
Knowledge, Attitude and Perceptions on Infection Prevention and Control among Primary Healthcare Workers in Calabar Municipality, Cross River State: A cross sectional study

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ABSTRACT: *Exposure to infectious diseases is one of the most frequently identified occupational hazards facing healthcare workers. This study was aimed at determining the knowledge, attitude and perceptions regarding infection prevention and control (IPC) among primary healthcare workers in Calabar municipality. A descriptive cross-sectional study design was adopted using a structured questionnaire to elicit information from 359 healthcare workers drawn from 9 primary healthcare facilities. All data collected were analyzed using SPSS version 25. The results indicate that 62.7% of the respondents had heard about IPC. The Major source of information was training (61.8%). Majority (72.4%) of the respondents knew that hand hygiene is highly effective in preventing Hospital acquired Infections (HAIs). Among the respondents, 80.2% knew that hand washing should be done before and after contacts with patient, 84.12%, knew that changing gloves while working with different patients reduce the risk of infection transmission, however, only 22.56% knew that chemical sterilization technique cannot be used for all equipment. Summarily, 64.3% of the respondents had good level of knowledge. Majority of the respondents (88.3%) were found to have positive attitude regarding IPC, and 81.6% had good perceptions towards infection prevention and control. Though majority of the healthcare workers were found to have high knowledge levels, positive attitude and good perceptions regarding IPC, there is still need for primary healthcare facility leadership to organize regular training to further improve on healthcare workers' knowledge on IPC.*

KEYWORDS: infection prevention and control, primary healthcare, knowledge, attitude, perception.

INTRODUCTION

Hospital Acquired Infections have been thought to be more prevalent among patients, but healthcare workers have also been identified as being at risk of acquiring infection through occupational exposure and can also transmit infections to patients and workers.[1] These infections are usually caused by bacteria or viruses and can be spread from healthcare worker (HCW) to patient or vice versa through human contact with an infected surface, airborne transmission through droplets and/or aerosols and, finally, by common vehicles as food or water. Among these, blood-borne pathogens such as hepatitis B virus, hepatitis C virus, and human immunodeficiency virus (HIV) comprised major risks to health workers, particularly those who are exposed to blood and body fluids through sharps or needle stick injuries during the care for the patients.[2]

Exposure to infectious diseases is one of the most frequently identified occupational hazards facing healthcare workers. The early provision of training programs that provides information about protecting health workers from exposure to blood borne pathogens is therefore appropriate and is of paramount importance.[3] Unlike in developed countries where the prevalence of infectious diseases including HIV and TB are low, the risk for healthcare workers to occupationally contract a serious disease is usually high and is a major concern and their prevention must be a top priority for healthcare systems and organizations.[4]

HCWs play an important role in providing prevention, diagnosis, treatment, and care to people in diverse healthcare settings. According to the World Health Organization (WHO), health workers are all people who are involved in activities that aim at enhancing health, include those who provide healthcare services such as doctors, nurses, laboratory technicians, pharmacists, and those providing health management and supporting services such as officers, drivers, cleaners, and cooks.[5] Knowledge of HCWs is therefore fundamental for effective infection prevention and control.[6] Lack of knowledge of guidelines for IPC combined with an unawareness of preventive indications during daily patient care and the potential risks of transmission of microorganisms to patients constitute barriers to IPC compliance.[7] Lack of knowledge about the appropriateness, efficacy and use of IPC measures determine poor compliance.[3]

To overcome these barriers, education and training are the cornerstones of improvement in IPC practices.[8] HCWs should be aware of the fact that knowledge is power. However, a lack of knowledge of IPC measures has been repeatedly shown after education and training.[8] HCWs' awareness should include issues related to hand hygiene, wearing personal protective equipment (PPE), the use of personal protective equipment, the safe use and disposal of sharps/needles, safe handling and disposal of clinical waste, spillage of blood, and bodily fluids, decontamination of equipment and the environment, and safe management of linen immunization for prevention of communicable diseases, modes of infection transmission, and assessment of patients for infection.

