

Knowledge and Practice of Injection Safety among Primary Healthcare Workers in Sokoto State, Nigeria

UMAngo,¹ MT Umar,² B Hali,³ MD Abdul-Aziz,¹ SS Yakubu,¹ ZH Ismail,¹ BA Musa,¹

¹Department of Community Health, Faculty of Clinical Sciences, Usmanu Danfodiyo University, Sokoto, Nigeria.

²Department of Pharmacology and Therapeutics, Faculty of Basic Clinical Sciences, Usmanu Danfodiyo University, Sokoto, Nigeria.

³Department of Medical Microbiology and Parasitology, Faculty of Basic Clinical Sciences, Usmanu Danfodiyo University, Sokoto, Nigeria

Abstract

Background:

Unsafe injection practices exposed patients and health care workers to the risk of injury and/or infection with blood-borne diseases such as HIV, Hepatitis B and C viruses and also put the community at risk. These exposures constitute serious challenges in the health care setting as they are common causes of illnesses and mortality among health care workers and hospitalized patients. This study aimed to determine the knowledge and practice of injection safety and associated factors among health care workers of primary health care facilities in Sokoto State, Nigeria.

Materials and Methods:

A cross-sectional study was conducted from May to August, 2018, among 300 health care workers of primary health care facilities in Sokoto metropolis selected by multistage sampling technique. A set of pretested, semi-structured self-administered questionnaire was used to collect data on the research variables. Data was analyzed using IBM[®] SPSS version 20, statistical package.

Results:

The mean age of the respondents was 33.1±8.6 SD and majority of them 120(40%) were aged 20-29 years. Greater proportion 117(39.0%) of the respondents were nurses and Midwives, More than half of the respondents were males 164(54.7 %). Most 238(79.3%) of them had ≤ 10 years duration of service. The proportions of respondents with good knowledge and practice of injection safety were 161(53.7%) and 151(50.3%) respectively. The commonest unsafe injection practices among the respondents were recap of needles 225(75 %), non-use of gloves 194(64.7%), not checking expiry date 253(84.3 %), re-use needle and syringe 50(16.7%) and not observing hand washing 152(50.7%). Factors found to be associated with unsafe injection practices among the respondents were unavailability of safety boxes, lack of disposable gloves, inadequate materials for hand washing and lack of dedicated waste disposal sites at health facilities.

Conclusion and Recommendation:

Averagely, the respondents have demonstrated good knowledge and practice of injection safety. Even though majority of them reported to have attended training on injection safety, continuous training of HCWs and provision of adequate materials for injection safety practice by facility management is highly recommended.

Key words: Knowledge, Practice, Injection Safety, PHC Workers.

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I. Introduction:

According to the World Health Organization (WHO), a safe injection is one that does not harm the recipient, or expose the healthcare workers (HCWs) to any avoidable risks, and does not result in any waste that is dangerous to the community.¹ It has been estimated that, at least 50% of the world's injections administered each year are unsafe, particularly in developing countries, and the majority of curative injections have been judged to be unnecessary, ineffective or inappropriate.²

According to estimates from the 2003 Global Burden of Disease Study, unsafe injections are responsible every year worldwide for about 21 million, 2 million and 260,000 new cases of new hepatitis B viral (HBV), hepatitis C viral (HCV) and Human immunodeficiency viral (HIV) infections respectively.³ In the year 2000, WHO reported that reuse of injection devices in developing countries accounts for about 22 million, 2 million and 260,000 cases of HBV, HCV and HIV infections respectively.³

Additionally, injection safety baseline studies revealed that unsafe injection practices expose patients, HCWs and the community to transmission of HIV and other blood borne infections.⁴ Unsafe injection practices are common in developing countries including Nigeria, and worldwide up to 40% of injections are given with used syringes and needles and in some countries this proportion is as high as 70%. These practices cause an estimated 1.3 million deaths each year worldwide, a loss of 26 million years of life primarily due to the transmission of blood-borne viruses such as hepatitis B and C and HIV with an annual burden amounting to approximately US\$ 535 million in direct medical costs.^{5, 6, 7}

