Evaluation of clinicians' reporting proficiency and their risk perceptions of Ebola virus disease in Ebonyi State, Nigeria

Nnennaya Anthony Ajayi[1], Chiedozie Kingsley Ojide[2], Immanuel Anthony Ajayi[3], Kingsley Nnanna Ukwaja[4,]*

Abstract

Introduction **Ebola virus disease (EVD) is a highly contagious infection with a high case fatality rate. Thus, there is a crucial need for early detection and reporting of any individual suspected to have EVD in order to facilitate containment strategies. The aim of our study was to evaluate clinicians' reporting proficiency and their risk perceptions of EVD in Ebonyi State, Nigeria.**

Methods **We performed a descriptive cross-sectional study conducted among clinicians. Consenting clinicians completed a structured questionnaire on the reporting of and their risk perceptions about EVD. Predictors of reporting proficiency and risk perceptions of EVD were identified using multivariable logistic regression analysis.**

Results **A total of 398 clinicians completed the survey, 312 (78.4%) were male. The average duration of the respondent's clinical practice was 5.0, 8.0, and 8.9 years for those working in primary, secondary and tertiary hospitals, respectively. The overall mean±SD knowledge score for proficiency in reporting was 4.4±0.6 (out of a maximum of 5), and 380 (95.5%) of the respondents had a good knowledge of the modalities of reporting suspected EVD cases. The overall mean±SD risk perception score was 5.6±1.2 (out of a maximum of 10) and only 202 (50.8%) of the respondents had accurate risk estimates towards EVD control. Only male sex was a predictor of accurate risk perception of EVD (aOR 1.7, 95%CI: 1.1-2.9).**

Conclusion **There was a high level of knowledge of reporting modalities regarding EVD among the clinicians; however, only approximately half of them had accurate risk perception towards EVD. The gaps identified should inform post-EVD control strategies.**

Keywords **Ebola virus disease, clinicians, preparedness, notification, reporting, risk perceptions, Nigeria.**

Introduction

The recent Ebola virus disease (EVD) epidemic infected a total of 28,616 people in Guinea, Liberia and Sierra Leone, with 11,310 deaths.[1] As the most widespread of any EVD epidemic, it swept across six West African countries with case fatality rates reported as high as 70%, and up to 60% among hospitalized patients.[1] Like most other viral hemorrhagic fevers, EVD could easily be transmitted between persons and even among health workers if proper personal protective measures are not instituted.[2-5] The World Health Organization (WHO) reported that healthcare workers (HCWs) could be at a 21 to 32 fold higher risk of EVD infection compared to the general population, and this was associated with high case fatality rates.[6] Healthcare delivery

Received: 24 April 2017; revised: 15 August 2017; accepted: 17 August 2017.

[1]MBBS, Department of Internal Medicine, Federal Teaching Hospital, PMB 102, Abakaliki, Ebonyi State, Nigeria; [2]MBBS, MSc, Department of Medical Microbiology, Federal Teaching Hospital, PMB 102, Abakaliki, Ebonyi State, Nigeria; [3]MBBS, Department of Internal Medicine, Federal Teaching Hospital, PMB 102, Abakaliki, Ebonyi State, Nigeria; [4]MBBS, MSc, Department of Internal Medicine, Federal Teaching Hospital, PMB 102, Abakaliki, Ebonyi State, Nigeria.

[*]**Corresponding author:** Kingsley Nnanna Ukwaja, MBBS, MSc, Department of Internal Medicine, Federal Teaching Hospital, PMB 102, Abakaliki, Ebonyi State, Nigeria. ukwajakingsley@yahoo.co.uk

Published September 2017

ISSN 2248 – 2997
ISSN – L = 2248 – 2997

settings contribute to the possibility of transmission during EVD outbreaks.[7] In such settings, HCWs are more likely to have high-risk contact with confirmed EVD patients, or close contact with their body fluids, and other contaminated environments, particularly in the absence of strict infection prevention and control (IPC) measures.[8]

HCWs are more likely to be infected and/or die from EVD mainly due to poor infection control practices, misdiagnosis, and late treatment.[6-8] The mishandling of US Patient Zero got widespread media attention because, despite the fact that the US is a developed country, it highlighted limitations in "disaster management, infectious disease control, national security, and emergency department care".[9] In addition, an error in detecting and notifying EVD on initial emergency department presentation despite positive signs and symptoms "generated fear, uncertainty, and doubt about the competence of US healthcare delivery system".[9] Thus, there is a need for emergency clinicians to understand reporting channels to notify suspicious patients with febrile illnesses during outbreak situations.

