International Journal of TROPICAL DISEASE & Health
16(4): 1-13, 2016, Article no.IJTDH.26390
ISSN: 2278–1005, NLM ID: 101632866

SCIENCEDOMAIN *international*
www.sciencedomain.org

Safety Precaution; Knowledge, Attitude, Practice and Sociodemographic Determinants among Health Care Workers at Primary Health Care Level in Enugu State, Nigeria

Elias Chikee Aniwada[1*] and Chika Onwasigwe[1]

[1]Department of Community Medicine, College of Medicine, University of Nigeria, Enugu Campus, Nigeria.

Authors' contributions

This work was carried out in collaboration between both authors. Author ECA did the study design and wrote the protocol. Authors ECA and CO did the statistical analysis and literature searches while analyses of study were by author ECA. Both authors read and approved the final manuscript.

Article Information

DOI: 10.9734/IJTDH/2016/26390
Editor(s):
(1) Thomas I Nathaniel, Department of Biomedical Sciences, School of Medicine –Greenville, University of South Carolina, Greenville, USA.
Reviewers:
(1) S.A. Olowookere, Obafemi Awolowo University, Ile-Ife, Nigeria.
(2) Julius Ojulong, University of Namibia, Namibia.
Complete Peer review History: http://sciencedomain.org/review-history/14567

Original Research Article

Received 14th April 2016
Accepted 2nd May 2016
Published 11th May 2016

ABSTRACT

Aim: This aims to explore the knowledge, attitude, practice and sociodemographic determinants of Safety Precaution (SP) among Health Care Workers (HCWs) at Primary Health Care level.
Study Design: Descriptive cross sectional study.
Place and Duration of Study: Selected Primary Health Care Centres in Enugu state, Nigeria, between April and June 2013.
Methodology: Health Care Workers eligible for voluntary participation were selected and studied using pre-tested, semi-structured, interviewer administered questionnaire. Multistage sampling technique was used. Level of significance was at $p \leq 0.05$
Results: It was based on 435 Health Care Workers. Their mean age was 38.14±9.03. Majority were females 281(64.6%), had tertiary education 313(72.0%) and Community Health Extension Workers (CHEW) 125(28.7%) Mean knowledge of concept, components of, correct time to wash

**Corresponding author: Email: eaniwada@gmail.com;*

their hands, conditions requiring SP was above average (>50%). They equally had positive attitude and good practice of SP.(>50%). Over 50% were vaccinated against Hepatitis B virus. Sex (χ^2 =7.81, p = 0.005), cadre of HCWs (χ^2 11.62, p= 0.040) and marital status (χ^2= 17.895, p=0.001) showed significant association with their knowledge. Educational level (χ^2 30.11, p = 0.013) and cadre (χ^2 88.25, p =0.002) showed significant association with their mean attitude of SP. No variable showed significant associations with mean practice of SP. Doctors were about 2.6 times (AOR 95% CI; 1.72-3.97) to have good knowledge, about 5.8 times (AOR 95% CI; 3.70-9.02) to have positive attitude and about 2.3 times (AOR 95% CI; 1.37-3.71) to have good practice than ward maids or cleaners.

Conclusion: Knowledge attitude and practice on safety precaution were good among health care workers. High formal education may not guarantee correct knowledge of safety precaution. Being a doctor is a predictor of correct knowledge, positive attitude and good practice of safety precaution.

Keywords: safety precaution; knowledge; attitude; practice; health care workers.

1. INTRODUCTION

Occupational exposure to blood and body fluids is a serious concern for health care workers and presents a major risk for the transmission of infections such as Human Immunodeficiency Virus (HIV), Hepatitis B Virus (HBV), Hepatitis C Virus (HCV) [1-3]. Health Care Workers (HCWs) working in hospitals frequently provide care to patients whose HBV, HCV or HIV status are unknown [4]. Identification of patients infected with blood-borne pathogens cannot be reliably made through medical history and physical examination, and it is not feasible or cost-effective to test all patients for all pathogens prior to providing care. Recognizing these as well as threats it poses, the U.S. Centers for Disease Control and Prevention (CDC) proposed a series of procedures for preventing occupational exposures and for handling potentially infectious materials such as blood and body fluids [2,3]. These procedures, known as Standard Precautions (SPs), advise health care workers (HCWs) to practice regular personal hygiene; use protective barriers such as gloves and gown whenever there is possibility of contact with mucous membranes, blood and body fluids of patients; and dispose of sharps, body fluids, and other clinical wastes properly. The principle is that it assumes every patient is infected with blood-borne pathogens, and ensuring that HCWs minimise the risk of exposure to infected body fluids [5].

These measures are important, as it is estimated that the attributable fractions for percutaneous occupational exposure are 37% for hepatitis B, 39% for hepatitis C and 4.4% for HIV [6]. The WHO equally estimates that 40-60% of hepatitis B virus (HBV) and hepatitis C virus (HCV) and 2.5% of HIV infections in HCWs are occupationally acquired. Studies has shown that 89.1% of the HCWs were routinely in contact with body fluids and blood at work and 82.5% reported ever having an accidental splash with body fluids, with blood being the reported fluid in 69.3% and urine in 50.0% of cases. Needle pricks occurred in 59.8% of cases while medication vials were responsible for 22.2% [4,6].