Infections are a significant problem to healthcare patients, staff and the entire public. HAIs have been recognized as a problem affecting the quality of health care and principal source of adverse healthcare outcomes. The impact of these infections is well-established, as they pose significant threats to patient safety and can result in increased morbidity and mortality levels. [9] In 2020, nosocomial infections killed approximately 99,000 lives in the United States; which represents about 1.7 million cases of hospital-acquired infections per year in the U.S.[10] Nurses are in contact mostly when with patients and pose the greatest risk to their patients' health. Even if healthcare workers are taking the standard precautions, there is still a risk of transferring pathogens through their scrubs that they take home, their stethoscopes that are not being sanitized between patients, and their cell phones.

A prevalence rate of 18.63% was reported for HAIs in a tertiary hospital in north-western Nigeria.[11] Also, in Calabar Metropolis of Cross River State, Georde et al.[12] recorded prevalence rates up to 22.2% and 29.7% in General and Infectious Disease Hospitals respectively. A Knowledge survey conducted by Abuduxile [5] health workers from a hospital in Northern Cyprus employed a survey design. Questionnaire and interview guide were the major instruments for the study. Results showed that 12.7% of the nurses knew the definition of HAIs. The findings of the study showed that the level of knowledge regarding HAIs is low. This was attributed to lack of resources and training opportunities.

Another study was conducted by Alhumaid et al.[3] on the knowledge of infection prevention and control among healthcare workers and factors influencing compliance. The study was a systematic review of published literature on the topic. Results revealed that knowledge of IPC among nurses was generally average while knowledge level was low in tropical countries like Nigeria and high in the United States. It was recommended that training and awareness programmes be carried out in areas of need.

In a descriptive study conducted by Al-Moari et al.[4] in four tertiary private hospitals of Zobol city in Iran, 170 nurses who worked in different wards such as medical, surgical, pediatric wards and dialysis units were randomly sampled to analyze their knowledge regarding standard precautions for the prevention of HAIs. This study found that 43% of the nurses involved in the study had poor knowledge on IPC. Asfaw [13] carried out a study on Knowledge and practice of nurses towards prevention of hospital acquired infections and its associated factors in Northern Ethiopia. Results revealed that 52.5 % of the nurses had good knowledge; similarly 48.6 % of them had good practice on prevention of HAIs. It was concluded that nurses' knowledge and practice regarding prevention of HAIs was found to be inadequate. Being more experienced and attending formal training showed a positive association with knowledge. In a study that was conducted in India, where Nair et al.[14] assessed knowledge, attitude and practices of hand hygiene among medical and nursing students at a tertiary health care centre, the majority of students had poor knowledge with regard to hand hygiene. Sessa et al.[15] assessed the level of knowledge, attitudes

and practices regarding disinfection procedures among nurses in Italian hospitals. The study revealed an extremely positive attitude towards the utility of guidelines and protocols for disinfection procedures.

The study by Refeai et al.[16] aimed to assess perception of healthcare workers (HCWs) toward infection control measures. Results revealed that 85% of HCWs in Minia University Hospital compared with 82% in Minia General Hospital had a positive perception toward Standard precautions (SPs). Knowledge score was the only significant predictors of perception of HCWs toward infection control. A one- point increment in knowledge score is associated with significantly 13% lower odds of having negative perception; AOR (95% confidence intervals) was 0.87 (0.81–0.95). The most frequent barrier of practice of SPs was inadequate gloves and gowns. The present study sought to determine the level of knowledge, attitude and perceptions on infection prevention and control among primary healthcare workers in Calabar Municipality.

METHODOLOGY

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 141,33km² and an estimated population of 179,392 from the 2006 and 276218 from the 2014 census.[17] The postal code of the area is 540, it lies between latitude 04 155 and 5 N and longitude 25 E in North. Calabar Municipality LGA plays a dual role apart from being the capital city of Cross River State, it also plays its role as the headquarters of the southern senatorial district. There are 10 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, the 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 of 62 primary healthcare facilities, 36 secondary, and 2 tertiary healthcare facilities including private and public sectors.

Study Design

A descriptive Cross-sectional study design was adopted for this study.

Study Population

The study population comprises healthcare workers such as Doctors, Nurses, Laboratory scientists, Community health workers and Cleaners at the selected primary healthcare facilities in Calabar Municipality L.G.A.