Sometimes, 9 out of 10 patients presenting to a primary healthcare provider receive an injection, over 70% of which are unnecessary or could be given orally.^{8, 9} This is often because patients believe that injections are stronger and faster in healing disease conditions than other routes of drugs administration and in some instances, doctors in response to the patient's immediate need, over prescribe injections despite other available options.^{10, 11} This could predispose the recipients and HCWs to blood borne infections such as HBV, HCV, and HIV among others.^{12, 13}

In developed countries health care workers have been shown to have an improved Knowledge and Practice of injection safety and hospital waste management over the decade and their consistent practices of injection safety have been shown in several studies to provide protection in the health care settings.^{14, 15} On the contrary, the knowledge and compliance to safe injection practices in Nigeria is still suboptimal.^{16, 17} Furthermore, the incidence of Blood borne infections is on the increased and hospital workers are in the increased risk because of their continuous contact with patients in the course of carrying out their duties.^{18, 19}

Studies conducted in some parts of Nigeria, revealed an average level of knowledge as well as practice of injection safety among the respondents.^{20, 21} This study therefore aimed to determine the Knowledge and Practice of injection safety among the healthcare workers of primary healthcare facilities in Sokoto metropolis.

II. Materials and Methods

This cross-sectional study was carried out among primary healthcare workers in Sokoto metropolis, Sokoto state, Nigeria, from May to August, 2018. All primary healthcare providers in public health facilities in the metropolitan Local Government Areas (LGAs) were considered eligible for enrollment into the study. The sample size was estimated at 300 using the Cochran formula for calculating the sample size for the descriptive studies,²² a 79.8% prevalence of health workers with good practice on injection safety from the previous study,²³ and a precision level of 5% were used, and an anticipated response rate was considered at 95 %.

The eligible participants were selected by multi-stage sampling technique. At first stage three local governments out of five local government areas in Sokoto metropolis were selected by simple random sampling technique using balloting procedure. At the second stage, six primary health care facilities from each of the 3 selected local governments were selected by simple random sampling technique using balloting procedure. And at the third stage, eligible study subjects were selected (in direct proportion to the number of staff in the respective health facilities) by systematic sampling technique using the staff list in the respective health facilities to constitute the sampling frame.

A semi-structured, self-administered questionnaire was used to obtain information on respondent's Socio-demographic characteristics, as well as Knowledge and Practice of injection safety. The questionnaire was reviewed by senior researchers in the department to ascertain content validity. It was then pretested on 15 healthcare providers in Kalambaina Primary Health care Centre, Sokoto-South LGA of Sokoto State, Nigeria. Some questions were rephrased for clarity based on the observations made during the pretesting. Four 500 level medical students and four medical records staff assisted in questionnaire administration after pre-training on conduct of survey research, the study objectives, and questionnaire administration. Ethical clearance was obtained from the Ethical committee of State Ministry of Health, Sokoto, Nigeria. Permission to conduct the study was sought from the administration of the selected LGAs, while written informed consent was obtained from the participants before data collection.

Respondents' knowledge of injection safety was scored and graded on a 12-point scale; one mark was awarded for a correct response, while a wrong response or a non-response received no mark. This gives a minimum score of '0' and a maximum score of '12' marks. Those that scored equal or greater than 50% of the maximum knowledge score (i.e., ≥ 6 of 12 marks) were considered as having 'good' knowledge, while those that scored less than 50% of the maximum knowledge score (i.e., < 6 of 12 marks) were graded as having 'poor' knowledge. Respondents' practice of injection safety was scored and graded on an 8-point scale. One mark was awarded for a correct response, while a wrong response or a non-response received no mark. This gives a minimum score of '0' and a maximum score of '8' marks. Those that scored equal to or greater than 50% of the maximum practice score (i.e., ≥ 4 of 8 marks) were considered as having 'good' practice, while those that scored less than 50% of the maximum practice score (i.e., < 4 of 8 marks) were graded as having 'poor' practice.

