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Preparedness and response to outbreaks in port of entries: A case of Ebola Virus Disease at Julius Nyerere International Airport, Tanzania

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ABSTRACT

Background

Preparedness and response to outbreak remain a major means for the prevention and control of outbreaks including Ebola Virus Disease (EVD). Although Tanzania has not being seriously hit by EVD in the past few decades, some of the neighboring countries have been badly hit. The disease is highly contagious and easily transmitted through human-to-human transmission. Port of entries in countries remains the major point of focus especially when a neighboring country having an outbreak.

Objective

To explore challenges facing preparedness of port of entries in Tanzania on prevention and control of outbreaks from the experiences of Julius Nyerere International Airport (JNIA) during the 2018 EVD outbreak in Congo (DRC)

Methods

We conducted nine in-depth interviews with officials from departments of Health, Immigration, Airport Authority and members of Comprehensive Emergency Preparedness and Response Team at JNIA to explore the challenges facing preparedness and response to EVD. A hybrid thematic analysis was employed for the data analysis.

Findings

Limited EVD information sharing among Emergency Comprehensive Team, inadequacy staff for EVD preparedness, poor coordination of resources for EVD response, limited capacity building opportunities for staff at JNIA, inappropriate utilization of isolation place, and limited transport capacity for referral cases were the major challenges facing preparedness and response for prevention and control of outbreak at JNIA.

Conclusion

Preparedness of EVD at JNIA, the largest international airport in Tanzania faces many challenges. Coordination of resources, strengthening the communication system for outbreaks and capacity building to staff at port of entries are recommended initial steps in strengthening preparedness and response to outbreak. This small-scale study calls for further studies to explore preparedness and response to outbreaks in port of entries in Tanzania.

Keywords: Ebola virus disease, Hemorrhagic fever, Preparedness, Response, Point of entry, Tanzania

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INTRODUCTION

Preparedness and response of health systems is key to the prevention and control of outbreaks. Globalization has made it easy for transportation of infections from one part of the world to another. Weak health systems in many low-and middle-income countries have only one option, to prevent and control outbreaks from entering their countries (1). The latter is perhaps the most cost-effective way compared to managing already imported cases. The prevention and control of an outbreak requires both routine and emergency preparedness during an outbreak (2). Points of entry (POE) for the travelers are the first line of defense against the international spread of disease and are important nodes in disease detection and sensitization of travelers crossing borders. A wide variety of public health events ranging in severity, may occur at the (POEs), and require different actions for emergency preparedness and response. To achieve EVD preparedness, countries need to have well-functioning coordination systems, including a coordination mechanism and structure at all levels, from national to community levels (3). National and International mechanism and partners, is required to rapidly mount an effective response to any emergency, including an EVD outbreak. Other preparedness components include Epidemiological Surveillance which calls for rapid detection and isolation of EVD cases and Laboratory capacity to conduct EVD confirmation. The severity of EVD outbreaks is evident in past events, such as the one in the DRC, which recorded 3,470 cases and 2,280 deaths by 21 June 2020, as reported by WHO (CDC) (1)

Tanzania, an East African country, is a major business route to its many landlocked neighboring countries. Therefore, an outbreak in any of these neighbors is potentially harmful to Tanzania. Periodically, there have been reported Ebola Virus Disease (EVD) outbreaks in DRC and thus putting Tanzania at high risk according to WHO (4). It is from this perspective that a well-prepared and responsive health system to prevent and control outbreak is needed (5). Some of the measures which have been done within the country include strengthening routine preparedness as recommended by the Joint External Evaluation (JEE) (6). However, an evaluation of a snapshot of the Ebola Preparedness Dashboard of June 2018 showed that the country still had low capacity rapid response teams and contact tracing for Ebola Virus Disease (7). Julius Nyerere International Airport (JNIA) in Dar es Salaam is Tanzania's largest international airport and a major point of entry, making it a critical location for **Ebola Virus Disease (EVD) surveillance** (8–10). Therefore, strong preparedness and response measures are essential at this airport. This study aimed to explore the challenges faced by points of entry in Tanzania in preparing for the prevention and control of disease outbreaks, using the experiences at the Julius Nyerere International Airport (JNIA) during the 2018 Ebola Virus Disease (EVD) outbreak in Congo as a case study.

METHODS

Study Design

This was an exploratory case study which employed qualitative methods conducted from June to July 2019. Data were collected through Key Informant Interviews (KIIs) and review of relevant documents. An exploratory case study design was appropriate for gaining an understanding of the context for preparedness and response to outbreaks. Preventive measures remain a major means for combating transmission of outbreaks including Ebola Virus Disease (EVD), case study approach is deemed relevant as it enables the researcher to collect detailed information, which is often grounded in their social context.

Study context

The study was conducted at Julius Nyerere International Airport (JNIA), which is the primary aviation hub for Tanzania, serving as the biggest airport in Dar es Salaam and the whole country. In 2019, over 4.8 million passengers used the airport, making it the third-busiest in East Africa (18). It has two terminals for domestic and one for international flights; being among the important POEs in Tanzania made it fit for the study.

Study population

The study population included Airport Management, Airport leaders, Health workers and Immigration Officers working in JNIA. All workers

dealing with or contacting travelers, including checking travelers screening forms for passengers from Congo and Uganda.

Sampling

Purposive sampling was used to obtain key informants and a comprehensive emergency preparedness and response team working at JNIA. These informants were selected based on the researchers' judgment that they were expected to know the prevailing status of the outbreak response teams at the study site and other stakeholders on prevention and control of diseases of international concern such as Ebola. Table 1.