Sample size determination

The sample size for this study was determined using Cochran[18] for sample technique calculation which is given as;

$$N = \frac{Z^2(p.q)}{e^2}$$

Where;

N = desired sample size

Z = standard score corresponding to the given confidence interval of 1.96 at (95%)

P = proportion of practices of (IPC) prevalence among HCWs is 29.7% George et al., (2017) which is 0.297 ~ 0.3

q = probability of non-occurrence is (1-p) which is 1-0.3 = 0.7

e = acceptable margin of error or degree of accuracy is 5% (i.e. 0.5)

The calculated sample size was 322.69 approximately 323.

To account for non-response, the sample size was increased by 10%. This gave a final sample size of 358.88 ~ 359

Sampling Procedures

Multi stage sampling techniques was used

Stage 1: Selection of primary health care facility

There are 9 core primary health care facilities in Calabar Municipality Local Government Area, Calabar, Cross River State. The nine (9) Primary healthcare facility were used for the study.

Stage 2: Selection of department/units

Four (4) departments were randomly selected from each of the 9 primary healthcare facilities. This gave a total of 36 departments.

Stage 3: Selection of Respondents

Ten (10) respondents were conveniently selected from each of the 4 selected departments. These included; doctors, nurses, midwifery, cleaners, and community health workers.

Instrument(s) for data collection/method

A structured self-administered questionnaire comprising of four (4) sections- Section A: Socio demographic characteristics, Section B: knowledge of IPC, Section C: Attitude of primary health care workers towards IPC, Section D: Perceptions of primary health care workers towards IPC, was used to elicit information from respondents.

Methods of Data Analyses

The quantitative data that was generated, entered and analyzed with the aid of Microsoft Excel 2008 and 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. A mean score of 5 was used to determine respondents' knowledge level. Scores above 5 were graded as good knowledge and below 5 as poor knowledge level. For attitude, A 4-point likert scale was used with strongly agree to a positive question having a score of 3 and strongly disagree 0. A mean score of 20 was used to determine attitude. Scores above the mean were graded as positive attitude and below, negative attitude. Respondents' perceptions were determined using a mean score of 3. Scores above 3 were regarded as good perception and below, poor perceptions regarding IPC.

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 the questionnaires were correctly filled and returned giving a response rate of 100.0%. Most of the respondents were females 251(69.9%). Respondents aged between 21-40 years were the majority in the study. Responses based on educational status shows that majority of respondents 299(83.3%) had acquired tertiary education. Most of the respondents, 196(54.6%) were married. 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 Christians. Distribution of respondents based on year of experience shows that majority, 117(32.6%) had 1-5years years of experience. Distribution of respondents based on their departments: 103(28.7%) worked at the outpatient department, 67(18.7%) were laboratory technicians, 72(20.1%) worked in family planning, while majority of respondents 117(32.6%) worked at the antenatal clinic department. (See Table 1).

Table 1
Socio-Demographic characteristic of respondents

Socio-demographic characteristics	Frequency (N = 359)	Percentage (%)
Age		
Below 20	23	(6.40)
21 -40	199	(55.4)
41 -60	119	(33.2)
60 above	18	(50.0)
Sex		
Male	108	(30.1)
Female	251	(69.9)
Marital status		
Single	137	(38.2)
Married	196	(54.6)
Divorced/separated	10	(2.8)
Widowed	16	(4.4)
Educational level		
Primary	13	(3.6)
Secondary	47	(13.1)
Tertiary	299	(83.3)
Religion		
Christianity	347	(99.4)
Islam	2	(0.6)
Role in facility		
Nurse/midwife	99	(27.6)
Doctor	21	(5.8)
Community Health worker	172	(47.9)
Lab. Technicians	39	(10.9)
Cleaners	21	(5.8)
Others	7	(1.9)
Years of experience		
1 -5	86	(24.0)
6-10	117	(32.6)
11 -15	85	(23.7)
Above 15	71	(19.8)
Department		
Outpatient department	103	(28.7)
Laboratory	67	(18.7)
Family planning	72	(20.1)
Antenatal	117	(32.6)

