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Original Research Article

Use of Personal Protective Equipment among Health Workers in a Tertiary Health Institution, South East Nigeria: Pre-Ebola Period

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ABSTRACT

Background: Hospital acquired (nosocomial) infections are common in developing countries with healthcare workers often dying from these infections. Use of personal protective equipment is an established method of reducing these infections. Present study aimed at identifying the compliance to using personal protective equipments among hospital workers in a tertiary hospital, Southeast Nigeria.
Study Design: In 2014, a descriptive cross-sectional method was used to obtain information from health workers in a tertiary institution in South-east, Nigeria. Study instrument was semi-structured self administered questionnaire. Stratified sampling method was used to select the study population.
Results: Out of these 511 health workers, 59% were females; 69% were married and 41% were within the age range of 30 - 39 years. Most of the respondents were nurses (40%). Most (89%) had heard of personal protective equipments but only 38% could correctly define it. Although almost half 45% had received training on personal protective equipments majority 96% had not seen any policy on personal protective equipments. Only 22 (4.3%) of health workers claim to always wear the appropriate personal protective equipments during work. Availability of personal protective equipments (59%) is the commonest conditions that enable respondents comply with use of personal protective equipments. The commonest inhibiting factor to use of PPEs even when available was perception of low risk to hazard.
Conclusion: Training, provision and use of personal protective equipments is poor in study area. There should be development of health safety policies, regular training on personal protective equipments, provision of personal protective equipments and changing health care attitude to "think safety first."

Keywords: nosocomial, infections, personal protective equipment, Nigeria, healthcare, training.

INTRODUCTION

The use of appropriate and good quality personal protective equipment in workplaces cannot be over emphasized. Several years ago this need was highlighted by several physicians like Sir Thomas Morrison Legge. He identified the roles of the employer of labour and those of the employee in reducing workplace hazards and consequently achieving a healthy workplace environment. Indeed protection of workers from workplace hazards is crucial to reduce mortality and morbidity in the workplace. Many of these morbidities and mortalities occur long after the workman has left the work. [1] Hence besides other control measures it becomes important to assess compliance of the employer/employee with personal protective equipment (PPE).

Personal Protective Equipment (PPE) or Personal Protective Devices

(PPDs) are designed to protect employees from serious workplace injuries or illnesses resulting from contact with chemical, radiological, physical, electrical, mechanical, or other workplace hazards. They include face shields, safety glasses/goggles, hats/safety helmets, safety shoes, coveralls, gloves, ear protection (ear plugs and muffs), vests, respirators, etc. [2] Often, more than one of these PPEs are worn at same time in workplace depending on the work exposure e.g. a health worker may need gloves, facemask, apron, etc depending on the activity being carried out.

The need for these PPEs has increased over the years with increasing awareness of workplace hazards, and the difficulties associated with overdependence on other control measures which for some agents cannot be totally eliminated or even monitored. This is especially important in hospital settings where workers are often exposed to biohazards and other infectious agents like hepatitis B, hepatitis C and HIV. Indeed, health facilities are rife with very hazardous agents: just recently Ebola viral disease, Lassa fever and other infections caused high mortality among health workers in the affected countries in African sub-region. Control of Ebola became particularly difficult and several measures including use of appropriate PPEs were used to contain it. Apart from biohazards, in hospitals there are departments that work on radioactive materials (radiology department) and others that work on both biohazards and chemicals (laboratory department). Some hospitals have therefore established policies on PPE. [3-7] Interestingly most online available hospital policies on PPE are those of developed countries and paucity of existence of such in developing countries. However, no matter the environment it is generally recognized that while in some hospital work environments, the non-compliance to PPE policy may not result in significant health problems, for some other occupations failure to comply with PPE could determine the difference between life and disability or even death e.g. in epidemics of SARS, Lassa fever, Ebola and MERS.