Apart from the risk of exposure to blood borne pathogens (BBP), HCWs are also at high risk of Needle Stick Injury (NSI) [7]. Globally, injection is one of the most common health care procedures and they are often abused. The safe handling and disposal of needles and other sharp instruments forms part of an overall strategy of clinical waste disposal to protect staff, patients and visitors from exposure to blood borne pathogens [8]. Wearing gloves as a protective barrier can reduce the incidence of contamination of the hands but it cannot prevent penetrating injuries caused by needles or other sharp instruments. Recapping, disassembly, and inappropriate disposal increase the risk of NSI [9].

Decision regarding the level of precautions to use will depend on the nature of the procedure and not on the actual or assumed serological status of the patients. It is not safe to take precautions only with people from so-called “high-risk groups” because many infected people may not even be from the high-risk groups. The practice of SPs is not without criticism. Some patients advocate that use of standard precautions is potentially stigmatizing as it tends to label patients as contaminated and thus bad. Some identified factors responsible for poor compliance with SPs were lack of knowledge, lack of time, forgetfulness, lack of means,

negative influence of the equipment on care-giving, uncomfortable equipment, skin irritation, lack of display of universal precautions guideline, insufficient water supply, patient perceived to be at low risk of blood borne pathogens and universal precautions interfering with technical skills [10-12].

Despite government concerted effort to implement guidelines for risk reduction including those on safe injection practices, hospital waste management, standard precautions, the number of occupational exposures to blood borne pathogens and injection injuries remain unacceptably high [13]. Acceptance and implementation of SPs by HCWs have been selective and not as "universal" as the CDC intended that it should be [13].

The adoption of primary health care in Nigeria has led to the expansion of health care delivery frontiers especially at the rural level. This level is the most critical health services delivery point, with an attendant increase in contact between primary health care providers and patients. There is, however, a simultaneous increase in exposure to occupational and related health risks and hazards in these centers [14].

This study would explore the knowledge, attitude and practice as well as sociodemographic determinants of SPs among HCWs at PHC level. It will strive to add to evidence base to commit limited health resources to safety of both HCWs and patients at large.

2. MATERIALS AND METHODS

2.1 Setting

The study was carried out in selected Primary Health Care Centres (PHCC) in Enugu state. Enugu state is located in the southeast geopolitical zone of Nigeria. Politically the state is divided into three senatorial zones and seventeen Local Government Areas (LGAs). It has a total population of 4,881,500 people within a total area of 7618 sq. km [15]. The inhabitants are predominantly of Igbo ethnicity and Christians. The major occupation includes farming, trading and civil/public servants. The state operates district health system and based on this the state is divided into seven health districts for purpose of healthcare delivery. These are Awgu, Udi, Enugu Ezike, Nsukka, Enugu Metropolis, Isi – Uzo and Agbani. Each health district is made up of at least two to three LGAs and has a range of public health facilities including a district hospital and PHCC. The total number of health facilities available is one thousand and ninety (1090), [464 public; 626 private and mission] [16].

2.2 Study Design

The study was a descriptive cross-sectional study using interviewer administered questionnaire.

2.3 Study Participants

All HCWs involved directly in handling of patients, specimens, waste, living or death tissues were studied.

2.4 Sample Size Determination

This was determined using minimum sample size formula for descriptive study in population > 10,000 (adding power component). The proportion that practice standard precaution in the target population was taken as 64%, from studies in different parts of the country [17-19]. Attrition rate of 10% was added. A total of 435 HCWs were studied.

2.5 Sampling Technique

The multistage sampling technique was used. *Stage 1*; Two out of three senatorial zones (Enugu North, Enugu East and Enugu West) in the state were selected. *Stage 2;* two health districts (Nsukka and Awgu), one from each zone (Enugu North and Enugu West) were selected. Both selections were by simple random sampling using balloting. *Stage 3*; the PHCs from selected districts were all studied. There are seventy and eighty four PHCs in Awgu and Nsukka respectively. The whole health workers that meet the inclusion criteria were interviewed.

2.6 Study Instruments

Questionnaires: pre-tested, semi-structured (both open ended and closed), interviewer administered questionnaire. This was used to obtain data on socio-demographic variables, knowledge, attitude and practice of SPs. The questionnaire was validated by pretesting it in another PHCC in the third senatorial zone not selected for study.

2.7 Data Analysis

Data was analyzed using Statistical Packages for Social Sciences (SPSS) version 18. Chi square test and logistic regression were used to compare attributes on knowledge, attitude and practices of SP as well as associations between socio-demographic variables and means of knowledge, attitude and practice of SP among the health workers. Significance level was at $p \leq 0.05$. Grading used for knowledge, attitude and practice was; <50 poor and ≥50 good. There were 21 knowledge questions, 5 attitude questions and 7 practice questions with correct answers coded as 1. These scores were recoded into 2 categories of < ½ as poor; ½ and above as good.