Data was analyzed using the IBM®SPSS Statistical Package version 20.

Frequency runs were done for further editing and cleansing of the e-data. Frequency distribution tables were constructed; and cross tabulations were done to examine relationship between categorical variables. Chi-square and Fisher's exact tests were used to test for relationship between categorical variables. All levels of significance were considered at $p \leq 0.05$.

III. Results:

Socio-demographic characteristics of the respondents.

The ages of the respondents range between 20-59 years with a mean age of 33.1 ± 8.6 SD. Majority 120(40%) of them were between 20-29 years. More than half of the respondents were males 164 (54.7 %). Nurses and midwives constituted the highest number of cadre among the study participants 117(39.0%) while Doctors, Community Health Extension Workers, Community Health Officers, Laboratory Technicians and others were 3(1.0%), 89(29.7%), 23(7.6%), 56(18.7%) and 12(4.0%) respectively. Greater proportion 238(79.3%) of the respondents had ≤ 10 years duration of service (Table 1).

Knowledge on injection safety among the respondents

All the respondents have heard about injection safety. Up to 225 (75%) of them knew WHO definition of injection safety. About 82 (27.3%) of the study participants do not consider reused of needle and syringe on another patient as unsafe injection measure. High proportion of the respondents (87.0%) knew that hand washing before and after injection is an injection safety measure and majority 261 (87.7%) of the respondents stated that use of hand gloves before administration of injection is an injection safety practice. Greater percentage (83.7%) of the study participants knew that sterilization is an injection safety measure and can reduce the risk of infections transmission. More than half 155 (51.7%) of the respondents stated that recapping needle is an unsafe injection safety measure. Up to 267 (89.0%) and 196 (65.3%) of the respondents knew that discarding used syringes/needles and swab respectively into the safety box after injection is an injection safety measure. Majority of the study participants 214 (71.3%), 234 (71.3%), and 202 (67.3%) knew that HIV, HBV and HCV infections respectively could be transmitted through unsafe injection practice (Table 2).

Association between cadre, duration of service and the knowledge of the respondents

Whereas, there was no association ($p > 0.05$) between knowledge of injection safety and respondents' duration of service, it was found to be associated with cadre of the respondents. The proportion (100%) of Doctors with good knowledge was statistically significantly higher as compared to other cadres, $\chi^2=21.300$, $P=0.001$ (Table 3).

Practice of injection safety among respondents

Majority 276 (92.0%) of the respondents attended training on injection safety. More than half 152 (50.7 %) of the study participants do not always wash their hands before administering injections, reasons were due to lack of constant running water 72 (47.4 %), and unavailability of soap 80 (52.6 %). Greater proportion of the respondents 194 (64.7 %) do not wear hand gloves during injections administration, reasons were due to inconvenience 110 (56.7 %) and the disposable gloves were not always provided 84 (43.3%).

Majority of the respondents 269(89.7%) clean the injection site with swab before injection, however, non-regular supply of the swab 25 (80.6 %) and feelings that it is not necessary 6 (19.4 %) were the reasons for not cleaning injection site among the respondents. Up to 250(83.3%) of the respondents do not reuse needle and syringe on another patient. Reason for the re-use of needle and syringe was shortage of needles and syringes in the health care centers 40(80 %). Majority 225(75.0%) of the respondents do not recap needles after injection while only 47 (15.7%) of the study participants check expiry date before injection is given and majority 246 (82.0%) of the respondents give injection to recipient only when absolutely indicated. However, demand 94 (62.5%), pressure and assumption 50 (37.5%) from the patients that injection is better than oral medication were reasons for administering the injections. Most of the respondents 284(94.7%) reported to disposed sharp objects into safety boxes, whereas inadequate safety boxes 16(15.3%) was stated as a reason for inappropriate disposal of sharp objects. Methods of disposal mentioned by the respondents at their various health facilities were burn and buried 218(72.6%), local incineration 67(22.3%) and 15(5.1%) of them were practicing open dumping.(Table 4).

