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An Investigation into the Existing Capacity and Screening Procedures for Ebola at Jomo Kenyatta International Airport, Nairobi

Bocha Manaseh[1], Kombe Yeri[2], Gikunju Joseph[3]

[1,2]Jomo Kenyatta University of Agriculture and Technology/Institute of Tropical Medicine and Infectious, Kenya
[3]Jomo Kenyatta University of Agriculture and Technology, Kenya

ABSTRACT

For about 12 months in the year 2014, the outbreak of Ebola disease in West Africa dominated the world health news. As a result, Kenya banned flights from Sierra Leone and Liberia as a precautionary measure in preventing the disease from entering its territory. From the beginning of the year 2014, Kenya was on high alert following the Ebola outbreak in West Africa. This study sought to investigate the existing capacity and screening procedures for Ebola at Jomo Kenyatta international airport, Nairobi. This study made use of a cross sectional study design. The target population was all the 130 health personnel working at the Jomo Kenyatta International Airport. Primary data was collected by use of questionnaires and Key Informant Interview guides. The results indicate that 59.2% of the health personnel at Jomo Kenyatta international airport health department were public health officers, followed by nurses (22.5%) and clinical officers (12.2%). The study also found that Jomo Kenyatta international airport had a documented process for screening passengers for Ebola disease. The study also concludes that although the health department had most of the facilities and equipment necessary for Ebola disease screening some was lacking. The study found that the health department had PPEs necessary for screening passengers for Ebola disease. However, facilities and equipment like closed vacuum container, polymerase chain reaction, Quarantine room, Functional thermos scanners, well equipped Lab facilities, PCI laboratories were lacking. The study also established that the personnel in the health department were trained on the required skills for the screening of passengers for Ebola disease. The study concludes that the personnel available for screening passengers for Ebola disease at the Jomo Kenyatta International Airport include public health officers, laboratory technicians, epidemiologists, clinical officers, nurses, doctors and support staff. The study also concludes that the health department in Jomo Kenyatta international airport had a document process for screening passengers for Ebola disease. The study also concludes that although the health department had most of the facilities and equipment necessary for Ebola disease screening, some were lacking.

Keywords: Personnel and Cadres, Process of Screening, Ebola Disease, Health Personnel Skills

I. INTRODUCTION

There have been multiple Ebola transmission events over the years and more than 20 Ebola outbreaks since the 1970s [1]. In August 2014, the largest, most sustained, and widespread Ebola outbreak in history was declared a Public Health Emergency of International Concern (PHEIC) by the World Health Organization (WHO) [2]. The WHO was initially notified of the outbreak in March 2014, after a febrile illness cluster associated with a high case fatality rate in the area of Gueckedou, Guinea, attracted international attention, and was subsequently identified as the viral zoonosis Ebola (EBOV), formerly known as Zaire Ebolavirus(ZEBV) [3]. This deadly member of the family Filoviridae, an enveloped, negative single-stranded RNA virus, is the most virulent of the five family members. The other members of the Ebolavirus family are Sudan (SUDV), Tai Forest (TAFV), Bundibugyo (BDBV), and Reston (RESV) sub-types. The sequencing data showed that the 2014 outbreak in West Africa was due to infections with a strain of ZEBV, which differed from the viral strains identified in the earlier outbreaks [4].

Regarding the current EBOV outbreak, it is hypothesized that the index case most likely originated via animal - human contact like ingestion of undercooked 'bush meat', animal bite, or inadvertent contact with body fluids or blood from an animal [5]. Following the index transmission event, the predominant mode of the subsequent viral transmission is human-to-human [6]. This is consistent with the previous observations and characteristics of human-to-human transmission [7]. Late in the spring of 2014, the number of reported cases declined, causing medical investigators to believe that the course of this outbreak followed the trajectory of previous outbreaks and that the outbreak's 'burnout' phase had begun [8]. However, within a period of a few months, sporadic cases were being diagnosed beyond Guinea, including Liberia, Sierra Leone, Senegal, Mali, Nigeria, and most recently in the United States and Spain [9]. Some of the reported cases were clearly associated with transmission following a history of travel to the affected regions of Africa [10].

