

## HAND HYGIENE PRACTICES POST EBOLA VIRUS DISEASE OUTBREAK IN A NIGERIAN TEACHING HOSPITAL

S.O. Martins and A.O. Osiyemi

Department of Family Medicine, University College Hospital, Ibadan, Nigeria

*Correspondence:*

**Dr. S.O. Martins**

Department of Family Medicine,  
University College Hospital,  
Ibadan, Oyo State,  
Nigeria

Telephone - 08032129690

E-mail: segunmartinez@yahoo.com

### ABSTRACT

**Introduction:** Ebola virus disease (EVD) is a highly contagious viral infection that requires a high risk perception and practice of good hand hygiene by regular hand washing or use of hand sanitizers for infection control at all time. The declaration of Nigeria as an Ebola-free country by the World Health Organization on the 20<sup>th</sup> of October, 2014 has prompted many Nigerians, including healthcare workers, to discontinue the regular practice of good hand hygiene which was commonplace during the EVD outbreak.

**Objectives:** The study assessed hand hygiene practices for infection control after the West African Ebola virus disease outbreak in a Nigerian teaching hospital.

**Methods:** This study was cross-sectional in design. A total of 450 staff of the University College Hospital, Ibadan participated in the survey. Data was collected using a structured, self-administered questionnaire. Chi-square test and multivariate logistic regression were used to determine associations between predictors of good hand hygiene practice at 5% level of significance.

**Result:** The mean age was  $42.2 \pm 8.6$  years. A higher proportion of respondents in this study had a good knowledge of the risk factors of EVD; good knowledge of the precautionary measures against EVD and a good risk perception towards EVD. However, the majority of respondents, 359 (80.0%), had a poor practice of hand hygiene for infection control. Having good knowledge of risk factors and precautionary measures against EVD was associated with practice of good hand hygiene. Respondents with good risk perception of EVD were 1.63 times more likely to practice good hand hygiene (OR= 1.63; 95% CI= 1.20 – 4.38; p= 0.019).

**Conclusion:** There was a good knowledge of risk factors and precautionary measures of EVD among staff of the University College Hospital, Ibadan. However, the majority of respondents had a poor practice of hand hygiene for infection control, Post EVD. Sensitization workshops to promote the regular practice of good hand hygiene is recommended for healthcare workers to control infection from EVD.

**Keywords:** Hand hygiene, Ebola virus disease, University College Hospital.

### INTRODUCTION

Ebola virus disease (EVD) is an infectious viral disease characterized by a high case-fatality rate which may be as high as 90%.<sup>1,2</sup> Ebola virus may be acquired during contact with blood or body fluids of an infected animal, commonly monkeys or fruit bats.<sup>2</sup> Once human infection occurs, the disease may spread among humans usually associated with direct contact with infected persons (or the bodies of persons who have died from EVD). Also, direct contact with body fluids from EVD patients may result in the disease.<sup>2,3</sup> Ebola virus disease typically occurs in outbreaks in tropical regions of Sub-Saharan Africa.<sup>4,5</sup>

In March 2014, the World Health Organization (WHO) reported a major EVD outbreak in West Africa; the

largest ever documented.<sup>6</sup> The first laboratory confirmed case of EVD in Nigeria was on the 23<sup>th</sup> July, 2014 and the country was officially declared free of EVD on 20<sup>th</sup> October, 2014 by the WHO.<sup>7</sup> However, the threat posed by EVD is yet to be over as the disease is still present in West Africa. The Centers for Disease Control and Prevention (CDC) recently indicated on 14<sup>th</sup> June, 2016 that there were flare-ups of EVD in Sierra Leone, Guinea and Liberia, since the control of its initial outbreak which appear to be related to viral persistence in survivors.<sup>8</sup>

