing of face mask to protect oral and nasal mucosa if the procedure might induce splashing of blood, body fluid, secretions, or excretion** | | |
| Never | 5 | 1.4 |
| Sometimes | 36 | 10.0 |
| Always | 318 | 88.6 |
| **Using sterile gloves** | | |
| Never | 15 | 4.2 |
| Sometimes | 67 | 18.7 |
| Always | 277 | 77.2 |
| **A number of times hands are washed while at work?** | | |
| 1-2 times | 2 | .6 |
| 3-5 times | 49 | 13.6 |
| over 5 times | 308 | 85.8 |
| **Ever received training on IPC in the last 3 years?** | | |
| Yes | 199 | 55.4 |
| No | 160 | 44.6 |
| **Experienced hospital-acquired infection within the past three years?** | | |
| Yes | 29 | 8.1 |
| No | 291 | 81.1 |
| Not sure | 39 | 10.9 |

**Perceived factors influencing compliance with Infection prevention and control (IPC) guidelines:** The majority 261 (72.7%) of the respondents felt that lack of from their management team influences their compliance with IPC guidelines and 275 (76.6%) asserted that inadequate training of HCWs on IPC guidelines influences their compliance. The majority 235 (65.5%) felt that lack of IPC materials/equipment influences their compliance with the guidelines and more than half 222 (61.8%) of the respondents reported that lack of personal protective equipment (PPE) influences their compliance with IPC guidelines, 208 (57.9%) thought that crowded work schedule does not influence their compliance with IPC guidelines. 197 (54.9%) said inadequate time does not influence their compliance with guidelines. 200 (55.7%) said lack of knowledge does not influence their compliance with guidelines. The majority 189 (52.6%) are of the opinion that lack of space is a factor that influences their compliance with IPC guidelines. The majority 282 (78.6%) said lack of resources influences their compliance with IPC guidelines and 212 (59.1%) said lack of isolation room influences their compliance with IPC guidelines. Less than half of the respondents 139 (38.7%) said the lack of a shower facility influence their compliance with IPC guidelines. Most respondents 227 (63.2%) thought that poor quality equipment influences their compliance with IPC (Table 5).

Table 4: Association between some socio-demographic and levels of IPC practice

| Socio-demographic characteristic | Level of practice | | $X^2$ | p-value |
|---|---|---|---|---|
| | Good | Poor | | |
| **Level of education** | | | | |
| Primary education | 12 (92.3%) | 1 (7.7%) | | |
| Secondary education | 27 (57.4%) | 20 (42.6%) | 8.553 | 0.128 |
| Tertiary education | 204 (68.2%) | 95 (31.8%) | | |
| **Years of experience** | | | | |
| 1-5 years | 46 (53.5%) | 40 (46.5%) | | |
| 6-10 years | 78 (66.7%) | 39 (33.3%) | | |
| 11-15 years | 66 (77.6%) | 19 (22.4%) | 35.703 | 0.000 |
| 16-20 years | 32 (86.5%) | 5 (13.5%) | | |
| 20 above | 21 (61.8%) | 13 (38.2%) | | |
| **Personnel type** | | | | |
| Nurses | 18 (34.0%) | 35 (66.0%) | | |
| Midwives | 34 (73.9%) | 12 (26.1%) | | |
| Doctors | 15 (71.4%) | 6 (28.6%) | | |
| Community health workers | 128 (71.4%) | 44 (25.6% | 35.703 | 0.001 |
| Laboratory technicians/technologists | 30 (76.9%) | 9 (23.1%) | | |
| Cleaners | 12 (57.1%) | 9 (42.9%) | | |
| Others | 6 (85.7%) | 1 (14.3%) | | |