Association between cadre, duration of service and knowledge with practice of injection safety

Whereas, there was no association ($p > 0.05$) between practice of injection safety with respondents' knowledge and duration of service, it was found to be associated with cadre of the respondents. The proportion (15.7%) of Community Health Extension Workers with good practice was statistically significantly higher as compared to other cadres $P=0.047$ (Table 5).

IV. Figures and Tables

Table 1: Socio-demographic characteristics of the respondents

Variable	Frequency (%) n=300
Age group (years)	
20-29	120(40)
30-39	117(39)
40-49	50(16.7)
≥50	13(4.3)
Mean33.1 ±8.6SD	
Sex	
Male	164(54.7)
Female	136(45.3)
Cadre	
Doctors	3(1.00)
Nurses and Midwives	117(39.0)
CHEWs	89(29.7)
CHOs	23(7.7)
Laboratory Technicians	56(18.7)
Others	12(4.00)
Marital status	
Single	95(31.7)
Married	197(65.7)
Divorced	6(2.0)
Separated	2(0.7)
Duration of service	
≤ 10 years	238(79.3)
11-20 years	51(17.0)
>20years	11(3.7)

CHEWs: community health extension workers, CHO: community health officers

Table 2: Knowledge of injection safety among the respondents

Variable	Frequency (%) n=300
Have you heard about injection safety?	
Yes	300(100)
No	0 (0.00)
WHO definition of injection safety	
Yes	225(75.0)
No	51(17.0)
I do not know	24(8.0)
Reused of needle and syringe on another patient is not an injection safety measure	
Yes	185(61.7)
No	82(27.3)
I do not know	33(11.0)
Is hand washing before and after injection an injection safety measure?	
Yes	261(87.0)
No	17(5.7)
I do not know	22(7.3)
Use of hand gloves before administration of injection is an injection safety measure.	
Yes	263(87.7)
No	22(7.3)
I do not know	15(5.0)
Do you know that Sterilization of needles and syringes is an injection safety measure and can reduce the risk of transmission of infections	
Yes	251(83.7)
No	29(9.7)
I do not know	20(6.7)
Recapping of needle by hand is an injection safety measure.	
Yes	114(38.0)
No	155(51.7)
I do not know	31(10.3)
Discarding needles and syringes into the safety box after injection is an injection safety measure.	
Yes	267(89.0)
No	23(7.7)

I do not know	10(3.3)
Discarding used swab into the safety box after injection is an injection safety measure	
Yes	196(65.3)
No	87(29.0)
I do not know	17(5.7)
HIV infection can be transmitted through unsafe injection measures.	
Yes	214(32)
No	44(43)
I do not know	42(32)
HBV infection can be transmitted through unsafe injection measures.	
Yes	234(78.0)
No	39(13.0)
I do not know	27(9.0)
HCV infection can be transmitted through unsafe injection measures.	
Yes	202(67.3)
No	76(25.3)
I do not know	22(7.3)

Table 3 Association between cadre, duration of service and the knowledge of the respondents

Variable	Good knowledge n (%)	Poor knowledge n (%)	Test of significance
Overall Cadre	161(53.7)	139(46.3)	
Doctors	3(100)	0(0.0)	
Nurses /Midwives	57(56.4)	44(43.6)	
CHO	21 (47.8)	12(52.2)	$\chi^2=21.300$
CHEWs	58 (65.2)	31(34.8)	p=0.001
Lab. Technicians	17 (30.4)	39(69.6)	
Others	5 (38.5)	13(61.5)	
Duration of Service			
≤ 10	112(50.7)	109(49.3)	$\chi^2=3.027$
11-20	42(61.8)	26(38.2)	p=0.220
>20	7(63.6)	4(36.4)	

CHEWs: community health extension workers, CHO: community health officers

Table 4: Practice of injection safety among the respondents.

