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Self-Reported Knowledge and Practices of Healthcare Workers on Occupational Exposure and Protection from Infectious Disease at the Military Hospital in

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Abstract

To assess Healthcare workers (HCWs) knowledge and experiences with infection prevention and control (IPC) practices and towards occupational exposure in Sierra Leone, after the 2014-2015 Ebola virus disease outbreak, which in turn can be used to identify areas that require additional training.Study Design: A cross-sectional study.Methods: From December 9 th to 23 rd , 2016, questionnaires contained 45 questions spanning five themes focusing on knowledge and practice and training were administered to all clinical HCWs at the No. 34 Military Hospital, Freetown, Sierra Leone. Main outcome measures are knowledge and practices score on occupational exposure and protection from infectious disease.

Index terms— healthcare workers: occupational exposure and protection: knowledge: practices: sierra leone.

1 I. Introduction

he protection of medical personnel from exposures to infectious agents is crucial to ensure occupational health and safety, while reducing the risk of hospital-acquired infections. Proper training and safe practices help reduce the spread of disease, especially in outbreak scenarios. West Africa serves as a natural focus for multiple highly infectious agents, many of which are considered blood-borne pathogens and pose a serious risk for occupational exposure in HCWs. It is particularly important in developing countries, like Sierra Leone, which lacks resources and infrastructure, and has limited access to infection prevention and control (IPC) training. Although attempts have been made to characterize gaps in training in these settings, research focusing on knowledge and practices of HCWs towards adhering to basic precautions has been largely ignored.

The Ebola virus disease (EVD) outbreak from 2014-2016, which infected 28,616 and resulted in over 10,000 deaths in West Africa serves as a grim reminder of the importance of protecting the health and safety of HCWs [1]. The cumulative incidence rate of Ebola was almost 100 times higher in HCWs than in the general population [2]. A total of 199 laboratory-confirmed Ebola cases reported from Sierra Leone were in HCWs [3], of which, 101 out of 127 (79.6%) died [4]. With the help of the international community, the epidemic was effectively contained in 2016 in part due to increased training in IPC [5].

Ebola infection prevention and control in primary healthcare facilities located in Sierra Leone, gradually improved during the outbreak as preventative practices were followed [6]. However, the dilemma facing Sierra Leone and other Ebola-affected countries is how to maintain proper IPC. Unfortunately, data on HCW occupational exposures and acquired infections in West Africa including Sierra Leone remains scarce. Survey data from 19 hospitals in Ethiopia, showed that the level of awareness of general preventive measures was lower in the HCWs, with reported sharps injuries at 29.1% a year [7]. Now that Ebola has been controlled for over

two years, HCWs knowledge, self-efficacy and experiences with IPC practice in this country required further investigation.

In order to better understand gaps in knowledge and practice regarding occupational safety and exposure, we surveyed HCWs, post-Ebola epidemic, at the No. 34 Military Hospital, the only general hospital in the army, where these same staff admitted and treated a large volume of EVD patients months earlier. Our objectives were to assess HCWs knowledge, and experiences with IPC practice, which in turn can be used to identify areas that require additional training. It is hoped that the findings and recommendations in this article will influence hospital authorities and elicit lasting change in how these outcomes are measured and what is needed to reduce the risk of infection in HCWs in Sierra Leone.

2 II. Methods a) Study Design and Population

A descriptive cross-sectional study was conducted at the 34 Military Hospital, which has 200 beds for the admission of various medical conditions and is located at the Wilberforce Barracks, Freetown, Sierra Leone. This hospital provides both the secondary and tertiary health care for soldiers, their families and civilian workers in the Ministry of Defence. A few in hospital educational opportunities (such as lecture for occupational health) were held periodically in the lecture room etc. All health care workers at the Hospital must have completed the secondary school level of education before enrolling in any category of health related courses. Some state Enrolled Community Health Nurses (SECHNs) have completed the three years course in community health nursing from the recognized nursing schools in Sierra Leone. Some are Health Care Assistants (HCA) who serve as assistants to the SECHNs. All 220 HCWs involved in clinical diagnosis and treatment of patients were invited to participate in this study (Table 1). All responses to the questionnaire were confidential and de-identified. Recruitment took place from December 9 to 23, 2016. Ethical approval was obtained from the study hospital.