Knowledge on IPC among primary healthcare workers

The results presented in table 2, shows that most 225 (62.87%) of the respondents had heard about IPC 245 (68.24%) and majority of those who heard about it did so through training. Majority, 260 (72.42%) knew that hand hygiene is highly effective in preventing HAIs. Most 268 (74.65%) respondents agreed that disinfection can prevent HAI, 271 (75.49%) respondents agreed that proper handling of working equipment can decrease the risk of contamination, while 222 (61.84%) agreed that protective clothing can minimize HAI, 181 (50.42%) of respondents knew that gloves can provide complete protection against acquiring/ transmitting infection, 200 (55.71%) knew that there is need to wash hands before doing procedures that do not involve body fluids. Most 277 (77.16%) respondents knew to what levels safety boxes should be filled before closing and sealing, majority, 203 (56.55%) also knew specific waste disposal buckets according to their level of contamination. A little above half, 188 (52.37%) knew that all equipment need decontamination before sterilization. On the average, 231(64.3%) of the respondents had a good knowledge of IPC while 128(35.7%) have poor knowledge of IPC as shown in Figure 1.

Table 2**Knowledge on IPC among primary healthcare workers**

Knowledge on IPC	Frequency (n = 359)	Percentage (%)
Heard about Infection prevention and control (IPC)		
Yes	225	(62.67)
No	134	(37.33)
Information source		
Media	57	(15.88)
Colleague	34	(9.47)
Friends/ Relatives	46	(12.81)
Training	222	(61.84)
Others	0	(0.00)
How effective hand hygiene is in preventing HAIs		
Somewhat effective	11	(3.07)
Very effective	348	(96.93)
Disinfection can prevent HAIs		
Yes	268	(74.65)
No	91	(25.35)
Protective clothing can minimize HAIs		
Yes	222	(61.84)
No	137	(38.16)

Gloves can provide complete protection against acquiring / transmitting infection

Yes	181	(50.42)
No	178	(49.58)

There is a need to wash hands before doing procedures that do not involve bodily fluid

Yes	200	(55.71)
No	159	(44.29)

Knowledge of limit to filling safety boxes before closing and sealing

Yes	277	(77.16)
No	82	(22.84)

Knowledge of specific waste disposal buckets according to the level of their contamination

Yes	203	(56.55)
No	156	(43.45)

All equipment need decontamination before sterilization

Yes	188	(52.37)
No	171	(47.63)

