



Ebola Virus Disease: Risk Perception and Gaps in Compliance with Infection Control Practices among Mortuary Workers in Two South Western Cities of Nigeria

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Authors' contributions

This work was carried out in collaboration between both authors. Authors ANH and MDD did the study conception, study design and wrote the protocol. Author ANH did the literature searches and data collection. Both authors did the statistical analysis while author MDD prepared the draft manuscript. Both authors read and approved the final manuscript.

Article Information

DOI: 10.9734/IJTDH/2016/26552

Editor(s):

(1) Anthony R. Mawson, Department of Epidemiology and Biostatistics, School of Public Health, Jackson State University, Jackson, Mississippi, USA.

Reviewers:

(1) Mohammed A. Soghaier, Federal Ministry of Health, Sudan.

(2) Oel K. Weltman, Brown University, USA.

Complete Peer review History: <http://sciencedomain.org/review-history/14732>

Original Research Article

Received 23rd April 2016
Accepted 9th May 2016
Published 22nd May 2016

ABSTRACT

Aims: Mortuary workers and embalmers represent a high risk group for the transmission of Ebola virus disease. However risk perception that may determine adoption of behavioral preventive among this group is not documented in Nigeria. Therefore, this study aims to determine the risk perception and level of adherence to infectious disease control practices among mortuary attendants and embalmers in Ibadan and Lagos metropolis, Nigeria.

Methodology: This is a quantitative study of mortuary attendants in both public and private embalming centres in Lagos and Ibadan Nigeria.

Study Design: This was a cross-sectional study.

Place and Duration of Study: The study was conducted in Ibadan and Lagos metropolis, Nigeria between October and November 2014.

Sampling Techniques and Data Collection: This study used a two stage random sampling

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technique to select one hundred and seven (107) mortuary attendants and embalmers from Ibadan and Lagos metropolis. A pretested interviewer administered questionnaire was used to elicit information on the compliance with the use of personnel protective equipment and individual risk perception.

Results: A total of 107 respondents were interviewed. Most (86.9%) respondents had high risk perception. There were substantial low use of each type of PPE among the respondents as follows: face shields (43%), aprons (62.6%) and nose masks (55.1%). About 60.7% of the respondents believed that they were very likely to contract any infectious disease.

Conclusion: The low use of personal protective equipment, despite the high Ebola risk perception among this vulnerable group of mortuary attendants indicates a need for sustained media campaigns to maintain the successful control of the disease in these regions. Selected training and on job professional courses are recommended.

Keywords: Ebola virus disease; mortuary workers; risk perception; infection control practices.

1. INTRODUCTION

Ebola Viral Disease (EVD) is currently ravaging parts of West Africa. It is the largest outbreak on record with a death toll of 9194 and 22,903 cases as at 12th February 2015 [1]. Countries particularly affected include Guinea, Sierra Leone and Liberia. Nigeria experienced an outbreak of EVD in the month of July, 2014 with a total of 898 contacts that were linked to the index case, a Liberian who imported the deadly disease into the country in late July, 2014. Although Nigeria was declared Ebola free, the Ebola Epidemic ongoing in West Africa still places Nigeria at risk due to the non-restriction of international travelers from endemic countries, inadequate surveillance activities and the inability of the community members to seek prompt medical treatment for persistent fevers and diagnosis of disease, compromised certification process for dead bodies being transferred across borders or to funeral homes. Risky traditional burial practices has been linked to 60% of all cases in Guinea. In Sierra Leone, 365 deaths were linked to a single funeral wherein mourners from adjoining towns participated in traditional burial ceremony to honor a famous traditional healer who died of EVD [2]. Mortuary attendants and embalmers handles bodies in preparation for burial ceremonies and therefore are constantly at risk of contracting EVD in the course of performing their duties. Improving the dead bodies handling practices of these group of workers could be a critical intervention to break the chain of transmission of Ebola viral disease and therefore limit its spread within the community. There is dearth of data on the risk perception of Ebola Viral disease among mortuary attendants and embalmers in Nigeria and Africa. Therefore this study was conducted in Oyo and Lagos state, Nigeria to determine the

knowledge and practice regarding EVD of this vulnerable group and their adherence to infectious disease control practices in order to identify areas for intervention among this occupational group.