There is no Ebola virus-specific treatment as treatment is primarily supportive in nature.<sup>9</sup> However, there a number of recommended precautionary measures to

be taken by the caregivers of persons suspected to have EVD. These include isolation of the patient, good hand hygiene by regular hand washing or use of hand sanitizers and wearing personal protective equipment (PPE) for infection control.<sup>10,11</sup> Most States in Nigeria established isolation and intensive care units in hospital facilities to manage cases of EVD during the outbreak. Health workers were also encouraged to practice the recommended precautionary measures against EVD, such as wearing of personal protective equipment (PPE), frequent hand washing or use of hand sanitizers at all times. These efforts served as part of emergency preparedness during the EVD outbreak such that hospitals could provide treatment of EVD cases and promote infection control. During the EVD outbreak, the prospective patients of the University College Hospital, Ibadan had an initial temperature at various entry points of the hospital while patients with fever and symptoms related to those noted among EVD patients were isolated and attended to in a temporary holding bay where they would undergo further blood screening for viral hemorrhagic fever. The management of the Hospital also organized several grand rounds, lectures and seminars on EVD to sensitize all workers.

Nevertheless, post-declaration of Nigeria as an Ebola-free country by the WHO, many Nigerians, including health care workers discontinued the practice of recommended precautionary measures which were commonplace during the outbreak. Research however shows that hospital workers with a poor hand hygiene or those who do not wear appropriate PPE are particularly vulnerable as they are often the direct primary contacts of patients suspected with EVD.<sup>10,12</sup> Nosocomial outbreaks of EVD are characterized by a relatively high proportion of deaths amongst healthcare workers and as of 28<sup>th</sup> June 2015, a total of 869 health workers have contracted EVD in Sierra Leone, Guinea and Liberia since the latest outbreak began, with 58% reported death.<sup>13</sup>

In addition to having deaths amongst healthcare workers, hospital-based outbreaks in settings with low standards of hygiene and sanitation are a source of EVD epidemic amplification, especially if barrier-nursing techniques and universal hygiene measures are not adequately observed by healthcare workers.<sup>12</sup> A knowledge gap exists about the level of hand hygiene for infection control following outbreak of Ebola virus disease among staff in hospital settings in Nigeria. The aim of the study therefore was to assess the level of hand hygiene following outbreak of Ebola virus disease among staff of the University College Hospital, Ibadan.

## **MATERIALS AND METHODS**

### **Study site description**

The study was carried out at the University College Hospital (UCH), Ibadan, Nigeria. The hospital has a total staff population of 5,697. A cross sectional design was used.

### **Sample size determination**

The sample size was estimated using the Leslie Kish formula for prevalence studies.<sup>14</sup> An estimated sample size of 450 participants was determined based on a precision of 0.05 and a prevalence of 50% (indicating the proportion of healthcare workers with a good practice of hand hygiene for infection control against EVD to achieve highest possible sample size in the absence of similar local studies at the time). Four hundred and fifty consenting members of staff of University College Hospital, Ibadan, who met the inclusion criteria, were included in the study.

### **Data collection**

A semi-structured, self-administered questionnaire was used. The questionnaire captured the respondents' socio-demographic data, post-outbreak knowledge of risk factors and precautionary measures of EVD, post-outbreak risk perception on EVD, self-reported practice of hand hygiene. Questions on knowledge and risk perception were scored on a five-point Likert scale as; strongly agree (SA), agree (A), undecided (UN), disagree (D) or strongly disagree (SD). Questions on practice were scored on a Likert scale as; always, often, rarely or none of the time.

### **Data management**

The data collection instrument was in English language and self-administered. Data was entered, cleaned and analysed using SPSS version 17. Risk perception variables were ranked as High (responses such as; strongly agree SA or agree A) or Low (responses such as; undecided UN, disagree D or strongly disagree SD). Knowledge variables were ranked as 'Good' or 'Poor'. Self-reported practice variables were ranked as Good (responses such as; always or often) or Poor (responses such as; rarely or none of the time). The respondent had to answer "Yes" to all the knowledge and practice questions in order to earn a "Good" score. Categorical variables were summarized using frequency and percentages while mean and standard deviations were computed for quantitative variables. Chi-square test was used to test associations at 5% level of significance. Multivariate logistic regression was performed to generate a model for independent predictors of a good practice of hand hygiene for infection control against EVD.