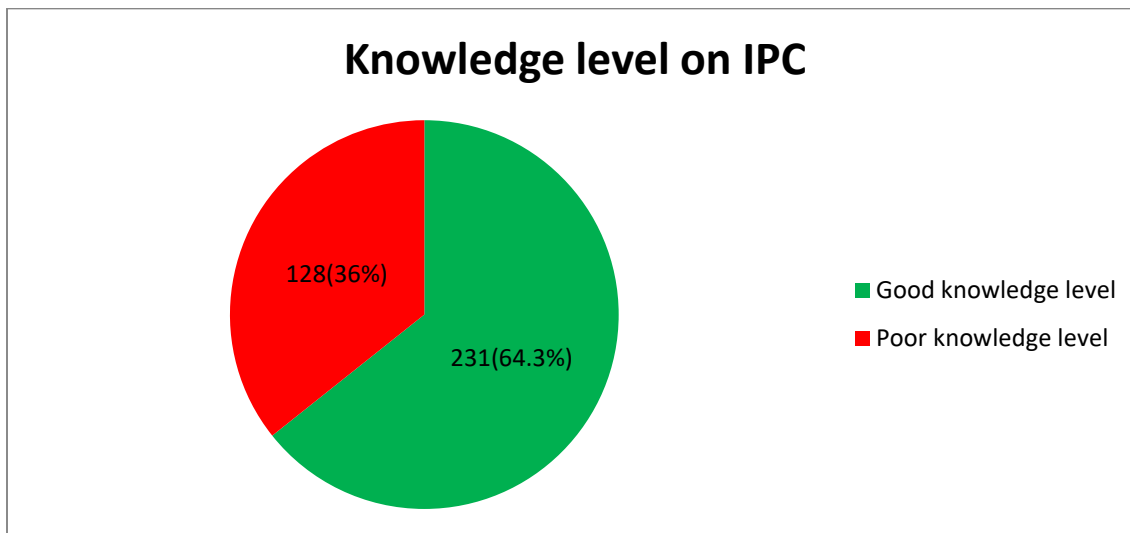


Fig. 1: Knowledge level on IPC among primary healthcare workers

Attitude of primary healthcare workers toward IPC

Findings on attitude of primary healthcare workers are presented in table 3. Most respondents, 239 (66.57%) strongly agreed that a new pair of gloves should always be used for each new patient visiting the facility, 243 (67.69%) strongly agreed that standard operation procedures decrease the risk of contamination, 175 (48.75%) agreed that vaccination decreases HAI. 167 (46.52%) agreed that prophylaxis decreases HAI. It was also noted that most, 228 (63.51%) respondents agreed that proper personal hygiene decreases risk of contamination, 273 (76.04%) strongly agreed to the assertion that overcrowding of the working area increases transmission of infection. 203 (56.55%) agreed that increased workload increases the risk of HAI, 187 (52.09%) agrees that a patient awareness about transmission of microorganisms can decrease the of HAI. 202 (56.27) respondents' hands should be washed with soap and running water after contact with patient, 284 (79.11%), strongly agreed that sharps should be discarded in a safety box. On the average, 317(88.3%) had positive attitude toward IPC while 42(11.7%) had negative attitude toward IPC as shown in Figure 2.

Table 3:
Attitude of primary healthcare workers toward IPC

Attitude towards IPC	Frequency (N=359)	Percentage (%)
A new pair of gloves should always be used for each new patient visiting the facility?		
Strongly Agreed	239	(66.57)
Agreed	89	(24.79)
Disagreed	22	(6.13)
Strongly disagreed	9	(2.51)
Standard operation procedures decrease the risk of contamination.		
Strongly Agreed	243	(67.69)
Agreed	87	(24.23)
Disagreed	20	(5.57)
Strongly disagreed	9	(2.51)
Vaccination decreases HAI		
Strongly Agreed	158	(44.01)
Agreed	175	(48.75)
Disagreed	22	(6.13)
Strongly disagreed	4	1.11)
Prophylaxis decreases HAI		
Strongly Agreed	110	(30.64)
Agreed	167	(46.52)
Disagreed	44	(12.26)
Strongly disagreed	38	(10.58)
Proper personal hygiene decreases risk of contamination		
Strongly disagreed	228	(63.51)
Agree	103	(28.69)
Disagreed	21	(5.85)
Strongly disagreed	7	(1.95)
Overcrowding of the working area increases transmission of infection		

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Strongly disagreed	273	(76.04)
Agree	78	(21.73)
Disagreed	6	(1.67)
Strongly disagreed	2	(0.56)
Increased workload increases the risk of HAI?		
Strongly disagreed	99	(27.58)
Agree	203	(56.55)
Disagreed	54	(15.04)
Strongly disagreed	3	(0.84)
A patient awareness about transmission of microorganisms decrease the of HAI?		
Strongly disagreed	78	21.73
Agree	187	52.09
Disagreed	71	19.78
Strongly disagreed	23	6.41
Hands should be washed with soap and running water after contact with patient?		
Strongly disagreed	202	56.27
Agree	109	30.36
Disagreed	36	10.03
Strongly disagreed	12	3.34
Sharps should be discarded in a safety box?		
Strongly disagreed	284	79.11
Agree	59	16.43
Disagreed	12	3.34
Strongly disagreed	4	1.11

