

## Knowledge and Practice of Standard Precautions among Health Care Workers in a Secondary Facility in Southern Nigeria

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### Abstract

**Background:** Health care workers are at risk of acquiring infections from blood borne pathogens in healthcare settings.

**Objectives:** This study was carried out to assess the knowledge and practice of standard precautions (SP) among healthcare workers in a health facility in southern Nigeria.

**Methods:** This was a descriptive cross sectional study carried out among 150 health workers in Saint Luke's hospital, Uyo, Nigeria in April 2018. Respondents were selected using multistage sampling method. Data was collected with a semi-structured interviewer administered questionnaire and analyzed using Stata version 12. Level of significance was set at 0.05.

**Results:** Thirty six percent of the respondents were aged 30-39 years, 80.7% were females and 40% had worked for > 10 years. The mean knowledge and practice scores on a scale of 10 were 8.2±1.0 and 6.4±2.2 respectively. Poor practices reported included needle recapping 54%, faulty sharps disposal 13% and not being immunized against hepatitis B, 39.3%. Doctors were most likely (OR=8.87; p=0.03), while ward orderlies were least likely (OR=0.08; p=0.00) to have good practice of SP compared to nurses. Also, those who were trained on SP were more likely to have good practice than those who were not (OR=4.93; p=0.01). Overall, 18 (12%) of the respondents experienced sharps related injuries, while 13 (8.7%) had splashes in the previous year.

**Conclusion:** Several gaps were identified in the practice of SP among health workers. Regular training of all health workers who come in contact with body fluids is advocated to ensure optimum practices among them.

**Keywords:** Standard precautions; knowledge; practice; health workers; Nigeria.

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### 1. Background

Standard precautions, an expanded concept from universal precautions are a set of infection control practices used to prevent transmission of diseases that can be acquired by contact with blood, body fluids, non-intact skin and mucus membrane [1]. Such practices include hand hygiene, use of personal protective equipment (PPE), needle stick and sharps injury prevention, respiratory hygiene, proper disposal of sharps and other hospital wastes. These measures are used while providing care to all individuals, whether they appear infectious or not since standard precautions assume that the blood and body substances of all patients are potential sources of infection regardless of the diagnosis or presumed infectious status [2].

Health care facilities all over the world employ over 59 million workers who are exposed to a variety of health hazards, including exposure to blood and body fluid borne infections [3].

The attributable fractions for percutaneous occupational exposure for hepatitis B virus (HBV), hepatitis C virus (HCV), and human immune-deficiency virus (HIV) among health care workers all over the world are 37%, 39% and 4.4%, respectively [4]. Developing countries, which account for the highest prevalence of HIV in the world, also record the highest rate of needle-stick injuries [5]. Infection with HBV is 95% preventable with immunization but less than 20% of health workers in some regions of the world have received the 3 doses needed for immunity [2].

Despite the availability of detailed guidelines, the knowledge, attitude and practice of standard precautions among many health care workers are not optimal. A cross-sectional descriptive study involving the health workers in primary health centers in Enugu, Nigeria in 2014 showed that though, 77.2% of the respondents admitted to have heard of universal precautions, only 18% had adequate knowledge [6]. Even when the knowledge of standard precautions is high, poor practice has been recorded. In a study conducted in two tertiary hospitals in Nigeria in 2011/2012, though the overall median knowledge and attitude score was above 90%, the median practice score was only 50.8% [7].

In many resource-poor countries, most health care facilities do not provide adequate equipment and amenities for proper practice of standard precautions which adds a further constraint on the ability of health care workers (HCWs) to observe these practices. Other challenges preventing practice of standard precautions identified in studies included lack of regular training on infection control, busy work schedule and absence of workplace policy [7-9].

The practice of standard precautions reported in different studies showed varying levels among the different professional groups. Some have reported higher compliance among nurses than doctors [10,11], while a study in Uyo, Nigeria in 2008 showed highest compliance among doctors and the lowest among nurses [12].

