

Full Length Research Paper

Knowledge, attitudes, and practices of health care workers on Ebola virus disease in Conakry, Guinea: A cross-sectional study

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In the current Ebola virus disease (EVD) outbreak, health care workers (HCWs) are on the frontline of the response. The study aimed to report on the knowledge, attitudes and practices of Conakry HCWs. A cross-sectional survey was done among HCWs from the two national hospitals and at the communal hospitals in Conakry, using a standardized questionnaire. Demographic, knowledge, attitudes and practices data of the respondents were recorded and analyzed. Respondents (n = 525) were mainly physicians (43.0%) or nurses (36.8%). Over 90% of HCWs cited the three major clinical signs of EVD. Only 68% knew the correct concentration of Javel water that is advised for hand washing. This was known by 69.4% of nurses, 59.0% of residents, 69.5% of physicians, 100% of pharmacists and 60.9% of midwives ($P = 0.35$). The EVD transmission risk in the ward was estimated as probable for 70.6% and very probable for 24.0% of HCWs. Eighty-four percent of all respondents estimated their knowledge on EVD insufficient and 97.1% reported that they either need specific training on EVD or enhance their knowledge. This study underlines the low level of knowledge, attitude and perceptions regarding EVD prevention despite the high incidence and mortality of this disease.

Key words: Ebola virus disease, perception, health care workers, Guinea.

INTRODUCTION

Filoviruses that is, Marburg viruses and Ebola viruses, are highly infectious and transmitted from person-to-

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Table 1. Characteristics of health care workers at Conakry.

Characteristics	N= 525	%
Age (mean±SD)	39.3±9.9	-
Men	253	48.2
Profession	-	-
Nurses	193	36.8
Resident	39	7.4
Physician	226	43.0
Pharmacist	3	0.6
Midwife	64	12.2
Hospitals		
Municipal hospitals	-	-
Coléah	47	9.0
Matam	64	12.2
Matoto	50	9.5
Minière	46	8.8
Ratoma	56	10.7
University hospitals	-	-
Donka	111	21.1
IgnaceDeen	151	28.8

person by direct contact with infected body fluids or by contaminated fomites (Bühler et al., 2014). The ongoing Ebola virus disease (EVD) outbreak in West Africa is the largest and most sustained Ebola epidemic recorded to date, with 28,476 probable, confirmed or suspected cases of Ebola virus disease and 11,298 reported deaths mainly in Liberia, Sierra Leone and Guinea as of October 21, 2015 (WHO, 2015; Bausch et al., 2014). The control of the outbreak is expected to last longer than initially planned. The current outbreak, like previous, has been deadly in health care settings with increased risk for health care workers (HCWs) (Benowitz et al., 2014).

The overall mortality rate associated with EVD in the Conakry Ebola treatment center has been reported to be 44% by Barry et al. (Jamieson et al., 2014). They found that 19% of patients hospitalized with laboratory confirmed EVD were HCW. This suggests that HCW are highly exposed to EVD and many of them might be infected during the current outbreak. Because HCWs are on the frontline of the response to the outbreak, their occupational health and safety is critical to achieve the control of the outbreak and to maintain an efficient health care workforce during and even after the crisis (Barry et al., 2014). The aim of this study was to report the knowledge, attitudes and practices (KAP) of HCW about EVD in the Health district of Conakry in Guinea. The study objectives were:

1. To assess the level of knowledge of HCWs on EVD.
2. To evaluate the level of awareness and practices towards EVD.

MATERIALS AND METHODS

Study population

The study population consisted of all HCWs working at the two national hospitals of Donka and IgnaceDeen and the five communal hospitals of Conakry. The following professionals were considered as HCW: Physicians, medical residents, nurses and midwives. Administrative staff was excluded of the survey as HCWs.

Data collection

A semi-structured self-reported questionnaire was developed by the research team through group discussions after an extensive literature review. The draft questionnaire was reviewed by two experts in the fields of infectiology and epidemiology. The questionnaire was validated and pre-tested with 20 individuals to ensure reliability and validity prior to initiating the fieldwork. Some questions were open ended and allowed the respondents the chance to give greater details while others were restricted to a yes or no answer. The questionnaire captured demographic data (age, sex, profession, department at hospital and length of experience), knowledge on the EVD, attitudes and practices regarding EVD. Participants were asked about their perception of contamination in health services, and the risk was scored using Likert scales (Skowronski et al., 2003). The numeric scale was scored from 0 ("no risk") to 10 ("high risk"). The Likert scale included the categories "very improbable," "improbable," "undecided", "probable," and "very probable". The questionnaire was anonymous and the confidentiality for participants was preserved. The study data was collected between September, 1 and October, 31, 2014.