In West Africa, the number of new EBOV cases was increasing at an accelerating rate, with a number of factors contributing to this phenomenon, including poorly functioning healthcare, under-developed water and waste management systems; a degree of international complacency, population movement within the affected geographic areas (including rural-to-urban migrations); increasing urban population density; local cultural factors (e.g., burial customs); widespread poverty; and a lack of responsiveness from the local and national governments [11]. To make things worse, there was a shortage of physicians in West Africa [12]. For example, before the outbreak, less than a 100 physicians were providing healthcare for 4.3 million people in Liberia [13]. The fact that numerous healthcare workers were themselves becoming infected with Ebola (including over a 100 healthcare workers who died as of late August 2014) further complicated the already critical situation [14].

It was noted that the global response to the current epidemic was initially slow, disorganized, financially constrained, and poorly planned and executed [15]. As it confronts the possibility of as many as 10,000 new cases per week, the international medical community had to realize that the confluence of circumstances and factors beyond human control could not always be in the society's favor, as it were within the last decade, with Influenza H1N1, Influenza H5N1, Hantavirus, or the Severe Acute Respiratory Syndrome (SARS [16]. In the face of easy movement across relatively porous borders (intercontinental travel) in an age of super highways, fast rail, and air travel, all 'corners' of the planet have become reachable in a matter of hours, making cities such as Lagos, New York, Tokyo or New Delhi, with populations exceeding 12 million, easily vulnerable. In fact, a recently 'imported' case of Ebola in New York City should serve as a wakeup call and a global stimulus for both local and global coordinated action [17].

It is important to note that initial care in the first documented US case of Ebola may have been delayed due to poor recognition of the patient's disease symptoms [18]. The diagnosis of two healthcare workers from the same hospital and the possible threat of spread of infection to people who had been in close contact with these subsequent cases has threatened a chain of transmission events [19]. This chain included a number of potentially exposed individuals on a commercial airline flight from Ohio to Texas on which an individual possibly experiencing early symptom of Ebola may have traveled [4].

From the beginning of the year 2014, the country was on high alert following the Ebola outbreak in West Africa. However, health workers screening travelers for Ebola at JKIAcomplained of poor equipment, lack of follow-up on passengers and low morale. The workers said the gun thermometers they used were not reliable, as they gave different readings. According to the workers, there was no follow-up on screened travelers from the Ebola-hit countries after 21 days, as required.

For 12 months in the 2014, the outbreak of Ebola disease in West Africa dominated the world. Kenya banned flights from Sierra Leone and Liberia as a precautionary measure in preventing the disease from entering its territory. This situation resulted in screening of all passengers leaving international airports, seaports, and major ground crossings as directed by the UN health agency. The challengesthen were that there was no adequate capacity and screening procedures, health workers were not provided with proper protective clothing and equipment, they stood the risk of getting infected with the virus and when infected with the virus, they would become agents of transmission. Taking into

account that a daily average of 19,000 passengers from Africa and other regions come into the country through JomoKenyatta International Airport, Kenya stood the risk of admitting some cases of Ebola into the country.

Therefore this prompted the researcher to carry out a case study at the Jomo Kenyatta International Airport, Nairobi to find out whether the screening for ebola disease was efficient and effective. The study was carried out at Jomo Kenya International Airport, Nairobi in the year 2015 during the month of December up to February, 2016.

The purpose of the study was to investigate the existing capacity and screening procedures for Ebola at JomoKenyatta international airport, Nairobi. The study also seeks to establish the personnel and cadres available for screening passengers for ebola disease; to describe the process of screening of passengers for ebola disease; to establish the facilities available for screening passengers for ebola disease; and to determine the health personnel skills in the screening of passengers for ebola disease.