Prevention remains the main control strategy against blood borne pathogens as there are no immunizations against most of them. Also with the increasing incidence of reemerging viral hemorrhagic diseases such as Ebola and Lassa fever disease in developing countries like Nigeria, it is imperative that health care workers adhere strictly to standard precaution practices while handling patients in order to prevent themselves from contracting these diseases. In the 2018 Lassa fever outbreak in Nigeria, as at 10th June 2018, 38 out of 437 confirmed cases recorded in 21 States of Nigeria were health workers [13].

With no record of any previous study conducted in the only secondary health facility in Uyo, this study was conducted to assess the knowledge and practice of different components of standard precautions among the healthcare workers in that setting.

## 2. Methodology

### 2.1 Study Area

This study was carried out in Saint Luke's hospital, Uyo, Akwa Ibom State, Nigeria in April 2018. The State is located in the South-South geopolitical zone with Uyo the capital of the State having a projected population of 413,381 in 2015.[14] The health institutions in Uyo consist of private, public, primary, secondary and tertiary health facilities.

Saint Luke's Hospital is a foremost missionary hospital established in 1937 and run by the Medical Missionary of Mary, a medical evangelism arm of the Catholic Church in Uyo, Akwa Ibom State, Nigeria. It is the only secondary health facility in Uyo and presently has 360 beds and 430 staff comprising of 150 nurses, 31 doctors, 4 qualified laboratory scientists, 2 physiotherapists and 48 orderlies.

### 2.2 Study Design

This study was a descriptive cross sectional study. It involved health workers in Saint Luke's hospital Anua, Uyo, Akwa Ibom State.

### 2.3 Study Population

The study was carried out among selected participants including doctors, nurses, laboratory scientists, and ward/clinic orderlies in Saint Luke's hospital Anua, Uyo, Akwa Ibom State.

### 2.4 Inclusion and exclusion criteria

Doctors, nurses, laboratory scientists and ward/clinic orderlies who willingly gave informed consent and had worked for up to 6 months were included in the study, while health care workers who refused to give consent, administrative staff, pharmacists, physiotherapists and newly employed staff were excluded from the study.

### 2.5 Sample size determination

To determine the minimum sample size for the study, the formula for single proportion was used with the  $p$  of 0.92 being the standard precaution practice score among health workers in a previous study [15]. With an assumed non response rate of 10%, a sample size of 118 was obtained. The sample size was however increased to 150.

### 2.6 Sampling technique

Stratified sampling method was used for the study. The first stage involved categorizing the health workers who were directly in contact with patients or their body fluids into their different professional groups. The required number of respondents from each stratum was then determined using proportionate allocation.

The calculated number of respondents was subsequently selected from each stratum by simple random sampling method. Where a selected individual was unavailable or declined to participate, the next person on the list was chosen.

### 2.7 Instrument of data collection

Data was collected using a semi structured interviewer-administered questionnaire adapted from previous studies on standard precautions [8,9]. The data was collected by five final year medical students during the three work shifts of the respondents for a period of three weeks. Information obtained included socio-demographic characteristics, level of knowledge and practice of standard precautions, factors influencing compliance, exposure of health care workers to occupational hazards and actions taken by healthcare workers when exposed to occupational

hazards. The questionnaire was pretested by administering it on 10% of the sample size (15 health workers) at a tertiary health facility 14 km from study location to ensure clarity and content validity.

### 2.8 Data management

The data collected was analyzed by the use of Stata version 12. Descriptive and inferential statistics were explored and presented as tables and a chart.

Knowledge and practice levels were calculated using 10 questions each. Scoring was 1 for correct answers and 0 for wrong answers. The maximum possible score was 10. The scores were graded as poor (0-3), Fair (4-6) and good (7-10) for knowledge; poor (0-5), and good (6-10) for practice. Cross tabulations were done for the different variables to determine any relationship and chi-square was used as the test for significance. The level of significance was set at 0.05.

