Awareness and Practice of Safety Precautions among Healthcare Workers in the Laboratories of two Public Health Facilities in Nigeria

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Summary

Aims and objectives*: To determine the level of awareness and practice of SP among laboratory workers at two tertiary public health facilities in Nigeria.*

Methods*: A semi-structured, self-administered questionnaire was used to assess the awareness, attitude and adherence to SP among laboratory workers. Information on the availability of safety equipment was also sought. The laboratory safety practice of respondents was assessed based on self-reported observance of basic principles of universal precautions in clinical settings.*

Results*: Study participants were 130, mean age: 28.2 years (SD±6.6), number of years in hospital employment: 3.7 years (SD±2.4) and the male to female ratio was 1.8:1. Many (41.5%) were unaware and 25.4% do not observe SP. Participants attest to availability of various safety devices and equipment including hand gloves (86.2%), disinfectants (84.6%), HBV immunisation (46.2%) and post exposure prophylaxis (PEP) for HIV and HBV (79.6%). Attitude to safety is unsatisfactory as 60.0% eat and drink in the laboratory, 50.8% recap needles and 56.9% use sharps box. Even though 83.1% are willing to take PEP, only 1.5% will present self following laboratory injury.*

Conclusion*: This study shows the deficit in the awareness of SP among laboratory personnel and demonstrates that attitude and practice of safety rules are unsatisfactory. Training and re-training on SP is therefore desired. Counselling to induce a positive attitudinal change on HBV immunisation and PEP is similarly necessary.*

Key words: safety precautions, awareness, practice, attitude, medical laboratory personnel, Nigeria

A giant stride at ensuring safety of healthcare workers was made in 1983, when the Centre for Disease Control (CDC) published a document entitled Guideline for Isolation Precautions in Hospitals [1]. The document contained a section entitled "Blood and Body Fluid Precautions" which is to be applied when a patient is known or suspected to be infected with blood borne pathogens. However, in August 1987, CDC published another document entitled "Recommendations for Prevention of HIV Transmission in Health-Care Settings" [2-6] with the aim of intensifying effort at ensuring healthcare workers safety. In contrast to the 1983 document, the 1987 document recommended that blood and body fluid precaution be consistently used for all patients regardless of their blood borne infection status. The document is therefore referred to as "Universal Blood and Body Fluid Precautions" or "Universal Precautions." The policy which has widened in scope and has since been renamed standard precautions includes: barrier techniques, hand washing and sharp precautions. [7-8] Standard precautions is often also called safety precaution because it is meant to ensure the safety of healthcare workers.

Healthcare workers refer to any person working in health care settings and who has the potential for exposure to infectious materials including body substances, contaminated medical supplies and equipment, contaminated environmental surfaces or contaminated air[9]. They include, but are not limited to, physicians, nurses,

technicians, therapists, pharmacists, nursing assistants, laboratory personnel, autopsy personnel, emergency medical service personnel, dental personnel, students and trainees, contractual staff not employed by the healthcare facility and persons not directly involved in patient care but potentially exposed to infectious agents such as volunteer, dietary, housekeeping, maintenance and clerical personnel[10].

Healthcare workers are at increased risk of acquiring human immunodeficiency virus (HIV), hepatitis B virus (HBV) and hepatitis C virus (HCV) hence the need to ensure their safety. Furthermore, the safety of healthcare workers is very important in the face of outbreaks of epidemics of diseases such as Ebola and Lassa fever which often have a fatal outcome. [11- 13]

Medical laboratory personnel constitute a special group of health workers that are particularly at risk as they are often exposed to infected biological specimens which contain unknown infectious pathogens. [14] Laboratory acquired infection (LAI) due to various pathogens have been reported among laboratory workers. [15-16] *Mycobacterium tuberculosis* and Hepatitis B virus are agents of LAI occurring with high frequency [12, 15] while Human Immuno-deficiency Virus (HIV) infection and Acquired Immuno-deficiency Syndrome (AIDS) are seen less frequently.[15]

Several studies on laboratory acquired infections have shown the role of safety devices, procedures and practices in the control of these infections.[18- 19] Safe laboratory practices are important in the prevention of laboratory acquired infections,[9] and are achievable when universal blood and body fluid precautions are followed, as provided by CDC. However, safety provisions have economic implications. Consequently, in most laboratories sited in countries with poor economy, safety measures are usually compromised.[11] This is because such laboratories cannot afford the cost of safety facilities or do not consider their procurement a priority.

