Original Article

Knowledge and Practice of Standard Precautions by Health-Care Workers in a Tertiary Health Institution in Enugu, Nigeria

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ABSTRACT

Background: Standard precautions (SPs) are crucial in protecting both health-care workers (HCWs) and patients from nosocomial infections. This study assessed the knowledge and practices of SP among HCWs in tertiary health-care facilities. **Methods:** This descriptive study was done in October 2014 among 629 HCWs at the University of Nigeria Teaching Hospital, Ituku-Ozalla, Enugu State. A pretested questionnaire was used and analysis done using SPSS version 13. **Results:** The HCWs studied were 629, mostly females (64.4%), married (62.3%), Christians (94%), and within 20–59 years. Majority were nurses (46.1%) working in the wards. Over 90% of respondents had heard of SP, mainly from formal training (62%). Over 70% could define SP, 74.6% had knowledge of when SP is needed and >70% identified most components of SP. Over 90% agreed that SPs are useful and that employers should provide SP training. Most respondents washed hands after removal of gloves (73.6%) and before leaving patient's care area (33.1%). More than 70% had been exposed to patient's body fluids and washed the exposed part with water, soap, and disinfectant (52.1%). Gloves were the most commonly used personal protective equipment (PPE) (53.4%) and the major reason for inconsistent use was irregular access (57.7%). Over 50% recap needles before discarding. Exposure to patients' serum was significantly higher among doctors and nurses $P < 0.05$, while the use of PPEs was highest among the laboratory scientists (82.4%). Those who were trained on SP (70.8%) and PPE (69.7) were significantly more likely to use PPEs, $P < 0.05$. **Conclusions:** SP training and regular provision of PPEs are vital in compliance to SP.

KEYWORDS: *Enugu, health-care workers, nosocomial infections, standard precautions*

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INTRODUCTION

It is generally known that health-care workers (HCWs) often come in contact with blood-borne pathogens and other microorganisms.[1] These exposures commonly occur during major or minor surgical procedures, during routine clinical and nursing services like simple physical examination, while handling laboratory specimen, and during disposal of hospital wastes as well as during accident and life-saving emergency procedures. On exposure, HCWs can equally transmit healthcare-associated infections (HAI) to their patients and may be the source of infection for their families and communities. Occupational exposure to HAI is of great concern in developing countries where there are higher risks of exposure to blood-borne pathogens, frequent contacts with patients' body fluids and little or no protection against airborne infections.[2]

To prevent spread of nosocomial infections, the United States' centers for disease control (CDC) in 1985 introduced Universal precautions to protect HCWs from contact with blood and a number of other body fluids

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visibly contaminated with blood.[3] However, research around stigma and discrimination in health-related settings implicated Universal precautions as a means by which HCWs discriminate against patients because by failing to mainstream Universal precautions in practice, health professionals are making judgment based on individual's health status.[4,5]

As a result, in 1996, CDC revised the infection control practice from Universal precautions to Standard precautions (SP). SPs are the minimum infection prevention practices that apply to all patients regardless of suspected or confirmed infection status of the patient in all settings where health care is delivered.[6] These practices are designed to protect both the HCWs and the patients from nosocomial infections. Thus, SPs are crucial in hospital infection control as well as in issues related to biosafety and security of patients, professionals, and students in direct or indirect health-care delivery. For SP to be effective, consistency of application is of the essence. Hence, a combination of an enabling environment (in terms of regular supply of necessary facilities and equipment) and the willingness by HCWs to observe SP at all times is vital for a successful compliance.

Although SPs' policy was introduced 20 years ago, adherence to these precautions is poor in health-care facilities particularly in resource-limited countries.[7] Hence, HAIs remain a critical challenge for the public health sector. Poor knowledge of infection control practices among HCWs has been noted to hinder compliance with SP.[8] In addition, strengthening SP' training for HCWs is variously recommended as a major means of promoting adherence to SP and protecting HCWs and patients from nosocomial infections.[9,10] Nonavailability of materials, limited organizational support, and lack of knowledge regarding infection control practices among HCWs were some of the factors responsible for poor compliance to SP.[7,8]

Changing current behavior requires knowledge of the factors that can influence HCWs' compliance with SP and implementing programs and preventive actions that contribute to the avoidance of occupational exposure.[10] The objective of the present study is to assess the knowledge and practices of SP among tertiary level HCWs in Enugu, Nigeria. It is also hoped that findings will be of value in determining ways of promoting compliance with SP in all public health institutions in Nigeria.