**Table 1:** Socio-demographic characteristics of respondents

Variable	Frequency	Percentages (%)
<b>Age (years)</b>		
< 30	48	10.7
30-39	125	27.8
40-49	162	36.0
50-60	115	25.5
<b>Sex</b>		
Male	162	36.0
Female	288	64.0
<b>Religion</b>		
Christianity	244	54.2
Islam	206	45.8
<b>Marital Status</b>		
Single	50	11.1
Married	279	62.0
Separated	94	20.9
Divorced	24	5.3
Others	3	0.7
<b>Tribe</b>		
Yoruba	295	65.7
Igbo	153	34.1
Hausa	2	0.2
<b>Education</b>		
Primary	17	3.8
Secondary	137	30.4
Tertiary	296	65.8
<b>Cadre</b>		
Senior cadre	259	57.6
Junior cadre	191	42.4

### Ethical consideration

Ethical approval for the study was obtained from the UI/UCH Institutional Review Committee with number UI/EC/15/0023 and written informed consent was obtained from each participant.

### RESULTS

#### Socio-demographic characteristics of the respondents

The socio-demographic characteristics of the respondents are shown in Table 1. Mean age was  $42.2 \pm 8.6$  years. About two-thirds of the respondents (64.0%) were females while 65.8% of respondents had tertiary education. More than half; 59.7% were senior members of staff.

#### Knowledge of risk factors, precautionary measures and risk perception of EVD

As shown in Table 2; (54.2%) of the respondents and 52.9% of the respondents had good knowledge of risk factors and precautionary measures against EVD respectively. Nearly two-thirds of the respondents, 74.0% had a good risk perception towards EVD.

#### Respondents' self-reported practice of hand hygiene during and after the EVD outbreak

The respondents' self-reported practice of hand hygiene during and after the EVD outbreak are shown in Figure 1. During the EVD outbreak, 403 (89.6%) respondents had good self-reported practice of hand hygiene for infection control against EVD. However, the majority of respondents, 359 (80.0%), had poor self-reported practice of hand hygiene for infection control after the EVD outbreak.

#### Association between respondents' variables and practice of hand hygiene for infection control against EVD

The association between respondents' variables and practice of hand hygiene for infection control against EVD are shown in Table 3. The majority of

**Table 2:** Knowledge and risk perception of respondents on EVD

Variable	N= (450)	Percentages (%)
<b>Knowledge of risk factors of EVD</b>		
Good	244	54.2
Poor	206	45.8
<b>Knowledge of precautionary measures of EVD</b>		
Good	238	52.9
Poor	212	47.1
<b>Perception of risk factors of EVD</b>		
Good	333	74.0
Poor	117	26.0

**Table 3:** Determinants of practice of hand hygiene for infection control against EVD amongst respondents

Variable	Hand hygiene		$\chi^2$	p-value
	Good N (%)	Poor N (%)		
<b>Sex</b>				
Male	131 (80.9)	31 (19.1)	21.04	0.039*
Female	188 (65.3)	100 (34.7)		
<b>Religion</b>				
Christianity	205 (84.0)	39 (16.0)	7.43	0.061
Islam	143 (69.4)	63 (30.6)		
<b>Educational Level</b>				
Below Tertiary	86 (55.9)	68 (44.1)	31.84	0.029*
Tertiary	269 (90.9)	27 (9.1)		
<b>Cadre</b>				
Senior	248 (95.8)	11 (4.2)	63.41	0.019*
Junior	109 (57.1)	82 (42.9)		
<b>Knowledge of Risk Factors of EVD</b>				
Poor	91 (44.2)	115 (55.8)	29.08	0.003*
Good	237 (97.1)	7 (2.9)		
<b>Knowledge of Precautionary Measures of EVD</b>				
Poor	135 (63.7)	77 (36.3)	19.73	0.042*
Good	199 (83.6)	39 (16.4)		
<b>Perception of risk factors of EVD</b>				
Poor	75 (64.1)	42 (35.9)	74.11	0.028*
Good	321 (96.4)	12 (3.6)		