Table 5: Perceived factors influencing compliance with infection prevention and control guidelines

| Variable | Frequency (n = 359) | Percentage |
|---|---|---|
| **Lack of support** | | |
| Yes | 261 | 72.7 |
| No | 98 | 27.3 |
| **Inadequate training of health workers about IPC guideline** | | |
| Yes | 275 | 76.6 |
| No | 84 | 23.4 |
| **Lack of IPC materials/equipment** | | |
| Yes | 235 | 65.5 |
| No | 124 | 34.5 |
| **Lack of PPE** | | |
| Yes | 222 | 61.8 |
| No | 137 | 38.2 |
| **Crowded work schedule** | | |
| Yes | 151 | 42.1 |
| No | 208 | 57.9 |
| **Inadequate time** | | |
| Yes | 162 | 45.1 |
| No | 197 | 54.9 |
| **Lack of knowledge** | | |
| Yes | 159 | 44.3 |
| No | 200 | 55.7 |
| **Lack of isolation room** | | |
| Yes | 212 | 59.1 |
| No | 147 | 40.9 |
| **Lack of space** | | |
| Yes | 189 | 52.6 |
| No | 170 | 47.4 |
| **Lack of resources** | | |
| Yes | 282 | 78.6 |
| No | 77 | 21.4 |
| **Lack of shower facility** | | |
| Yes | 139 | 38.7 |
| No | 220 | 61.3 |
| **Poor quality equipment** | | |
| Yes | 227 | 63.2 |
| No | 132 | 36.8 |

## DISCUSSION

The majority of respondents reported that they have existing protocol/guidelines, majority of healthcare workers had received specific training related to new or updated IPC guidelines being introduced in the facility. This result contradicts the findings of Dan-Jumbo *et al.*[9], who reported that 20.2% of the facilities assessed had IPC programs with clearly defined objectives and 40.4% of facilities had healthcare workers that were trained based on updated IPC guidelines. Salwa *et al.*[14] reported that compliance with IPC guidance was 0.061 times greater among participants who reported low perceived barriers compared with those withhigh perceived barriers. According to WHO[15] minimum guidelines for infection control in healthcare facilities, it is the role of healthcare administrators to ensure the safety of healthcare providers and patients through training on IPC and adequate provision of materials for IPC.

The study revealed that the majority of health workers always practice good hand hygiene before interacting with patients and the majority also regularly make use of sterile gloves when conducting medical procedures. Generally, the HCWs had good IPC practice. The findings agreed with that of Dan-Jumbo *et al.*[9], who reported overall, (56.6%) of the facilities had scores within the basic IPC level of practice while 43 (43.4%) had scores within the intermediate level of IPC practice. This study is in contrast with the findings of Alhumaid *et al.*[16], who reported that HCWs have been found to demonstrate poor compliance with hand hygiene practices despite well-established guidelines for the prevention of HAIs. The study is in contrast with that of Khan *et al.*[17], who revealed that poor hygienic practices of the health personnel, use of unsterilized or poorly sterilized medical equipment on patients when conducting medical procedures and a polluted hospital environment also contribute significantly to the occurrence of nosocomial infections". According to WHO[15] hand hygiene is the initial step towards successC and still remains the basic and most effective measure to prevent pathogen transmission and infection. Simple hand hygiene when performed well can reduce the prevalence of HAIs substantially. In the present study, the most prevalent practice adhered to by a majority of the HCWs was hand hygiene.

The major factors influencing compliance with IPC guidelines were found to be a lack of support from the management team. These findings are in contrast with the findings of Houghton *et al.*[18], who reported that the practice of IPC among healthcare workers was influenced by the level of support they felt that they received from their management team. Some of the respondents also revealed that a lack of IPC materials/equipment influences their compliance with the guidelines. This agreed with the report of Alhassan *et al.*[10] that IPC materials were 78.9% always not available. The majority of respondents from the present study also indicated that lack of resources was a major factor that influences HCWs' compliance with IPC guidelines. These findings agreed with Zinatsa *et al.*[19] who reported that limited resources are a common contributor to poor IPC practices. The present study also indicated that a crowded work schedule was not a factor that influences HCWs compliance with IPC guidelines, majority of the respondents also indicated that inadequate time is not a factor that influences HCWs' compliance with IPC guidelines. These findings disagree with Ogoina *et al.*[20] who reported that Non-availability of resources, high workload and time limitation have been reported as the main factors influencing HCW's compliance with IPC practice. Alhumaid *et al.*[16] reported that 'While HAIs burden is already demanding in developed countries, the magnitude of the problem is intensified in healthcare organizations where basic IPC measures are not available mainly due to limited financial resources.

