Original Article

Knowledge of Ebola Virus Disease Prevention and its Intra-Epidemic Practice among Health Workers of a Tertiary Health Care Facility in North-Western Nigeria

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ABSTRACT

Background: Ebola virus disease (EVD) is a highly contagious, life-threatening viral illness characterised by haemorrhagic symptoms in late stage of the disease. A substantial number of healthcare personnel acquired the illness in the 2014 outbreak in West Africa. Health workers (HCWs) have 21–32 higher chances of contracting the disease compared to the general adult population. In Nigeria, three out of the first four casualties were a doctor and two nurses.

Objectives: The study was conducted to assess the knowledge and intra-epidemic practices regarding the prevention of EVD among healthcare workers in a healthcare facility in northwestern Nigeria.

Methods: This was a cross-sectional descriptive study, in which systematic sampling technique was used to select the respondents. Data were analysed using Statistical Package for Social Sciences software (version 21). A structured self-administered questionnaire containing close-ended questions was used. It has three sections: sociodemographic data, knowledge of prevention of EVD and the practice of prevention of EVD.

Results: Out of 150 respondents studied, 91 (60.6%) had good knowledge of how to prevent EVD. Despite the good knowledge of how to prevent EVD, 72 (48.0%) respondents did not practice comprehensive prevention of EVD during the epidemic. There was a statistically significant association between the professions of the respondents and their practice of prevention of EVD ($P = 0.0279$). Practice of comprehensive EVD prevention decreases with professional rank and is lower among junior HCWs.

Conclusion: For effective control of future outbreaks, there is a need to adopt infection prevention control strategies that will improve intra-epidemic preventive practices among HCWs, especially the junior HCWs.

Key words: Ebola virus disease, health workers, knowledge, Nigeria, practices, prevention

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INTRODUCTION

Ebola virus disease (EVD) is a highly contagious, life-threatening viral haemorrhagic fever (VHF) that is characterised by haemorrhagic symptoms in late stage of the disease. It is caused by infection with Ebola virus which belongs to the family called *Filoviridae*. The case fatality rate of EVD in humans is up to 90%.[1]

Ebola virus is introduced into the human population through close contact with the blood, secretions, organs or other bodily fluids of infected animals.[2] It then spreads in the community through human-to-human transmission, with infection resulting from direct contact with the blood, secretions, organs or other bodily fluids through broken skin or mucous membranes of infected people and indirect contact with environments contaminated with such fluids. Burial ceremonies in which mourners have direct contact with the body of the deceased person can also play a role in the transmission of EVD.[2]

An outbreak of EVD is a global health emergency, in which everybody and every nation is at risk. The 2014 outbreak of

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EVD in West Africa affected several countries, including Guinea, Liberia, Sierra Leone, Nigeria, Senegal and Mali. It started in December 2013 and ended on 17th March 2016 when the World Health Organization (WHO) declared the end of the EVD flare-up in Sierra Leone after 42 days passed since the last Ebola patient tested negative.[3] During the outbreak, there were a total of 15,261 laboratory-confirmed cases of EVD and 11,325 deaths globally due to the disease. In Nigeria, there were 19 laboratory-confirmed cases with a total of eight deaths.[3] Nigeria was declared free of EVD by the WHO on 20th October 2014.[4]

A substantial number of healthcare personnel acquired EVD in the 2014 outbreak. Health Care Workers (HCWs) have 21–32 higher chances of contracting the disease compared to the general adult population.[5] In Sierra Leone, the incidence of EVD was 103 folds higher in HCWs than that in the general population.[6] HCWs are described as amplifiers of the disease. In Nigeria, three out of the first four casualties, excluding the index case, were HCWs comprising a doctor and two nurses.[7]

The high prevalence of the disease among HCWs is due to the fact that caring for patients with EVD is a complex process and the patients are severely acutely ill and need constant monitoring by health care staff. However, to safely monitor the patients, HCWs need comprehensive protections to avoid skin contact or accidental ingestion of fluids expelled by patients with EVD.[8] Previous studies showed poor knowledge of prevention of VHFs and poor infection prevention among HCWs.[2] During the 1995 outbreak of EVD in Kikwit, Democratic Republic of Congo, 80 (25.4%) of the 315 patients were healthcare personnel, and all the HCWs who developed EVD had provided care to patients with EVD without appropriate contact precautions.[9] During the 2007–2008 outbreak of EVD in Bundibugyo district, western Uganda, 14 HCWs were infected with Ebola virus before implementation of standard precautions and barrier nursing; none became infected after the implementation of the standard precautions.[10]

The consistent and appropriate use of routine practices (RPs) remains the best defence against the transmission of EVD and other infections.[11] RP includes the use of hand hygiene, cleaning and disinfection of all shared equipment, regular environmental cleaning using a hospital-approved disinfectant, meticulous attention to safety around the use of needles and sharp objects and a complete and careful risk assessment performed before the encounter of any patient.[11] Healthcare providers must conduct a risk assessment with each patient to evaluate their potential exposure to blood and/or body fluids. This should be used to determine the need for additional personal protective equipment.[11]

During the epidemic in Nigeria, suspected cases of EVD were seen at health facilities across the country. The present study was therefore carried out 2 weeks after the EVD epidemic to assess the knowledge and claimed intra-epidemic practices regarding the prevention of EVD amongst HCWs in a healthcare facility in northwestern Nigeria.