2. MATERIALS AND METHODS

2.1 Study Setting

The study was carried out in Lagos and Oyo States of Nigeria. These states made up a significant population of Nigeria being 17 million and 5 million respectively. These total population account for about one sixth on Nigeria's population and more than half of the population of all the southwestern Nigeria which are border states to the Nation on the western axis of Nigeria. Border communities in Lagos and Oyo State serve as portals for entry and exit of international Migrants into the States. Although there are border Patrols, there are several unmanned international entry ports into both Lagos and Oyo States. Lagos state, located in the south-western part of Nigeria, is bounded in the North and East by Ogun state, in the West by the Republic of Benin and in the south by the Atlantic Ocean. Lagos metropolis is made up of 16 LGA's and contains 83% of the population of Lagos State. There are several border communities through which human, vehicular and mercantile traffic moves across international borders in Lagos State such as the Seme border. Oyo State is an administrative territory which borders the Republic of Benin. Oyo state is bounded in the south by Ogun state, in the North by Kwara state, in the West it is partly bounded by Ogun state and partly by the Republic of Benin, while in the East by Osun state. Ibadan is the capital of Oyo State. Ibadan metropolis is made up of 5 Local Government Areas. Ibadan

is a highly populous city and has major commercial industries, educational institutions and healthcare facilities in the state. Thus both Ibadan and Lagos experiences influx of International migrants from neighbouring West African States and are vulnerable to importation of exotic diseases.

2.2 Study Design and Population

An analytical cross-sectional study was conducted among mortuary attendants and embalmers in public and private healthcare facilities in Ibadan and Lagos metropolis, southwest geopolitical zone of Nigeria. Two stage sampling procedure was used to select the study participants. In the first stage, five local governments were selected by simple random sampling process from the 16 local government areas (LGAs) in Lagos metropolis in Lagos state and another five from the 11 LGAs in Ibadan metropolis in Oyo State. In the second stage, all Mortuary attendants and embalmers who were employees of the private and government health facilities and private funeral homes and who willingly gave their full consent were recruited into the study.

2.3 Sample Size Determination

Total sampling procedure was used for the study. All the mortuary attendants who were willing to participate were interviewed.

2.4 Data Collection Instruments

Data were collected using a pretested interviewer administered questionnaire with 45. Item structured questions to obtain data on the respondents' socio-demographic characteristics, compliance to infectious disease control practice and Ebola Viral Disease (EVD) risk perception. The questionnaire was developed after a review of the literature, and then field tested in neighboring Osun state and thereafter modified in response to observation from the field testing. The research instrument was translated to Yoruba, the predominant local language to ensure adequate understanding of the items by the participants. The questionnaires collected information on socio-demographic characteristics of participants, awareness of, and knowledge Ebola Viral Disease.

2.5 Study Outcomes Determination

Knowledge of EVD was assessed using a devised 6(six) item questions scale which

included questions on knowledge of EVD infectious agent, symptoms of EVD, mode of transmission and prevention of EVD. On this six point knowledge scale, correct response to a knowledge item was scored 1 point and incorrect knowledge response was scored zero. Individual aggregate knowledge score was then calculated by summing the scores for each question on the knowledge scale. A similar scoring system was used to assess the risk of Lassa fever among physicians in Osun State in Nigeria [3].