Several questions are therefore raised: Do the health workers know about workplace hazards? Do they know the appropriate PPE and how to use them? What is their attitude to and utilization of these PPE? What factors influence utilization of these PPE? Has the employer done everything (Sir Thomas Legge aphorism) by providing PPE and educating the employee on work hazards and how to use PPE? If yes then why are some health workers not wearing them? The relevance of this study is to assist in highlighting what gap exists between the employer and utilization of the PPEs by health workers.

MATERIALS AND METHODS

The study was a descriptive cross-sectional study carried out in the first quarter of 201 and involved some categories of staff known to come in contact with hospital hazards. University of Nigeria Teaching Hospital (UNTH) was the study site and is also the biggest teaching hospital in the South east and South-south of Nigeria and gets referrals from most parts of these two regions (South-East and South-South regions). The staff strength is about 5,000. The departments studied are those ones that handle biohazards, chemicals or radiation: medical, surgical, radiology, laboratory, orderlies, and mortuary.

Sample Size estimation: A minimum sample size of 377 was calculated using a previous prevalence of PPE utilization (wearing protective clothes) of 43.4% among nurses in Cyprus. [8] This was however increased by 50% (giving 566) to increase on the power and enroll at least 10% of study population.

Ethical Permit: Ethical permit was obtained from the Ethics Committee of University of Nigeria Nsukka while informed consent was obtained from the management and staff of University of Nigeria Teaching Hospital.

Data Collection: Proportionate sample of the staff in the departments were selected by

balloting. Following informed consent, pre-tested self administered questionnaires were used to collect data from respondents. Contents of the questionnaire included demography e.g. age, sex, educational level and department. Others include work experience, knowledge, attitude and use of PPEs in workplace and factors influencing utilization of PPEs.

Data Analysis: Data were entered and analyzed in Statistical Package for Social sciences (SPSS) version 17. Data were presented as frequency tables.

Study Limitations: The study was among health workers in tertiary health facility and cannot be generalized to other healthcare levels i.e. primary and secondary. Also the healthcare workers in private sectors were not included in present work.

RESULTS

From an initial calculated 566 only 511 had complete data and hence were analyzed giving a response rate of 90.3%. Out of these 511 health workers, 303 (59.3%) were females. Most were married (68.5%) and within the age range of 30 - 39 years (41.3%). Majority (90.6%) had attended tertiary education and of the professions studied most were nurses (40.1%) followed by laboratory scientists (25.4) and medical doctors (24.5%). Medical department (39.7%) and laboratory units (25.8%) were among the commonest departments involved in the study. Most of the workers had spent 5years or less in present employment. Table 1

In Table 2, 455 (89.0%) had heard of PPEs and main source of information to most was through their employers (49.0%). However only 196 (38.4%) could correctly define PPEs. About 44.8% had received training on PPEs but most of these (43.2%) had been more than five years ago. Most of the respondents (38.7%) were not aware of any hospital policy on PPEs and even greater percent (95.9%) had not seen any hospital policy. Only 22 (4.3%) of health workers claim to always wear the appropriate PPEs during work while most (76.1%) sometimes wear the PPEs during work. Availability of PPEs and when working in a place with obvious hazards are the commonest conditions that enable respondents comply with use of PPEs (58.9% and 57.9% respectively). Fewer people (12.1%) comply with PPEs when punishment is attached to non-compliance.

The commonest inhibiting factors to use of PPEs even when available are perception of low risk to hazard, forgetfulness and disturbance with work activity (74.0%, 39.9% and 22.5% respectively) (Table 3). Provision of PPEs, continued education on use of PPEs and attachment of punishment to non-compliance were commonest recommendations by the respondents on improving use of PPEs (Table 4).