MATERIALS AND METHODS

The study was conducted at Ahmadu Bello University Teaching Hospital, Zaria, Nigeria. The facility has 12 wards: male medical, female medical, male surgical female surgical, orthopaedics, maternity, labour, psychiatric, paediatric medical, paediatric surgical, special care baby unit and eye wards. It also has many laboratories which include haematology, microbiology, chemical pathology, histopathology, immunology and anti-retroviral therapy laboratories. Clinics include general outpatient department, medicine, surgery, gynaecology, family planning, obstetrics, ophthalmology, orthopaedics, ear, nose and throat and paediatrics. In addition, it has three operation theatres, one Intensive Care Unit and one radiology unit. Respondents to this descriptive cross-sectional study were HCWs of the facility. The study was conducted in November 2014, 2 weeks after Nigeria was declared free of EVD.

The respondents were stratified into various professional groups. The respondents were systematically selected from each professional through the use of a staff list until the required sample size was reached for every stratum.

A minimum sample size of 138 was obtained using the formula $n = z^2\ p\ q/d^2$, where p is the proportion of HCWs (90%) in a public health facility known to practice standard precaution of wearing personal protective equipment: gowns for prevention against infection.[12] Finite population correction was done.[13]

A structured self-administered questionnaire containing close-ended questions was given to the respondents. The questionnaire was divided into three sections: sociodemographic data of respondents, knowledge of the respondents on prevention of EVD and the practice of prevention of EVD by the respondents.

Fourteen questions were used to assess the knowledge of EVD prevention. Each correct response carries 1 mark and incorrect response carries 0 mark. The maximum score obtainable was 14 and the minimum was 0. The mean (standard deviation [SD]) of scores on knowledge was calculated. Those who scored points above the mean knowledge score were considered as having good knowledge of EVD prevention while those who scored below it were considered as having poor knowledge of EVD prevention.

For the present study, good practice of EVD prevention was when a respondent was consistent with all the components of RP: hand hygiene, cleaning and disinfection of all shared equipment, regular environmental cleaning using a hospital-approved disinfectant, meticulous attention to safety around the use of needles and sharp objects and a complete and careful risk assessment performed prior to any patient encounter.

Informed consent to participate in the study was obtained from each respondent. Respondents were assured that the information obtained was going to be solely used for academic purposes. They were also assured of strict confidentiality.

Data analysis

Data were manually cleaned, coded and analysed using version 21 of Statistical Package for Social Sciences software, developed by IBM Corp. Released 2012. IBM SPSS Statistics for Windows, Version 21.0. Armonk, NY, USA. The results are presented in tabular format. Chi-square test was used to assess association between two discrete variables at 95% confidence interval with alpha level of significance set at $P < 0.05$.

RESULTS

Table I shows distribution of the respondents in relation to age, sex, religion, ethnic groups and professional groups. The age range of respondents was between 27 and 68 years and the mean age was 33.4 (5.9) years. Eighty-one (54.0%) respondents were aged between 30 and 39 years. The respondents consisted of 80 (53.3%) nurses, 34 (22.7%) doctors, 24 (19.0%) health assistants, 9 (6.0%) medical laboratory staffs and 3 (2.0%) pharmacists. There were 90 (60.0%) males and 60 (40.0%) females, giving a male:female ratio of 1.5:1.

Table II compares proportion of the professional groups with good and poor knowledge of EVD prevention. The overall mean (SD) of scores of knowledge was 14 (2.84). As shown in Table II, 91 (60.7%) respondents had a good knowledge of the prevention of EVD while 59 (39.3%) had a poor knowledge of prevention. From the inter-professional comparison perspective, 20 (58.8%) of the 34 medical doctors and 61 (76.3%) of the 80 nurses had a good knowledge of the prevention of EVD while only 6 (25.0%) of the 24 health assistants, 3 (33.3%) of the 9 laboratory staff and 1 (33.3%) of the 3 pharmacists had a good knowledge of the prevention of EVD. Although the numbers in some groups were small, there was a statistically significant association between having a good knowledge of prevention of EVD and the profession of respondents with nurses and doctors having higher proportions of respondents with good knowledge than the other groups ($P < 0.001$).

Table III compares the practice of EVD prevention among the various professional groups. Overall, 78 (52.0%) HCWs practiced prevention of EVD, while the remaining 72 (48.0%) did not practice prevention of EVD. Among the eighty nurses, 48 (60.0%) practiced prevention of EVD, while 16 (47.1%), 10 (41.7%), 3 (33.3%) and 1 (33.3%) of the medical doctors, health assistants, laboratory staff and pharmacists practiced prevention of EVD, respectively. There was a statistically significant association between professional groups' practice of prevention of EVD ($P = 0.0279$).