A number of studies have evaluated the knowledge and attitude of HCWs and the general population regarding EVD.[3-5,10-12] However, these studies did not evaluate the knowledge of reporting of EVD. The Nigerian EVD response was swift and quickly contained the epidemic due to the high index of suspicion maintained by the clinicians who managed the Nigeria patient zero.[13] Several studies have shown that clinicians have poor knowledge and reporting of notifiable diseases.[14-16] Since clinicians are the first point of contact in suspecting, detecting and notifying EVD, it is important to carry out baseline studies on their knowledge of disease notification modalities. Moreover, following the confirmation of a notifiable disease the clinicians involved in the management of the index patient often undertake a risk assessment to determine their level and type of contact with the patient.[13,17] Only a few studies have evaluated the risk perceptions of clinicians on EVD, and these were limited by being qualitative surveys.[18] This study determined clinicians' reporting proficiency, and their risk perceptions of Ebola virus disease in Ebonyi State, Nigeria.

Methods

Study setting

Ebonyi State, one of the 36 states of the Nigerian Federation, is located in the South-East of the country. The State shares boundaries with Enugu, Cross River and Abia States, and has 13 local government areas with several primary health centers, comprehensive health centers, and general (secondary care) hospitals across the state. Also, Ebonyi State has two tertiary care hospitals (Federal Teaching Hospital, Abakaliki, and Mater Misericordiae Hospital, Afikpo). During the study period, about 550 medical doctors were practicing in Ebonyi state, serving an estimated population of 4 million people.

Study design

We performed a descriptive cross-sectional study conducted during September 2014. All clinicians attending a continuing medical education (CME) training organized by the Nigerian Medical Association (NMA) at the Federal Teaching Hospital Abakaliki, Ebonyi State Nigeria were invited to participate in the survey.

Instrument

A face-validated self-administered structured questionnaire was used for collection of data on the respondents' socio-demographic characteristics, detailed knowledge of the clinical presentation, transmission, diagnosis, management and prevention of EVD as well as their attitude towards EVD. In addition, the instrument elicited their knowledge of EVD notification modalities and their risk perceptions of various EVD exposure scenarios. Herein, we report on their knowledge of EVD notification modalities and their risk perceptions of various EVD exposure scenarios.

The knowledge of suspected EVD notification modalities consisted of 5 questions. The questions consisted of statements that participants responded to with "yes", "no" or "I don't know". A scoring system was applied to assess the level of knowledge of each respondent: one point was given for each correct answer. No point was given for an incorrect answer.

Questions related to their risk perceptions were assessed by 10 scenarios that participants responded to by assigning risk exposure levels (i.e., "high risk", "some risk", "no risk" or "I don't know"). A scoring system was applied. A point was given for a correct risk classification and no score was given for incorrect classification. The correct answers to the questions assessing both the knowledge of reporting and risk perceptions to EVD was based on information about EVD provided by the World Health Organization (WHO), Integrated Disease Surveillance and Response in Nigeria, and the US Centers for Disease Control.[1,19-20]

Data analysis

Data were entered into and analysed using Epi Info 3.5.1 (CDC, Atlanta, GA, USA). The data was reported as frequencies for categorical variables. The normality of the distribution of the knowledge and risk perception scores data were evaluated using a visual inspection of their graphs. These scores data were normally distributed and were therefore summarized using the means ± standard deviation (SD). Participants with a knowledge of reporting score of >70% were considered to have good knowledge; those with ≤70% were considered to have poor knowledge. Similarly, those with a risk perception score of >70% were considered to have accurate risk perceptions and those with a score of ≤70% were recorded as having inaccurate risk perceptions towards EVD. Chi-square test was used to compare categorical variables. Multivariable logistic regression analyses were carried out to identify predictors of good knowledge of reporting and accurate risk perceptions towards EVD. A p-value <0.05 was accepted as significant.