3 b) Design and Administration of the Questionnaire

Data were collected using a self-filled in, structured questionnaire, which was developed after reviewing related references [8][9][10][11]. The survey had questions on socio-demographic characteristics, and 45 questions across five themes, including actual practice of preventive measures (Q5-Q8, Q10-Q11,Q17-Q19 and Q29-31, Appendix), knowledge and perception of universal precautions and infectious disease (Q32-Q45), training level (Q20-Q26, Q28), and some probable reasons for poor practice (Q9, Q12-Q15), as well as self-evaluation and external evaluation (Q1-Q4, Q16, Q27) (Appendix). Ten questions had binary (yes or no) responses, seventeen multi-items questions had one correct answer, and eighteen multiple choice questions focusing on practice and knowledge of infectious diseases which had more than one correct answers. Each study participant was required to fill out information mentioned above. For some volunteered nurses or low education level nurses who cannot really understand the meaning of some question and choices, the investigators from the hospital explained them. Three co-investigators from Chinese Military Medical Experts Group in Sierra Leone supervised data collection.

The questions which had only one correct answer were graded in the categories of wrong and right. Eighteen multiple choice questions which had more than one correct answers were graded in the categories of completely wrong (very poor), poor, intermediate or adequate according to the combination of the response answer. These levels were given scores of zero, one, two and three for completely wrong (very poor), poor, intermediate or adequate (right), respectively. Total scores for knowledge, practice, and training were calculated and split into three cut-points based on quartiles of ranked data values. Education levels were stratified as follows: Bachelor's degree and above as 'High', diploma certificate as 'Middle', and technical, SECHNs, HCA, secondary school, and midwife all categorized as 'Tertiary' background.

4 c) Data Analysis

Univariate analysis was used to access the association between socio-demographic characteristics and knowledge, practice, and training level, by using a chi-square test or a Fisher's exact test. All variables with a P-value of <0.05 from univariate analysis were entered into a multivariate forward stepwise logistic regression analysis. All analyses were conducted using SPSS (version 18.0, SPSS Inc. Chicago, IL).

5 III. Results a) Participant Characteristics

There were 190 respondents with valid questionnaires, giving a response rate of 86.3% (190/220). Demographic data can be found in Table 1. More than half of HCWs were categorized as 'tertiary' for educational level and according to the self-evaluation, 77.9% of participants rate their level of occupational protection knowledge and protection awareness as high.

6 b) Survey Response Results

According to responses, 17.4% of the staff knew how to deal with needles and syringes correctly, and 12.1% of staff knew how to respond to sharp hospital as a reason for extremely humble and broken injuries correctly. Less than 10 % of staff knew exactly what scenarios required follow-up hand washing or disinfection, and 15.8% knew in what cases they should wear gloves. When responding to questions about the routes of transmission for HIV

and Hepatitis B Virus, 26.3% and 27.9% of participants answered correctly, respectively. Less than half of staff (42.6%) answered correctly about proper protection from blood-borne exposures from HIV patients. The results also showed that 27.9% of the HCWs never received professional protection training. Furthermore, 98.4% think it is necessary to set up occupational protection courses regularly and more than half (64.7 %) reported that the hospital is insufficiently supplied with protective equipment (Table S1 Appendix).

A majority of self-reported sharp injuries occurred when recapping (56.8%), breaking the ampoule (52.1%), and removing the needle from the syringe or infusion set (31.1%). A total of 101 (53.2%) HCWs responded that the reason why people operate without gloves is that gloves are not available or there is a shortage. Less than half of HCWs (48.9%) have never been injured by medical sharps during operation before. Of those who did report a previous sharps injury, 23-76% was due to carelessness, in a hurry, inadequate lighting in the work place or not following the standardized sharps protocol. Among staff who were suffered from the sharp injury, the breakdown by department is as follows, 84.6% in the Under Fives Clinic, 80% in the Laboratory, 70% in Physiotherapy, 56.7% in Internal Medicine and 40.6% in the Surgical Department.

Encouragingly, 86.3% participants responded that they would report to superior immediately if they get a sharp injury.