II. METHODS AND MATERIAL

Study Design

This study used of a cross sectional study design. In this design, researchers recorded the information present in a population, without manipulating the variables.

Study Population

The study population was all the 130 health personnel at the Jomo Kenyatta International Airport. It covered all the Public Health Officers, Doctors, Clinical Officers, Nurses and laboratory personnel working at Jomo Kenya International Airport, Nairobi. This study made use of census method and hence all the staff were involved in the study.

Data Collection

The study collected primary data by use of questionnaires and Key Informant Interview guides. A pilot test was conducted to test the reliability and validity of the instruments.

Ethical Approval

The study was then approved by KNH-UoN ERC. In addition, a written informed consent was obtained from the respondents before administering the questionnaires.

Data Analysis

After confirming that all data filled in was accurate, descriptive statistics was utilized to analyze quantitative data. Descriptive statistics are frequency distribution, percentages, measures of central tendencies (mean) and measures of dispersion (Std deviation) [20]. The data was then represented in tables and graphs. Descriptive statistics helped the researcher to significantly explain distribution of measurements and to also explain, organize and review data [21]. On the other hand, qualitative data was coded thematically and then evaluated statistically. Content analysis was used to qualitative data, that is, data collected from open ended questions. The results were then presented in form of a prose.

III. RESULTS AND DISCUSSION

The population of this study was all the 130 staff manning the health facility and desk at the Jomo Kenya International Airport, Nairobi. Out of the 130 staff, 98responses were obtained, which gave a response rate of 75.38%. According to Kothari [22] any response of 50% and above is adequate for analysis thus 75.38% is even better.

1) Participants Socio-demographic information

As indicated in table 1, 59.2% of the participants were female and 40.8% were male. In relation to their age, 75.5% of the participants were aged between 36 and 45 years, 25.5% were between 46 and 55 years, 21.43% were between 25 and 35 years, 12.24% were below 25 years and 5.10% were between 56 and 65 years. With regard to level of education, majority of the participants (55.1%) had college education, 26.5% had university education and 14.3% had postgraduate education. The results also show that 40.8% of the participants had been working at Jomo Kenyatta International Airport for more than 13 years.

Table 1 : Participants Socio-demographic information

	Category	Frequency(n)	Percent (%)
Gender	Male	58	59.2
	Female	40	40.8
Age bracket	Below 25 years	12	12.5
	25-35 years	21	21.43
	36-45 years	35	35.71
	46-55 years	25	25.51
	56-65 years	5	5.1
Level of education	Secondary education	4	4.1
	College	54	55.1
	University	26	26.5
	Postgraduate	14	14.3
Work Experience	Less than 2 years	10	10.2
	2-5 years	20	20.4
	6-9 years	22	22.4
	10-13 years	6	6.1
	More than 13 years	40	40.8

2) Personnel and cadres available for screening of passengers for ebola disease

According to the findings, as show in figure 1, majority of the participants (59.2%) were public health officers, 22.4% were nurses, 12.2% were clinical officers, 4.1% were laboratory personnel and 2% were doctors. The key informants indicated that the health personnel working at Jomo Kenyatta International Airport include laboratory technicians, public health officers, epidemiologists, clinical officers, nurses, doctors and support staff. However, the staffs were inadequate. These findings agree with Klompas et al. [2] argument that there were shortages of health workers and clinics in the West African countries like Liberia and hence the spread of Ebola. Similarly, Allaranga et al. [22] found that inadequate access to health personnel and facilities is a problem in Sierra Leone and Guinea.