### 2.9 Ethical considerations

Ethical clearance (UUTH/AD/S/96/VOL. XXI/169) was obtained from the Health Research Ethical Committee of the University of Uyo Teaching Hospital, Uyo, Nigeria. Also, participation in the study was completely voluntary and informed consent was obtained from all participants. They were also assured of strict confidentiality and their rights to withdraw from the study at any time they wished.

## 3. Results

A total of 150 questionnaires were administered and successfully retrieved. About a third (36%) of the respondents were aged 30-39 years, 121(80.7%) were

females and 40% had worked for more than 10 years. (Table 1)

**Table 1: Socio demographic characteristic of the respondents**

Characteristics	Frequency	Percentage
<b>Age (years)</b>		
Less than 30	40	26.6
30-39	54	36.0
40-49	28	18.7
50 and above	28	18.7
<b>Sex</b>		
Male	29	19.3
Female	121	80.7
<b>Education level</b>		
Completed primary	16	10.7
Completed secondary	15	10.0
Completed tertiary	119	79.3
<b>Marital status</b>		
Single	37	24.7
Currently married	97	64.7
Previously married	16	10.7
<b>Occupation</b>		
Doctor	20	13.3
Nurse	96	64.0
Lab scientist	3	2.0
Ward orderly	31	20.7
<b>Year of Practice</b>		
Less than 5	54	36.0
6-10	36	24.0
Above 10	60	40.0

The mean knowledge score was  $8.2 \pm 1.0$  out of 10. However, 93 (62%) of the respondents disagreed that standard precautions included covering of wound before contact with the patients, while about 20% did not agree that hepatitis B immunization was part of standard precautions. (Table 2)

**Table 2: Knowledge of standard precautions among respondents**

Variable	Frequency	Percentage
<b>Standard precaution include recommendation for both patients and Health workers</b>		
Agree	144	96.0
Disagree	6	4.0
<b>Standard precautions apply to all patients</b>		
Agree	142	94.7
Disagree	8	5.3
<b>Standard precautions apply to all body fluids</b>		
Agree	123	82.0
Disagree	27	18.0
<b>Standard precautions recommends the use of separate gloves for each patient</b>		
Agree	144	96.0
Disagree	6	4.0
<b>Standard precautions includes covering of wound before contact with the patients</b>		
Agree	57	38.0
Disagree	93	62.0
<b>Standard precaution practice includes immunization against Hepatitis B</b>		
Agree	121	80.7
Disagree	29	19.3
<b>The following are examples of PPE (correct answers only)</b>		
Gloves	145	96.7
Safety boots	136	90.7
Respirator	120	80.0
Safety eyewear	137	91.3
<b>Overall level of knowledge</b>		
Poor (0-3)	2	1.3
Fair (4-6)	7	4.7
Good (7-10)	141	94.0
Mean score (SD)	8.2 (1.0)	

The mean practice score of SP was 6.4 out of 10; 54% of respondents admitted always recapping needles, while 13% sometimes did not dispose sharps in hazard boxes. Only 54.7% always washed their hands before touching patients, while 39.3% were not immunized against hepatitis B. (Table 3)