2.8 Ethical Consideration

Ethical clearance was sought from the Health Research and Ethical Committee of University of Nigeria Teaching Hospital, Ituku-Ozalla. Permission was also sought from the LGAs Health Authority and the heads of various PHCs. Verbal informed consent was obtained from the HCWs during which their cooperation were sought. Confidentiality was assured and maintained.

3. RESULTS

Table 1 showed the socio-demographic characteristics of HCWs. Majority (45.3%) of the workers were aged 31 to 40 years with mean of 38.14±9.03. They were mainly females 281 (64.6%), had tertiary education 313(72.0%), married and lived with spouse 276(63.4%). Most of the healthcare workers were Senior or Junior Community Health Extension Workers {SCHEW/ JCHEW} 125(28.7%) and about 9(2.1%) were doctors. Over 55% of them have worked for ≤10 years.

Table 2 shows the knowledge on SP by HCWs. They had good knowledge (≥50%) of concepts of SP and potential ways of occupational exposure to pathogens including; washing hands before and after contact with patient 256(58.9), aseptic technique for safe injection 229(52.6%), needle stick or sharp injuries 267(61.4%) and touching patients 231(53.1%) but poor knowledge of consideration of patient placement position as a concept of SP 186(42.8%). Equally they had good knowledge of correct time to wash their hands. For conditions requiring SP; 382(87.8%) considered blood borne pathogens, 228(52.4%) all patients while 206 (47.4%) considered saliva in dental procedures. Two hundred and forty one (54.7%) knew that PEP is done for only HIV negative test, 270(55.9%) knew that 2 or 3 drugs are given within 72 hours of exposure while 247(54.5%) were aware of guideline for PEP. Mean knowledge score was 20.50±6.84

Table 3 shows the attitude of the HCWs to SP. The healthcare workers were positive in believes that; they will not be infected in caring for patients with infection 240(55.2%), it is their professional duty to care for infected patients 253(58.2%), and that they need vaccination as HCWs 265(60.9%). Mean attitude score was 2.78±1.37.

Table 4 shows the practice of SP by HCWs. They had good practice of hand washing 261(60.0%), wearing gloves 243(55.9%) and using mask 230(52.9%) but poor practice of wearing apron 206(47.4%). Main reasons for poor practice were non availability of the items and not willing or forgetfulness. Two hundred and sixty five (60.9%) HWs handle needles appropriately (including not recapping needles, not manipulating or bending needles, not passing needles between workers) and 238 (54.7%) discard used sharps and needles appropriately (covered puncture proof container not just any container or general waste bin). One hundred and seventy seven (40.7%) have PEP practice while 173(39.8%) had a designated staff for PEP in their facility. Mean practice score was 3.72±1.52.

Table 5 shows practice of vaccination against Hepatitis B virus (HBV). Two hundred and forty eight (57.0%) were vaccinated. More workers received two doses 93(37.5%). Reason for non-vaccination was their not being aware of vaccination, 92 (49.2%) and non-availability of the vaccines 95(50.8).

Table 6 shows association between HCWs socio-demographic characteristics and mean knowledge of SP. Sex (χ^2 =7.81, p = 0.005), cadre of HCWs (χ^2 11.62, p= 0.040) and marital status (χ^2= 17.895, p=0.001) showed a statistically significant association with their knowledge of SP. Females were about 1.2 times more likely to have correct knowledge than males. (AOR 95% CI; 0.92-1.61). Doctors were about 2.6 times (AOR 95% CI; 1.72-3.97), Nurses about 1.4 times (AOR 95% CI; 0.84-2.23) and CHO/CHEWs about 1.6 times (AOR 95% CI; 0.69-3.52) more likely to

have correct knowledge than ward maids or cleaners. Those that are single were about 5.6 times (AOR 95% CI; 0.04-0.93) less likely to have correct knowledge than those married and living with spouse.

Table 7 showed association between HCWs socio-demographic characteristics and mean attitude of SP. Educational level (χ^2 30.11, p = 0.013) and cadre (χ^2 88.25, p =0.002) showed a statistically significant association with their mean attitude of SP. Those that had secondary education were about 1.2 times (AOR 95% CI; 0.53-2.58) and tertiary education about 1.4 times (AOR 95% CI; 0.66-2.87) more likely to have positive attitude than those without formal education. Doctors were about 5.8 times (AOR 95% CI; 3.70-9.02), Nurses about 3.8 times (AOR 95% CI; 1.64-8.99), CHO/CHEWs about 2.8 times (AOR 95% CI; 1.70-4.66), more likely to have positive attitude than ward maids or cleaners. Those that are single were about 1.3 times (AOR 95% CI; 0.75-2.32) more likely to have positive attitude than those married and living with spouse.

Table 8 showed association between HCWs socio-demographic characteristics and mean practice of SP. No variable showed significant association with their mean practice of SP. Those that had secondary education were about 1.3 times (AOR 95% CI; 0.58-3.13) and tertiary education about 1.7 times (AOR 95% CI; 0.80-3.52) more likely to have good practice than those without formal education. Doctors were about 2.3 times (AOR 95% CI; 1.37-3.71), Nurses about 5.4 times (AOR 95% CI; 1.94-14.95) and CHO/CHEWs about 1.2 times (AOR 95% CI; 0.82-1.86) more likely to have good practice of SP than ward maids or cleaners.