Variable	n (%)
Have you attended training on injection safety?	
Yes	276(92.0)
No	24 (8.0)
Washing hands before administration of injection	
Yes	152(50.7)
No	148(49.3)
Reasons for not washing hands before administration of injection	
Lack of constant running water	72(47.4)
Soap not always provided	80(52.6)
Wearing of hands gloves before administering injection	
Yes	106(35.3)
No	194(64.7)
Reasons for not wearing the hand gloves	
Due to inconvenience	110(56.7)
Hand gloves not always available	84(43.3)
Do you always clean injection site with swab prior to injection administration?	
Yes	269(89.7)
No	31(10.3)
Reasons for non-cleaning the injection site prior to injection administration	
Swab not always available	25(80.6)
Feeling it is not important	06(19.4)
Do you reuse needle and syringe on another patient.	
Yes	50(16.7)
No	250(83.3)
Reasons for reuse of needle and syringe	
Shortage of needles and syringes	40(80.0)
Patients not able to afford new needles and syringes	10(14.0)
Do you recap needle after injection administration?	
Yes	225(75.0)
No	75(25.0)
Do you check for the expiration date prior to administration of injection?	
Yes	47(15.7)

No	253(84.3)
Do you dispose sharp objects into safety box?	
Yes	284(94.7)
No	16(5.3)
Inadequate safety boxes was reason for inappropriate disposal of sharp objects	
	16(5.3)
Methods of waste and sharp objects disposal	
Burn and buried	218(72.7)
Local incineration	67(22.3)
Open dumping	15(5.0)
Do you give injection only when there is an indication?	
Yes	246(82.0)
No	54(18.0)

Table 5: Association between cadre, duration of service and knowledge with practice of injection safety among the respondents.

Variable	Good practice n(%)	Poor practice n(%)	Test-statistics p-value
Overall Cadre	151(50.3)	149(49.7)	
Doctors	0(0.0)	3(100)	
Nurses/ Midwives	7(6.0)	110(94.0)	
CHOs	0(0.0)	23(100)	Fisher's Exact
CHEWs	14(15.7)	75(84.3)	P=0.047
Lab. Technicians	2(3.6)	54(96.4)	
Others	1(8.4)	11(91.6)	
Knowledge			
Good	15(9.3)	146(90.7)	$\chi^2=0.819$
Poor	19(12.7)	130(87.2)	p=0.401
Duration of service			
≤10	38(16.0)	200(84.0)	$\chi^2=2.824$ Fisher's Exact
11-20	3(5.9)	48(94.1)	P=0.233
>20	0(0)	11(100)	

CHEWs: community health extension workers, CHO: community health officers

V. Discussion

This study assessed important information regarding knowledge and practice of health care workers about injection safety in health care facilities in Sokoto metropolis. Injection safety measures are paramount in reducing the risk of transmission of blood borne infections to the patients, the health care personnel as well as the community.

In this study majority of respondents 237 (79%) were between the ages of 20 and 39, the preponderance of young ages among the respondents could be due to the fact that over two-third of them 238 (79.3%) were newly recruited and have spent between 1-10 years in service. This finding is similar to a study in India where most of the respondents were between the ages of 20 and 35 years,²⁴ but differs from a study conducted in Calabar where larger proportion (52.9%) of the respondents were between 40 and 50 years.²¹ In the current study, males constitute high proportion 164 (54.7%), this observation is in agreement with a study done in Benue State Teaching Hospital where majority of the respondents were predominantly males (56.7%),²³ but, it is in variance to studies done in Calabar and Kaduna states, Nigeria and in India where female respondents constituted (66.7%), (97.9%) and (89.5%) respectively.^{20,21,24} The findings of the studies in Calabar, Nigeria and in India were not surprising because the studies were conducted among nurses professional in which females are usually predominant.