**Table 3: Practice of standard precaution among the respondents**

Variable	Frequency N=150	Percentage
<b>Frequency of practice of standard precautions</b>		
Always	107	71.3
Occasionally	32	21.3
Only for blood borne diagnosis	10	6.7
Never	1	0.7
<b>Hepatitis B virus immunization</b>		
Yes	91	60.7
No	59	39.3
<b>Use of PPE during procedures with potential for blood splatter</b>		
Always	116	77.3
Sometimes	32	21.3
Never	2	1.4
<b>Change of PPE after contact with Hepatitis B or TB patient</b>		
Always	78	52.0
Sometimes	57	38.0
Never	15	10.0
<b>Hand wash before touching patients</b>		
Always	82	54.7
Sometimes	61	40.7
Never	7	4.7
<b>Hand wash after touching patients</b>		
Always	122	81.3
Sometimes	28	18.7
<b>Use of mask during exposure to respiratory aerosol</b>		
Always	106	70.7
Sometimes	41	27.3
Never	3	2.0
<b>Covering of open cuts during clinical work</b>		
Always	116	77.3
Sometimes	28	18.7
Never	6	4.0
<b>Recapping of needles after use</b>		
Always	81	54.0
Sometimes	48	32.0
Never	21	14.0
<b>Disposing sharps in hazard boxes</b>		
Always	127	84.7
Sometimes	20	13.3
Never	3	2.0
<b>Level of practice</b>		
Poor (0-5)	44	29.3
Good (6-10)	106	70.7
Mean score (SD)	6.4 (2.2)	

Eighteen (12.0%) of the respondents experienced sharps related injuries within the previous one year, out of which only 67.0% of them received post exposure prophylaxis. (Table 4)

**Table 4: Exposure of respondents to hazards**

Variable	Frequency N=150	Percentage
<b>Experience of occupational hazard in last 1 year</b>		
Yes	33	22.0
No	117	78.0
<b>Experienced sharps injury</b>		
Yes	18	12.0
No	15	88.0
<b>Received post exposure prophylaxis</b>		
Yes	12	67.0
No	6	33.3

At bivariate analysis, the practice of SP was associated with profession, years of employment, availability of guidelines and PPE, training on SP and encouragement by senior colleagues ( $p < 0.05$ ). Practice increased with level of knowledge but the relationship was not statistically significant (Fisher's test = 0.37). (Table 5)

**Table 5: Factors associated with practice of standard precautions among the respondents**

	Practice of SP n (%)		Statistical indices
	Poor (n=44)	Good (n=106)	
<b>Profession</b>			
Doctor	2 (10.0)	18 (90.0)	$\chi^2=50.45$ p value= 0.00*
Nurse	16 (16.7)	80(83.3)	
Lab scientist	1 (33.3)	2 (66.7)	
Ward orderly	25 (80.6)	6 (19.4)	
<b>Years of employment</b>			
<5	19 (35.2)	35 (64.8)	$\chi^2=13.86$ p value= 0.00*
6-10	17 (47.2)	19 (52.8)	
>10	8 (13.3)	52 (86.7)	
<b>Availability of guidelines on standard precautions</b>			
Yes	23 (21.5)	84 (78.5)	$\chi^2=11.06$ p value= 0.00*
No	21 (48.8)	22 (51.2)	
<b>Availability of PPE</b>			
Yes	20 (21.5)	73 (78.5)	$\chi^2=7.23$ p value= 0.01*
No	24 (42.1)	33 (57.9)	
<b>Training on standard precautions</b>			
Yes	21 (19.1)	89 (80.9)	$\chi^2=20.87$ p value=0.00*
No	24 (60.0)	17 (40.0)	
<b>Encouragement by senior colleagues on PPE use</b>			
Yes	35 (26.3)	98 (73.7)	$\chi^2=5.16$ p value= 0.02*
No	9 (52.9)	8 (47.1)	
<b>Knowledge of SP</b>			
Poor	1 (50.0)	1 (50.0)	Fisher's exact = 0.37
Fair	3 (42.9)	4 (57.1)	
Good	40 (28.4)	101 (71.6)	

\*Significant

Multivariate logistic regression showed that doctors were the most likely (OR=8.87;  $p=0.03$ ), while ward orderlies were least likely (OR=0.08;  $p=0.00$ ) to have good practice of SP compared to nurses. Also, those who were trained on SP were more likely to have good practice than those who were not (OR=4.93;  $p=0.01$ ). (Table 6)