DISCUSSION

In the present study, the knowledge of HCWs on prevention of EVD and intra-epidemic practice of HCWs were assessed. Findings in the present study revealed that 60.7% of the respondents had a good knowledge of prevention of EVD, while 39.3% had a poor knowledge of EVD prevention.

Table I: Distribution of respondents by age, sex, religion, ethnicity and subspeciality

	n (%)
Age (years)	
20-29	47 (31.3)
30-39	81 (54.0)
40-49	20 (13.3)
>50	2 (1.3)
Sex	
Males	90 (60.0)
Females	60 (40.0)
Religion	
Islam	96 (64.0)
Christianity	54 (36.0)
Ethnic groups	
Hausa	64 (42.7)
Yoruba	32 (21.3)
Igbo	10 (6.7)
Others	44 (29.3)
Professional groups	
Doctor	34 (22.7)
Nurse	80 (53.3)
Health assistant	24 (16.0)
Laboratory staff	9 (6.0)
Pharmacist	3 (2.0)

Table II: Association between speciality of respondents and their knowledge of Ebola virus disease prevention

Professional groups	Knowledge of EVD prevention		
	Good, *n* (%)	Poor, *n* (%)	Total, *n* (%)
Doctors	20 (58.8)	14 (41.2)	34 (22.7)
Nurses	61 (76.3)	19 (23.7)	80 (53.3)
Health assistants	6 (25.0)	18 (75.0)	24 (16.0)
Laboratory staff	3 (33.3)	6 (66.7)	9 (6.0)
Pharmacists	1 (33.3)	2 (66.7)	3 (2.0)
Total	91 (60.6)	59 (39.3)	150 (100.0)

χ^2=36.0, df=8, P<0.001. EVD: Ebola virus disease

Table III: Comparison of practice of prevention of Ebola virus disease between various professional groups

Professional groups	Practice of prevention of EVD		
	No, *n* (%)	Yes, *n* (%)	Total, *n* (%)
Doctors	18 (52.9)	16 (47.1)	34 (22.7)
Nurses	32 (40.0)	48 (60.0)	80 (53.3)
Health assistants	14 (58.3)	10 (41.7)	24 (16.0)
Laboratory staff	6 (66.7)	3 (33.3)	9 (6.0)
Pharmacists	2 (66.7)	1 (33.3)	3 (2.0)
Total	72 (48.0)	78 (52.0)	150 (100.0)

χ^2=5.09, df=4, P=0.0279. EVD: Ebola virus disease

Since EVD is associated with very high fatality rate, good knowledge of prevention EVD in only about 60% of the HCWs was not encouraging. What is needed to prevent such a highly

infectious disease is good knowledge among all HCWs because anything less may lead to catastrophic consequences.[14] Apart from doctors and nurses, majority of the other HCWs such as laboratory staff, pharmacists and health assistants had poor knowledge of prevention of EVD. This finding was consistent with the findings in the study by Kakade[15] in 2012, in which only 18.9% of junior HCWs had good knowledge regarding the prevention of dengue fever.[15] The implication of this finding is that junior HCWs need more health education on prevention of EVD. Lack of such knowledge may result in widespread infection to HCWs and consequently to the general public with resultant higher casualties. This is because HCWs are amplifiers of the disease.[16]

There was a wide gap between the knowledge of prevention of EVD and the actual practice among respondents. While a little over 52% of the respondents were practicing prevention of EVD with all patients, this level of practice was however lower than that obtained among HCWs in Lagos State, Nigeria, where almost 90% of the HCWs practiced preventive measures against EVD with all their patients.[17] A possible explanation for the higher level of practice in Lagos compared to the findings in the present study (Kaduna, the present study area) is that there was no confirmed case of EVD in Kaduna, the study area, whereas, several cases of EVD were recorded in Lagos. Moreover, the relatively poor disposition to precautions, even in Lagos and in the present study area, is unacceptable for a highly contagious disease such as EVD. What is required is that 100% of facilities must comply with the minimum standards of infection prevention and control (IPC).[18]

One limitation of the present study is that, due to occupational desirability, some respondents may claim to be practicing prevention of EVD when in reality they were not. The other limitation of the study was the absence of a patient with diagnosis of EVD in the study facility, which may result in complacence in the practice of prevention of EVD.

CONCLUSION

The results indicated that, during the EVD epidemic, practice of preventive measures was low despite a good EVD prevention knowledge amongst most of the professional groups of respondents. This wide gap between knowledge of EVD prevention and its practice depicts a problem in the IPC standard in the study facility and in the emergency preparedness of the HCWs. There is a need to adopt strategies that will improve intra-epidemic IPC practices, especially among the junior HCWs, even in the absence of any diagnosed EVD case.

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Conflicts of interest

There are no conflicts of interest.

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