Ethical approval

Approval for the study was obtained from the Ebonyi state branch of the Nigerian Medical Association (ref: NMA/EB/Vol 1/2014/169; 05 September 2014), and verbal consent was obtained from all clinicians invited to participate in the survey. We ensured we maintained confidentiality and anonymity throughout the study.

Results

Characteristics of the respondents

Of the 426 clinicians who participated in the training, 398 completed the survey. Their demographic characteristics according to their duration of practice are shown in Table 1.

Table 1. Profile of the respondents according to duration of practice (N=398)

Variables	≤ 10 years n (%)	> 10 years n (%)
Age (years)		
≤40	258 (86.6)	16 (16.0)
>40	40 (13.4)	84 (84.0)
Gender		
Female	68 (22.8)	18 (18.0)
Male	230 (77.2)	82 (82.0)
Work position		
Consultant	14 (4.7)	64 (64.0)
Medical officer	14 (4.7)	8 (8.0)
Registrar	270 (90.6)	28 (28.0)
Type of clinical practice		
Primary	6 (2.0)	0 (0)
Secondary	2 (0.7)	2 (2.0)
Tertiary	290 (97.3)	98 (98.0)
Department		
Accident & Emergency	12 (4.0)	2 (2.0)
Anesthesiology	26 (8.7)	4 (4.0)
Community Medicine	14 (4.7)	6 (6.0)
Dental Care	2 (0.7)	2 (2.0)
Family Medicine	20 (6.7)	16 (16.0)
Internal Medicine	42 (14.1)	8 (8.0)
Obstetrics and Gynecology	52 (17.4)	10 (10.0)
Pediatrics	48 (16.1)	8 (8.0)
Surgery	38 (12.8)	22 (22.0)
Others	44 (14.8)	22 (22.0)
Previous training on Ebola		
Yes	24 (8.1)	20 (20.0)
No	274 (91.9)	80 (80.0)
Previous training on Lassa		
Yes	128 (43.0)	42 (42.0)
No	170 (57.0)	58 (58.0)
Interested in Ebola training		
Yes	284 (95.3)	90 (90.0)
No	14 (4.7)	10 (10.0)

Of them, 298 had practiced for 10 years or less and 100 had been in clinical practice for more than 10 years. Also, 312 (78.4%) of the participants were male. The average duration of

the respondents' clinical practice was 5.0, 8.0, and 8.9 years for those working in primary, secondary and tertiary hospital setting, respectively.

Knowledge of reporting of probable EVD cases

The respondents' knowledge of the modalities and when to report suspected EVD cases are shown in Table 2.

Table 2. Respondents' knowledge of reporting of Ebola according to duration of practice

Variables	Total	≤ 10 years	> 10 years	p-value
	n (%) correct	n (%) correct	n (%) correct	
Main reporting channel for suspected EVD is from your immediate unit head to your hospital management	398 (100)	298 (100)	100 (100)	-
Suspected Ebola patient should be observed for 1 (one) week prior to reporting	374 (94.0)	284 (95.3)	90 (90.0)	0.054
Suspected Ebola case should be reported immediately	392 (98.5)	292 (98.0)	100 (100.0)	0.153*
A confirmed Ebola case should be reported immediately	398 (100)	298 (100.0)	100 (100.0)	-
Persons under evaluation for Ebola should be reported weekly for administrative efficiency	176 (44.2)	122 (40.9)	54 (54.0)	0.023
Good knowledge of reporting				0.771
Yes	380 (95.5)	284 (95.3)	96 (96.0)	
No	18 (4.5)	14 (4.7)	4 (4.0)	

*p-value based on Fisher's exact test

The overall mean±SD knowledge score was 4.4±0.6 (out of a maximum of 5) indicating that the respondents had an excellent knowledge of how and when to notify suspected EVD cases in their health facilities. The most frequent deficits in terms of EVD notification knowledge were: only 176 (44.2%) of the respondents correctly knew that persons under evaluation for suspected EVD should not be reported weekly for administrative efficiency, and 24 (6%) reported that suspected EVD patients should be observed for 1 (one) week prior to reporting. Overall, 380 (95.5%) of the respondents had a good knowledge of the modalities of notification of suspected EVD cases. In addition, clinicians who had practiced for over 10 years tended to have better knowledge of modalities of notification of EVD compared with their younger colleagues (Table 2), however there were no differences in the overall knowledge score between clinicians who had 10 years or less versus those who had over 10 years of clinical practice (95.3% versus 96%; p=0.771).