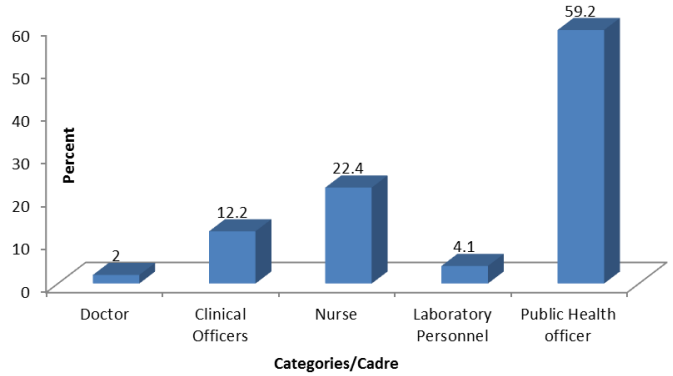

Figure 1: Personnel Cadres

The doctors indicated that their roles included clinical examination, treatment and giving of advice to any of the sick passengers. The nurses indicated that their roles included giving first aid and accompanying the suspect to the healthcare facilities. Other roles of the nurses include screening of passengers, quarantine, checking country of origin, history of exposure, notification, triage, isolation, sensitization and sample handling. It was also the role of the nurses to take medical history of the patient and isolate and organize to refer to a hospital of choice KNH. The role of the clinical officers included to examine cases for symptoms or signs as well as to prevent and control infections. The Epidemiologists indicated that their roles include data collection and analysis while the Laboratory personnel indicated that their roles include analysis of samples.

The Public health officer indicated that their roles include screening of patients, sensitization, notification, sample handling, sample processing triage and isolation. The public health officers were also taking temperatures, collecting and verifying information in the scrutiny form and summarizing the information into reports. They were also guiding the passengers through the thermal camera's to pick temperatures, were directing passengers with abnormal temperatures to the clinical staff for further management and manage quarantine services. The public health officers also identified passengers coming from affected countries in accordance with the disease surveillance forms and take necessary steps.

3) The process of screening of passengers for Ebola disease

The study found that the health department in JKIA had a documented process for screening passengers for

Ebola disease as indicated by 98% of the participants. These findings concur with Gulland [23] findings that Public Health England (PHE) is helping to roll out enhanced screening for Ebola starting at Heathrow, then Gatwick and St Pancras (Eurostar). In addition, as indicated in table 2, all the respondents (100%) indicated that they followed the step of taking of passengers' temperature of all passengers in screening passengers for Ebola virus. In addition, 93.9% of the respondents reported that the health personnel were asking questions on health and exposure history of all passengers. Also, 98% of the respondents reported that were assessing all passengers for signs of potential illness. Further, 98% of the health personnel indicated that they were separating suspected cases for further assessment. In addition, 85.7% of the health personnel indicated that they quarantined cases for further evaluation. These findings concur with Mabey, Flasche and Edmunds [24] argument that the first basic element involves all travelers where they have their temperature taken, answer questions about their health and exposure history and are visually assessed for signs of potential illness.

Table 2 : Steps in Screening Passengers for Ebola Virus

	Frequency		Percent	
	Yes	No	Yes	No
Taking of passengers temperature of all passengers	98	0	100.0	0.0
Asking questions on health and exposure history of all passengers	92	6	93.9	6.1
Assessment for signs of potential illness of all passengers	96	2	98.0	2.0
Separation and further assessment of suspected cases	96	2	98.0	2.0
Quarantine of cases for further evaluation	84	14	85.7	14.3

The key informants were asked to describe the process of screening passengers for Ebola disease. From the findings the respondents indicated that when passengers come out of the plane they are given the traveler surveillance form to fill. They then proceed to screening area where temperature is taken through either thermal gun or thermal scanner. If no high temperature detected, they are released to go, but if have temperature above 37.5^0C they are taken to observation room (isolation). If within 1 to 2 hours the temperatures have subsided and have no history of travel to the affected areas and are not showing signs and symptoms of the disease, they are released to go. If the temperatures persist beyond 37.5^0C after 1 to 2 hours they are referred to KNH for further management.