Perception of EVD risk was assessed on a 7 point scale and included questions on personal assessment of EVD risk status (Susceptibility), perception of EVD fatality (severity), and perception of fear of contracting EVD (dread). Risk perception responses were categorized high risk perception group and low risk perception group. The high risk perception group are those whose responses to question on risk perception includes responses such as ("serious", "very serious") and ("likely", "very likely") and ("a great deal" and from time to time") and ("agree", "strongly agree"). Those with the other spectrum of responses were categorized into the low risk perception group. High risk perception was assigned a score of one point while low risk perception was assigned a score of zero. The Individual aggregate risk perception score was then calculated by summing the scores for each question on the perception scale. A similar scoring system was used to assess the risk perception among community members on Crimean-Congo hemorrhagic fever in Iran [4].

Adherence to infectious disease control practices was graded by assigning scores to Likert scales on a scale of 0-2 points. Responses were scored 2 points for Always, 1 point for Sometimes and 0 points for never. A similar scoring system was used for adherence in the study to investigate the knowledge and practice of infection control among health workers in Edo state [5].

The filled questionnaire were cleaned and sorted before the data entry. Data was analyzed with the SPSS version 17.0 data analysis software. Categorical variables were presented as counts and percentages. Statistical tests using the chi-square and logistic regression was done at confidence level of 95%. Chi square was used to determine the association between knowledge of Ebola viral disease and Socio-demographic variables.

3. RESULTS

3.1 Respondents' Characteristics

One hundred and seven questionnaires with complete data were analyzed. Respondents' ages ranged from 18-75 with a mean age of 45.61±11.2 years. Majority of them were males (89.7%), more than half (54.2%) were Christians. A large majority (86%) were from Yoruba ethnic group. Most of the respondents (60.7%) worked at a public health facility, while 39.3% worked at a private health facility (Table 1).

Table 1. Socio-demographic characteristics of respondents "N=107"

| Respondent characteristics | Number (%) | |
|----------------------------|---------------------|----------|
| Age in years | <20 | 1(0.9) |
| | 20-29 | 5(4.7) |
| | 30-39 | 30(28.0) |
| | 40-49 | 32(29.9) |
| | 50-59 | 27(25.2) |
| | >= 60 | 12(11.2) |
| Gender | Male | 96(89.7) |
| | Female | 11(10.3) |
| Marital status | Married | 95(88.8) |
| | Unmarried | 12(11.2) |
| Level of education | No formal education | 14(13.1) |
| | Primary | 15(14) |
| | Secondary | 44(41.1) |
| | Tertiary | 34(31.8) |
| Years of experience | 1-4 years | 20(18.7) |
| | 5-9 | 19(17.8) |
| | 10-14 | 26(24.3) |
| | 15-19 | 17(15.9) |
| | 20 and above | 25(23.4) |
| Type of health facility | Public | 65(60.7) |
| | Private | 42(39.3) |

3.2 Level of Compliance with Infectious Disease Control Practices and Personnel Protective Equipment Use

Respondents appear to be more conversant with hand washing practices and compliance with hand washing is nearly total among the respondents. However hand washing is just simple hand washing and not detailed process as provided in the infection control guidelines. Although out of the 107 respondents interviewed, about four-fifth (87.9%) reported ever use Personnel Protective Equipment (PPE) when handling corpses, use of specific personnel

protective equipment is rather low among the respondents. As shown in Table 2 only about half of the respondents use face shields and gowns during risky procedures. Respondents however are more likely to appreciate the risk inherent in soiled gowns than use gowns while embalming corpses. Frequently stated reasons for not using PPE were limited number of PPE's in the facility (21.5%), work rate impedance due to PPE (15%), work overload (14%), peer influence (8.4%), and lack of appreciation of PPE importance (9%) (Table 2).

3.3 Respondents' Risk Perception on Ebola Viral Disease

Table 3 shows respondents risk perception regarding EVD. Majority (91.6%) of the respondents opined that Ebola is a serious disease, and possibility of contracting any infectious disease (susceptibility to infections) was perceived by 52.3%, while 86.9% perceived that their occupation predisposes them to the possibility of contracting EVD. A high percentage (74.8%) of the respondents fears that they may contract Ebola Viral Disease. Perception of EVD as a serious disease was high among respondents in both Ibadan (89.3%) and Lagos (94.1%).