Methods

The study was descriptive cross-sectional done in October 2014 among HCWs at University of Nigeria Teaching Hospital (UNTH), Ituku-Ozalla, Enugu. The HCWs studied were medical doctors, nurses, laboratory scientists, and hospital attendants/orderlies. These groups of HCWs are known to come in contact with hospital hazards. UNTH is located in Ituku Ozalla a semi-urban community about 30 min drive from the state capital. It is the biggest teaching hospital in the Southeast and South-south regions of Nigeria with about 750-bed spaces and gets referrals from most parts of these two regions. The staff strength is about 5000, and the study population constitutes 30% of the staff strength. The departments and units studied were those ones that handle biohazards, namely, Intensive Care Unit, theater, wards, laboratories, casualty, outpatient departments, and blood bank.

Sample size estimation

A minimum sample size of 380 was calculated using a previous prevalence of personal protective equipment (PPE) use of 55% among HCWs in North Eastern Nigeria.[11] This was however doubled for a better representation of the study population.

Ethical permit

Ethical approval with reference number NHREC/05/01/2008B-FWA00002458-1RB00002323 was obtained from the Ethics Committee of UNTH while informed consent was obtained from the management and staff of UNTH.

Data collection

Multistage sampling technique was used. First stage was selection of departments and units which was done by simple random sampling. Then, for those departments that are more than one in number like the wards, theater and outpatient departments, half of them were selected by simple random sampling. The next stage was selection of the respondents which was done by cluster sampling. Thus, the entire staff in these selected departments were enrolled into the study. Pretested self-administered questionnaires were used to collect data from respondents. Pretesting was done among 20 HCWs (doctors, nurses, laboratory scientists, and orderlies were represented) at the State tertiary health institution in Enugu. Contents of the questionnaire include demographical variables, knowledge/attitude, and practice of SP.

Data analysis

Data were entered and analyzed in Epi-Info version 7 by Centers for Disease Control and Prevention, Atlanta, Georgia. Discrete variables were presented as frequencies. The mean and standard error of the mean were calculate for the age and years of service. The knowledge score was obtained as follows: Each correct answer scored 1 while wrong answer or nonresponse is scored zero. Total

knowledge score = total correct answers divided by total possible correct answers multiplied by 100%. A score of <50% is considered poor, 50%–<70% is fair while 70% and above is considered good. Chi-square was used to identify association between demographic variables/ training and exposure to patient's serum/use of PPEs.

Results

Out 760 possible respondents, 629 agreed to participate in the study giving a response rate of 83%.

Table 1: Sociodemographic distribution of health workers (*n*=629)

Demographic variables	Frequency (%)
Gender	
Female	405 (64.4)
Male	224 (35.6)
Age range	
20-29	137 (21.8)
30-39	253 (40.2)
40-49	158 (25.1)
50-59	81 (12.9)
Marital status	
Married	392 (62.3)
Single	187 (29.7)
Widow/widower	39 (6.2)
Divorced/separated	11 (1.8)
Religion	
Christianity	591 (94.0)
Islam	24 (3.8)
African traditional religion	14 (2.2)
Occupation	
Nurse	290 (46.1)
Doctor	143 (22.7)
Laboratory scientist	136 (21.6)
Orderly/cleaners	60 (9.5)
Location of work	
Ward	256 (40.7)
Laboratory	121 (19.2)
Outpatient department	98 (15.6)
Theater	58 (9.2)
Casualty	43 (6.8)
ICU	20 (3.2)
Blood bank	12 (1.9)
Others	21 (3.3)
Years of service	
1-5	269 (42.8)
6-10	169 (26.9)
11-15	83 (13.2)
16-20	55 (8.7)
21-25	26 (4.1)
26-30	19 (3.0)
31-35	8 (1.3)