Table 1. Socio-demographic characteristics of HCWs

Socio-demographic characteristics	N=435	
	Freq	**Percent**
Age in categories (years)		
<30	90	20.7
31-40	197	45.3
41-50	105	24.1
>50	43	9.9
Mean ± SD	**38.14±9.03**	
Sex		
Male	154	35.4
Female	281	64.6
Educational level		
Primary and below	55	12.6
Secondary	67	15.4
Tertiary	313	72.0
Cadre		
CHEW/CHO	125	28.7
Nurse	89	5.1
Cleaners/ward maid	74	15.4
Doctor	9	2.1
Others*	138	31.7
Marital status		
Married with spouse	276	63.4
Single	93	21.4
Others	66	15.2
Years of practice		
≤10	240	55.2
11-20	146	33.6
>20	49	11.3
Median	10.0	10.0

**Environmental Health Officer, Laboratory technicians, CHO and nursing students on posting etc*

Table 2. Knowledge of HCWs on standard precaution

Variables	n = 435	
	Freq	Percent
Concepts of standard precaution		
Hand washing before and after contact with patient	256	58.9
Potential for transmission in patient placement decisions	186	42.8
Covering of mouths/noses when coughing or sneezing	241	55.4
Safe injection practices eg use of aseptic technique	229	52.6
Wearing PPE eg gloves, apron,	247	56.8
Safe handling of needles and sharps	236	54.3
Potential ways of occupational exposure to pathogens		
Needle stick /sharp injury	267	61.4
Splash on the eye	228	52.4
Inhalation	245	56.3
Touching patients	231	53.1
When hand washing should be performed		
Before and after contact with patients	239	54.9
Between patients' contact	243	55.9
Immediately after removing gloves	240	55.2
After touching body fluids eg blood,	242	55.6
Conditions requiring SP		
Blood borne pathogen eg HIV, HBV	382	87.8
Patients coughing	224	51.5
Patients with skin infections	256	58.9
Vaginal fluid	236	54.3
Blood tinged body fluids	256	58.9
Saliva in dental procedures	206	47.4
All patients	228	52.4
HIV post exposure prophylaxis		
HCT is done only to HIV negative test result	241	54.7
2 or 3 ARVs are given within 72 hours of exposure	270	55.9
ARV is taken for 4 weeks	239	56.1
Awareness of guideline for PEP management	247	54.5
	Mean	Std. Deviation
Knowledge score	*20.50*	*6.84*

Table 3. Attitude of HCWs on safety precautions

Variables	n = 435			
	Positive		Negative*	
	Freq	Percent	Freq	Percent
You may not be infected when caring for patient	240	55.2	195	44.8
You have professional duty to care for infected patients	253	58.2	182	41.8
Infected patients are entitled to the same care as any other patients	228	52.4	207	47.6
Your knowledge of SPs affect your attitude towards infected patients	224	51.5	211	48.5
You need vaccination as HCW	265	60.9	170	39.1
	Mean		Std. Deviation	
Attitude score	2.78		1.37	

Positive – Strongly agree, Agree Negative- strongly disagree, disagree, Neutral

Table 4. Practice of HCWs on standard precaution

	N = 435	
	Good	**Poor**
	Freq(%)	**Freq(%)**
Wash hands with soap and water after any direct contact with patients	261(60.0)	174(40.0)
Reason for poor practice	**n=174**	
Non availability of washing materials	74(42.5)	
Not Aware	50(28.7)	
Not willing/forget	50(28.7)	
Wear gloves for contact with body fluids, non-intact skin etc	243(55.9)	192(44.1)
Reason for poor practice	**n=192**	
Not Available	97(50.3)	
Not Aware	33(17.1)	
Not willing/forget	62(32.6)	
Wear gown/ apron for procedures likely to splash blood/ body fluid	206(47.4)	229(52.6)
Reasons for poor practice	**n=229**	
Not Available	84(36.7)	
Not Aware	73(31.9)	
Not willing/forget	72(31.4)	
Wear mask/goggle for procedure likely to splash blood/ body fluid	230(52.9)	205(47.1)
Reasons for poor practice	**n=205**	
Not Available	77(37.6)	
Not Aware	63(30.7)	
Not willing/forget	65(31.7)	
Cover all cuts and abrasions with a water proof dressing	244(56.1)	191(43.9)
Ways of handling of used needles		
Appropriate	265(60.9)	
Inappropriate	170(39.1)	
Means of discarding used needles and sharps		
Appropriate	238(54.7)	
Inappropriate	197(45.3)	
	Yes	**No**
Post Exposure Prophylaxis(PEP)		
Availability of PEP in facilities	177(40.7)	258(59.3)
Focal person designation for PEP in facilities	173(39.8)	262(60.2)
	Mean	Std. Deviation
Practice score	*3.72*	*1.52*

Table 5. Baseline practice of vaccination against Hepatitis B virus (HBV)