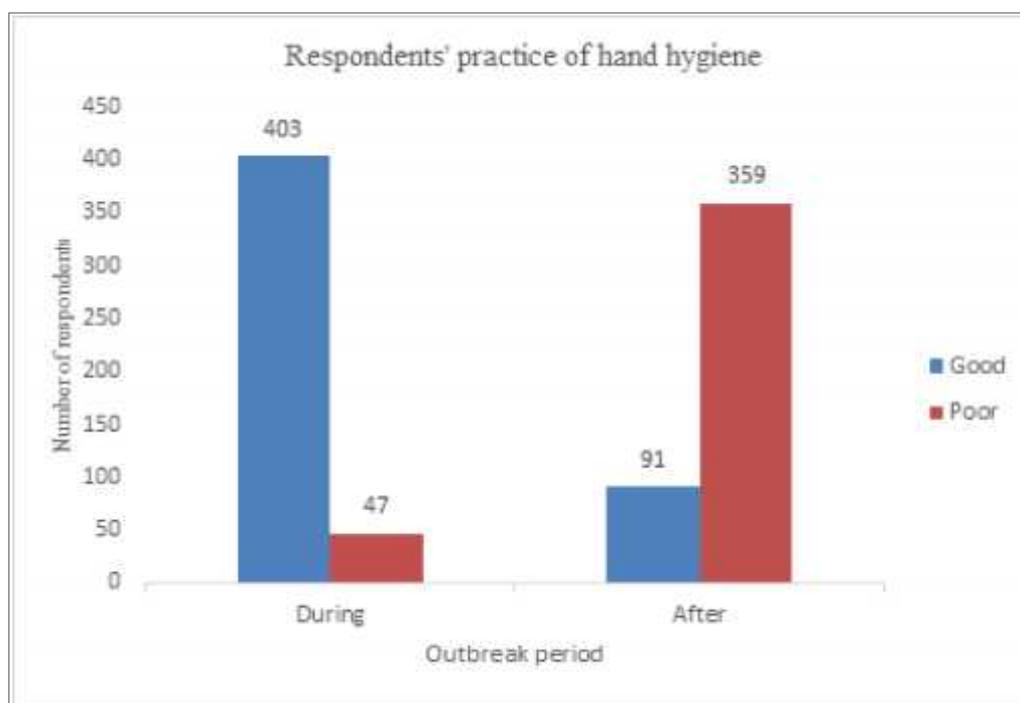
\*statistically significant at 5% level of significance

**Table 4:** Multivariate logistic regression model for predictors of a good practice of hand hygiene among the respondents

Variable	Odd Ratio (OR)	95% CI for OR	p-value
<b>Sex</b>			
Male	1.00	Reference	0.049*
Female	1.36	1.24 - 2.75	
<b>Educational Level</b>			
Below Tertiary	1.00	Reference	0.037*
Tertiary	1.29	1.08 - 3.42	
<b>Cadre</b>			
Senior	1.19	1.03 - 3.51	0.076
Junior	1.00	Reference	
<b>Knowledge of Risk Factors of EVD</b>			
Poor	1.00	Reference	0.029*
Good	1.37	1.19 - 2.33	
<b>Knowledge of Precautionary Measures against EVD</b>			
Poor	1.00	Reference	0.001*
Good	1.22	1.06 - 2.88	
<b>Perception of risk factors of EVD</b>			
Poor	1.00	Reference	0.019*
Good	1.63	1.20 - 4.38	

95% CI for OR: 95% Confidence Interval for Odd's ratio

\*statistically significant at 5% level of significance



**Fig. 1:** Self-reported practice of Hand Hygiene during and after the EVD Outbreak

respondents with good knowledge of risk factors of EVD had good practice of hand hygiene ( $\chi= 29.08$ ,  $p= 0.003$ ). Over two-thirds of respondents with good knowledge of precautionary measures against EVD had good practice of hand hygiene ( $\chi= 19.73$ ,  $p= 0.042$ ). The majority of respondents with good risk perception towards EVD had good practice of hand hygiene ( $\chi= 74.11$ ,  $p= 0.028$ ). Predictors of a good practice of hand hygiene are shown in Table 4. There was significantly increase likelihood of having a good practice of hand hygiene among the female respondents and respondents with tertiary education. Respondents with good knowledge of risk factors for EVD were 1.37 times more likely to have a good practice of hand hygiene (OR= 1.37; 95% CI= 1.19 – 2.33;  $p= 0.029$ ) while respondents with good knowledge of precautionary measures against EVD were 1.22 times more likely to have a good practice of hand hygiene (OR= 1.22; 95% CI= 1.06 – 2.88;  $p= 0.001$ ). Respondents with good risk perception towards EVD were 1.63 times more likely to have a good practice of hand hygiene (OR= 1.63; 95% CI= 1.20 – 4.38;  $p= 0.019$ ).