Statistical analysis

The characteristics of the study population were presented using proportions, means (SD). Fischer exact test and the Student T tests were used to compare categorical and quantitative variables. All statistical analyses were performed with SPSS (Statistical Package for Social Sciences, Version 21.0; SPSS, Chicago, IL, USA). All tests were 2-tailed, with a p-value <0.05 considered as being significant.

Ethical approval

Verbal informed consent was obtained from all participants. Ethical approval was obtained from the Faculty of Medicine, University of Conakry, Guinea.

RESULTS

Demographic characteristics

A total of 990 HCWs were contacted and 525 completed the questionnaire corresponding to a response rate of 53.03%. The overall mean age of the participants was 39.3±9.9 years and 48.2% were women. A total of 43.0% were physicians and 36.8% were nurses. Almost half of the respondents (49.9%) were working at the national university hospitals Donka and IgnaceDeen (Table 1). The median duration of their working experience was 8.0

Table 2. Knowledge of Conakry health care workers about the Ebola transmission.

Do you systematically wear gloves during the routine actions such as punctures, installation of catheters, dressings?	Number	%
No in nurses	190	98.4
No in residents	36	92.3
No physicians	218	96.5
Pharmacist	3	100.0
Midwives	59	92.2
Have you received specific training on Ebola virus disease?		
No	152	29.0
Yes	373	71.0
How would you judge your knowledge on the Ebola virus disease?		
insufficient	442	84.2
sufficit	83	15.8
Do you need a continuing training on the Ebola virus disease?		
No	15	2.9
Yes	510	97.1
Do you systematically screen for Ebola virus disease in all the patients received in your department?		
Systematically	432	82.3
Some times	78	14.9
Never*	15	2.8

(0.4 to 36) years.

Knowledge

Nearly 98% of the respondents knew the duration of Ebola incubation. However, only 30.5% of them knew the total number of EVD cases in HCWs that occurred in Guinea from the start of the outbreak to the time of the study. More than 90% of HCWs cited the three major clinical signs of EVD, that is, fever, diarrhea and asthenia. According to the respondents, the diagnosis of EVD is based on clinical signs (24.6%), serology (44.4%), blood culture (1.9%) and polymerase chain reaction (29.2%). When they were asked about the type of treatment, 5% of HCWs reported that the treatment given in the Ebola treatment centers was etiological. For the rest, the treatment was symptomatic. Concerning their knowledge about the transmission of Ebola, the contact with blood fluids was the most cited (82.7%) followed by direct contact with the skin of patients (84.2%) (Table 2). Regarding the knowledge on protection measures, 57.90% (304/525) responders had seen at least once the personal protective equipment against Ebola. Of these, 99.0% (301/304) knew how these equipment must be worn. Sixty-eight percent knew the correct concentration

of Javel water that is advised for hand washing. This was known by 100% of pharmacists, 69.4% of nurses, 69.5% of physicians, 60.9% of midwives and 59.0% of residents ($P = 0.35$) (Table 2).

Attitudes and perception about EVD

Perception of the risk of transmission of Ebola in the medical ward was measured by Likert scale (Table 3). For 70.6% of the respondents, the transmission was probable in the ward, very probable for 24.0%, and improbable for 1%. The results showed that 4.4% were undecided. Five hundred and six HCWs (96.6%) reported not systematically wearing gloves during the routine actions such as punctures, installation of catheters, dressings etc. This was lower in midwives (92.2%) and residents (92.3%) compared nurses (98.4%) ($P = 0.06$). Eleven percent reported having had an exposure to the patient biological fluids. To the question "Have you received specific training on EVD?" 29% responded having received no specific training. Eighty-four percent of all respondents estimated their knowledge on EVD insufficient and 97.1% reported that they either need specific training on EVD or enhance their knowledge. 82.3% of the respondents reported that they systematically

Table 3. Attitudes and preception of Conakry health care workers about the Ebola transmission.