Table 1: Demographic variable of health workers

Variables	Frequency N = 511	Percent
Sex		
Male	208	40.7
Female	303	59.3
Age range		
20 - 29	119	23.3
30 - 39	211	41.3
40 - 49	141	27.6
50 - 59	40	7.8
Marital status		
Single	143	28.0
Married	350	68.5
Divorced/Separated	5	1.0
Widow	13	2.5
Educational level		
No formal education	2	0.4
Primary	7	1.4
Secondary	39	7.6
Tertiary	463	90.6
Profession		
Medical doctor	125	24.5
Nurse	205	40.1
Lab. Scientist	130	25.4
Mortician	4	0.8
orderlies	47	9.2
Department		
Surgery	49	9.6
Medical	203	39.7
Radiation medicine	9	1.8
Dentistry	4	0.8
Laboratory	132	25.8
Orderlies	34	6.7
Others	80	15.6
Number of years worked (yrs)		
1 - 5	254	49.7
6 - 10	145	28.4
11 - 15	54	10.6
16 - 20	37	7.2
21 - 25	15	2.9
26 - 30	4	0.8
31 - 35	2	0.4

Age range: 20 - 59 years

Table 2: Awareness, training and presence of health policy on PPEs

	Frequency (N = 511)	Percent
Respondents who have heard of PPEs		
Yes	455	89.0
No	56	11.0
Main source of information	**N = 455**	
Employer	223	49.0
Friends	14	3.1
Mass media	65	14.3
Colleague	62	13.6
others	91	20.0
Definition of PPEs	**N = 511**	
Correctly defined PPEs	196	38.4
Wrong definition of PPEs	315	61.6
Received formal training on PPEs		
Yes	229	44.8
No	282	55.2
When the training took place (yrs)	**N = 229**	
In the last 1 year ago	49	21.4
More than 1 year but less than 5 years ago	81	35.4
More than 5 years ago	99	43.2
Presence of hospital policy on PPEs	**N = 511**	
Yes	172	33.7
No	141	27.6
I don't know	198	38.7
Staff who have seen hospital policy on PPEs	**N = 511**	
Yes	31	6.1
No	480	95.9

Table 3: Use of PPEs by health workers and Factors that will enable or discourage compliance

Frequency of use of all necessary PPEs during work	Number (N = 511)	Percent (100.0)
Always (100% of the time)	22	4.3
Frequently (75% - less than 100% of the time)	63	12.3
Sometimes (50% - less than 75% of the time)	389	76.1
Rarely (less than 50% of the time)	37	7.3
Never	0	0.0
Enabling factors to use of PPEs		
If the PPE is always available	301	58.9
If I am working in a Place that has obvious hazards	296	57.9
If there is an ongoing infection	155	30.3
Provision of enough information on the PPE	114	22.3
Attachment of punishment for not wearing it	62	12.1
If other workers comply with wearing it	28	5.5
If PPEs are available inhibiting factors to its regular use		
If the risk of infection is low	378	74.0
Forgetfulness	204	39.9
Some are ill-fitting and disturb work process	115	22.5
If the one available cannot protect me	57	11.2
Some of the PPEs are uncomfortable and ill-fitting	36	7.0
Not knowing how to use it	21	4.1
None, I will always wear it if available	109	21.3

Some respondents gave more than one option

Table 4: Recommendations on improving compliance with PPEs

Recommendations	Frequency N = 511	Percent (%)
Always make PPEs available	459	89.8
Continuous education of use of PPEs	318	62.2
Attach punishment to non-compliance	297	58.1
Attach incentive to compliance	114	22.3
Provide more suitable PPEs	98	19.2
Others	17	3.3

DISCUSSION

Present study set out to assess the use of PPEs among health workers in a tertiary institution in a developing country setting. This is because proper use of appropriate PPEs is an important standard precaution in preventing the ever increasing presence of nosocomial infections especially in these countries. These PPEs are mainly to protect the worker from biological and chemical hazards to which they are exposed. This study was carried out before the Ebola epidemic that occurred in 2014 in Nigeria and some other countries especially in the West African sub-region.