## DISCUSSION

This study recorded a high level of knowledge of the risk factors and precautionary measures against EVD and this might be related to the fact that the study was carried out in a tertiary healthcare institution where such level of knowledge is not unexpected among its work force. This was similar to the high knowledge score recorded in a study done by Toure et.al<sup>15</sup> among health

care workers in Guinea. Some other population-based studies in Sierra Leone, Guinea and Liberia have also found a high level of public knowledge the risk factors and precautionary measures against EVD similar to our study.<sup>16–19</sup>

The high level of post-outbreak knowledge of the risk factors and precautionary measures against EVD translated to the good risk perception towards EVD that was noted among the majority of respondents in this study. In another study by Oloowokere *et.al*<sup>20</sup> among health workers in a tertiary hospital in Ile-Ife, Nigeria, there was a good knowledge of the risk factors and precautionary measures against EVD and only one-quarter (24.2%) of their respondents had low risk perception against EVD. However, it was expected that the good knowledge of precautionary measures and the good risk perception of EVD among the respondents in our study would translate to a good practice of hand hygiene for infection control after the EVD outbreak but this was not the case.

As noted in our study, a high proportion of respondents had a poor self-reported practice of hand hygiene after the EVD outbreak. This was noted as many of the workers had remarkably reduced use of hand sanitizers and practice of regular hand washing despite their high risk perception towards EVD. A possible factor that might be responsible for this may be the reduced levels of sensitization workshops on EVD after the outbreak. Another fact is that; most healthcare workers might feel the increased need to

drop these habits that were taken up during the EVD outbreak because they perceive a reduced threat posed by Ebola virus following the declaration of Nigeria as an Ebola-free country.

The major implication of a poor practice of hand hygiene among health workers in Nigeria against a highly contagious infection such as EVD is a poor infection control and a possible occurrence of a hospital-based outbreak of EVD. This can occur because EVD still pose a significant threat to Nigeria on account of the recent CDC report of occasional flare-ups of EVD in some West African countries like Sierra Leone, Guinea and Liberia.<sup>21,22</sup> Therefore, there is a strong need to intensify the importance of regular practice of good hand hygiene for infection control against EVD among hospital staff by providing more structured sensitization workshops on EVD even after the outbreak.

#### Limitations of the study

Respondents' practice of good hand hygiene for infection control during and after the EVD outbreak were self-reported and this might have introduced some information (recall) bias into the study. This survey was a cross-sectional survey carried out among workers in UCH, Ibadan and so its findings might not be representative of hospital staff in other healthcare facilities in Nigeria.

#### CONCLUSION

Healthcare workers had high level of knowledge of precautionary measures and a high risk perception of EVD but their self-reported practice of hand hygiene for infection control against EVD after the outbreak was poor. There should be periodic sensitization programs and continuing medical education on EVD to improve the practice of good hand hygiene for infection control against EVD among hospital employees.

#### Authors' Contributions

The conceptualization, study design, data analysis and writing of the manuscript were done by both authors.

#### Acknowledgement

We thank Dr. J. O. Akinyemi of the Department of Epidemiology and Medical Statistics, University of Ibadan for his immense contribution during the preparation of this manuscript.

#### Competing Interests

The authors declare no competing interest.