Risk perceptions of EVD

The respondents' risk perceptions of EVD scenarios are shown in Table 3. The overall mean±SD risk perception score was 5.6±1.2 (out of a maximum of 10). The majority of the respondents correctly knew the high level of risks associated with percutaneous injury or contact with body fluid of an EVD patient (99.5%), direct contact with an EVD patient without wearing personal protective equipment – PPE – (94.5%), laboratory personnel risk in processing blood samples of EVD patients (96.5%), and contact with dead bodies of persons who died from EVD without PPE (95.0%). In addition, the majority of the respondents knew that there were some risks associated with being: an asymptomatic household contact of an EVD patient 354 (88.9%) and a person with brief interactions with undiagnosed EVD cases 290 (72.9%), but only 130 (32.7%) considered that there was some risk of exposure from other types of protected contact with an EVD patient in health facilities 130 (32.7%). Also, only 50 (12.6%)

Table 3. Respondents' accurate risk perception on Ebola according to duration of practice

Variables	Total n (%)	≤ 10 years n (%)	> 10 years n (%)	p-value
Overall	398	298	100	
An individual with percutaneous (e.g., needle stick) or exposure to body fluids of EVD patient	396 (99.5)	298 (100)	98 (98.0)	0.063*
Direct skin contact with, or exposure to body fluids of an EVD patient without appropriate PPE	376 (94.5)	286 (96.0)	90 (90.0)	0.024
Persons involved in processing blood samples of an EVD patient without appropriate PPE	384 (96.5)	288 (96.6)	96 (96.0)	0.762
Direct contact with a dead body of an EVD patient without appropriate PPE	378 (95.0)	282 (94.6)	96 (96.0)	0.588
A household contact with an EVD patient	354 (88.9)	266 (89.3)	88 (88.0)	0.728
Other contact with an EVD patient in health facilities or community	130 (32.7)	94 (31.5)	36 (36.0)	0.411
Persons with brief interactions, e.g. walking by a person or moving through a hospital with EVD cases	290 (72.9)	218 (73.2)	72 (72.0)	0.464
Visiting a country in which an Ebola outbreak occurred many years in the past	50 (12.6)	36 (12.1)	14 (14.0)	0.616
Visiting a region 6 months after an EVD outbreak occurred and was contained	54 (13.6)	34 (11.4)	20 (20.0)	0.030
Living in the same house with an EVD survivor	130 (32.7)	92 (30.9)	38 (38.0)	0.188
Accurate risk perceptions				0.773
Yes	202 (50.8)	150 (50.3)	52 (52)	
No	196 (49.2)	148 (49.7)	48 (48.0)	

PPE – personal protective equipment; *p-value based on Fisher's exact test

correctly knew that there are no risks of EVD exposure by visiting a country where EVD previously occurred many years ago, visiting a region 6 months after an EVD outbreak is contained 54 (13.6%), and living in the same house with an EVD survivor 130 (32.7%). Overall 202 (50.8%) of the respondents had accurate risk perceptions towards EVD control, while 196 (49.2) had inaccurate risk perceptions towards EVD control (p=0.773).