What are the exposures at riskof transmission of Ebola virus disease in health care?	Number = 525	%
Respiratory droplets by coughing or talking	345	65.7
Projection of pathological products on the eyes	159	30.3
Contact with the skin of a patient	442	84.2
Contact with blood fluids of a patient	434	82.7
Prolonged contact with clothing or bedding of a patient	365	69.5
Did you once saw a personal protective equipment against Ebola?		
Yes	304	57.9
Non	221	42.1
Do you systematically wear gloves during the routine actions such as punctures, installation of catheters, dressings?		
No in nurses	190	98.4
No in residents	36	92.3
No in physicians	218	96.5
No in Pharmacist	3	100.0
No in Midwives	59	92.2

*Nurses (n = 5), physicians (n = 9) and pharmacist (n = 1).

screen for EVD in all patients at the time of medical consultation. Screening for EVD in patients was performed sometimes by 14.9% of HCWs and never by 2.8% of them (Table 3).

DISCUSSION

The current Ebola outbreak is the largest EVD outbreak in history (WHO, 2015). It has taken a heavy toll among HCWs, representing nearly 6.2% of all laboratory confirmed Ebola cases in Guinea (MacIntyre et al., 2014; Delamou et al., 2015) and 5.2% in Sierra Leon (Barry et al., 2014; Kilmarx et al., 2014). Recent studies in Guinea Ebola centers treatment, reported that one in five HCWs in Ebola laboratory confirmed and suspected cases (Jamieson et al., 2014; Bah et al., 2015). The present study explored the knowledge, attitudes and perceptions of 525 HCWs from hospitals in Conakry.

The study showed that HCWs in Conakry have good knowledge of some aspects of EVD such as duration of incubation period and EVD clinical signs. However, it pointed out the lack of knowledge about the methods of diagnosis, and the knowledge of the disease. Only around 30% knew that the diagnosis is laboratory based on PCR. The reason for this could be the fact that PCR was not used in Guinea on a routine basis before EVD outbreak. The only laboratories equipped with this exam in Guinea were the Guinean Hemorrhagic Fever laboratory in Donka (supported by the Pasteur Institute of Dakar and France), one provided by the Russian Cooperation and another one by the European Mobile

Lab in Gueckédou.

HCWs are on the frontline of the response, and their occupational health and safety is critical to the control of the outbreak and the maintenance of the health care workforce during the crisis (MacIntyre et al., 2014). A total of 94.7% of HCWs reported that EVD might be transmitted during care. This is reassuring concerning the behaviors that can be expected for avoiding infection in HCWs. However, nearly 18% still were not systematically screening EVD in their patients. That can be related to a lack of knowledge or care for patients with few symptoms.

The implementation of the infection control policy resulted in some improvements in the appropriate hand washing practices and use of gloves. However, despite the context of the Ebola outbreak, the proportion of HCWs who reported not systematically using gloves was 96.6%. This proportion was enough for facilitating EVD transmission within HCW and patients. Such behavior is in total contradiction with the infection control guidelines implemented in health care setting by health services authorities. These findings could explain the high incidence of confirmed EVD in HCWs in the current (MacIntyre et al., 2014). The vast majority of documented EVD outbreaks involving hospitals have explained no socomial transmissions by inadequate isolation of facilities, lack of use of gloves and protective clothing by HCWs (Okeke et al., 2014). In 1995 during the Ebola outbreak that occurred in Kikwit, the investigators reported that the high transmission of EVD in health care workers was due to the lack of use of aseptic-nursing techniques during surgical and obstetrical care and patient

care in general, especially during the of EVD cases (Kerstiens and Matthys 1999).

This study showed that the need for training was strong among HCWs. One HCW over three had received no specific training on Ebola and almost all of them estimated their knowledge insufficient.

Conclusion

To the best of the study knowledge, this is the first study on KAP of HCWs in the context of the current Ebola outbreak in Guinea. The study findings underline the low level of knowledge, attitude and perceptions regarding Ebola prevention in Conakry despite the high incidence and mortality of this disease. There is a strong need to intensify prevention measures among HCWs by providing more structured trainings on Infection control and prevention.

LIMITATIONS

The study has several limitations. First, it used self-reported questionnaire to collect data from the participants, who might misreport their behaviors or attitudes. Because of the cross sectional design, the study could not estimate a trend of KAP. Then, it can be expected that the knowledge improved when the duration of the outbreak increased. A repeated survey might provide some changes regarding KAP in these populations. Analysis of KAP taking account of the number of EVD diagnosed in the wards was not done. Only 53% of HCWs accepted to answer the questionnaire. Nevertheless, the study did not if there are differences between participants and those who declined to participate.