Furthermore, studies have shown that training of staff and implementation of universal precaution reduces the risk of contacting infections[20- 21]. Since communicable diseases are more prevalent in poor resource countries, there is need to focus on the laboratory worker's perception of health and safety as a modifiable factor in the promotion of safe work place. In this study, our concern was limited to laboratory personnel who perform blood sampling (risk of needle-sticks) and deal with blood or body fluid samples or reagents on an almost daily basis. Besides, there are few studies on the awareness and compliance to safety rules among laboratory workers at the tertiary hospitals in Nigeria with none conducted since inception of the participating hospital: Federal Medical Centre, Ido-Ekiti in Ekiti State, South Western Nigeria and University of Ilorin Teaching Hospital, Ilorin, Kwara State, Central Nigeria. This study therefore is aimed at determining the awareness, attitude and level of practice of safety precaution among the laboratory workers.

Methods

This descriptive cross sectional survey was conducted among laboratory staff of Federal Medical Centre, Ido-Ekiti in Ekiti State, South Western Nigeria and University of Ilorin Teaching Hospital, Ilorin, Kwara State, Central Nigeria, between January and March 2010. All laboratory personnel in the participating hospitals were recruited into the study except those that were less than 6 months in hospital employment.

Information on the general purpose of the study and the need to respond correctly to anonymous questions in the questionnaire were given to the participants. They were also informed that their participation was voluntary and could be terminated at any time they desire having assured them of the confidentiality of information supplied. The study was approved by the Ethical Research Committees of participating hospitals.

The instruments of research consisted of a set of semi-structured, self-administered questionnaire containing 39 items. The questionnaires were issued to the participants on reporting at duty and were allowed to be taken away and completed at a convenient time. They were to be returned within one week of collection. Text messages were sent into the mobile phones of everyone who collected the questionnaire as reminder 48hours to when submission is due if not yet returned.

The information obtained through the questionnaire was in three parts:

(a) Socio-demographic characteristics such as age, sex, occupational group, number of years in hospital employment *etc*

(b) Awareness of safety precautions and availability of protective equipment in the laboratory

(c) Practice and attitude related to safe laboratory practice such as use of protective equipment, handling of contaminated items and post-laboratory accidents/injury measures. The laboratory safety practice of respondents was assessed based on self-reported observance of basic principles of universal precautions in clinical settings.

All information obtained was imputed into the computer and statistical analysis was performed by SPSS software version 15.

Results

A total of 130 out of 156 questionnaires distributed to the laboratory personnel were returned giving a response rate of 83.3%.

Socio-Demographic Characteristics

The mean age and number of years in hospital employment of the participants was 28.2 years (SD±6.6493) and 3.7 years (SD±2.40246) respectively. Majority, 84 (64.6%) were males and 46 (35.4%) females giving a Male: Female (M: F) ratio of 1.8:1. Most, 106 (81.5%) had tertiary education with 13 (10.0%), 4 (3.1%) and 7 (5.4%) having

secondary, primary and other forms of education respectively.

Awareness of Safety Precaution and Availability of Safety Devices

In this study, 58.5% of the respondents were aware of Safety Precaution. Majority of the respondents, 75 (57.7%) got to know about universal precaution in the hospital, while only 37, (28.5%) learnt about it while in school. Other sources of information included workshops, 6 (4.6%) and the media, 12 (9.2%).

Various safety devices and equipment were made available in the hospital laboratory for the personnel. As shown in table i; 86.2% of the personnel knew of the availability of hand glove, 84.6% hypochlorite and other disinfectants, 70.6% sharps and safety box, 63.1% facemasks and goggles, and 61.5% incinerator. Only 46.2% of the respondents were aware of the availability of immunization to HBV and 79.6% knew about post exposure prophylaxis to both HIV and Hepatitis B.

Attitude to safety measure in the laboratory

Despite the risk involved in laboratory work, 25.4% of the respondents do not observe universal precaution (Table ii). As a measure of safety within the laboratory, only 69.2% wore glove when handling sample, hand washing pre and post procedure was observed by 98.2%, wearing laboratory coat during procedure was observed by 76.2%, covering of open wounds before laboratory procedure was observed by 96.2% while wearing of facemasks and goggles for aerosol generating procedures was observed by 66.2% of the respondents. Majority of the respondents were very much willing to take immunization against HBV (72.3%) and post exposure prophylaxis against HIV and HBV (83.1%).

With the possible risk of auto-infection, 60% of respondents still ate and drank in the laboratory while 48.5% were involved in the habit of entertaining visitors within the laboratory. Despite the provision of sharp/safety box, 56.9% recaps needles and 50.8% detach needle from syringe after use.

Reasons advanced by some laboratory workers for not wearing protective safety devices included: not essential 24, (60.0%) and discomforting 5 (12.5%), among others (Table iii). Of the 6.2% that were not willing to take post exposure prophylaxis for HIV and Hepatitis B, 42.9% cannot give any tangible reason for the refusal while 21.4% claimed they don't want to be stigmatized (Table iv).