The hypotheses tested showed no association between the level of education and the level of IPC practice. An association was found between those with years of experience and IPC practice. Good IPC practice level was more prevalent among HCWs with 16-20 years of experience and seems to decline with 20 years of experience. These findings contradict the findings by Alhasan *et al.*[10], who reported educational level ($p = 0.0010$) is associated with the level of IPC practice. This study agrees with the study of Ige *et al.*[21], who carried out a study to evaluate the effectiveness of IPC practices utilized in the COVID-19 testing

drive-through facility in Lagos Nigeria. Their results revealed that, out of 42 personnel, 92.8% had a tertiary level of education while 71.4% had at least 5 years of work experience. An association was also found between personnel type and level of IPC practice in the present study. Poor practice was more prevalent among nurses. This could be ascribed to high workload and time limitations which have been reported as the main factors influencing HCWs compliance with IPC practice.

The findings of this study indicate that both healthcare workers and patients at the studied PHCs are at risk of contracting infections due to lapses in compliance with standard IPC. There is a need for the provision of IPC materials to enhance compliance, besides strict monitoring by administrators of Primary healthcare facilities and the ministry of Health. There is also a need for regular training of health workers to facilitate their compliance with IPC guidelines.

The study was delimited to PHCs in Calabar Municipal Local Government Area, as such, the findings may not represent the IPC practices at PHCs in the entire Cross River state.

## CONCLUSION

The study reveals that the majority of the respondents had a good level of IPC practice. The most prevalent practice adhered to by a majority of the HCWs was hand hygiene. Inadequate training, lack of support by facility management and lack of resources have been identified as perceived factors influencing compliance with IPC guidelines among primary healthcare workers.

## SIGNIFICANCE STATEMENT

Healthcare-acquired infections (HAIs) have been recognized as a problem affecting the quality of healthcare and are a principal source of adverse healthcare outcomes. Healthcare professionals face an increased risk of exposure to new and re-emerging infectious diseases. Consequently, all reasonable precautions must be adopted to limit these risks. Thus it was necessary to assess the practices of primary healthcare workers regarding Infection prevention and control (IPC) and associated factors. Major factors perceived by healthcare workers (HCWs) as influencing compliance with IPC guidelines were: lack of resources and inadequate training. The findings are indicative of the need to scale up the provision of IPC resources and training to improve practice.

## REFERENCES

1. Mynaříková, E., D. Jarošová, E. Janíková, I. Plevová, A. Polanská and R. Zeleníková, 2020. Occurrence of hospital-acquired infections in relation to missed nursing care: A literature review. Cent. Eur. J. Nurs. Midwifery, 11: 43-49.
2. Haque, M., M. Sartelli, J. McKimm and Muhamad Bin Abu Bakar, 2018. Health care-associated infections-An overview. Infect. Drug Resist., 11: 2321-2333.
3. Dayyab, F.M., G. Iliyasu, A. Aminu, Z.G. Habib and A.B. Tiamiyu *et al*., 2018. A prospective study of hospital-acquired infections among adults in a tertiary hospital in North-Western Nigeria. Trans. R. Soc. Trop. Med. Hyg., 112: 36-42.
4. George, U.E., C.I. Mboto, U.O. Edet, E.N. Mbim, C.F. Umego and U. Onyekosor, 2017. Comparative evaluation of nosocomial infections in two major hospitals in Calabar metropolis, Cross River State. Asian J. Res. Med. Pharm. Sci., Vol. 2. 10.9734/AJRIMPS/2017/36168.
5. Islam, M.S., K.M. Rahman, Y. Sun, M.O. Qureshi, I. Abdi, A.A. Chughtai and H. Seale, 2020. Current knowledge of COVID-19 and infection prevention and control strategies in healthcare settings: A global analysis. Infect. Control Hosp. Epidemiol., 41: 1196-1206.
6. Mohamed, K., E. Rodriguez-Roman, F. Rahmani, H. Zhang and M. Ivanovska *et al*., 2020. Borderless collaboration is needed for COVID-19-A disease that knows no borders. Infect. Control Hosp. Epidemiol., 41: 1245-1246.