	Freq(%)	**Freq(%)**
	Yes	**No**
HCWs vaccinated against HBV	248(57.0)	187(43.0)
Doses of vaccine received	n=248	
Once	84(33.9)	
Twice	93(37.5)	
Three times	71(28.6)	
Reasons for non-vaccination	n=187	
Not aware	92(49.2)	
Not available	95(50.8)	

Table 6. Association between socio-demographic variables of HCWs and mean knowledge of SP

Socio-demographic characteristics	n = 435		χ^2 test	p value	AOR	95% C.I. for AOR	
	Good	Poor				Lower	Upper
	n (%)	n (%)					
Age in categories							
<30	44(48.9)	46(51.1)					
31-40	127(64.5)	70(35.5)	6.77	0.080	NA	NA	NA
41-50	61(58.1)	44(41.9)					
>50	23(53.5)	20(46.5)					
Sex							
Male	104(67.5)	50(32.5)	7.81	0.005	1.22	0.92	1.61
Female	151(53.7)	130(46.3)					
Educational level							
Primary and below	28(50.9)	27(49.1)					
Secondary	40(59.7)	27(40.3)	4.39	0.222	NA	NA	NA
Tertiary	187(59.7)	126(40.3)					
Cadre							
Cleaner/ward maid	37(50.0)	37(50.0)					
Doctor	6(66.7)	3(33.3)			2.61	1.72	3.97
Nurse	63(70.8)	26(29.2)	11.62	0.040	1.37	0.84	2.23
CHEW/CHO	72(57.6)	53(42.4)			1.56	0.69	3.52
Others	77(55.8)	61(44.2)			0.75	0.39	1.45
Marital status							
Married with spouse	163(59.1)	113(40.9)					
Single	44(47.3)	49(52.7)	17.90	0.001	0.18	0.04	0.93
Others	48(72.7)	18(27.3)			0.26	0.05	1.26
Years of practice							
≤10	137(57.1)	103(42.9)					
11-20	86(58.9)	60(41.1)	1.14	0.565	NA	NA	NA
>20	32(65.3)	17(34.7)					

Table 7. Association between socio-demographic variables of HCWs and mean attitude to SP

Socio-demographic characteristics	n = 435		χ^2 test	p value	AOR	95% C.I. for AOR	
	Good	Poor				Lower	Upper
	n (%)	n (%)					
Age in categories							
<30	40(44.4)	50(55.6)					
31-40	116(58.9)	81(41.1)	15.92	0.354	NA	NA	NA
41-50	76(72.4)	29(27.6)					
>50	27(62.8)	16(37.2)					
Sex							
Male	93(60.4)	61(39.6)	0.07	0.609	NA	NA	NA
Female	166(59.1)	115(40.9)					
Educational level							
Primary and below	15(27.3)	40(72.7)					
Secondary	38(56.7)	29(43.3)	30.11	0.013	1.17	0.53	2.58
Tertiary	206(65.8)	107(34.2)			1.38	0.66	2.87
Cadre							
Cleaner/ward maid	17(23.0)	57(77.0)					
Doctor	8(88.9)	1(11.1)			5.78	3.70	9.02
Nurse	51(57.3)	38(42.7)	88.25	0.002	3.84	1.64	8.99
CHEW/CHO	72(57.6)	53(42.4)			2.82	1.70	4.66
Others	111(80.4)	27(19.6)			0.84	0.42	1.69

Socio-demographic characteristics	n = 435		χ^2 test	p value	AOR	95% C.I. for AOR	
	Good	Poor				Lower	Upper
	n (%)	n (%)					
Marital status							
Married with spouse	173(62.7)	103(37.3)					
Single	42(45.2)	51(54.8)	15.86	0.149	1.32	0.75	2.32
Others	44(66.7)	22(33.3)			1.73	0.56	5.34
Years of practice							
≤10	132(55.0)	108(45.0)					
11-20	96(65.8)	50(34.2)	4.68	0.469	NA	NA	NA
>20	31(63.3)	18(36.7)					

Table 8. Association between socio-demographic variables of HCWs and mean practice of SP

Socio-demographic characteristics	n = 435		χ^2 test	p value	AOR	95% C.I. for AOR	
	Good	Poor				Lower	Upper
	n(%)	n (%)					
Age in categories							
<30	41(45.6)	49(54.4)					
31-40	107(54.3)	90(45.7)	6.87	0.710	NA	NA	NA
41-50	66(62.9)	39(37.1)					
>50	20(52.8)	23(47.2)					
Sex							
Male	77(50.0)	77(50.0)	1.38	0.486	NA	NA	NA
Female	124(44.1)	157(55.9)					
Educational level							
Primary and below	34(61.8)	21(38.2)					
Secondary	24(35.8)	43(64.2)	12.56	0.186	1.34	0.58	3.13
Tertiary	176(56.2)	137(43.8)			1.68	0.80	3.52
Cadre							
Cleaner/ward maid	35(47.3)	39(52.7)					
Doctor	5(55.6)	4(44.4)			2.26	1.37	3.71
Nurse	34(38.2)	55(61.8)	22.98	0.069	5.38	1.94	14.95
CHEW/CHO	69(55.2)	56(44.8)			1.23	0.82	1.86
Others	91(65.9)	47(34.1)			1.05	0.55	1.97
Marital status							
Married with spouse	144(52.2)	132(47.8)					
Single	48(51.6)	45(48.4)	8.29	0.791	NA	NA	NA
Others	42(63.6)	24(36.4)					
Years of practice							
≤10	138(57.5)	102(42.5)					
11-20	76(52.1)	70(47.9)	4.82	0.203	NA	NA	NA
>20	20(40.8)	29(59.2)					