After accidental laboratory exposure to infectious materials, the most common procedure among the laboratory personnel was the washing of the exposed part with water 55, (42.3%) among others (Table v). Only 2, (1.5%) would report to the clinic after post-exposure. Similarly, only 13 (10.0%) of the respondents would disinfect blood stained materials before discarding them (Table vi) while only 52 (40.0%) would adopt the acceptable procedure of Decontaminate-Clean-Sterilise for reusable materials (Table vii).

Table i: A**vailability of safety device/ equipment**

Safety device/ equipment/measure	Yes	No
Hand glove	112(86.2%)	18(13.8%)
Sharps / Safety box	92(70.8%)	38(29.2%)
Incinerator	80(61.5%)	50(38.5%)
Facemasks and goggles	82(63.1%)	46(35.5%)
Hypochlorites and other disinfectants	110(84.6%)	17(13.1%)
Immunisation against Hepatitis B	60(46.2%)	66(50.8%)
Post exposure prophylaxis for HIV and Hepatitis B	103(79.2%)	22(16.9%)

Table ii: Attitude to safely measure in the laboratory

Safety measure types	Yes		No	
	Freq	%	Freq	%
Observation of universal safety measures at work	95	73.1	33	25.4
Wearing of hand gloves when handling samples	90	69.2	40	30.8
Hand wash before and after any laboratory procedure	128	98.5	2	1.5
aterproof plaster covering hand wounds before Laboratory procedure	125	96.2	5	3.8
Wearing laboratory coats while working in the laboratory	99	76.2	31	23.8
Wearing laboratory coats outside the laboratory	20	15.4	110	84.6
Eating, drinking, smoking in the laboratory	78	60	52	40
Entertaining guests in the lab	63	48.5	67	51.5
Recapping needles after use	74	56.9	56	43.1
Detach needle from syringe after use	66	50.8	64	49.2
Needles and scalpels discard in sharp/safety box	120	92.3	9	6.9
Wearing facemasks and goggles when procedures can generate aerosols	86	66.2	44	33.8
Willingness for immunisation against Hepatitis B	94	72.3	7	5.4
Willingness for post exposure prophylaxis for HIV & Hepatitis B	108	83.1	8	6.2

Table iii: **Reasons for not wearing protective device**

Reason	Frequency	Percentage
Not necessary/essential	24	60.0
High cost	10	25.0
Disturbance/ Nuisance / Discomforting	5	12.5
Non availability	1	2.5
Total	**40**	**100.0**

Table iv: **Reasons for rejecting post exposure prophylaxis for HIV & Hepatitis B**

Reason	Frequency	Percentage
Cannot be infected	2	14.3
Avoid stigmatisation	3	21.4
Avoid losing job	1	7.1
Just unnecessary	2	14.3
Can't say	6	42.9
Total	**14**	**100**

Table v: **Safety practices of respondents after laboratory**

Practices	Frequency	Percentage
Wash	55	42.3
Squeeze	24	18.5
Apply alcohol	29	22.3
Apply Lysol	2	1.5
Apply other disinfectant	16	12.3
Report for post exposure prophylaxis	2	1.5
Total	**120**	**100.0**

Table vi: **handling of blood stained non-reusable materials**

Discard method	Frequency	Percentage
Throw into dust-bin and subsequently incinerate	66	50.8
Dispose into a container & burn 10m away from clinic	40	30.8
Burry	5	3.8
Disinfect before discarding	13	10.0
Can't say	2	1.5
Total	**130**	**100**

Table vii: Handling of resusable contained laboratory items

Method of handling	Frequency	Percentage
Decontaminate-Clean-Sterilise	52	40.0
Clean-Decontaminate-Sterilise	0	0.0
Clean-Sterilise-Decontaminate	14	10.8
Sterilize-Clean-Decontaminate	38	29.2
Sterilize-Decontaminate- Clean	12	9.2
Total	**130**	**100**

Discussion

Even though safety precaution is aimed at preventing transmission of HIV, HBV and other blood borne pathogens [22], the result of this study indicates that awareness and practice of safety precaution among various classes of medical laboratory personnel in the hospitals studied is not encouraging. This is because only 58.2% and 73.1% of the medical laboratory personnel studied are aware and observe safety precaution principles respectively. Although this is in agreement with the rest of the world as the global knowledge of universal precautions has been described inadequate and compliance low, [23] there is need for intervention if safety of the Nigerian medical laboratory personnel is to be ensured.

