

## Research Article

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## Knowledge, Awareness and Compliance with Standard Precautions among Health Workers in North Eastern Nigeria

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## Abstract

**Background:** Health care workers (HCWs) are at risk of various occupational hazards in the hospital, including exposure to blood borne infections such as Human Immuno-deficiency Virus (HIV) and hepatitis B and C virus (HBV and HCV) infection from sharps injuries and contact with body fluids. Compliance on the part of Healthcare workers (HCWs) with standard precautions has been recognized as being an efficient means to prevent and control healthcare-associated infections.

**Objective:** To assess knowledge, awareness and compliance of universal precautions among health workers in north eastern Nigeria.

**Method:** This is a crosssectional study conducted between March and August 2010. A 32- item self-administered questionnaire and observational checklist were used to obtain information from the health workers. Data was analyzed using SPSS version 17 and the level of significant was at p-value of  $\leq 0.05$

**Results:** Less than one-fifth (13%) of the respondents have adequate knowledge of universal precautions with females (67.8%) better than the males (32.2%) ( $p < 0.05$ ). Nurses (85.7%), midwives (80.2%) and community health officers (69.8%) were very knowledgeable of universal precautions compared with other studied health workers. Those with ten years and above working experience had a high level of awareness of universal precautions than those with below five years ( $p < 0.05$ ). Compliance with the use of sterile gloves, handling and disposal of needles and other sharp objects was higher than the knowledge of these procedures recorded ( $p < 0.05$ ) especially among those with experience of ten years and above.

**Keywords:** Health workers; Knowledge; Compliance; Universal precautions; Nigeria

## Introduction

Standard precautions are set of measures formulated to prevent transmission of blood borne pathogens when providing health care. Since identification of patients infected with these pathogens cannot be reliably made by medical history and physical examination, the Centers for Disease Control (CDC) has recommended that standard precautions are used on all patients, regardless of knowledge about their infection status [1]. Health care workers (HCWs) are at risk of various occupational hazards in the hospital, including exposure to blood borne infections such as HIV and hepatitis B and C virus from sharps injuries and contact with body fluids [2-4].

Developing countries, which account for the highest prevalence of HIV-infected patients in the world, also record the highest rate of needle-stick injuries [5]. The World Health Organization estimates that about 2.5% of HIV cases and 40% of HBV and HCV cases among HCWs worldwide are the result of these exposures [6]. The risk of seroconversion following a needle-stick injury from an HCV-antigen-positive patient is estimated to range from 1.2% to 10% [7].

Compliance with standard precautions reduces the risk of exposure to blood and body fluids [8]. Gershon et al. [9] observed that better knowledge of universal precautions among HCWs was one of the correlates of good compliance. Michalsen et al. [10] observed the same among physicians. Knowledge of standard precautions by HCWs may be influenced by their type of training [9,11-13]. Jeong et al. [14] in Korea observed that nurses who were working in the operating room need training to increase their compliance with standard precautions.

Compliance on the part of healthcare workers with standard precautions has been recognized as an efficient means to prevent and

control health care-associated infections in patients and health workers [15,16].

Standard precautions include hand washing; use of barriers (gloves, gown, cap and mask); care with devices, equipment and clothing used during care; environmental control (surface processing protocols and health service waste handling); adequate discarding of sharp instruments; and patient's accommodation in accordance to requirement levels as an infection transmission source [15]. Hand hygiene is most important among the standard precautions advocated [17,18]. Adoption of safe practices for handling needle sticks and other sharp objects, in view of the possibility of outbreaks, especially of Hepatitis B and C is also a preventive measure worthy of mentioning [15].

Many factors are responsible for non-adherence to the basic principles of universal precautions among health care providers [19,20]. From the available literature, the compliance with universal precautions among health workers in the Northern Borno State has not been assessed. This study is being conducted to assess the knowledge,

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awareness and compliance with universal precautions among health workers in Northern Borno State, Nigeria.

## Methods

This is a cross-sectional study conducted between March to August 2010 among primary health workers in Mobbar, Gubio and Guzamala Local Government Areas of Borno State. The health workers included those that had full-time employment with the LGA and had direct contact with patients, specimen and chemicals during their routine clinical duties. All the 30 Primary Health Care centers in the LGAs of study were selected. The health centers were visited on week days between 10:00 am and 4:00 pm over a period of 6 months. All categories of trained health workers (Nurses, midwives, community health officers, community health extension workers and health assistant) were invited to participate in the study after signing an informed written consent form.