3.4 Association between Respondents' Demographic Characteristics and Use of Personnel Protective Equipment

Table 4 shows that in a bivariate analysis, the proportion of respondents with good compliance increases with the level of education as shown in the table. In the same manner, the level of compliance increases with the age of the respondents.

3.5 Association between Respondents' Sociodemographic Characteristics and EVD Risk Perception

Table 5 shows the risk perception of the respondents by their demographic characteristics. The table shows that respondents from the Ibadan metropolis were about 8 times more likely to have a high Ebola risk perception than those from the Lagos metropolis (OR= 8.307, 95% CI = 1.76-39.24). In addition those respondents from the Public health facilities are 5 times less likely to have a high risk perception compared to their counterparts in the private health facilities (O.R = 0.22, 95% CI = 0.04-1.024).

Table 2. Level of compliance with infectious disease control practices and personnel protective equipment use

| | Variable | No (%) |
|---------------------------------------------------------------|-----------------------------------------------------------|---------------|
| Hand washing | Wash hands after contact with deceased body | 96(89.7) |
| | Wash hands after contact with contaminated equipment | 98(91.6) |
| | Use disinfectants after cleaning contaminated floors | 93(86.9) |
| Use of face masks | Uses face masks in procedures likely to generate splashes | 46(43) |
| | Wears face masks during embalming process | 59(55.1) |
| | Reuses disposal gloves | 5(4) |
| Wearing of gowns and overalls | Wears gowns when handling corpses | 67(62.6) |
| | Removes wet/soiled gowns as soon as possible | 90(84.1) |
| Overall compliance with infectious diseases control practices | Compliant | 98.1 |
| | Non compliant | 1.9 |
| Ever use of PPE | Yes | 87.9% |
| | No | 12.1% |
| Reasons for non-use of PPE | There is no penalty in not using PPE | 11(10.3) |
| | Never been infected with any hospital related illness | 22(20.6) |
| | Limited number of PPE's in my facility | 23(21.5) |
| | My colleagues do not wear them | 9(8.4) |
| | It slows down my work | 16(15) |
| | There is too much work at my work placel don't care to | 15(14) |
| | It is unnecessary | 1(0.9) |

Table 3. Respondents' risk perception on Ebola viral disease

| Variable | Number (%) |
|-----------------------------------------------------------------|-------------------|
| Perceived severity of consequence of Ebola viral disease | |
| Not serious | 1 (0.9) |
| Somewhat serious | 4(3.7) |
| Undecided | 4(3.7) |
| Serious /Very serious | 98 (91.6) |
| Possibility of contracting any infectious disease | |
| Unlikely/Very unlikely | 48 (44.9) |
| Undecided | 3(2.8) |
| Likely/ very Likely | 56(52.3) |
| Susceptibility to Ebola viral disease from occupation | |
| Disagree/ strongly disagree | 13(12.2) |
| Don't know | 1(0.9) |
| Agree/strongly agree | 93(86.9) |
| Fear/ worry about contracting Ebola viral disease | |
| Never/ rarely | 27(25.2) |
| From time to time/ a great deal | 80 (74.8) |
| Risk perception by location n= 107 | |
| Ibadan N=56 | |
| Serious | 50(89.3) |
| Not Serious | 6(10.7) |
| Lagos N=51 | |
| Serious | 48 (94.1) |
| Not serious | 3 (5.9) |