7 c) Knowledge & Practice & Training and Associated

Factors Sixty (31.6%) and thirty-four (17.9%) of HCWs had intermediate and adequate knowledge on occupational exposure and protection from infectious disease respectively, while eighty-two (43.2%) and twelve (6.3%) had an intermediate and good practice on them respectively (Table 2). Findings also revealed that work experience years, type of occupation, type of department were associated significantly with knowledge on occupational exposure and protection. In addition, occupation, type of department and gender were also associated significantly with practice level. In addition, the level of received training among occupation or department was significantly different respectively (Table 2). A majority of volunteer nurses scored below poor in training (90.9%). The training level of staff from the surgical department and the Under Fives Clinic were also below other staff, with 61.8% and 66.7% at the very poor level, respectively.

Analysis of practices showed significant differences between younger and older staff compared to middle age staff members for the following: when hand washing and disinfection of hands should occur (Q31), when should you report to your superior if you get a sharp injury (Q43) and what should a nurse wear when receiving a new patient with Fever of Unknown Origin (Q35). The participants with different education levels had significantly different responses based on the following questions: disinfecting nursing equipment (Q29), dealing with contaminated medical equipment (Q30), frequency of cleaning and disinfecting the surface of trolleys or desks (Q31) as well as when should you wash your hands (Q32) (Table **??**, $P<0.05$). The military nurses and technicians had significantly more correct responses than those from other groups. It also showed that there are a higher proportion of participants from the laboratory who had correct practices (Q11, Q43). However, the participants from the Surgical Department and the Under Fives Clinic had more poor or incorrect responses (Q11, Q17, Q29, Q33, Q36-Q45). Among the 97 (51.1%) HCWs who reported having been injured by medical sharps during medical-associated work, multivariate logistic regression analysis showed that the Under Fives Clinic ($P = 0.013$, $OR = 9.874$) was a risk factor for sharps injury, while receiving specialized training ($p = 0.015$, $OR = 0.422$) was protective.

8 IV. Discussion

The present study assessed knowledge and practices of healthcare workers (HCWs) on risks of occupational exposure and proper protection from infectious diseases at the military hospital located in Sierra Leone after the Ebola outbreak. To our knowledge, this is the first study to quantitatively / qualitatively describe the knowledge and practices of HCWs towards infectious disease prevention and control in Sierra Leone post-Ebola outbreak.

We found that 49.5% of the participants had an intermediate or adequate knowledge on occupational exposures and protection from infectious diseases, and good practice, while 42.6% staff had a positive response for protection from blood-borne exposure of HIV patients. This low insufficient knowledge and perception are at a similar level to that which was reported in Ethiopia [7] and Iran [12]. Only 26.3% and 27.9% of staff understood the route of transmission for HIV and Hepatitis B Virus, respectively. It is also similar to same settings in South Africa [13] and lower than that (two third) at some regional hospitals in Tanzania [14], as well as the developed countries [15,16]. In addition, the present study also showed that the proportion that received training among participants were very low according to self-assessment and objective assessment, with variations observed by occupation and department ([14], as well as stressing the importance and proper practice of hand hygiene along with improving hand sanitizer options in disinfection protocols can improve occupational protection from infectious disease [17].

Needle-stick and sharps injuries carry the risk of infection and are occupational hazards for all health care professionals involved in clinical care. Our present study showed that more than half of HCWs (51.1 %) had been injured by medical sharps during work, which indicates that the overall occupational exposure among the subjects was alarmingly higher than the 29.1% needle stick injury prevalence reported in Ethiopia [7] and 27.5% in India **??**18]. Additionally, 17.4% of the staff knew how to dispose of used needles and syringes, suggesting that more than 80% of the staff were inadequately trained in handling needles and syringes correctly. According to

survey responses, 12.1% of staff can deal with sharp injury correctly, indicating a potential risk of no socomial infections. However, though occupational sharps injuries are common among HCWs in this study area, 86.3% participants responded that they will report to superior immediately if a sharp injury occurs, which scores higher than the 42.3% who would report a sharp injury to a superior in Ethiopia [19] and 37% of respondents reporting needle sticks in Nigeria **??**20].

Our results found that more sharp injuries happened when recapping (56.8%), breaking the ampoule (52.1%), removing the needle from the syringe or infusion set (31.1%). This is comparable to a multicenter research study in Lagos, Nigeria, which found that the most common activity leading to needle-stick and sharps injuries was recapping of needles (45%) **??**20]. In addition, among the HCWs injured by medical sharps, 41-76% was due to carelessness, hurry, or not following standard protocols. However, it should be noted that 23.7% was due to inadequate lighting in the work place. Thus, administrative and hospital policies, should also be strengthened to reduce the risk of occupational exposures in HCWs. The present study showed that 84.6% staffs in the Under Fives Clinic, which provides services for children under-five years and pregnant women, were suffered from the sharp injury. The reason and the risk factors maybe are that there is more outpatient volume as more free treatment, more frequency for re-capping of needles after injection procedures, or A more humble and crowded environment in this hospital.