**Table 6: Multivariate logistic regression in response to good practice of SP among respondents**

Variables	Odds Ratio	95% CI	P value
<b>Profession</b>			
Nurse	Ref		
Ward orderly	0.08	0.03-0.28	0.00*
Lab scientist	3.45	0.20-60.22	0.39
Doctor	8.87	1.29-61.12	0.03*
<b>Years of employment</b>			
<5	Ref		
6-10	0.44	0.12-1.59	0.21
>10	1.53	0.49-4.80	0.47
<b>Availability of guidelines</b>			
No	Ref		
Yes	2.91	0.95-8.94	0.07
<b>Availability of PPE</b>			
No	Ref		
Yes	1.05	0.35-3.12	0.93
<b>Training on SP</b>			
Yes	Ref		
No	4.93	1.52-16.00	0.01*

\*Significant

Occupational hazards were experienced by 25% of doctors 22.9% of nurses and 19.4% of ward orderlies in the past 1 year.

Commonest factors considered to affect use of PPEs by respondents were emergency situations (32.0%), fear of offending patients (26.0%) and discomfort (23.3%). (Figure 1)

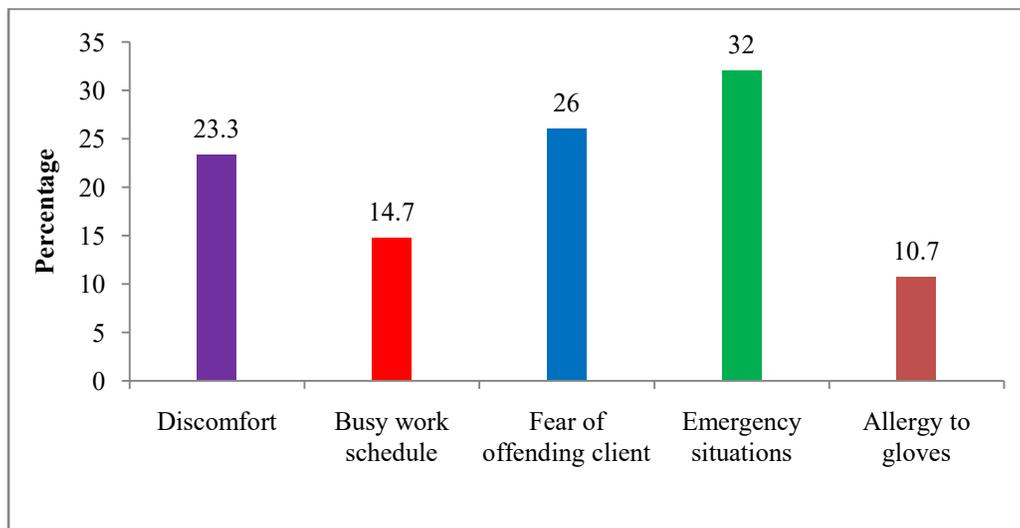


Figure 1: Perceived factors affecting use of PPEs among health workers

#### 4. Discussions

This study was carried out to assess the knowledge and practice of standard precautions among healthcare workers in a secondary health facility in Uyo, Nigeria. More than 9 in 10 respondents had good knowledge of standard precautions. Health workers with good knowledge of SP in different studies ranged from 42.9%-96.7% with higher figures being from the more recent studies [7,12,16-22]. This may be due to more access to information on SP through different sources such as training, internet, colleagues and books. The level of knowledge of SP has been shown to affect practice. A study conducted among midwives in Benin City revealed that there was significant association between knowledge of standard precautions and practice among midwives [23].

Despite the importance of training on the practice of SP, only about half of the respondents in the present study reported receiving any form of training. The proportion of those who had attended any workshop or training on infection control in different studies varied from 8.1%-53.7% [18,19,24]. It is important to equip health workers with the necessary skills through training before expecting optimum practice of SP.