Age range: 20-59 (mean±SEM=37.20). Years of service 1-35 (Mean±SEM=8.85=0.299). SEM=Standard error of mean; ICU=Intensive Care Unit

Sociodemographic variables

The number of HCWs studied was 629. They were mostly females (64.4%), married (62.3%), Christians (94%), and within 20–59 years of age range. Majority of the respondents were nurses (46.1%), followed by doctors, 143 (22.7%). The job locations of most respondents were the wards, laboratories and the outpatient departments while the range of years of service was 1–34 years [Table 1].

Knowledge of standard precautions

Over 90% of the respondents have heard of SP, mainly from formal training (62%) or colleagues (25%). A total of 442 (70.3%) could define SP; over 70% knew the indications and could identify most components of SP. However, 272 (43.2%) knew about respiratory etiquette and 21.9% knew of anal or perineal hygiene. Some of the advantages of SP noted were: Protects both HCWs and patients (84.4%), reduces spread of communicable

Table 2: Knowledge and source of information on standard precaution (*n*=629)

Variables	Frequency (%)
Ever heard of SP	594 (94.4)
Main source of information for those who have heard of SP	
Formal training	390 (62.0)
Colleague/friend	157 (25.0)
Media	33 (5.2)
Others	14 (2.2)
Have not heard	35 (5.6)
Correct knowledge of SP	
Definition of SP	442 (70.3)
Components of SP	
Hand hygiene	508 (80.8)
Use of PPE	477 (75.8)
Safe injection practices	471 (74.9)
Safe handling of potentially contaminated equipment or surfaces	451 (71.7)
Respiratory hygiene etiquette	272 (43.2)
Anal/perineal hygiene	138 (21.9)
Indications for SPs	469 (74.6)
Examples of body fluids to be guarded against	501 (79.7)
Advantages of SP	
Protects both health workers and patients	531 (84.4)
Reduced spread of communicable disease	494 (78.5)
Not associated with stigma and discrimination	182 (28.9)
Indications for hand hygiene include	
After contact with blood, body fluids or excreta	431 (68.5)
Before performing any aseptic procedure	379 (60.3)
After glove removal	340 (54.1)
Before touching a patient	287 (45.6)
Before exiting the patient's care area	246 (39.1)

Summary of correct knowledge on SP - total correct response/total possible correct answer multiplied by 100%=3729/5661×100%=65.8% (fair). SPs=Standard precautions; PPE=Personal protective equipment

Table 3: Attitude of health workers to standard precaution

Attitude	Strongly disagree (%)	Disagree (%)	Indifferent (%)	Agree (%)	Strongly agree (%)
Employers should always provide training on SP	3 (0.5)	6 (1.0)	18 (2.9)	152 (24.1)	450 (71.5)
SPs are useful in protecting against hazards in workplace	14 (2.2)	4 (0.6)	17 (2.7)	164 (26.1)	430 (68.4)
SPs are not really necessary in hospitals	386 (61.3)	183 (29.2)	42 (6.7)	9 (1.4)	9 (1.4)
SPs are meant only for theatre workers	397 (63.1)	189 (30.0)	23 (3.7)	13 (2.1)	7 (1.1)