Despite the importance of PPEs in disease prevention, deliberate efforts have not been made by employers to educate

their workers on their use. Indeed some researchers opined that few companies in Nigeria recognize occupational health and safety. Such companies are the big multinationals who run occupational and safety policies of their parent countries of origin. [9,10]

Present study observed that most of the health workers had heard of PPEs but only a few could define it. This study was among health workers of different groups and training like doctors, nurses, lab scientists, morticians and hospital orderlies. This could explain the poor result obtained in definition of PPE despite being aware of its presence. Level of knowledge on PPEs from previous studies ranged from poor to good. Among several different professions the level of knowledge, attitude and use of appropriate PPEs was poor. [11-14] A study in West Indies showed most of the health workers was knowledgeable on universal precautions. [15] Another on funeral home workers [16] also showed that they were knowledgeable on use of common PPEs relevant to their work.

It is doubtful if most health facilities have their health safety and environment policy. Present study did not set out to confirm presence or absence of this. However only very few of the workers claimed to have seen one. Nigeria has Labour, Safety, Health and Welfare Bill of 2012 which to the knowledge of the researchers is yet to be passed into law. There is however, a National Policy on Injection Safety and Health Care Waste management. [17]

Presence of policies and good knowledge of PPEs are not enough in infection control and do not equate to compliance. Training on how to use them is vital. Indeed, observation during the last Ebola outbreak shed light on the poor training and use of PPEs where health workers frequently contaminated themselves. [18] In present study, though about 44.8% had ever received training on PPEs only 49 (21.4% of these) had received training within the last 1 year of study. In a previous study a much higher proportion (90.9%) had received training in the past 1 year of the study. The difference may be because of the following reasons: that study was done in developed country where more emphasis is on safety and it was done during the period of influenza A H1N1 epidemic. [19] The employer may not always be to blame for lack of training: another researcher opined that "healthcare workers may feel little sense of urgency on the issue in the absence of a life-threatening infection." [18]

Another important factor to utilization of PPE is availability of product. In most situations more than one PPE is required for protection e.g. facemask, gloves and coveralls may be necessary at same time for standard precaution. Appropriate PPEs are hardly always available in most facilities in Nigeria when needed. Conditions are often worse in primary health care centers compared to secondary and tertiary health centers. This may be because of higher level of manpower in the secondary and tertiary facilities and consequently increased awareness and demand for PPEs. Another reason may be because of increased funding from state and federal governments to the secondary and tertiary health centers respectively. Present study was in a tertiary hospital which is expected to always have these PPEs being readily accessible. Findings however show that only very few workers reported to always have these facilities when required.

Similar findings were obtained from previous work which reported inadequate provision of PPEs to health workers. [15] Indeed shortage and improper use of PPEs when available were observed to be contributing factors to the challenge of control of previous Ebola epidemic. [18] Similarly a study done even among non-health professionals showed only 29.7% of sugar producers had complete PPEs. [20] Poor utilization of PPEs was however not always reported in previous studies: in a study there was high use of PPEs such as gloves and gowns among nurses. [21]

In present study the commonest reasons for not wearing the PPEs even when available include perception of low risk to infection, forgetfulness and if the PPEs is ill-fitness. Unfortunately fit test for the PPEs is not done in the study environment unlike some other places where it is mandatory. Many other reasons for non-compliances have been suggested by other researchers. One of the reasons is healthcare worker attitude toward PPE for routine pathogens. [22] Indeed a study observed that perception of susceptibility to and severity of exposure risks in these professionals' work environment were strong determinants to utilization of PPEs. [3] A different view from yet another study opined that professionals' knowledge on risks in the work environment does not always guarantee compliance with the use of protective measures. [4] A study among nursing students showed only 25% compliance with PPE and safety regulations. [23] Other reasons include non-availability, [3] work overload, stress, [3] interference with patient care, lack of time and feeling that the PPE was inefficient. [24] Similarly, another study on emergency medical technicians done during SARS indicated the following reasons for non-compliance to air filter: emergency nature of condition, PPE not necessary or required for prevention and PPEs impaired movement. [25]

CONCLUSION AND RECOMMENDATIONS

The provision, training and utilization of PPEs are poor and this can be improved by developing health safety policies, regular training on PPEs, provision of PPEs and changing health care attitude to think safety first." More studies are needed to assess utilization of these PPEs post-Ebola era.

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