4. DISCUSSION

Majority of the workers being female was expected as majority of the workers were either CHEW, CHO, midwives or nurses. This can be ascribed to nature of the specialty as even though there are male nurses and CHEWs their number is usually small compared to the females. Midwifery is meant for the females only and in CHEW/CHO training most are females. Moreover Midwives Service Scheme introduced in the country to improve skilled care attendant situation contributed to the skewed gender distribution. Over two thirds of the workers had tertiary education. The literacy level among the HCWs was very high and this reflected on their good knowledge, attitude and practice of SP.

From this study, the workers' mean knowledge of concept and components of SP was above average. This is expected as even though they are working in rural areas, most of them had tertiary education and is expected that must have been taught or read about SP at a stage in course of their studying. This finding is comparable to that from similar studies locally

and internationally. A study in India on occupational exposure to HIV and practices of universal safety precautions among resident doctors had similar finding where 56.9% residents' doctors correctly knew about universal precaution [20]. However the finding contrast that from studies at Benin Nigeria among nurses where the nurses had a poor knowledge about universal precautions as only 34.2% of nurses had heard about universal precautions [18]. Similar studies in Mazandaran Province among HCWs and medical students and another in Kabul, Pakistan on occupational injury history and universal precautions, revealed a low understanding of precautions across all hospitals and cadres [21,22]. Knowledge of universal precautions measures was high 97.0% for doctors and 92.0% for nurses in a study done in Anambra State South East Nigeria [17]. Study on needle stick injuries among healthcare workers in Lahore, Pakistan had similar finding with the study as about 50 per cent HCWs knew about the need for and availability of PEP services in the hospital [23]. This was higher than the figures in a study in India with 31.6% [24].

This study shows that these healthcare workers had above average positive attitude as it concerns belief that they will not be infected in caring for patients with infection, they have professional duty to care for infected patients, infected patients are entitled to the same care as any other patients, their knowledge of UPs affected their attitude towards infected patients control and that they need vaccination as HCWs. This finding suggests that when the healthcare workers acquire the right knowledge, they are likely going to have the right attitude to it also and ultimately impact positively on practice or uptake of SP.

Health care workers had generally good practice of SP including good hand washing practice, wearing of PPE, handling of needles and sharps appropriately including not recapping needles, not manipulating or bending needles, not passing needle between workers and discarding of used sharps and needles appropriately in a covered puncture-proof container, not just any container or general waste bin. Most of HCWs cover their cuts, abrasion or cuts in carrying out their activities always. In studies carried out in Mazandaran Province among HCWs and medical students and another in Kabul, Pakistan, good practices were reported regarding hand-washing, disposal of needles, and glove, mask and gown usage [21]. In Nigeria, while a study in southern Nigeria among house officers and nurses practice was better for the nurses, 75.0%, compared to the doctors, 15.2%, $p < 0.05$ [17]. That in Benin among nurses showed poor observance of universal precautions [18].

The major reasons from the study for poor practice of SP were non availability of water and PPE and not willing to wash hand or use PPE or forgetfulness. This is most likely can be explained by poor funding of health sector as observed in the nation. A similar study on needle stick and sharps injuries among health care workers at public tertiary hospitals in an urban community in Mongolia identified that the most frequent reason for not adhering to universal precautions was that they did not think that universal precautions were important [25]. Another study in Nigeria identified lack of provision of adequate protective equipments as the most important factor influencing universal precautions practice [18]. Other reasons from studies for non-compliance includes inability to use PPE during emergencies, overwork and busy schedules [23,26]. The practice of recapping needles after use was still prevalent among HCWs (66.3%), with 59 percent using both hands. Some HCWs from similar studies also revealed that they bent the needles before discarding (11.4%) [24]. These are in contrast to current guideline which states that all used disposable needles/sharps shall be discarded immediately after use without recapping into an approved sharps container, a non-reusable plastic container that is puncture resistant, leak proof on the sides and bottom, properly labeled and closable.

Most facilities do not have PEP practice in their facility nor designated staff for PEP in their facility. This may be due to inequity in distribution of health care activities as most donor agencies and government sponsoring HIV/AIDS concentrate in urban areas to meet the required target or simply to obtain data. The implication is that those occupational exposures to blood borne pathogens will contribute to rising prevalence of diseases like HIV and HBV. This finding agrees with report in national injection safety forum report that post exposure prophylaxis to abort HIV infection after needle stick injuries was not offered to injured providers 43/46 (93.5%) at the time of the above-mentioned survey [27].