This study observed nurses to have higher proportion (39.0%) compared to other cadres. This finding is comparable to studies done in Benue and in Imo states, Nigeria, where nurses constituted (53.9%) and (62.8%) of the respondents respectively.^{23,25} Most 238 (79.3%) of the respondents had a duration of service of ≤10 years, this is in keeping with a study carried out by Allaqband, et al, in India where majority (74.4%) of the respondents had a duration of service between 1-10 years,²⁶ it is also closely similar to a study in Ethiopia where majority of the respondents had working experience of 5-10 years (55.4%).²⁶ But it differs from studies in Calabar, and Ilorin, Nigeria, where (66.9%) and (57.4%) respectively of the respondents had over 10 years duration of service.^{21, 28}

Even though overwhelming majority 276 (92%) of the respondents attended training on injection safety, good knowledge on injection safety recorded in this study was little above average (53.7%), therefore, their attendance on training of injection safety does not reflect maximally on their knowledge on the subject matter. This finding is in consonance with the findings of the studies in Kaduna state, and in Cross river state, Nigeria, which reported (54.3%) and (59.7%) respectively as good knowledge of injection safety among the respondents.^{20,21} The average (53.7%) good knowledge level recorded in this study was slightly lower when

compared to studies in Benue (70.2%),²³ Benin (96.6%),³⁵ Maharashtra, India (91.4%)²⁹ and in Vietnam (82.6%).³⁵ This study differs from studies conducted in Ethiopia among the medical students and among staff nurses in India where the good knowledge levels among the respondents were reported to be (37.9%) and (41.3%) respectively.^{30,31}

In the current study over two-third 225 (75.0%) of the respondents knew WHO definition of injection safety, this is closely related to studies in Kaduna and in India in which (65.2 %) and (65.8%) respectively were recorded as the percentages of the respondents who knew the WHO recommended definition of injection safety.^{20,26} Vast majority 261 (87.0%) of the respondents knew that hand washing should be observed during the injection procedure and greater proportion (87.7%) of the respondents knew that wearing of gloves during injection is a safety measure, these results are closely similar to studies in Imo state, Nigeria and India where (94.8%) and (100%) respectively of the respondents knew that wearing gloves is a safe injection measure.^{25,32} However, these findings are in contrast from another study in India by Bhargo et al, where only (33.4%) of the respondents knew that wearing gloves during injection procedure is a safety measure.³³ More than half 155 (51.7%) of the respondents knew that recapping needle is an unsafe injection measure, this finding is similar to a study conducted by Naiket et al, in India where (65.0%) of the respondents knew that needle should not be recapped after giving injection.³² About two-third 188 (61.7%) of the study participants knew that syringe and needle should not be re-used, this is in variance with a study by Allaqband et al, in India where only (45.4%) of the respondents knew that syringes should not be re-used.²⁶ Majority of the respondent 214 (71.3 %), 234 (78.0 %) and 202 (67.3 %) knew that HIV, HBV and HCV infections respectively can be transmitted through unsafe injection. This is comparable to a number of studies done in: Kaduna, where majority (65.9 %) of the respondents knew that HIV, HBV and HCV can be transmitted by unsafe injection practices,²⁰ Benue (98.6 %), (87.9 %) and (71.6 %) of the study participants knew that HIV, HBV and HCV, infections respectively could be acquired as a result of unsafe injection practices,²³ Surat City, India, (90.0 %), (80.0 %) and (30.0 %) of the participants knew that hospital staff can acquire HIV/AIDS, Hepatitis B and Hepatitis C infections respectively through unsafe injection practices³² and in Maharashtra, India which reported that (91.4%) of the respondents had good knowledge of HIV, hepatitis B and C viral infections transmission through unsafe injection.²⁹ However, these results differ from another study in India by Bhargo et al, where only (33.4%) of the health care providers knew about blood borne infections that can be acquired by faulty injection practices.³³

In this study an overwhelming majority 276 (92.0%) of the respondents reported to have attended training on injection safety measure, but only (50.1%) had good injection safety practice. This observation is comparable with the findings of a number of studies carried out by Onyemocho et al, in Kaduna, and Gulilat and Tiruneh, in India, where good practices of injection safety among the respondents were reported to be (50.4%) and (54.2%) respectively,^{20,27} However, higher percentages of good practice were obtained from other studies done in Cross river (66.0%),²¹ Benue (79.4%)²³ and Edo states (94.7%),³⁶ Nigeria.