Relationships between knowledge of notification modalities and risk perceptions to EVD, and the characteristics of the respondents

The relationships between characteristics of the respondents and their overall knowledge of notification modalities for EVD are shown in Table 4. The respondents' overall good knowledge score did not differ according to age, work position, type or duration of practice (all p>0.05). Also, the overall good knowledge score of the respondents did not differ according to previous training on EVD or interest in EVD training (p>0.05). However, respondents who had received a previous training on Lassa fever had a better understanding of reporting of EVD (100% vs. 92.1%, p<0.001). Table 5 presents the relationship between characteristics of the respondents and their risk perceptions to EVD. Except for gender categories, there were no significant differences in their risk perceptions to EVD according to the different characteristics of the respondents (p>0.05). In a multivariable logistic regressions analysis (Table 6), none of the factors evaluated was a predictor of good knowledge of reporting of EVD among respondents. Also, only male sex was a predictor of accurate risk perception to EVD (adjusted odds ratio [aOR] 1.7, 95% confidence interval [CI]: 1.1-2.9).

Discussion

This study assessed clinicians' knowledge of reporting, and their risk perceptions towards EVD in Nigeria. We have shown that the

Table 4. Relationship between profile of the respondents and knowledge of reporting of Ebola

Variables		Good knowledge n (%)	Poor knowledge n (%)	Chi-statistic (df)	Cramer's V	p-value
Age (years)	≤40	262 (95.6)	12 (4.4)	0.042 (1)	0.01	0.838
	<40	118 (95.2)	4 (4.8)			
Gender	Female	84 (97.7)	2 (2.3)	1.226 (1)	0.06	0.268
	Male	296 (94.9)	16 (5.1)			
Work position	Consultant	74 (94.9)	4 (5.1)	0.082 (1)	0.01	0.774
	Medical officer/Registrar	306 (95.6)	14 (4.4)			
Type of clinical practice	Primary/Secondary	10 (100.0)	0 (0)	-	0.03	1.000*
	Tertiary	370 (95.4)	18 (4.6)			
Duration of practice	≤10 years	284 (95.3)	14 (4.7)	0.084 (1)	0.01	0.771
	>10 years	96 (96.0)	4 (4.0)			
Previous training on Ebola	Yes	44 (100)	0 (0)	2.343 (1)	0.08	0.126
	No	336 (94.9)	18 (5.1)			
Previous training on Lassa	Yes	170 (100)	0 (0)	14.057 (1)	0.19	<0.001
	No	210 (92.1)	18 (7.9)			
Interested in Ebola training	Yes	358 (95.7)	16 (4.3)	0.859 (1)	0.05	0.354
	No	22 (91.7)	2 (8.3)			

df – degrees of freedom; *p-value based on Fisher's exact test;

Table 5. Relationship between profile of the respondents and their risk perceptions of Ebola

Variables		Accurate n (%)	Inaccurate n (%)	Chi-statistic (df)	Cramer's V	p-value
Age (years)	≤40	136 (49.6)	138 (50.4)	0.440 (1)	0.03	0.507
	>40	66 (53.2)	58 (46.8)			
Gender	Female	34 (39.5)	52 (60.5)	5.524 (1)	0.12	0.019
	Male	168 (53.8)	144 (46.2)			
Work position	Consultant	40 (51.3)	38 (48.7)	0.011 (1)	0.01	0.917
	Medical officer/Registrar	162 (50.6)	158 (49.4)			
Type of clinical practice	Primary/Secondary	4 (40)	6 (60)	0.475 (1)	0.03	0.491
	Tertiary	198 (51.0)	190 (49.0)			
Duration of practice	≤10 years	150 (50.3)	148 (49.7)	0.083 (1)	0.01	0.773
	>10 years	52 (52.0)	48 (48.0)			
Previous training on Ebola	Yes	18 (40.9)	26 (59.1)	1.918 (1)	0.07	0.166
	No	184 (52.0)	170 (48.0)			
Previous training on Lassa	Yes	80 (47.1)	90 (52.9)	1.617 (1)	0.06	0.203
	No	122 (53.5)	106 (46.5)			
Interested in Ebola training	Yes	194 (51.9)	180 (48.1)	3.101 (1)	0.09	0.078
	No	8 (33.3)	16 (66.7)			

df – degrees of freedom

clinicians surveyed had a high level of knowledge regarding reporting of suspected EVD cases with a major deficit being some not knowing that any suspected cases should be immediately notified. Also, we found that only about half of the clinicians had accurate risk perceptions towards EVD, the most frequent deficit in risk perception being that most of the respondents considered