Fifty seven percent were vaccinated for HBV. The number of doses of the vaccine received was distributed such that more workers received

two doses Reasons for non-vaccination were mainly non availability. This is expected as there was improvement in their awareness about need for the vaccine. In a study in Pakistan on Hepatitis B vaccination among health care workers, only 49% health care workers and 42.20% medical students were vaccinated. The main reasons for non-vaccination (47.7%) among health care workers were the high cost of vaccination [28]. In Nigerian studies, only 26.8% of operating room personnel were vaccinated against HBV and their primary reason for not being vaccinated or for defaulting from vaccination was lack of time [29] while in Benin city 20.0% of the health care workers had received three doses of the hepatitis-B vaccine, 48.6% received either two doses or a single dose, and 31.4% were not vaccinated [30]. The major barriers reported among the respondents who were not vaccinated were lack of opportunity and the fear of side effects of the vaccines [30]. Other studies reported 53.8% among healthcare workers in a tertiary hospital in southwest Nigeria and equally 48.1% was reported among dental practitioners [31,32].

Though sex, cadre and marital status showed a statistically significant association with the knowledge, cadre especially being a doctor was the identified predictor of good knowledge of SP. Doctors, nurses and CHO/CHEWs, having more correct knowledge of SP than ward maids or cleaners was not surprising as their level of exposure and training was by far more. They are more educated and likely to have attended more seminars, workshops and updates. The higher proportion of knowledge for doctors shown in the study is supported by another study in Malaysia where a large proportion of doctors showed good occupational safety and health knowledge compared to other categories of healthcare workers, with the administrative staff scoring the poorest marks [33]. The significant association with marital status is a surprise as they had a fairly uniform distribution of educational exposure unless it is due to the fact that the HCWs came from different training backgrounds and grew up in different environments.

The associations of educational level and cadre with positive attitude to SP are expected due to fact that both contribute to varying level of exposure and knowledge. Likewise cadre especially being a doctor was the identified predictor of positive attitude to SP. Though no variable was significantly associated with good practice, being a doctor was the identified predictor of good practice to SP. The finding that doctors had better knowledge and attitude than nurses but poorer practice (as shown by AOR), is likely due to the peculiar nature of women as most nurses are females. They are also more careful and meticulous. Pressure of work is more on doctors than nurses especially in emergencies which may make doctors forget about SP. Worthy of note in this study is that formal education may not guarantee good knowledge of SPs. Similar studies had similar findings; practice was better for the nurses, 75.0%, compared to the doctors, 15.2%, $p < 0.05$ [33]. A larger proportion of doctors showed good occupational and safety health knowledge compared to other categories of healthcare workers, with the administrative staff scoring the poorest marks [33].

5. CONCLUSION

The knowledge, attitude and practice of SP by the healthcare workers were good as on average they had over fifty percent correct knowledge, positive attitude and good practice of SP. Sex, cadre and marital status had statistically significant association with their knowledge. Educational level and cadre had statistically significant association with their attitude to SP. No variable was significantly associated with good practice. Educational level not being associated with knowledge suggests that high formal education may not guarantee correct knowledge of SP and even if it does, it does not translate to positive practice of SP as doctors had better knowledge than nurses but poorer practice. The identified predictor of correct knowledge, positive attitude and good practice of SP was being a doctor.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Joint International Labour Organisation/ World Health Organization guidelines on health services organization and HIV/AIDS. Geneva, Switzerland: International Labor Organization and World Health Organization; 2005. Available:http://www.who.int/hiv/ [Accessed 22 Jan 2016]
2. The world health report: reducing risks, promoting healthy life. Geneva,

Switzerland:World Health Organization; 2002.
Available:http://www.who.int/whr
[Accessed 22 Jan 2016]