Less than half 147 (49.0%) of the respondents practice hand washing when observing injection procedure. This finding is in consonance to the findings of studies in Benue and Maharashtra, India where (46.8%) and (48.5%) of the respondents respectively observed hand washing during injection.^{23,29} However, this finding differs from studies in Ethiopia and Ilorin where only (20%) and (13.5%) of the respondents respectively practice hand washing before and after injection administration.^{27,28} With regard to the wearing of hand gloves when administering injection, less than half 106 (35.3 %) of the respondents practice this safe injection measure, and this is well compared to a study by Naik et al, in India where (35.0%) of the respondents were reported to wear glove during injection,³² this observation differs from a study by Rohini et al, where only (18.6%) of the respondents wear protective gloves while giving injection.²⁹ However, higher values were obtained in studies in Benue and Imo states, (93.6%) and (92.2%) respectively.^{23,25} In this study, Majority 225 (75.0%) of the respondents recapped needle after injection, this practice put the health care providers at risk of injury and/or acquiring infection. This finding agrees with the studies in Bahir, Dar City, Ethiopia, Ilorin, Kwara State Nigeria and Tikur Anbessa Specialist hospital Addis Ababa, Ethiopia, where majority of the respondents (75.5%), (70.0%), and (50%) respectively recapped needle after injection, However, studies in Kaduna and Benue states, Nigeria reported (19.5%) and (19.1%) respectively of the respondents who recapped needles after injection.^{20,23} In the current study only 47 (15.7) checked expiry date before injection is given. The implication of this finding is that majority of the patients were put at risk of the danger of expired injection. This finding is contrary to some studies where much higher figure in compliance with the checking expiry date were obtained (100%) and (40%).^{32,33}

Most 284 (94.7%) of the respondents discard sharp objects into safety boxes, and therefore this reduces the risk of injury and/or acquiring infection by the health care worker and/or patients. This observation is similar to studies in Benue and Ilorin, Kwara States, Nigeria where (93.6%) and (95.2%) of the respondents make use of the safety boxes for immediate collection of used needles and syringe.^{23,28}

Over two-third 210 (70.0%) of the respondents reported to have dedicated disposal sites at their various health facilities, (72.6%) of them used burn and bury while (22.3%) of them used local incineration for final

disposal of used needles, and only (5.1%) of the respondents were engaged in open dumping method of disposal. The barriers to compliance with good injection safety practice as documented in this study include: unavailability of regular running water and other materials for hand washing, Inadequacy of safety boxes, disposable gloves, syringes and needles and lack of dedicated waste disposal sites. Similar findings were also reported in studies conducted in Kaduna and Kwara States, Nigeria.^{20, 28}

This study demonstrated significant statistical association between cadre of the respondents and the level of knowledge, with doctors having the highest knowledge level (100%), $\chi^2=21.300$, $p=0.001$, this compares well with the study in Kaduna where the knowledge level of doctors was reported to be (75.0%), $\chi^2=24.350$, p value= 0.001.²⁰ The current study also observed significant statistical association between cadre and good practice of safe injection measure, with CHEWs having higher proportion of good practice of safe injection measure (15.7%), p value= 0.04.

VI. Conclusion and Recommendation

Although, knowledge and practice of Injection safety were averagely good in this study, some faulty practices that were not in compliance with injection safety measure were observed among the respondents. The barriers to compliance with good injection safety practice were unavailability of regular running water and other materials for hand washing, Inadequacy of safety boxes, disposable gloves, syringes and needles and lack of dedicated waste disposal sites. The government and other stakeholders should do more to ensure regular training of HCWs on injection safety and the adequate supply of injection safety materials in the health care facilities across the State.

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