Table 6. Multivariable logistic regression analysis of factors associated with good knowledge of reporting and accurate risk perceptions towards Ebola among respondents

Variables	Crude OR 95%CI	Adjusted OR 95%CI	Adjusted p-value
Factors associated with good knowledge of reporting			
Younger age (≤40 years)	1.1 (0.4 - 3.0)	1.4 (0.4 - 5.3)	0.643
Female sex	2.3 (0.5 - 10.1)	2.3 (0.5 - 10.2)	0.279
Older duration of practice (>10 years)	1.2 (0.4 - 7.4)	1.6 (0.4 - 7.6)	0.525
Interested in Ebola training	2.0 (0.4 - 9.4)	2.2 (0.5 - 10.6)	0.313
Factors associated with accurate risk perceptions			
Older age (>40 years)	1.2 (0.8 - 1.8)	1.2 (0.7 - 2.1)	0.582
Male sex	1.8 (1.1 - 2.9)	1.7 (1.1 - 2.9)	0.030
Older duration of practice (>10 years)	1.1 (0.7 - 1.7)	1.0 (0.5 - 1.9)	0.989
Has not had a training on Ebola	1.6 (0.8 - 3.0)	1.3 (0.7 - 2.6)	0.424
Has not had a training on Lassa	1.3 (0.9 - 1.9)	1.3 (0.9 - 1.9)	0.237
Interested in Ebola training	2.2 (0.9 - 5.1)	2.1 (0.9 - 5.1)	0.106

OR – odds ratio; **95%CI** – 95% confidence interval

countries that have had EVD outbreaks in the past to be at risk of the disease. In addition, most of them considered individuals who were classified as having suspected/probable EVD and were observed and monitored using the WHO recommended time-limit without any symptoms as still being at risk of EVD.[2,19] Prior Lassa fever training was associated with good knowledge of reporting modalities of EVD, and male sex was an independent predictor of good risk perception towards EVD.

In this study, we have shown that the clinicians had an excellent knowledge of the need to and where to report suspected cases of EVD. This good knowledge may be a result of prior experiences/training in notifying Lassa fever, which is another viral hemorrhagic fever with repeated outbreaks in Nigeria.[21-22] Moreover, we found that a previous training on Lassa fever was significantly associated with good knowledge of modalities of notification of suspected EVD cases. The high level of knowledge among clinicians in other parts of Nigeria probably contributed to the early detection and notification of EVD from Nigeria's patient zero during the recent West African EVD outbreak.[13] However, our study also indicated that there are some knowledge gaps that need to be addressed in future training. One such gap is that a suspected EVD case should be notified immediately and that persons with suspected EVD should not be pooled-together and reported weekly for administrative efficiency. In Nigeria, there are no differences in the national reporting guidelines for EVD, Lassa fever or other viral hemorrhagic fevers.[20] The threat of viral hemorrhagic fevers (e.g. EVD, Lassa fever) is treated as an epidemic prone disease in Nigeria, as indicated by the regulations of the Nigeria Federal Ministry of Health, which require the declaration of an "alert" threshold if there is a single suspected case and the declaration of an "epidemic" threshold if there is a single confirmed case.[20] Delaying the notification of suspected EVD cases may result in widespread epidemic that may be more difficult to contain.

Furthermore, we found that only about half of the clinicians had accurate risk perceptions towards EVD with a major deficit being that the majority considered countries where EVD outbreaks had been contained as being risky. Although the majority of the respondents rightly identified the high risk and some risk scenarios, they tended to overestimate the risks for living with a survivor of EVD and visiting a region where EVD had been contained.[12] This indicates that the fear and paranoia that generally accompanied EVD outbreaks probably influenced the risk perceptions of the clinicians. This is a cause for concern as overestimation of the risk of EVD survivors may contribute to the social exclusion, stigma and unemployment

encountered by EVD survivors in Liberia and Sierra Leone.[23-24] Therefore, there is a need to consider and include these risk scenarios in future training programmes for clinicians in order to improve their risk perceptions. The overestimation of EVD risks in countries that have contained the disease may make clinicians to over diagnose "suspected EVD cases" in the population thereby increasing their likelihood of raising unnecessary alarms. However, when the EVD threat is real and clinicians fail to suspect and report such cases, it can lead to severe repercussions and challenges to control efforts. It is reassuring that in most countries where the recent EVD outbreak was contained, there has not been resurgence of cases. This may be due to the high surveillance maintained following containment of such EVD outbreaks.