The study was divided into 2 parts. The first part assessed the knowledge on standard precautions which was evaluated by means of a questionnaire. The second part used a check list to record practical activities performed by the health workers. The questionnaire was drafted according to Garner's [15] recommendations and included questions on the health workers' knowledge of: Hand hygiene (indication, areas deserving particular attention and minimum time for the procedure); sterile and non-sterile gloves (indication); needle sticks and other sharp objects (handling and disposal). The questionnaire was developed after a thorough review of the literature and further perusal by experts in public health to ensure quality and content validity. The questionnaire was piloted in a different Local Government Area (Abadam LGA). After the pilot the questionnaire was fine tuned before finally self administered to assess the health workers' knowledge, awareness and compliance on standard precautions. Information on socio-demographic variable and work experience of the health workers was also collected. The questionnaire was a 32-item one with both open-ended and closed questions in English language but translated to local language for proper understanding. The questionnaire administration took about 20 minutes to complete. The questionnaire also assessed awareness on policy regarding universal precautions, exposure to biological and chemical agents and awareness of potential harm when exposed to these agents, availability and use of protective equipment. Before administration of the questionnaire, the purpose of the study was explained to the respondents and they were assured of the confidentiality of the information given. Informed consent for participation was obtained from each health worker.

The knowledge of universal Precautions was measured by examining five questions on mode of transmission of HIV & hepatitis B and C virus, exposure to body fluids, use of protective barriers such as gloves and gown, recapping of needles and disposal of biohazards. A score of "1" for a correct answer and "0" for an incorrect answer was assigned. A health care worker who obtained a total score of "5" was considered "good knowledge;" "4 or 3" "fair knowledge;" and "1 or 0" "poor knowledge."

A passive and non-participative observation on health workers was performed during the study period. The parameters observed were recorded on the check list corresponding to the practice aspects evaluated during the knowledge assessment phase. The data from the questionnaire were coded and entered into a computerized data base and analyzed using SPSS, version 17. The chi-squared test was used to find the association between variables. A p-value of equal to or less than 0.05 was considered statistically significant.

## Results

Among the 276 health workers studied, only 5.4% declined to participate thus giving a response rate of 94.6%. Among the participants, 74.7% were females and 25.3% were males (Table 1). The age range of respondents was 21-53 years while the mean age was 26.4 years (SD 4.2). Life time work experience varied between 13 months and 19 years. The mean duration of clinical experience was 64.5 (SD 4.8) months. Half (55.2%) of the respondents had between 5 and 10 years of working experience, 19.5% had less than five years and 25.3% had more than 10 years experience. Half (50%) of the respondents had no knowledge of universal precautions; with more females (64.2%) than males (35.8%) ( $p < 0.05$ ).

About one third (37%) of the respondents had fair knowledge of universal precautions while 13% had good knowledge (Table 1). About two third (67.8%) women and one-third (32.2%) men were very knowledgeable ( $p < 0.05$ ). A significant relationship exists between knowledge of universal precautions and occupation status; nurses (85.7%), midwives (80.2%) and community health officers (69.8%) were knowledgeable of universal precautions compared with only 5.4% of community health extension workers and 0.9% of health assistants ( $p < 0.05$ ). The level of awareness of universal precautions was significantly associated with many factors (Table 2). Respondents with experience of 10 years and above (88.9%) reported higher levels of awareness of universal precautions compared with those less than 5 years experience (51%). Among those aware of standard precaution, 48 (55.2%) had information about it from seminars and workshops, 24 (27.6%) from classroom lectures and only 15 (17.2%) from books and health programmes on television and radio.

About one third (33.3%) of the respondents knew that the aim of standard precautions was to protect both health care workers and patients from transmission of infection (Table 3); 162 (62.1%) thought that standard precautions were meant to protect health workers alone from getting infections from patients, while 9.1% agreed that standard precautions aimed at protecting health workers while handling infectious waste.

Variables	Frequency	Percentage
<b>Age (Years)</b>		
<25	30	11.5
25-29	106	40.5
30-34	64	24.5
35-39	43	16.5
>40	18	7.0
<b>Sex</b>		
Male	195	74.7
Female	66	25.3
<b>Marital Status</b>		
Single	64	24.5
Married	126	48.3
Divorced/Separated	45	17.2
Widow	26	10
<b>Work Experience (Years)</b>		
<5	51	19.5
5-10	144	55.2
>10	66	22.3
<b>Knowledge of Standard Precaution</b>		
NO/Poor Knowledge	131	50.0
Fair (Average) Knowledge	96	37.0
Good Knowledge	34	13.0