Table 4. Association between respondents' characteristics and compliance and use of PPE

| Variable/Characteristics | Compliance/Use of PPE (No (%)) | | | |
|---------------------------|--------------------------------|---------|-------------------|---------|
| | Good | Poor | Tet statistics | P value |
| Age group | | | | |
| <20 | 1(100) | | | |
| 20-29 | 5(100) | | 4.54 ⁺ | 0.033 |
| 30-39 | 30 (100) | | | |
| 40-49 | 32(100) | | | |
| 50-59 | 26(96.3) | 1(3.7) | | |
| >= 60 | 11(91.7) | 1(8.3) | | |
| Gender | | | | |
| Male | 94(97.9) | 2(2.1) | | 1.00* |
| Female | 11(100) | - | | |
| Level of education | | | | |
| Nil formal education | 13 (92.9) | 1 (7.1) | | |
| primary | 14 (93.3) | 1(6.7) | 2.81 ⁺ | 0.09 |
| Secondary | 44 (100) | | | |
| Tertiary education | 34 (100) | | | |
| Marital status | | | | |
| Married | 94(98.9) | 1(1.1) | | 0.212* |
| Unmarried | 11(91.7) | 1(8.3) | | |
| Location | | | | |
| Ibadan metropolis | 55(98.2) | 1(1.8) | | |
| Lagos metropolis | 50(98) | 1(2.0) | | 1.0* |
| Occupation | | | | |
| Mortuary attendants | 69 (100) | | | |
| Embalmers | 36 (94.7) | 2 (5.3) | | 0.054* |

*fishers' exact p; ** Pearson chi square statistic; + chi square for trend

Table 5. Association between respondents' sociodemographic characteristics and EVD risk perception

| Variable /Characteristics | | EVD risk perception (No (%)) | | | |
|---------------------------|-------------------------|------------------------------|----------|------------|---------|
| | | High | Low | Chi-square | P value |
| Age group | <20 | | 1(100) | 0.156+ | 0.69 |
| | 20-29 | 4(80) | 1(20) | | |
| | 30-39 | 28(93.3) | 2(6.7) | | |
| | 40-49 | 27(84.4) | 5(15.6) | | |
| | 50-59 | 23(85.2) | 4(14.8) | | |
| | >= 60 | 11(91.7) | 1(8.3) | | |
| Gender | Male | 86(89.6) | 10(10.4) | 1.26* | 0.26 |
| | Female | 11(100) | | | |
| Level of education | Nil formal | 12(85.7) | 2(14.3) | | |
| | primary | 12(80.0) | 3(20) | 0.4507+ | 0.5019 |
| | Secondary | 38(86.4) | 6(13.6) | | |
| | Tertiary | 31(91.2) | 3(8.8) | | |
| Location (metropolis) | Ibadan | 54(96.4) | 2(3.6) | 9.35* | 0.001 |
| | Lagos | 39(76.5) | 12(23.5) | | |
| Occupation | Mortuary attendants | 61(88.4) | 8(11.6) | 0.38* | 0.56 |
| | Embalmers | 32(84.2) | 6(15.8) | | |
| Type of health facility | Public health facility | 53(81.5) | 12(18.5) | 4.21* | 0.04 |
| | Private health facility | 40(95.2) | 2(4.8) | | |

*Pearson chi square statistics; + Chi square for trend

4. DISCUSSION

4.1 Compliance with Use of PPE Use among Respondents

The present study found a low level of specific PPE use among the respondents. Although mortuary attendants use had not been reported, similar studies on PPE use had been done among health workers. The low level of use of gowns and face masks among this group of workers is similar to a previous study conducted in Borno state, Nigeria which reported 55.5% PPE use among physicians [6]. In this study the most frequently cited reasons for non-PPE use by respondents were unavailability of PPE (21.5%) in the health facility. In Nigeria, the rural areas have limited number of health facilities, and due to limited funds there were also limited availability of PPEs making compliance with infection control practice difficult. The hand glove though an important PPE, is not the only gear for infectious disease control and should be by other gears such as a gown, face shield, eye goggles, aprons, waterproof rubber boots, head covering and masks [7,8]. The frequent report of use of this equipment is similar to what was reported among doctors and nurses in a study carried out in Edo state and in Abuja both in Nigeria [4].