Male sex was an independent predictor of good risk perception towards EVD. This agrees with a recent study which suggests that female healthcare workers tended to underestimate their likelihood of contracting Ebola compared to men.[12] Training programmes for clinicians during viral hemorrhagic fever outbreaks should emphasize the use of standard universal precaution measures to ensure safer practices.

This study has some limitations. One key limitation of our study was that only clinicians who attended the Nigeria Medical Association CME activity were included. Although all clinicians working in Ebonyi State were expected to participate in the training, almost one fifth of the clinicians in the State did not attend. Therefore, selection bias (due to differences in clinicians who attended the training and those who didn't) may have occurred. This may impact the outcome of the study, thereby limiting the generalizability of our findings.[22] However, the work position and qualification of clinicians who regularly notify Lassa fever were fully represented in the survey. Also, this was a cross-sectional descriptive study suitable for identifying gaps for future training and generating hypothesis for future studies.

Conclusions

In conclusion, there was a high level of knowledge of notification modalities regarding EVD among the clinicians surveyed. Also, we found that only about half of the clinicians had accurate risk perception towards EVD. The gaps identified in the knowledge of notifications and the risk perception towards EVD by the clinicians should inform post-EVD control strategies.

Authors' contributions statement: NNA and KNU contributed to study design, statistical analysis and drafting of the manuscript. CKO, IAA, and KNU contributed to data acquisition and interpretation, as well as critical revision for intellectual content. All authors reviewed and approved the final version of the manuscript.

Conflicts of interest: All authors – none to declare.

Funding: None to declare.

Acknowledgements: The authors thank Nigeria Medical Association, Ebonyi State for their support during the survey.

References

1. World Health Organization. Ebola virus disease: situation reports. Accessed on: 14 January 2017. Available at: http://apps.who.int/iris/bitstream/10665/208883/1/ebolasitrep_10Jun2016_eng.pdf?ua=1.
2. World Health Organization. Ebola virus disease: fact sheet January 2016. Accessed on: 12 January 2017. Available at: http://www.who.int/mediacentre/factsheets/fs103/en/.
3. Almutairi KM, Alodhayani AA, Moussa M, Aboshaiqah AE, Tumala RB, Vinluan JM. Ebola outbreak preparedness and preventive measures among healthcare providers in Saudi Arabia. J Infect Dev Ctries 2016;10:829-36. [Crossref] [PubMed]
4. Ahmad A, Khan MU, Jamshed SQ, et al. Are healthcare workers ready for Ebola? An assessment of their knowledge and attitude in a referral hospital in South India. J Infect Dev Ctries 2016;10:747-54. [Crossref] [PubMed]
5. Alfaki MM, Salih AM, Elhuda DA, Egail MS. Knowledge, attitude and practice of health care providers toward Ebola virus disease in hotspots in Khartoum and White Nile states, Sudan, 2014. Am J Infect Control 2016;44:20-3. [Crossref] [PubMed]
6. World Health Organization. Health worker Ebola infections in Guinea, Liberia and Sierra Leone: a preliminary report 21 May 2015. Geneva: World Health Organization, 2015 (WHO/EVD/SDS/REPORT/2015.1).
7. Fischer WA 2nd, Hynes NA, Perl TM. Protecting health care workers from Ebola: personal protective equipment is critical but is not enough. Ann Intern Med 2014;161:753-4. [Crossref] [PubMed]
8. Matanock A, Arwady MA, Ayscue P, et al. Ebola virus disease cases among health care workers not working in