In the present study, 7 in 10 of the respondents had good practice of SP. This is similar to findings of a study in 2016 in Osogbo, Nigeria, where 70.1% of the health workers also had a good mean practice score [21]. However, wrong practices identified in the present study included recapping of needles after use by about half of the respondents and wrong disposal of sharps by about a tenth. This is similar to findings of a study in India where 59.3% of the respondents admitted to always recapping used needles and 18% of the respondents confessed to not placing the used needles in designated sharps containers. Not surprisingly 17.2% of the HCWs in that study and 12% in the present study reported needle stick injuries (NSI) at least once in the last twelve months [25]. Similarly,

recapping of needles has been reported among health workers in other studies [15,21]. This wrong practice is known to create opportunities for puncture injuries and transmission of blood borne pathogens.

Uptake of hepatitis B immunization among health care workers in different studies has been found to be generally low ranging from 38.2% - 58.6% [15,26,27]. In the present study, about a third of the respondents had not been immunized against hepatitis B virus. This immunization ought to be mandatory for all health workers involved in patient care in order to protect them.

Hand hygiene which is a vital part of SP was only practiced by about half of the respondents before contact with patients in the present study, while 8 in 10 reported hand wash after patient care. A study in India in 2015 showed that 44.7% practiced hand-washing before patient contact and 64% practiced hand-washing after patient contact [27]. Not washing of hands before patient care puts the latter at risk of acquiring infections from the health worker, while not washing after patient care exposes the health worker to possible infections from the patients.

In the present study good practice of SP was highest among doctors and least among ward orderlies. This may be due to more training opportunities of the former compared to the latter. Similar finding was reported in a previous study [12].

Noncompliance to standard precautions among healthcare workers has been ascribed to several factors in different studies. These include irregular supply of infection control materials, excess work load, limited personnel, poor supervision, poor compliance by senior colleagues, emergency situations, lack of motivation, discomfort with equipment, unexpected body fluid contact, possibility of inciting fear or offending the patient, time constraint, discomfort of personal protective equipment (PPE), busy work schedule and absence of a policy at the work places [7,8,18,19,24,26,28-31]. In the present study training of

health workers on SP was the most important predictor of good practice of SP.

In the present study, one third of the respondents did not access post exposure prophylaxis (PEP) after sharps injury. This is higher than findings of a study in Enugu, Nigeria where only 10.3% accessed PEP for HIV after sharps injury [6]. PEP should be initiated as soon as possible, ideally within 2 hours and no later than 72 hours of exposure [32].

About a tenth of respondents in the present study reported needlestick injuries within the previous year. This is lower than findings in studies in Bayelsa State, India and Enugu, Nigeria where needlestick injuries were reported by 52.5%, 63.0% and 81% of respondents respectively [15,30,6]. Efforts must continue to be made to strengthen infection control practices in order to prevent hospital acquired infections among health workers and patients.

## 5. Conclusion

Though there was high level of knowledge and a fairly good level of practice of SP amongst the health care workers, practices such as recapping of used needles, improper disposal of sharps and low immunization against HBV still existed among them, creating opportunities for puncture injuries and transmission of blood borne pathogens. Other commonly observed poor practices were improper disposal of sharps and low immunization against HBV. Sharp related injury was the commonest occupational health hazard among the respondents. Practice of SP was highest among doctors and least among ward orderlies. Periodic training on SP, particularly targeting orderlies is advocated. Also, availability of SP materials should be ensured to create an enabling environment for the practice of SP.