It is pleasant to note that the awareness recorded in this study (58.2%) is better than 20.8% [24] earlier reported in Lagos, Nigeria. This improvement ignoring the difference in the sites of the study is comparable to the finding in Lebanon where there was a significant difference in the education profile and observation of universal precaution between 1993 and 2003. [25] In another study conducted in Ibadan, Nigeria, 77.5% of safety precaution awareness was observed. [26] The difference between the present (58.2%) and Ibadan study (77.0%) may be related to the category of health workers recruited. Doctors which were the focus of the Ibadan study may be better opportuned to have learnt more about safety issues because of the extensive nature of their training and probably, greater exposure hence greater knowledge on the communicability and pathogenicity of HIV, HBV, HCV among other agents that could be acquired in hospital settings. This notwithstanding, greater awareness, knowledge and practice of safety rules in hospitals have been documented among nurses. [27-28] This is supported by a study in Ile-Ife, Nigeria which showed that nursing students (77.0%) had greater awareness compared with medical students (61.0%) though the overall awareness of the concept of universal precaution in Ile-Ife (64.3%) is comparable to the present study (58.2%). [29] The implication of the result of all these studies is the need for health education and training on universal precaution focusing on laboratory workers, doctors and other health personnel but re-training of nurses in order to attain acceptable safety level for all health personnel at work.

The attitude and practices of the laboratory health workers towards safety precautions call for concern as 60.0% ate and drank in the laboratory. This is far higher than the 45.6% observed in Lagos [24] and the 41.0% observed among laboratory scientist in Ibadan [11], both in Nigeria. Could this imply that laboratory workers in Ilorin and Ido-Ekiti, Nigeria do not understand the dangers of eating and drinking in the laboratory or are there other factors compelling them to behave in this manner? There is need to elucidate reasons for this dangerous attitude since this study did not, neither is there any with such aim. Such clue will be necessary for education aimed at discouraging the act of eating and drinking in the laboratory.

The use of personal protective equipment as revealed by this study is unsatisfactory. Despite the fact that disposable latex gloves were available in the

laboratory, only 69.2% wore latex gloves while handling specimens. Similar report by other researchers [24, 30] underscores the need for improvement in this area. A total of 15.48% of the respondents still wear laboratory coats outside the laboratory while 48.5% entertain their guests in the laboratory. These attitudes can facilitate transmission of infectious agents to unsuspecting friends, relatives and other categories of contacts hence the need to abrogate these practises to ensure the safety of the entire populace. The finding of 66.2% of respondents not wearing face masks and goggles was at variance with the 0.0% reported by Omokhodion in Ibadan [11] and is a behaviour that needs to be reinforced.

Majority (79.2%) were aware of the availability of post exposure prophylaxis (PEP) for HIV and HBV compared with the 8.0% obtained among British surgeons [31] and the 10.0% recorded among health workers in Lagos. [30] Despite the high level of awareness of PEP recorded in this study, only 1.5% responded positively to presenting themselves for PEP following laboratory accidents such as needle stick injury. The reasons proffered for the under utilisation of PEP services included fear of stigmatisation (21.4%) and job loss (7.1%). Furthermore, willingness (83.1%) and presentation (1.5%) for PEP as found in this study is not in consonance, an indication of interference by several factors which may not be totally understood. Stigmatization is a major issue in our setting; hence thorough counselling is therefore necessary to correct this attitude.

The incidence of HBV infection among health care workers has been on the decline in recent years and this is largely due to the wide spread immunisation with hepatitis B vaccine. [32] In many health care facilities, even though the personnel are vaccinated, the sero-conversion rate post vaccination is not assessed. [33] The CDC recommendation is to test for antibody after completion of three injections of HBV vaccine and if negative, repeat the 3rd dose and test again for antibody. [34] In this study, only 46.2% were aware of the availability of HBV vaccination in their workplace while 72.3% were willing to be vaccinated. This represents a wide gap and implying that publicity, awareness, and knowledge about HBV vaccine in the hospitals is probably not good enough. This finding also suggests that majority of the laboratory personnel are at risk of being infected with HBV. Furthermore, 56.9% of the laboratory workers were of the opinion that needles should be re capped after use against the dictate of the Occupational Safety and Health Administration (OSHA) directives [35] thereby endangering their lives.

In conclusion, this survey has revealed that there is a gross deficit in the awareness, attitude and practice of safety precaution among laboratory personnel studied and this observation is in consonance with the global trend. There is therefore an urgent need for training to increase the awareness, knowledge, and stimulate positive change in attitude and practice of universal precaution among the medical laboratory personnel in the participating hospitals as well as others in similar settings. Such training should also be repeated on regular basis for emphasis among all healthcare workers and include preventive measures and post-exposure prophylaxis.

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