7. Wu, Z. and J.M. McGoogan, 2020. Characteristics of and important lessons from the coronavirus disease 2019 (COVID-19) outbreak in China: Summary of a report of 72 314 cases from the Chinese center for disease control and prevention. J. Am. Med. Assoc., 323: 1239-1242.
8. McEachan, R., N. Taylor, R. Harrison, R. Lawton, P. Gardner and M. Conner, 2016. Meta-analysis of the reasoned action approach (RAA) to understanding health behaviors. Ann. Behav. Med., 50: 592-612.
9. Dan-Jumbo, A., C.T. Briggs-Nduye and T.C. Uzosike, 2021. Assessment of infection prevention and control implementation in primary and secondary health care facilities in Rivers State. J. Commun. Med. Primary Health Care, 33: 100-114.
10. Alhassan, A.R., E.D. Kuugbee and E.M. Der, 2020. Surgical healthcare providers' compliance to hand hygiene and facemask use: A case of tamale teaching hospital, Ghana. J. Prev. Infect. Control, Vol. 6.
11. Refeai, S.A., N.N. Kamal, E.R.A. Ghazawy and C.M. Fekry, 2020. Perception and barriers regarding infection control measures among healthcare workers in Minia City, Egypt. Int. J. Prev. Med., Vol. 11.
12. Awuh, M.E., M.C. Officha, A.O. Okolie and I.C. Enete, 2018. A remote sensing analysis of the temporal and spatial changes of land surface temperature in Calabar Metropolis, Nigeria. J. Geogr. Inf. Syst., 10: 562-572.
13. Bluman, A.G., 2012. Elementary Statistics-Formula Card. 8th Edn., McGraw-Hill Publishing, New York, ISBN-13: 9780077438616, Pages: 75.
14. Salwa, M., M.A. Haque, S.S. Islam, M.T. Islam, S. Sultana, M.M.H. Khan and S. Moniruzzaman, 2022. Compliance of healthcare workers with the infection prevention and control guidance in tertiary care hospitals: Quantitative findings from an explanatory sequential mixed-Methods study in Bangladesh. BMJ Open, Vol. 12. 10.1136/bmjopen-2021-054837.
15. WHO, 2019. Minimum Requirements for Infection Prevention and Control Programmes. World Health Organization. Geneva, Switzerland, ISBN: 9789241516945, Pages: 55.
16. Alhumaid, S., A.A. Mutair, Z.A. Alawi, M. Alsuliman and G.Y. Ahmed *et al*., 2021. Knowledge of infection prevention and control among healthcare workers and factors influencing compliance: A systematic review. Antimicrob. Resist. Infect. Control, Vol. 10. 10.1186/s13756-021-00957-0.
17. Khan, H.A., F.K. Baig and R. Mehboob, 2017. Nosocomial infections: Epidemiology, prevention, control and surveillance. Asian Pac. J. Trop. Biomed., 7: 478-482.
18. Houghton, C., P. Meskell, H. Delaney, M. Smalle and C. Glenton *et al*., 2020. Barriers and facilitators to healthcare workers' adherence with infection prevention and control (IPC) guidelines for respiratory infectious diseases: A rapid qualitative evidence synthesis. Cochrane Database Syst. Rev., Vol. 2020. 10.1002/14651858.CD013582.
19. Zinatsa, F., M. Engelbrecht, A.J. van Rensburg and G. Kigozi, 2018. Voices from the frontline: Barriers and strategies to improve tuberculosis infection control in primary health care facilities in South Africa. BMC Health Serv. Res., Vol. 18. 10.1186/s12913-018-3083-0.
20. Ogoina, D., K. Pondei, B. Adetunji, G. Chima, C. Isichei and S. Gidado, 2015. Knowledge, attitude and practice of standard precautions of infection control by hospital workers in two tertiary hospitals in Nigeria. J. Infect. Prev., 16: 16-22.
21. Ige, F.A., A.G. Ohihoin, B.O. Amuda, O.S. Amoo and C.K. Onwuamah *et al*., 2021. The effectiveness of infection control practices among health care workers responding to the COVID-19 pandemic in Nigeria. Adv. Infect. Dis., 11: 232-239.