This study also reported lack of penalty for not wearing PPE, high work load and insight that colleagues fail to follow as reasons for non-compliance with use of PPE. However there were no significant association between level of compliance and socio-demographic variables except education and age. The improved compliance observed with education reflects the improvement in utilization with increasing education noted with most health promoting commodities. However the wide margin of confidence interval noted in the estimate of these associations could be due to the small sample size used in this study. It is therefore recommended that further research be conducted with a larger sample size to give a better representation of the population.

4.2 Adherence to Infectious Disease Control Practices among Respondents

This study shows that majority (98.1%) of the respondents had good adherence to infectious disease control practice. This finding is better than a previous study conducted among health

care workers in Edo state, Nigeria which recorded a compliance of 46.8%. In spite of the inadequate provision of facilities, there were high proportion of the respondents complying with infection control guidelines, such as hand-washing after contact with contaminated equipment (91.6%), use of face shield (43%), and use of nose mask (55.1%) which corroborate the finding from previous study(5). The higher proportion (100%) with good level of compliance was observed among mortuary attendants though not statistically significant.

4.3 Risk Perception on EVD among Respondents

This study found 86.9% of the respondents to have an overall high risk perception towards EVD. A similar result was found in a study conducted in Iran on Crimean Congo hemorrhagic fever [4]. Also majority of the respondents (32.7%) believe that they are at risk of contracting infectious disease (susceptible). This finding is similar to the study conducted in Sierra Leone with 34% of the respondent believing that they are at great risk of contracting Ebola [9]. This study shows that majority of the respondents (57.1% versus 60.8%) had a "high" perceived risk to EVD irrespective of their area of residence. Studies have shown that the risk perceptions for viral hemorrhagic diseases are high especially when people witness disease outbreak. Ebola is associated with a high case fatality rate (up to 90%). It is recognized as a deadly disease more so by the mass media in their representation and this is likely to have influenced risk perception among the study population [4,7,10,11]. About 39.3% of the respondents believed that they are very unlikely to contract any infectious disease. This may be based on a reasoning process that encourages them to think that the deadly virus is not a real threat, resulting in a 'self-exempting optimistic bias' [4]. It is worrisome that 5.6% of respondents believe that a patient that died of Ebola is still not contagious to hospital staff. It is imperative that such false assumptions should be corrected by relevant health authorities. In this study more of the participants working in facilities based in Ibadan metropolis have high Ebola risk perception compared to those in Lagos. However, the Ebola disease outbreak was first reported in a private Hospital in Lagos indicating that the high level of the technical competence of the personnel working in the reporting facility. The health facility that reported the Ebola outbreak in Lagos is a high profile private centre

engaging highly qualified personnel who have high index of suspicion. However this high index of suspicion is not widespread in the city as workers in other health facilities do not appear to share this risk perception profile. A contrasting scenario however is observed among private health facilities who appear to have more of them appreciating Ebola risk and vulnerability compared to government workers. This finding suggests that assessment of individual institution staff risk perception profile may be required to guide Ebola risk awareness campaign and intervention programmes in these states.

5. CONCLUSION

Although the risk perception about EVD is high among this vulnerable occupational group, use of personal protective equipment is low among them. However the reported high adherence to hand washing aspect of the infection control guidelines indicate the possibility of success of interventions to improve the workers compliance with other infection control practices. In addition, Induction trainings for new recruitments into mortuary attendance profession, continuous professional development trainings, institution of regular supervisory visits and periodic recertification by the Ministries of Health is recommended to enforce compliance with standard precautions guidelines among the mortuary attendants in these localities.

CONSENT

Authors declare that 'written informed consent was obtained from the mortuary attendants for collection of the data including its publication.

ETHICAL APPROVAL

All authors hereby declare that the study protocol was examined and approved by the ethics committee of the Oyo State Ministry of Health. Therefore the study has been implemented in accordance with the ethical standards laid down in the 1964 Declaration of Helsinki.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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Peer-review history:
The peer review history for this paper can be accessed here:
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