4) The facilities available for screening of passengers for ebola disease

From the findings, the key informants indicated that these facilities include thermos guns, isolation rooms, Thermoscanners, Surveillance forms, well-equipped laboratory and well-equipped quarantine area with bed and catering facilities and infection control adequate measured. Other facilities include ambulances, disinfectants and PPEs such as gloves, gowns, googles and shoe covers.

From the findings, as shown in table 3, 10.2% of the participants reported that their department had bio-safety Level-4 laboratories and 75.5% of the participants indicated that their department had a quarantine room.

Table 3 : Facilities for Screening Passengers for Ebola Disease

	Frequency		Percent	
	Yes	No	Yes	No
Bio-safety Level-4 laboratories	10	88	10.2	89.8
Quarantine room	74	24	75.5	24.5

According to the findings, as indicated in table 4, 14.3% of the participants indicated that the health department at Jomo Kenyatta International Airport had Polymerase chain reaction (PCR). In addition, 49% indicated that their department had closed vacuum containers, 59.2% indicated that the health department had leak-proof containers and 69.4% reported that the health department had high potency disinfectants. According toLippi, Mattiuzzi and Plebani [25], any biological specimens or samples obtained from EBOV patients should be collected using adequate personal protective equipment, using closed vacuum containers.

Table 4 : Laboratory Equipment for Screening for Ebola Disease

	Frequency		Percent	
	Yes	No	Yes	No
Polymerase chain reaction (PCR)	14	84	14.3	85.7
Closed vacuum containers	48	50	49.0	51.0
Leak-proof containers	58	40	59.2	40.8
High potency disinfectants	68	30	69.4	30.6

In addition, the results in table 5 show that all the participants (100%) indicated that their department had hands gloves and eye protection (goggles or face shield), 98% indicated that their department had facemask, 95.9% indicated that their department had gown (fluid resistant or impermeable) and 93.9% indicated that the department had disposable shoe covers. Also, 89.8% of the participants indicated that the department had double gloving and 87.8% indicated that the department had leg coverings. The participants indicated that other facilities and equipment used in the screening of ebola virus include thermal scanners, surveillance forms, and hand washing stations, gun thermometer, quarantine room and thermometers for temperature. These findings agree with WHO (2014) guidelines that there should be adequate planning to ensure there is sufficient personal protective equipment (PPE) to support response (e.g. port health agencies maintain a four-week supply of PPEs for every responder, and inventory PPE stock for needed supplies every two weeks).

The study found that the facilities and equipment in health department atJomo Kenyatta International Airport were functional as indicated by 93.9%. However, the findings also show that there were other facilities and equipment necessary for screening passengers for Ebola virus lacking in the health department at Jomo Kenyatta International Airport as shown by 65.3% of the participants. The lacking equipment and facilities include that closed vacuum container, PCR, Quarantine room, Functional thermos scanners, well equipped Lab facilities and PCI laboratories. These findings are contrary to Adams [26] findings that in 2014, the ministry of health installed digital thermostats at airports and other ports that would automatically take temperatures of travelers.

Table 5 : Personal Protective Equipment for Screening Passengers

	Frequency		Percent	
	Yes	**No**	**Yes**	**No**
Hands Gloves	98	0	100.0	0.0
Gown (fluid resistant or impermeable)	94	4	95.9	4.1
Eye protection (goggles or face shield)	98	0	100.0	0.0
Facemask	96	2	98.0	2.0
Double gloving	88	10	89.8	10.2
Disposable shoe covers	92	6	93.9	6.1
Leg coverings	86	12	87.8	12.2

5) The health personnel skills in the screening of passengers for ebola disease

From the findings, the participants indicated that infection control skills , disease surveillance skills, listening and observing skills, Use of standard operating procedures, s Public health skills as well as laboratory, clinical and data analysis skills. Other skills required include customer care skills, basic skills such as taking of temperatures, observation skills, counselling skills, communication skills, contract tracing, biosafety skills, skills to remove removal of personal protective and case definition, guidelines and management skills.