3. Hutin Y, Hauri A, Chiarello L, Catlin M, Stilwell B, et al. Best infection control practices for intradermal, subcutaneous, and intramuscular needle injections. Bulletin of the World Health Organization. 2003;491–500.
4. Molinari JA. Infection control: Its evolution to the current standard precautions. Journal of the American Dental Association. 2003;569–574.
5. Universal precautions for prevention of transmission of HIV and other blood borne infections. Centre for Disease Control; 1996.
Available:http://www.cdc.gov/
[Accessed 22 Jan 2016]
6. Rapiti E, Hutin Y. Assessing the burden of disease from sharps injuries to healthcare workers at national and local levels. Environmental Burden of Disease Series, No 11Geneva: World Health Organization. 2005;11.
Available:http://www.who.int/hiv/
[Accessed Jan 2016]
7. National Institute of Occupational Safety and Health. Preventing needle stick injuries in health care settings. Washington, DC: Department of Health and Human Services; 1999.
Available:http://www.cdc.gov/niosh
[Accessed Jan 2016]
8. Last JM. Universal precautions. Encyclopedia of Public Health; 2002.
Available:Encyclopedia.com
[Accessed March 26, 2012]
9. National Audit Office. A safer place to work: Improving the management of health and safety risks to Staff in NHS Trusts. London: The Stationery Office; 2003.
10. Sax H, Perneger T, Hugonnet S, Herrault P, Chraiti MN, Pittet D. Knowledge of standard and isolation precautions in a large teaching hospital. Infect Control Hosp Epidemiol. 2005;26(3):298-304.
11. Oliveira AC, Cardoso CS, Mascarenhas D. Contact precautions in intensive care units: Facilitating and inhibiting factors for professionals' adherence. Rev Esc Enferm USP. 2010;44(1):161-165.
12. Sax H, Uckay I, Richet H, Allegranzi B, Pittet D. Determinants of good adherence to hand hygiene among healthcare workers who have extensive exposure to hand hygiene campaigns. Infect Control Hosp Epidemiol. 2007;28(11):1267-1274.
13. Gammon J, Morgan-Samuel H, Gould D. A review of the evidence for suboptimal compliance of healthcare practitioners to standard/universal infection control precautions. J Clin Nurs. 2008;17(2):157-167.
14. Isah HO, Sabitu K, Ibrahim MTO. Profile of institutional infrastructure for implementing universal precautions in primary health care facilities in Sokoto State, Nigeria: Implication for occupational safety. African Journal of Clinical and Experimental Microbiology. 2009;10(3):164-174.
15. National Population Commision. Population census; 2006.
Available:www.population.gov.ng
[Accessed Jan 18, 2016].
16. Department of Health Planning and Statistics, Enugu State ministry of Health.
17. Adinma ED, Ezeama C, Adinma JI, Asuzu MC. Knowledge and practice of universal precautions against blood borne pathogens amongst house officers and nurses in tertiary health institutions in Southeast Nigeria. Niger J Clin Pract. 2009;12(4):398-402.
18. Ofili AN, Asuzu MC, Okojie OH. Knowledge and practice of universal precautions among nurses in Central Hospital, Benin-City, Edo State, Nigeria. Nigerian Postgraduate Medical Journal. 2003;10(1):26-31.
19. Sadoh WE, Fawole AO, Sadoh AE, Oladimeji AO, Sotiloye OS. Practice of universal precautions among health care workers. Journal of the National Medical Association. 2006;98(5):722–6.
20. Gaidhane AM, Zahiruddin QS, Khatib N, Shrivastav T, Johrapurkar SR. Occupational exposure to HIV and practice of Universal safety precautions among resident doctors. The Internet Journal of Health. 2009;8:2.
21. Motamed N, BabaMahmoodi F, Khalilian A, Peykanheirati M, Nozari M. Knowledge and practices of health care workers and medical students towards universal precautions in hospitals in Mazandaran Province. Eastern Mediterranean Health Journal. 2006;12:5.
22. Salehi AS, Garner P. Occupational injury history and universal precautions awareness: A survey in Kabul hospital staff. BMC Infect Dis. 2010;10:19.

23. Chacko J, Isaac R. Percutaneous injuries among medical interns and their knowledge and practice of post-exposure prophylaxis for HIV. Indian J Public Health. 2007;51:127-9.
24. Muralidhar S, Singh PK, Jain RK, Malhotra M, Bala M. Needle stick injuries among health care workers in a tertiary care hospital of India. Indian J Med Res. 2010;131:405-410.
25. Kakizaki M, Ikeda N, Ali M, Enkhtuya B, Tsolmon M, Shibuya K, Kuroiwa C. Needlestick and sharps injuries among health care workers at public tertiary hospitals in an urban community in Mongolia. BMC Res Notes. 2011;1:184.
26. Kotwal A, Taneja DK. Health care workers and universal precautions: Perceptions and determinants of non-compliance. Indian J Community Med. 2010;35(4): 526–528.
27. Nigeria Federal Ministry of Health. National injection safety forum. Standard for Universal Precautions and Health Care Waste Management Practice. Abuja, Maxls. 2005;1-13.
28. Nasir K, Khan KA, Mohyuddin W, Salim SK, Hina KT Aziz, Sheikh S Ali A. Hepatitis B vaccination among health care workers and students of a medical college. Journal of Pakistan Medical Association. 2000;97:7.
29. Kesieme E, Uwakwe K, Irekpita E, Dongo A, Bwala KF, Alegbeleye BJ. Knowledge of hepatitis B vaccine among operating room personnel in Nigeria and their vaccination status hepatitis research and treatment. 2011;5.
    DOI: 10.1155/2011/157089
30. Azodo CC, Ehizele AO, ErhaborAnn P. Hepatitis-b vaccination status among dental surgeons in Benin City, Nigeria. Med Health Sci Res. 2012;2(1):24–28.
31. Rimkuviene J, Puriene A, Peciuliene V, Zaleckas L. Percutaneous injuries and hepatitis B vaccination among Lithuanian dentists. Stomatologija. 2011;13:2–7.
32. Utomi IL. Attitudes of Nigerian dentists towards hepatitis B vaccination and use of barrier techniques. West Afr J Med. 2005;24:223–6.
33. Lugah V, Ganesh B, Darus A, Retneswari M, Rosnawati MR, Sujatha D. Training of occupational safety and health: Knowledge among healthcare professionals in Malaysia. Singapore Med J. 2010;51(7): 586.

Peer-review history:
The peer review history for this paper can be accessed here:
http://sciencedomain.org/review-history/14567