Proper hand hygiene is one of the most simple and effective measures to prevent occupational exposure and reduce hospital infections in HCWs. This present study showed middle compliance (82.6%) to standard six-step hand wash procedure, with more problems on hand washing among doctors and lab technicians. While 66.8% had correct knowledge and practice of drying hands after washing, less than 10 % of staff knew exactly what occasions they should wash or disinfect hands, especially for younger and older staff members. We did not investigate the reasons for noncompliance to hand washing and drying. Good practice of basic hygiene need not only proper training, but also available amenities like portable water, hand washing stations and other enhanced infrastructure **??**21, **??**2]. As there has the high prevalence of cholera, typhoid fever, tuberculosis, pneumonia, influenza it is important and necessary that hand hygiene is stressed heavily in healthcare settings, as it is the most simple and effective measures to prevent and reduce hospital acquired infections.

It was not surprising that the degree of training was associated with level knowledge ($?2=52.04$, $P<0.01$). However, this was not the case with practice level ($?2=11.86$, $P=0.221$), which suggest that good practice should be stressed more in field operations, clinical settings, and under direct supervision, while ensuring that facilities are well equipped to maintain HCW safety.

9 a) Limitations

This study is based solely on self-reported results, which can allow for potential recall bias. Furthermore, less than half of clinical doctors (8 out of 19) responded to the questionnaires, limiting our ability to infer findings among this population and potentially exposing this study to non-response bias. In addition, because of the lack of data for HCW's knowledge before the outbreak of EVD in 2014-2015, the impact of the outbreak of EVD on the knowledge level of HCWs was not assessed. Finally, this study only occurred in one Hospital, which may not be representative of other healthcare settings in Sierra Leone.

10 V. Conclusions

Relatively scarce knowledge and practicing of hand hygiene, high frequency of sharp injuries, lack of understanding of important infectious diseases, and the insufficient facilities and supplies will continue to place HCWs at risk of hospital-acquired infections in Sierra Leone. We recommend that more intensive and targeted training be carried out as soon as possible, focusing on the above mentioned. Additionally, this hospital should strengthen supervision, particularly of volunteer nurses, while providing adequate supplies critical to reducing disease exposure risks, such as gloves, sharp boxes, and gowns. There is an urgent to establish the infection control evaluation systems for occupational exposures, including necessary designated infection control / occupational health professionals, regular infection control committee meetings to resolve issues, and provision of necessary supplies for the study hospital in Sierra Leone.

11 VI. Author Statements

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218 three respectively. Total scores for knowledge, practice, and training for each HCWs participants were calculated respectively, and then split into three cut-points level based on quartiles of ranked data values. [1] [2] [3]

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Figure 1: Table 2)

Figure 2: K

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Competing Interests: None declared.

*[Note: * : From Ebola Survivors Clinic, Dental Department, X-Ray Department, Chest Clinic, Ophthalmology Department, Operation Theatre, Infectious Disease Control Unit, where the number of participator are under four respectively.]*

Figure 3: Table 1 :

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[2] © 2018 Global Journals K Self-Reported Knowledge and Practices of Healthcare Workers on Occupational, Exposure and Protection from Infectious Disease at the Military Hospital in Sierra Leone

[3] Self-Reported Knowledge and Practices of Healthcare Workers on Occupational, Exposure and Protection from Infectious Disease at the Military Hospital in Sierra Leone