The study also found that there were inadequate personnel in the health department at Jomo Kenyatta International Airport for screening of passengers for Ebola disease as indicated by 69.4%. These findings were supported by 56% of the key informants. The WHO recommends one doctor and 2 nurses for every 1000 patients. Taking into account that a daily average of 19,000 passengers from Africa and other regions come into the country through Jomo Kenyatta International Airport, there should be at least 19 doctors and 38 nurses. According to WHO [16], guideline that staffing needs for entry screening are based on an estimation of the number of travelers to be screened on arrival identified in the planning phase; the layout of airports or port terminals; the location of secondary screening; and the number of arriving conveyances. In general, port health officers are placed in each airport terminal for secondary screening. Multiple work shifts may be required. Shifts should be coordinated around the arrival times of flights targeted for screening.

The findings show that the personnel in the health department at Jomo Kenyatta International Airport were trained on the required skills for the screening of passengers for Ebola disease as indicated by 83.7% of the participants. However, the key informants indicated that there was a need for regular refresher training. The findings agree with WHO [16] guidelines that indicate that health departments in points of entry should hold training on proper donning and doffing (putting on and removing) of PPE before screening is implemented. In relation to the effectiveness of screening of passengers for ebola virus, 53.1% of the participants indicated that the screening of passengers for Ebola virus disease at Jomo Kenyatta International Airport was effective.

IV. CONCLUSION

The study concludes that the personnel and cadres available for screening passengers for Ebola disease at the Jomo Kenyatta International Airport include public health officers, laboratory technicians, epidemiologists, clinical officers, nurses, doctors and support staff.

The study also concludes that the process of screening of passengers for Ebola disease at the Jomo Kenyatta International Airport begins with the filling of the travelers' surveillance form to fill. They then proceed to screening area where temperature is taken through either thermal gun or thermal scanner. If no high temperature detected, they are released to go, but if have temperature above 37.5^0C they are taken to observation room (isolation). If within 1 to 2 hours the temperatures have subsided and have no history of travel to the affected areas and are not showing signs and symptoms of the disease, they are released to go. If the temperatures persist beyond 37.5^0C after 1 to 2 hours they are referred to KNH for further management.

The study also concludes that although the health department ha most of the facilities and equipment necessary for Ebola disease screening some were lacking. The study found that the health department had a quarantine room but it did not have bio-safety Level-4 laboratories. In addition, the department had high potency disinfectants and leak-proof containers but it did not have Polymerase chain reaction (PCR) and closed vacuum containers. The departments also had PPEs like hands gloves, eye protection (goggles or face shield), gown (fluid resistant or impermeable), facemask, double gloving, disposable shoe covers and leg coverings for screening passengers for Ebola disease. Necessary facilities and equipment lacking included closed vacuum container, PCR, Quarantine room, Functional thermos scanners, well equipped Lab facilities, PCI laboratories.

Lastly, the study concludes that the skills required for the screening of passengers for Ebola disease included infection control skills, disease surveillance skills, listening and observing skills, Use of standard operating procedures, clinical and data analysis skills. Other skills required include customer care skills, basic skills such as taking of temperatures, observation skills, counseling skills, communication skills, contract tracing, biosafety skills, skills to remove removal of personal protective and case definition, guidelines and management skills. However, the study found there were inadequate personnel in the health department at Jomo Kenyatta International Airport for screening of passengers for Ebola disease.

Recommendations

The study recommends that the health personnel should be assisted to get regular updates on prevention and control of ebola. This will help them to increase their skills on the screening processes for Ebola virus. This study also recommends that the government of Kenya as well as the management of the airport should ensure that all the required equipment and facilities to screen for Ebola virus is available. Further, the management of Jomo Kenyatta International Airport should employ more health personnel so as to enhance the process of screening passengers for Ebola virus.

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