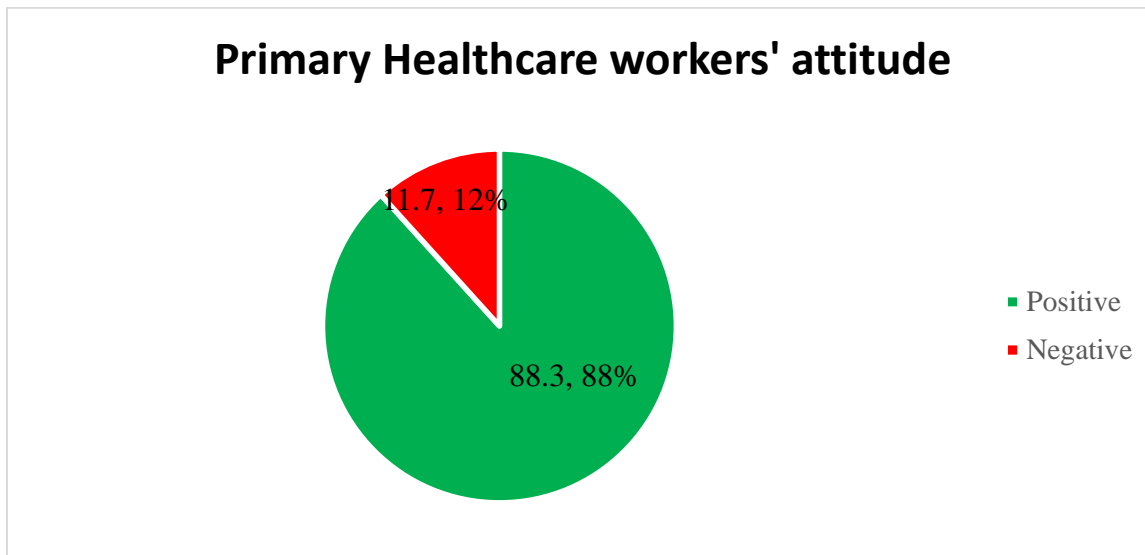


Fig. 2: Attitude of primary healthcare workers towards IPC

Perceptions of primary healthcare workers on IPC

Table 4 presents the results of the perceptions of primary healthcare workers regarding Infection prevention and control. Among the respondents, 288 (80.22%) think hand washing is proper before and after contacts with patient, 302 (84.12%) think that changing gloves while working with different patients reduce the risk of infection transmission, 299 (83.29%) think that direct contact with used needles can pose any risk on health care workers. 302 (84.12) agreed that cleaning the floor with antiseptic always can reduce the risk of infection transfer, 276 (76.88%) think that protective clothing minimize hospital acquired infections. On the average, 293(81.6%) of the respondents have good perception about IPC while 66(18.4%) have poor perception on IPC as shown in Figure 3.

Table 4**Perceptions of primary healthcare workers on IPC (N=359)**

Perceptions on IPC	Frequency (N = 359)	Percentage (%)
Do you think hand washing is proper before and after contacts with patient?		
Yes	288	(80.22)
No	71	(19.78)
Do you think that changing gloves while working with different patients reduce the risk of infection transmission?		
Yes	302	(84.12)
No	57	(15.88)
Do you think that direct contact with used needles can pose any risk on health care workers?		
Yes	299	(83.29)
No	60	(16.71)
Cleaning the floor with antiseptic always can reduce the risk of infection transfer?		
Yes	302	(84.12)
No	57	(15.88)
Do you think that protective clothing minimizes chances of acquiring nosocomial infections?		
Yes	276	(76.88)
No	83	(23.12)