**Table 1:** Socio-demographic Characteristics of the Respondents.

Level of Awareness			
Factors	None (%)	Fair (%)	Good (%)
<b>Occupational Status</b>			
Nurse	3 (2.2%)	11 (7.8)	126 (90)
Midwife	7 (7.3)	18 (19)	70 (73.7)
Community Health Officer	1(10)	3(30)	6 (60)
Health Assistant	13 (81.3)	3 (18.7)	0 (0)
<b>Work experience (years)</b>			
<5	19 (37.3)	6 (11.7)	26 (51%)
5-10	16 (11.2)	30 (20.8)	98 (68)
>5	2 (3.0)	4 (6.1)	60 (90.9)
<b>Place of training</b>			
Tertiary institution	2 (6.9)	5 (17.2)	22 (75.9)
Ministry of health	25 (13.2)	60 (31.3)	97 (50.5)
Private health Institution	25 (62.5)	5 (12.5)	10 (25)

**Table 2:** Factors affecting the level of awareness of universal precautions.

Concerning knowledge about infectious blood and body fluids, about one third (32.2%) of the respondents agreed that all patients were potentially infectious irrespective of their diagnostic status, while 63.2% believed that only those diagnosed were infectious and only 4.6% believed that those suspected of being infected are potentially infectious (Table 3). With regards to work experience affecting knowledge, 58.8% of those who had less than 5 years work experience agreed that all patients were potentially infectious and 72% of those with more than 10 years experience had correct knowledge of standard precautions guidelines (Table 4).

Among the 63 procedures observed, 47.6% and 34.9% had an indication for sterile and non-sterile gloves usage respectively; only 19.5% required washing of the hands. All respondents reported very inadequate provision of protective materials. More than two-thirds (80.6%) reported that only gloves and face mask were provided for surgical and delivery procedures and only 55.5% made use of these protective materials

Concerning the knowledge and practice of hand hygiene, this study revealed that 56.7% of the health workers knew that their hands had to be washed before and after patient care. However, compliance with hand hygiene was noticed in only 38.7% of the knowledgeable health workers. Three (3%) did not wash their hands before or after taking care of patients.

Regarding the use of sterile gloves, there was statistical difference only in those with more than 10 years clinical experience ( $p=0.05$ ). Even in those with more than 10 years experience, the practice among those who wore gloves adequately was superior to their knowledge on the matter. A comparative evaluation of the level of knowledge and practice in handling and disposal of needles and other sharp objects among those with above 10 years experience revealed a lower level of knowledge (43.8%) than the observed practice (47.2%), and the difference was not statistically significant ( $p > 0.05$ ).

More than four-fifth (90.8%) of the nurse were aware of the potential harmful effects of biological agents compared to 82.5.0% of midwives, 78.4% of Community health officers and 23.6% of community health extension workers. None of health attendants was aware of the potential harmful effects of biological agents. Majority (95%) of the respondents identified HIV as a potential harmful biological agents, followed by hepatitis (82.6%) and bacterial infections (77.8%). Knowledge of potential harmful effects of biological agents was relatively high and despite the high level of knowledge and awareness about the potential harmful effects of biological agents very few (2.5%) wear protective gear/apron.

## Discussion

Half (50%) of the respondents reported no knowledge of universal precautions; more than one third (37%) had average knowledge of universal precautions while 13% had good knowledge. Knowledge of universal precautions was highest among women than men, and among nurses (85.5%) compared with other health workers. The results of this study are almost similar with that by Vaz et al. [21] who reported that 90.0% of nurses had knowledge of standard precautions. The adequate knowledge of universal precautions among nurses and midwives may be due to incorporation of universal precautions in the Nigerian nursing and midwife student curriculum and on-the-job training. The low level of knowledge of universal precautions among community health extension worker and health assistant may be attributed to their poor educational background and non-provision of this information by their immediate superior.

The deficient knowledge base among some of the health workers may be due to a lack of investment in staff training by the their employer or to limited understanding of health care workers' safe behavior in the clinical setting or complacency [22,23]. Due to insufficient information retention, knowledge and adherence to taught, practice may still be deficient in spite of training and education [24,25]. Training and education have been found to be of paramount importance to developing awareness among health care workers, as well as improving adherence to good clinical practice [26,27].