2

	Response % (n=190)										
	Knowledge Level Grade Score					Practice Level Grade Level					T
	Very Poor	Poor	Interm-ediate	Good	P Value	Very Poor	Poor	Inter-mediate	Good	P Value	Very Poor	P
	?18	19-22	23-27	28+		?29	30-31	32-34	?35		? 11	1
	Age (Years)				0.244					0.986		
>45	23.9	21.7	37.0	17.4		28.3	19.6	47.8	4.3		29.5	1
21-25	53.3	26.7	13.3	6.7		26.7	20.0	46.7	6.7		33.3	2
26-45	24.0	24.8	31.8	19.4		31.8	20.2	41.1	7.0		42.1	1
	Sex				0.287					0.012		
Male	21.9	25.4	35.1	17.5		23.7	17.5	51.8	7.0		33.6	9
Female	33.3	22.7	25.3	18.7		41.3	24.0	29.3	5.3		45.9	1
	Work Experience (Years)				0.032					0.295		
>20	18.2	31.8	36.4	13.6		13.6	31.8	45.5	9.1		28.6	9
1-5	42.2	15.6	26.6	15.6		29.7	25.0	39.1	6.3		47.6	1
6-20	18.3	27.9	33.7	20.2		34.6	14.4	45.2	5.8		34.7	1
	Education Background				0.154					0.616		
High	24.0	26.0	34.6	15.4		29.8	18.3	47.1	4.8		31.4	1
Middle	28.4	23.5	29.6	18.5		29.6	22.2	39.5	8.6		45.6	8
Tertiary	40.0	0.0	0.0	60.0		60.0	20.0	20.0	0.0		75.0	0
	Occupation				0.010					0.043		
Civil Nurse	20.8	25.0	35.4	18.8		35.4	20.8	37.5	6.3		47.9	1
Medical Doctor	37.5	25.0	00.0	37.5		50.0	25.0	12.5	12.5		71.4	0
Military Nurse	22.2	25.0	36.1	16.7		26.9	16.7	51.9	4.6		32.7	1
Technical	26.7	20.0	26.7	26.7		33.3	13.3	33.3	20.0		20.0	6
Volunteer Nurse	81.8	18.2	0.0	0.0		27.3	54.5	18.2	0.0		54.5	3
	Department				0.012					0.006		
Emergency Depart	12.0	16.0	52.0	20.0		24.0	16.0	60.0	0.0		40.0	8
Gynecology	50.0	0.0	50.0	0.0		50.0	33.3	16.7	0.0		33.3	1
Medical Inspection	0.0	14.3	57.1	28.6		0.0	14.3	57.1	28.6		16.7	0
Internal Medicine	19.4	51.6	25.8	3.2		29.0	12.9	45.2	12.9		40.0	1
Laboratory	20.0	20.0	33.3	26.7		33.3	13.3	33.3	20.0		20.0	1
Mortuary	20.0	20.0	60.0	00.0		0.0	60.0	40.0	0.0		0.0	2
Pediatrics Depart	23.8	23.8	33.3	19.0		42.9	19.0	38.1	0.0		28.6	1
Physiotherapy	27.3	18.2	36.4	18.2		45.5	0.0	45.5	9.1		36.4	1
Surgical Depart-ment	38.2	14.7	20.6	26.5		23.5	29.4	44.1	2.9		61.8	5
Under Fives Clinic	61.5	7.7	7.7	23.1		69.2	30.8	0.0	0.0		66.7	1
Others	22.7	36.4	22.7	18.2		18.2	18.2	59.1	4.5		20.0	2
Total	26.3	24.2	31.6	17.9		30.5	20.0	43.2	6.3		38.4	1

Figure 4: Table 2 :

.1 Appendix

Table ??1: Descriptive statistics for responses to the hand washing and medical sharps disposal (n=190)

.2 Questions

Parameters / Answers Percent %

Questionnaire on Knowledge, Attitude and Practices of Occupational Exposure and Protection of HCWS

.3 Introduction and Consent

Hello everyone. I am Sister Qin from China Military Medical Expert Group, working in 34 MH now. We are conducting a survey on the knowledge, attitude and behavior of HCWs (health-care workers) in occupational exposure and protection. The study will help us to carry out one comprehensive training in the near future. The information will help the hospital to plan much better for nurses and health services. You are selected for the survey. I would like to ask you some questions and it may take about 15 to 20 minutes. All of your answers will be confidential and will not be shared with any other person except members of our survey team. We hope you will answer the questions accurately since your views are very important.

.4 Thank you very much!

Please Tick(?) in the "? ", or Write the Figure

[Available at: http://appswhoint/ebola/currentsituation/ebola-situation-report (2015)] *Available at: http://appswhoint/ebola/currentsituation/ebola-situation-report*, December 2015. -30-december-2015. (WHO: Ebola Situation Report-30)

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