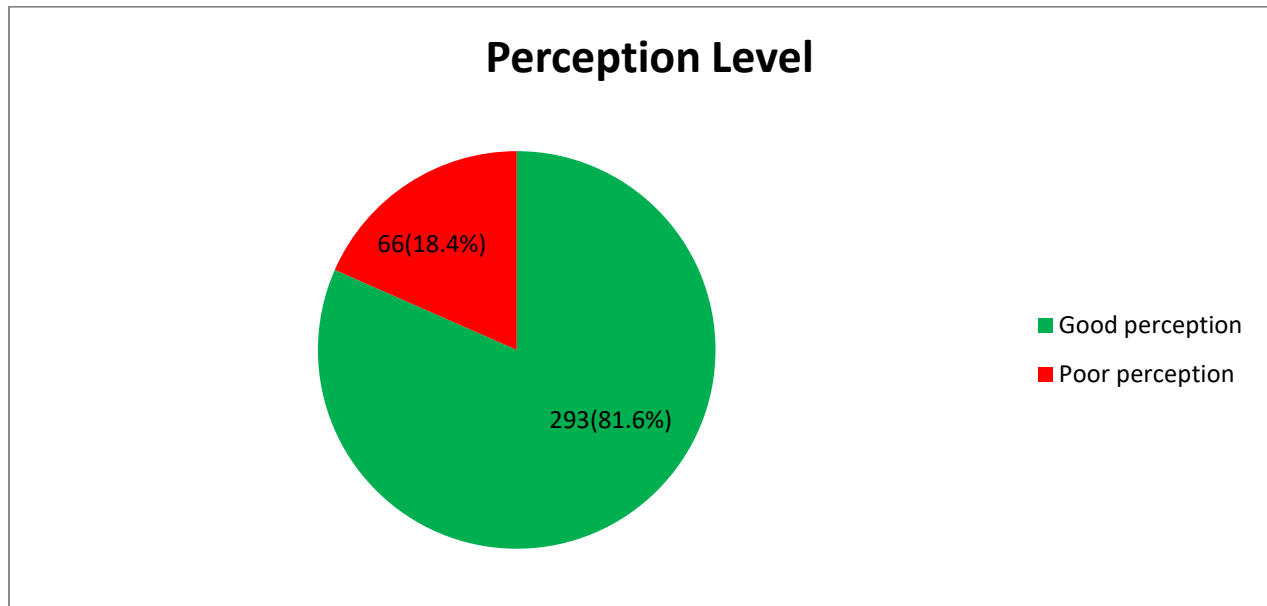


Fig. 3: Perception of primary healthcare workers on IPC

DISCUSSION

The present study revealed that more than half of the respondents had heard about infection prevention and control. Majority of the respondents heard of IPC through training, majority knew that; hand hygiene is highly effective in preventing HAIs, disinfection can prevent HAI, proper handling of working equipment can decrease the risk of contaminant, protective clothing can minimize HAI, gloves can provide complete protection against contracting or spreading infection, there is a need to wash hands before doing procedures that do not involve bodily fluid, to what levels safety boxes should be filled before closing and sealing, and specific waste disposal buckets according to their level of contamination. Generally, majority of the healthcare workers had good knowledge level on IPC. These findings are in contrast with the findings of Abuduxile et al.[5] who conducted a knowledge survey on health workers from a hospital in Northern Cyprus and reported a low level of knowledge regarding IPC among health workers. The present finding also contradicts the study by Alhumaid et al.[3] who reported that knowledge of IPC among nurses was generally average while knowledge level was low in tropical countries like Nigeria and high in the United States. The high level of knowledge observed in this study could be attributed to the training on IPC as indicated by the respondents' major source of information. It could also be attributed to the fact that majority had a tertiary level of education. Asfaw [13], reported that being more experienced and attending formal training showed a positive association with knowledge.

The present study shows that most primary healthcare workers had positive attitude towards IPC. Majority of the respondents strongly agreed that a new pair of gloves should always be used for each new patient visiting the facility, standard operation procedures decrease the risk of contamination and that sharps should be discarded in a safety box. Less than half of the respondents agreed that vaccination decreases HAIs, prophylaxis decreases HAIs. Majority also agreed that proper personal hygiene decreases risk of contamination, overcrowding of the working area increases transmission of infection, increased workload increases the risk of HAIs, a patient's awareness about transmission of microorganisms can decrease chances of HAIs, and that hands should be washed with soap and running water after contact with patient. These findings agree with the work of Sessa et al.[15], who reported an extremely positive attitude regarding disinfection procedures such as utility of guidelines and protocols among nurses in Italian hospitals.

It was observed in the present study that majority of primary healthcare workers have good perceptions towards IPC. Among them, majority think that: hand washing is proper before and after contacts with patient, changing gloves while working with different patients reduce the risk of infection transmission, direct contact with used needles can pose any risk on health care workers. cleaning the floor with antiseptic always can reduce the risk of infection transfer, and that protective clothing minimizes hospital acquired infections. The study also corroborates the findings of Refeai et al.[16], who reported positive perception of healthcare workers (HCWs) toward infection control measures. Lamin-Boima [19], also reported good perception of healthcare workers on IPC practices in two hospitals in Bo City. Majority of common HAIs are transmitted by healthcare workers, especially nurses, due to a lack of knowledge related to infection control. Knowledge of infection prevention and control (IPC) best practices among nurses is a prerequisite to maintaining standard precautions for the safety of patients and prevention of HAIs[20]

CONCLUSION

This study reveals that majority of the primary healthcare workers had good level of knowledge on IPC, their attitude and perceptions were equally favourable towards IPC. Policy makers and health facility leadership should provide regular training and retraining to further improve on knowledge of primary healthcare workers on infection prevention and control.

Consent for publication

All authors have approved this manuscript for publication

Conflict of Interest

The authors declare that there is no conflict of interest

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