The greater awareness of universal precautions among health care workers with longer years of experience in this study may be due to their participation in a greater number of seminars, conferences and training some of which may include universal precautions which not only encouraged safer work practices but also improved concordance with policy and procedures [28,29]. In this study, about one third (33.3%) of the respondents believed that standard precautions are aimed at protecting both health workers and patients from

Objective	Frequency	Percentage
Protection of health workers and patients from infection	87	33.3
Protection of health workers alone From getting infection from patient	162	62.1
Protecting health workers while handling Infectious agent alone	42	9.1
Knowledge of HBV	231	88.5
Vaccinated against HBV	51	19.5
Agreed that all patients were potential infectious irrespective of their diagnostic Status	84	32.2
Believed that only those diagnosed were infectious	165	63.2
Believed that those suspected of being infected are potentially infectious	12	4.6

**Table 3:** Aim of standard precautions, Knowledge about Infection and HBV Vaccination Status.

Potentially infected blood and body fluids	Work experience (yrs)						Total	
	<5 (n=51)		5-10 (n=144)		>10 (n=66)		(n=261)	
	Freq	%	Freq	%	Freq	%	Freq	%
All patients	30	58.8	48	33	50	72	162	62.1
Only those diagnosed as infectious	6	11.8	51	35.4	11	16.6	67	25.7
Those suspected	7	13.7	20	13.8	5	7.6	32	12.2

**Table 4:** Respondents' knowledge about potentially infectious blood and body fluids by duration of work experience ( $n = 261$ ).



transmission of infection; 62.1% thought that standard precautions were meant to protect health workers alone from getting infections from patients, while 42 (9.1%) agreed that standard precautions were aimed at protecting health workers while handling infectious waste only. This finding is in contrast with a Brasil study [30], where 11.0% understood standard precautions as protective measures for health workers only and 52.4% for both health workers and patients.

Protective barriers help to reduce the risk of exposure of the health worker's skin or mucous membranes to potentially infectious materials. They also reduce the risk of exposure to blood and other body fluids to which universal precautions apply. All the respondents reported very inadequate provision of protective materials. Gloves and face mask were the only protective materials being provided with. In spite of the inadequate provision, only 55.5% used these protective materials. This finding is in agreement with that of Sadoh et al. [31] in which less than two-thirds of health care workers used personal protective equipment such as aprons, gowns and gloves, during surgeries and deliveries. However, there is sometimes a high rate of non-compliance among health workers and this may be due to a lack of understanding among them on how to properly use protective barriers [32]. In addition, non-compliance among health workers is associated with insufficient knowledge, workload, forgetfulness, workplace safety and the insight that colleagues also failed to follow [33,34].

Non-compliance among health care workers could also be due to their belief that their workload is increased by adhering to universal precautions and therefore, these procedures are difficult to accommodate due to day to day current clinical pressures [35]. Other reasons include perceived reduction in dexterity when wearing gloves, and the absence of penalties [36]. This study also reported lack of penalty even for not using protective devices. Availability of supplies and awareness programs increase compliance on standard precautions [21]. Studies have reported significant improvement in compliance with the standard precautions from 48% to 74% after an educational symposium [37], and after a 30-minute educational program [38]. In this study, compliance with hand hygiene was 38.7% among health workers that had the knowledge. Our data corroborate those found in other studies [39,40], which goes to show that education and knowledge, although fundamental, but not sufficient to foster a behavioral change regarding hand hygiene. The use of gloves was 18% (with <5yrs experience) though the level of use increase with age. This finding is almost similar to a Pakistan study in which 20.9% of health workers wore gloves for "most of the time" to "always," [41].

## Conclusion

The level of knowledge and implementation of standard precaution in this study is unacceptably below standard to guarantee infection safety in health workers and patients. This study calls for a need to build the capacity of health workers on standard precaution either through continuous health education programme or regular training or sponsor for workshop and seminars. This is the most effective and long-lasting means to improve health workers knowledge and foster compliance with standard precaution measures.

## Recommendation

Due to a poor knowledge and a fair level of awareness among health workers on standard precautions, this study suggests a capacity building of health workers in order to increase their knowledge on the subject matter. Regular training should include the initial biohazard handling, safety policies, safety practices, safe handling of equipment and materials, monitoring of potential exposure and hazard.

The Ministry of Health, Borno State, Nigeria and its health institutions and facilities need to;

- Develop specific policies on the practice of Standard Precautions
- Ensure strict implementation of these policies
- Train and re-train health care providers in the implementation of standard precautions
- Ensure consistent supply of all protective materials at all times within institutions
- Rewarding of those health care workers who comply with safety measures, while penalizing those who failed to comply.

## Key Points

- No specific policy on the practice of Standard Precaution.
- The level of knowledge and implementation of standard precaution in this study is unacceptably below standard to guarantee infection safety in health workers and patients.
- Less than one-fifth (19.4%) of the respondents were provided with protective gear/apron and only 2.5% wear them.

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