#### REFERENCES

1. **Feldmann H.** Ebola - A Growing Threat? *N Engl J Med.* 2014; 371: 1375–1378.
2. **Van Kerkhove MD,** Bento AI, Mills HL, *et al.* A review of epidemiological parameters from Ebola outbreaks to inform early public health decision-making. *Sci Data.* 2015; 2: 1–10.
3. **Weyer J,** Blumberg LH, Paweska JT. Ebola virus disease in West Africa - An unprecedented outbreak. *South African Medical Journal.* 2014; 1: 555–556.
4. **Lashley FR,** Jerry D. Emerging infectious diseases: Trends and issues. *Emerg Infect Dis.* 2008; 14: 121–123.
5. **Chowell G,** Nishiura H. Transmission dynamics and control of Ebola virus disease (EVD): a review. *BMC Med.* 2014; 12: 1–16.
6. **Baize S,** Rieger T, Soropogui B, *et al.* Emergence of Zaire Ebola Virus Disease in Guinea. *N Engl J Med.* 2014; 371: 1418–1425.
7. **Althaus CL,** Low N, Musa EO, *et al.* Ebola virus disease outbreak in Nigeria: Transmission dynamics and rapid control. *Epidemics.* 2015; 11: 80–84.
8. Centers for Disease Control and Prevention. CDC's ongoing work to contain Ebola in West Africa: Flare-ups of Ebola since the control of the initial outbreak. *CDC MMWR* June, 2016. Available at <https://www.cdc.gov/vhf/ebola/pdf/cdcs-ongoing-work.pdf>.
9. **Bishop BM.** Potential and emerging treatment options for Ebola Virus Disease. *Ann Pharmacother.* 2014; 1–11.
10. **Ayenigbara GO.** The facts, the fears, and the prevention of Ebola haemorrhagic fever: A focus on Nigeria. *Int Res J Public Environ Heal.* 2014; 1: 192–196.
11. **Bogoch II,** Creatore MI, Cetron MS, *et al.* Assessment of the potential for international dissemination of Ebola virus via commercial air travel during the 2014 west African outbreak. *Lancet.* 2015; 385: 29–35.
12. Ebola: protection of health workers on the front line. Editorial. *Lancet.* 2014; 384: 470-471. <http://www.ncbi.nlm.nih.gov/pubmed/25110265> (2014, accessed 13 December 2014).
13. World Health Organization. Ebola response roadmap situation report, 17 December 2014. Available at [http://apps.who.int/iris/bitstream/10665/136020/1/roadmapsitrep\\_8Oct2014\\_eng.pdf?ua=1](http://apps.who.int/iris/bitstream/10665/136020/1/roadmapsitrep_8Oct2014_eng.pdf?ua=1).
14. **Araoye OM.** Subject selection. Research methodology with statistics for health and social sciences. Nathadex publishers, Ilorin, Nigeria. 2003; 115-129.

15. **Toure A**, Traore FA, Sako FB, *et al.* Knowledge, attitudes, and practices of health care workers on Ebola virus disease in Conakry, Guinea: A cross-sectional study. *J Public Heal Epidemiol.* 2016; 8: 12–16.
16. **Gidado S**, Oladimeji AM. Public knowledge, perception and source of information on Ebola Virus Disease – Lagos, Nigeria. *PLOS.* 2015; 2: 1–14.
17. **Rolison JJ**, Hanoch Y. Knowledge and risk perceptions of the Ebola virus in the United States. *Prev Med Reports.* 2015; 2: 262–264.
18. **Shittu RO**, Sanni MA, Odeigah LO, *et al.* Awareness, knowledge and misconceptions about Ebola Virus Disease in a family practice setting in Nigeria, West Africa. *J Antivir Antiretrovir.* 2015; 07: 10–14.
19. **Kobayashi M**, Beer K, Bjork A, *et al.* Community knowledge, attitudes, and practices regarding Ebola Virus Disease - Five counties, Liberia, September–October, 2014. *CDC MMWR* 2015; 64: 714–718.
20. **Olowookere SA**, Abioye-Kuteyi EA, Adepoju OK, *et al.* Knowledge, attitude, and practice of health workers in a tertiary hospital in Ile-Ife, Nigeria, towards Ebola Viral Disease. *J Trop Med.* 2015; 1-6.
21. **Peters CJ**, Leduc JW. An Introduction to Ebola: The virus and the disease. *J Infect Dis.* 1999; 179: 1–10.
22. **Cenciarelli O**, Pietropaoli S, Malizia A, *et al.* Ebola Virus Disease 2013-2014 outbreak in West Africa: An analysis of the epidemic spread and response. *Int J Micro.* 2015; 2015: 1–13.