Ebola treatment units – Liberia, June-August 2014. MMWR Morb Mortal Wkly Rep 2014;63:1077-81. [PubMed]
9. Upadhyay DK, Sittig DF, Singh H. Ebola US Patient Zero: lessons on misdiagnosis and effective use of electronic health records. Diagnosis (Berl) 2014;1:283. [Crossref] [PubMed] [FullText]
10. Iliyasu G, Ogoina D, Otu AA, et al. A multi-site knowledge attitude and practice survey of Ebola virus disease in Nigeria. PLoS One 2015;10:e0135955. [Crossref] [PubMed] [FullText]
11. Fazekas B, Fazekas J, Moledina M, Fazekas B, Karolyhazy K. Ebola virus disease: awareness among junior doctors in England. J Hosp Infect 2015;90:260-2. [Crossref] [PubMed]
12. Sridhar S, Brouqui P, Fontaine J, et al. Risk perceptions of MSF healthcare workers on the recent Ebola epidemic in West Africa. New Microbes New Infect 2016;12:61-8. [Crossref] [PubMed] [FullText]
13. Igonoh AK. My experience as an Ebola patient. Am J Trop Med Hyg 2015;92:221-2. [Crossref] [PubMed] [FullText]
14. Rubio-Cirilo L, Martín-Ríos MD, de Las Casas-Cámara G, Andrés-Prado MJ, Rodríguez-Caravaca G. [Notifiable infectious diseases: knowledge and notification among hospital physicians]. Enferm Infecc Microbiol Clin 2013;31:643-8. [Crossref] [PubMed]
15. Brabazon ED, O'Farrell A, Murray CA, Carton MW, Finnegan P. Under-reporting of notifiable infectious disease hospitalizations in a health board region in Ireland: room for improvement? Epidemiol Infect 2008;136:241-7. [Crossref] [PubMed] [FullText]
16. Spedding RL, Jenkins MG, O'Reilly SA. Notification of infectious diseases by junior doctors in accident and emergency departments. J Accid Emerg Med 1998;15:102-4. [Crossref] [PubMed]
17. Rubinson L. From clinician to suspect case: my experience after a needle stick in an Ebola treatment unit in Sierra Leone. Am J Trop Med Hyg 2015;92:225-6. [Crossref] [PubMed] [FullText]
18. Santibañez S, Polgreen PM, Beekmann SE, Rupp ME, Del Rio C. Infectious Disease physicians' perceptions about Ebola preparedness early in the US response: A qualitative analysis and lessons for the future. Health Secur 2016;14:345-50. [Crossref] [PubMed]
19. Centers for Disease Control (CDC). Ebola Virus Disease. Accessed on: 12 January 2017. Available at: http://www.cdc.gov/vhf/ebola/index.html.
20. Federal Ministry of Health Nigeria. Technical guidelines for Integrated Disease Surveillance and Response in Nigeria. Accessed on: 12 January 2017. Available at: http://www.ncdc.gov.ng/themes/common/docs/protocols/4_1476085948.pdf
21. Ajayi NA, Nwigwe CG, Azuogu BN, et al. Containing a Lassa fever epidemic in a resource-limited setting: outbreak description and lessons learned from Abakaliki, Nigeria (January-March 2012). Int J Infect Dis 2013;17:e1011-6. [Crossref] [PubMed]
22. Olowookere SA, Fatiregun AA, Gbolahan OO, Adepoju EG. Diagnostic proficiency and reporting of Lassa fever by physicians in Osun State of Nigeria. BMC Infect Dis 2014;14:344. [Crossref] [PubMed] [FullText]
23. Davtyan M, Brown B, Folayan MO. Addressing Ebola-related stigma: lessons learned from HIV/AIDS. Glob Health Action 2014;7:26058. [Crossref] [PubMed] [FullText]
24. Karafillakis E, Jalloh MF, Nuriddin A, et al. 'Once there is life, there is hope' Ebola survivors' experiences, behaviours and attitudes in Sierra Leone, 2015. BMJ Global Health 2016;1:e000108. [Crossref] [PubMed] [FullText]

Please cite this article as:
Ajayi NA, Ojide CK, Ajayi IA, Ukwaja KN. Evaluation of clinicians' reporting proficiency and their risk perceptions of Ebola virus disease in Ebonyi State, Nigeria. GERMS 2017;7(3):140-148. doi: 10.18683/germs.2017.1119