SPs=Standard precautions

Table 4: Practice of standard precautions by health workers

Practice of SP	Frequency (%)
Time to wash or decontaminate hands*	
After removal of gloves	463 (73.6)
Before leaving a patient's care area	208 (33.1)
Before wearing gloves	85 (13.5)
Before touching a patient	77 (12.2)
Before performing an aseptic procedure	72 (11.4)
Contact with patient's blood or other body fluids during work	457 (72.7)
Action taken during the most recent contact with patient's body fluid (*n*=457)	
Washed off fluid with soap, water, and disinfectant	238 (52.1)
Washed off fluid with soap and water	140 (30.5)
Used only an alcohol-based hand sanitizer	56 (12.3)
Washed off fluid with only water	19 (4.2)
Nothing	4 (0.9)
PPE always worn by health workers when working	
Gloves or coveralls	420 (66.8)
Gloves only	336 (53.4)
Gown only	274 (43.6)
Gloves and coveralls	215 (34.2)
Reasons for not always wearing both gloves and coveralls while working* (*n*=414)	
Do not have regular access to PPEs	239 (57.7)
Do not have time to wear them	175 (42.3)
Wearing them make it difficult for me to do my work	104 (25.1)
Do not believe they are really protective	88 (21.3)
Can work safely without them	23 (5.6)
Disposal of used needles and syringes among doctors, nurses and laboratory scientists (*n*=569)	
Recap needle and discard both syringe and needle	301 (52.9)
Discard both syringe and needle into the safety box without recapping	242 (42.5)
Disconnect and discard needle and replace with new needle for another drug administration on the same patient	26 (4.6)
Nurses and cleaners who ensure that manufacturers' instructions are followed while diluting disinfectants used in cleaning hospital surfaces (*n*=350)	223 (63.7)

*Some gave more than one response. PPEs=Personal protective equipment; SPs=Standard precautions

diseases (78.5%), and not associated with stigma and discrimination (28.9%). The total knowledge score was 65.8% (fair) [Table 2].

Attitudes to standard precautions

In general, there a positive attitude toward use SP: Over 90% agreed that SPs are useful in protecting against biohazards in the workplace and that employers should provide SP training for their workers. On the other hand, over 90% disagreed that SPs are not necessary in hospitals and that they are meant for only theater workers [Table 3].

Practice of standard precautions

Most of the respondents wash or decontaminate hands after removal of gloves (73.6%) and before leaving patient's care area (33.1%). More than 70% has been exposed to patient's blood or body fluids and washing the exposed part with water, soap, and disinfectant was the most frequent action (52.1%). Gloves were the most commonly used PPE (53.4%) and the major reason for inconsistent use was unavailability (57.7%). Over 50% recap needles before discarding [Table 4].

Table 5: Association between demographic variables/training and exposure to patient's serum/use of personal protective equipment

Variables	Skin has been exposed to patient's serum while working		Always wear PPEs (gloves or coveralls) while working	
	Yes (*n*=457), *n* (%)	No/cannot remember (*n*=172), *n* (%)	Yes (*n*=420), *n* (%)	No (*n*=209), *n* (%)
Doctor	114 (79.7)	29 (20.3)	84 (58.7)	59 (41.3)
Nurse	221 (76.2)	69 (23.8)	193 (66.7)	97 (33.3)
Laboratory scientist	92 (67.6)	44 (32.4)	112 (82.4)	24 (17.6)
Health attendant/orderly	30 (50.0)	30 (50.0)	31 (51.7)	29 (48.3)
χ^2; *P*	22.65; <0.01		25.22; <0.01	
Years of service				
1-5	184 (68.4)	85 (31.6)	181 (67.3)	88 (32.7)
6-10	120 (71.0)	49 (29.0)	113 (66.9)	56 (33.1)
11-15	59 (71.1)	24 (28.9)	54 (65.1)	29 (34.9)
16-20	49 (89.1)	6 (10.9)	38 (69.1)	17 (30.9)
21-25	22 (84.6)	4 (15.4)	19 (73.1)	7 (26.9)
26-30	17 (89.5)	2 (10.5)	10 (52.6)	9 (41.4)
31-35	6 (75.0)	2 (25.0)	5 (62.5)	3 (37.5)
χ^2; *P*	45.37; <0.01		2.52; 0.87	
Trained on the use of protective equipment				
Yes	342 (73.4)	124 (26.6)	325 (69.7)	141 (30.3)
No	115 (70.6)	48 (29.4)	95 (58.3)	68 (41.7)
χ^2; *P*	0.49; 0.48		7.15; <0.01	
Trained on SP				
Yes	286 (73.3)	104 (26.7)	276 (70.8)	114 (29.2)
No	171 (71.5)	68 (28.5)	144 (60.3)	95 (39.7)
χ^2; *P*	0.24;0.63		7.39; <0.01	

PPEs=Personal protective equipment; SP=Standard precaution

Association between demographic variables/training and exposure to patient's serum/use of personal protective equipment

Exposure to patients' serum was significantly higher among doctors and nurses $P < 0.05$, while the use of PPEs was highest among the laboratory scientists (82.4%). Those who were trained on SP (70.8%) and PPE (69.8%) were significantly more likely to always use PPEs, $P < 0.01$ [Table 5]. However, training had no significant effect on respondents' exposure to patients' serum.