Conflict of Interests

The authors have not declared any conflict of interests.

REFERENCES

- Bah EI, Lamah MC, Fletcher T, Jacob ST, Brett-Major DM, Sall AA, Shindo N, Fischer WA 2nd, Lamontagne F, Saliou SM, Bausch DG, Moumié B, Jagatic T, Sprecher A, Lawler JV, Mayet T, Jacquerioz FA, Méndez Baggi MF, Vallenás C, Clement C, Mardel S, Faye O, Faye O, Soropogui B, Magassouba N, Koivogui L, Pinto R, Fowler RA (2015). Clinical presentation of patients with Ebola virus disease in Conakry, Guinea. *N. Engl. J. Med.* 372:40-47.
- Barry M, Traoré FA, Sako FB, Kpamy DO, Bah EI, Poncin M, Keita S5, Cisse M6, Touré A (2014). Ebola outbreak in Conakry, Guinea: epidemiological, clinical, and outcome features. *Med. Mal. Infect.* 44(11-12):491-4.
- Bausch DG, Bangura J, Garry RF, Goba A, Grant DS, Jacquerioz FA, McLellan SL, Jalloh S, Moses LM, Schieffelin JS (2014). A tribute to Sheik Humarr Khan and all the healthcare workers in West Africa who have sacrificed in the fight against Ebola virus disease: Mae we hush. *Antiviral Res.* 111:33-5.
- Benowitz I, Ackelsberg J, Balter SE, Baumgartner JC, Dentinger C, Fine AD, Harper SA, Jones LE, Laraque F, Lee EH, Merizalde G, Yacisin KA, Varma JK, Layton MC; Centers for Disease Control and Prevention (CDC) (2014). Surveillance and Preparedness for Ebola Virus Disease-New York City, 2014. *MMWR Morb Mortal Wkly Rep.* 63(41):934-6.
- Bühler S, Roddy P, Nolte E, Borchert M (2014). Clinical documentation and data transfer from Ebola and Marburg virus disease wards in outbreak settings: Health care workers' experiences and preferences. *Viruses* 6(2):927-37.
- Delamou A, Beavogui AH, Kondé MK, van Griensven J, De Brouwere V (2015). Ebola: better protection needed for Guinean health-care workers. *Lancet* 385(9967):503-504.
- Jamieson DJ, Uyeki TM, Callaghan WM, Meaney-Delman D, Rasmussen SA (2014). What obstetrician-gynecologists should know about Ebola: a perspective from the Centers for Disease Control and Prevention. *Obstet. Gynecol.* 124(5):1005-1010.
- Kerstiens B, Matthys F (1999). Interventions to control virus transmission during an outbreak of Ebola hemorrhagic fever: experience from Kikwit, Democratic Republic of the Congo, 1995. *J. Infect. Dis.* 179 Suppl 1:S263-S267.
- Kilmarx PH, Clarke KR, Dietz PM, Hamel MJ, Husain F, McFadden JD, Park BJ, Sugerman DE, Bresee JS, Mermin J, McAuley J, Jambai A (2014). Centers for Disease Control and Prevention (CDC). Ebola virus disease in health care workers--Sierra Leone, 2014. *MMWR Morb Mortal Wkly Rep.* 63(49):1168-1171.
- MacIntyre CR, Chughtai AA, Seale H, Richards GA, Davidson PM (2014). Respiratory protection for healthcare workers treating Ebola virus disease (EVD): are facemasks sufficient to meet occupational health and safety obligations? *Int. J. Nurs. Stud.* 51(11):1421-1426.
- Okeke IN, Manning RS, Pfeiffer T (2014). Diagnostic schemes for reducing epidemic size of african viral hemorrhagic fever outbreaks. *J. Infect. Dev. Ctries* 8:1148-1159.
- Skowronski DM, Strauss B, De Serres G, MacDonald D, Marion SA, Naus M, Patrick DM, Kendall P (2003). Oculo-respiratory syndrome: a new influenza vaccine-associated adverse event? *Clin. Infect. Dis.* 36:705-13.
- WHO (2015). Ebola Situation Report - 21 October 2015. Assessed October 24, 2015, available at <http://apps.who.int/ebola/current-situation/ebola-situation-report-21-october-2015>.