## References

[1]. Wisconsin Department of Health Services. Infection control and prevention- Standard Precautions. Wisconsin Division of Public health 2018. <https://www.dhs.wisconsin.gov/ic/precaution>. Accessed on 30<sup>th</sup> June 2018

[2]. World Health Organization. Practical Guidelines for Infection Control in Health Care Facilities. WHO: Geneva. 2014

[3]. World Health Organization. Health workers: Health worker occupational health. WHO 2018. [www.who.int/occupational\\_health/topics/heworkers/en/](http://www.who.int/occupational_health/topics/heworkers/en/) accessed on 20th January 2018

[4]. Narhari Timilshina, Mohammad Aslam, Vinita Dayal. Risk of Infection among Primary Health Workers in The Western Development Region, Nepal: Knowledge And Compliance. *J Infect Dev Ctries*. 2011; 5(1):18-22.

[5]. Centres for Disease Prevention and Control. Blood borne Infectious Diseases: HIV/AIDS, Hepatitis B, *IJBR* (2019) 10 (01)

Hepatitis C: Emergency Needlestick Information [Internet]. Accessed on 26th January 2018.

[6]. Agu PU, Ogboi SJ, Ezugwu EC, Okeke TC, Aniebue PN. The knowledge, attitude, and practice of universal precaution among rural primary health care workers in Enugu southeast Nigeria. *World Journal of Pharmacy and Pharmaceutical Sciences* 2015; 4 (9):109-25.

[7]. Ogoina D, Pondei K, Adetunji B, Chima G, Isichei C, Gidado S. Knowledge, attitude and practice of standard precautions of infection control by hospital workers in two tertiary hospitals in Nigeria. *J Infect Prev*. 2015; 16(1):16-22.

[8]. Aniwada EC, Onwasigwe C. Safety Precaution; Knowledge, Attitude, Practice and Sociodemographic Determinants among Health Care Workers at Primary Health Care Level in Enugu State, Nigeria. *International Journal of Tropical Disease & Health*. 2016; 16(4): 1-13.

[9]. Obi IE, Agunwa CC, Omotowo BI, Azuikwe EC, Ndu AC, Umeobiere AK. Practice of Universal Precautions Among health care workers in Southeast Nigeria: what Factors matter? *Int. J. Med. Health. Dev*. 2017; 22(1): 45-53.

[10]. Cutter J, Jordan S. Inter-professional differences in compliance with standard precautions in operating theatres: a multi-site, mixed method study. *International Journal of Nursing Studies*. 2012; 49: 953-968.

[11]. Okechukwu EF, Modteshi C. Knowledge and practice of standard precautions in public health facilities in Abuja, Nigeria. *International Journal of Infection Control*. 2012; 8:1-7.

[12]. Johnson OE, Asuzu MC, Adebisi AO. Knowledge and Practice of Universal Precautions among Professionals in Public and Private Health Facilities in Uyo, Southern Nigeria- A Comparative Study. *Ibom Medical Journal*. 2012; 5(1): 9-19.

[13]. Nigeria Centre for Disease Control (NCDC). An update of Lassa fever outbreak in Nigeria. <https://ncdc.gov.ng/diseases/sitreps> accessed on 17<sup>th</sup> June 2018.

[14]. Ministry of Economic Development, Uyo, Akwa Ibom State. Projected Population 2007-2015. Accessed 24<sup>th</sup> November 2017.

[15]. Otovwe A, Adidatimi P O. Knowledge, Attitude and Practice of standard precaution among Health Care Workers in Federal Medical Centre Yenagoa, Nigeria. *Journal of Pharmacy and Biological Sciences*. 2017; 12(4): 79-86.

[16]. Gebresilassie A, Kumei A, Yemane D. Standard Precautions Practice among Health Care Workers in Public Health Facilities of Mekelle Special Zone, Northern Ethiopia. *J Community Med Health Educ*. 2014; 4(3): 286.