Discussion

Almost half of the respondents in the present study were nurses. This is similar to a previous study conducted in France where nurses constituted 44% of the group of HCWs studied and another study in Nigeria in which nurses were 50.7% of all the hospital workers studied and this appears to be a reflection of the proportion of nurses among HCWs in general.[12,13] Awareness of SP was quite high which is not surprising since the policy on SP was introduced a long time ago. A slightly higher level was reported in the United Arab Emirates where 97% of the respondents were familiar with the concept.[14]

Detailed knowledge of SP was fair high in the present study. A similar level of knowledge has also been reported.[15] This shows the degree of interest on SP by HCWs which is most likely associated with their hope in SP as key to infection control in public health settings. In line with previous findings, most of the respondents in the present study were positively disposed to SP.[13,16] Again, the displayed positive attitude could be as a result of their faith in SP because the SP policy is indeed a good package designed to prevent the spread of nosocomial infections and ensure safety of HCWs while at work.

Hand hygiene was suboptimally practiced which is not good because aside from being an important component of SP, regular hand hygiene is very crucial in infection control. Present finding is significantly lower than the previous report from south India in which the practice of hand hygiene was 95%.[17] The probable reason for the poor practice could be irregular access to materials for hand hygiene. On the other hand, it could be due to nonchalance on the part of HCWs who may believe that hand hygiene before patient's care is irrelevant.

As has been reported previously, most of the respondents who came in contact with patient's blood or body fluids washed off the exposed part immediately.[18] Doctors

and nurses were more likely to be exposed to patient's body fluids. This could be because they work in close proximity with the patients than lab scientists but it could also be as a result of the less likelihood to use PPEs by the doctors and nurses. Thus, strict compliance to SP is of utmost importance in the prevention of health workers' contact with patients' body fluids.

Only 34% of respondents from the present study regularly wear gloves and coveralls while working. Main reasons given for this poor use of PPEs were: irregular access to PPEs, lack of time to wear them and that wearing them interferes with clinical duties. Similar reasons have been identified by several studies.[13,15,18] This shows the need for maximum cooperation between management and HCWs for the full implementation of SP. On the one hand, the management should create an enabling environment by regularly providing PPEs and other required resources as well as monitoring their use while the HCWs on the other hand, should ensure absolute compliance by following prescribed protocols and consistently making use of available resources.

Eliminating needle recapping is one of the effective measures to prevent infections from occupational exposure of HCWs to blood.[19] Surprisingly, more than half of the respondents still recapped needles before discard. Similar unfortunate trend has been reported, and this is not good for the safety of the HCWs as recapping has been noted to be the most common cause of needle-stick injuries.[20,21] Thus, concerted efforts should be made to completely eliminate this dangerous old habit from the health-care industry.

Training of HCWs is a known predictor for SP practice.[22] In agreement with this, significantly more respondents who were trained on either SP or use of PPE used PPEs while working when compared with their counterparts who were not trained. Training serves as a reminder of previous knowledge and revitalizes good practice. Contrary to expectations, more of the trained HCWs had contacts with patients' body fluids, but this could be related to the degree of exposure rather than compliance to SP.

Conclusions/Recommendations

Knowledge was fair with positive attitude toward use to SP. However, the practice was poor. Main reason for the poor practice was the unavailability of required resources. Training was significantly associated with the use of PPEs. It is therefore recommended that regular SP training should be organized for HCWs and that resources for its full implementation should be regularly supplied.

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Conflicts of interest

There are no conflicts of interest.

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