- [17]. Vaz K, McCrowder D, Alexander-Lindo R, Gordon L, Brown P, Irving R. Knowledge, awareness and practice of universal precaution among healthcare workers at a University Hospital in West Indies. *International Journal of Occupational and Environmental Medicine*. 2010; 1(4):171-81.
- [18]. Saidu MA, Habu HK, Robert T, Dathini H, Inuwa A, Maigari B et al. Assessment of knowledge and practice of standard precautions among nurses working at Federal Medical Centre Gombe, Nigeria. *Direct Research Journal of Health and Pharmacology*. 2015; 3(1):1-11.
- [19]. Amoran OE, Onwube OO. Infection control and practice of standard precautions among healthcare workers in northern Nigeria. *Journal of Global Infections Disease*. 2013; 5(4): 156-63.
- [20]. Chaudhuri S, Baidya OP, Singh TG. Knowledge and attitude of universal precaution among nursing staff in a tertiary hospital of Manipur. *Int J Community Med Public Health*. 2016; 3 (2):451-54.
- [21]. Wasiu OA. Knowledge, Attitude, and Practice of Use of Safety Precautions Among Health Care Workers in a Nigerian Tertiary Hospital, 1 Year After the Ebola Virus Disease Epidemic. *Annals of Global Health*. 2016; 82(5): 897-902.
- [22]. Frank MD, Robinson-Bassey GC, Ibudeh SE. Knowledge and Compliance With Standard Precautionary Measures Among Nurses In Madonna University Teaching Hospital, Elele, Rivers State. *International Journal of Nursing Didactics* 2016; 6(3): 21-26.
- [23]. Bolaji-Osagie SO, Adeyemo FO, Onasoga OA. The knowledge and practice of universal precautions amongst midwives in Central Hospital, Benin City. *J. Public Health Epidemiol*. 2015; 7(11): 331-36.
- [24]. Afolaranmi TO, Hassan ZI, Bello DA, Oyebode T, Chingle MP. Assessment of knowledge and practice of standard safety precautions among Primary Health Care Workers in Plateau State North Central Nigeria. *International Journal of Biomedical Research*. 2017; 8(4): 187-93.
- [25]. Punia S, Nair S, Shetty RS. Health Care Workers and Standard Precautions: Perceptions and Determinants of Compliance in the Emergency and Trauma Triage of a Tertiary Care Hospital in South India. *International Scholarly Research Notices* 2014; 2014: 1-5.
- [26]. Shereen R, Dorgahm, Heba K, Obied. Factors affecting nurse interns' compliance with standard precautions for preventing stick injury. *Journal of Nursing Education and Practice* 2016; 6(12): 121-130.
- [27]. Manjit Dasa, Jutika Ojahn. The knowledge and practices of Universal Precautions among the Interns of Gauhati Medical College: a cross sectional study. *Indian Journal of Basic and Applied Medical Research*. 2016; 5(2): 805-15.
- [28]. Abdulraheem IS, Amodu MO, Saka MJ, Bolarinwa OA, Uthman MMB. Knowledge, Awareness and Compliance with Standard Precautions among Health Workers in North Eastern Nigeria. *J Community Med Health Edu*. 2012; 2(3):1-5.
- [29]. Tariku Gebre Haile, Eshetu Haileselassie Engeda and Abdella Amano Abdo. Compliance with Standard Precautions and Associated Factors among Healthcare Workers in Gondar University Comprehensive Specialized Hospital, Northwest Ethiopia. *Journal of Environmental and Public Health* 2017; 2017(2): 1-8.
- [30]. Holla R, Kanchan T, Kumar N, Unnikrishnan B, Rekha T, Mithra P, Kulkarni V, Darshan B. Perception and practices of standard precautions among health care professionals at tertiary care hospitals in coastal South India. *Asian J Pharm Clin Res*. 2014; 7(2): 101-4.
- [31]. Kotwal A, Taneja DK. Health Care Workers and Universal Precautions: Perceptions and Determinants of Non-compliance. *Indian Journal of Community Medicine*. 2010; 35(4): 526- 528.
- [32]. Australian Society for HIV Medicine (ASHM). Australian national guidelines for post-exposure prophylaxis after non-occupational and occupational exposure to HIV (Second edition) 2016.