Table 1. Categories of study participants

List of Participants – Key Informants		
1	2 Informants	Airport management, health personnel, Immigration officers
2	5 Comprehensive Emergency Preparedness and Response Team	Airline representative baggage handlers, flight guide, security workers and taxi driver's representative
3	2 Health care workers	Health workers at Temeke Isolation Centre

Data collection

In-depth interviews were carried out to gather information by using an interview guide. The guide was developed based on the researcher's knowledge on the topic and information gathered from the literature to capture key information from members of the comprehensive EPR team of JNIA. An in-depth interview guide developed in English was then translated into the Kiswahili language in which both the research team and respondents are fluent, and was used for conducting the interviews. Each interview lasted between 30 to 60 minutes. Prior commencement of an interview, the researcher introduced the aim of the study and sought written consent for participation and verbal consent for recording the conversations from the participants. The interviews were audio-recorded using a digital recorder by the research assistant who accompanied the principal investigator. We stopped data collection at the 9th interview after attaining information saturation (when no new information would come up despite different styles of probing and more interviews).

Data analysis

Data analysis was performed through the process of coding following six phases to create established, meaningful patterns (themes) within the data. We followed the thematic analysis process (11). The whole process of analysis was iterative; further scrutiny was carried out by going back to the interview transcripts to identify, summarize, and retain the patterns and similarities, differences and newly emerged themes. Finally we further clustered the subthemes and themes into themes. Table 2.

Table 2. Summary of findings on the challenges facing preparedness and response to EVD at JNIA airport

Subthemes	Themes
• Absence of risk communication package • Language barrier	Limited EVD information sharing among emergency comprehensive team
• Deficit of skilled personnel • Lack of new allocation of human resources for health	Inadequate staff for EVD preparedness
• Inappropriate utilization of isolation place • Lack of dedicated transport for the referral of suspected cases and response	Poor coordination of resources for EVD
• No Specific training on EVD for subordinates within the EPR team sections • No consistency training for EVD	Limited capacity-building opportunities for staff at JNIA

Ethical consideration

Ethical clearance was obtained from the Muhimbili University of Health and Allied Sciences (MUHAS) with the Institutional Review Board (IRB) reference number 287/298/01A/. The permission to conduct the study was obtained from the Tanzania Airport Authority, under the Ministry of Transport and from the Dar es Salaam Regional Medical Officer's office

FINDINGS

Limited EVD information sharing among the emergency comprehensive team

Absence of a risk communication package

Most of the respondents did not know the existence of Ebola in DRC, while some reported that they heard presence of the disease months ago. It was revealed that a specified risk communication package which contains Information, Education and Communication (IEC) materials, was not available. It was also reported that there were no banners posted regarding Ebola at the airport.

"You are lucky you came to us, in reality, we do not have the communication materials. If we can have electronic IEC materials for EVD, we are ready to print and distribute to staff and arriving passengers" (KI No.7)

Language barrier

Study informants explained about language barrier among entry passengers who came from DRC which is French speaking country and it was reported that other passengers used English language making it difficult to comprehend Kiswahili IEC materials which were used to disseminate Ebola messages. Participants claimed that even though our country is Kiswahili speaking but most of the passengers who came from abroad were non-Kiswahili speakers and at recommended that IEC materials were to be produced in both Kiswahili and English to cover a wider range of the audience.

"We are now just waiting from the Ministry of Health, Community Development, Gender, Elderly and Children to give us IEC materials to be at least in Kiswahili and English versions, which being suitable for our targeted audience" (KI No5)

Inadequate staffing for EVD preparedness

Deficit of skilled personnel

The analysis revealed that the Comprehensive Emergency Preparedness and Response Team at JNIA had a deficit of skilled personnel. Participants reported that few comprehensive EPR team members were skilled in EVD prevention. Most of the informants said that training for EVD preparedness was conducted for few personnel during the West Africa epidemic. (a quote with this information could be more relevant.)

"The plans regarding Ebola prevention and quality of PPEs that were provided shows clearly that we were not ready for the disease. Our trained EVD personnel and our borders are porous making it difficult to screen travelers" (KI No.5)

Lack of new allocation of human resources for health

It was stated that the number of trained staff was minimal compared to the load of passengers entering the country through the airport. Some staff were shifted from their working station without allocation of new human resources for replacement which increased the workload for the available few to attend the passengers.

"As you have seen here, we have many flights which land here and we are few but we are supposed to attend to all passengers from abroad". (KI No 4)

Limited capacity-building opportunities for staff at JNIA

Inconsistent training and orientation to other staff at JNIA

Most of the respondents explained that there was no consistency training which was arranged for EVD. Some informants reported that they were exposed to various providers of orientation related to preventive measures on contacting people who were suspected for Ebola through safeguarding themselves.

"Only a few staff were normally taken for training, and in general all of us needs to be taken for training. However, so far, we haven't encountered the disease in the country. What we hear is from other countries like Congo and now in Uganda" (KI No 1)

No Specific training on EVD for subordinates within EPR team sections

The informants reported that there was no specific training for EVD for staff subordinate within EPR team sections conducted. Some of respondents who got EVD training explained importance of the training but unfortunately, they did not share on what they were taught for other subordinates to get the updates. Immediately the first suspected Ebola case was reported, there was a team from the national level to the region. It was a single visit by the Ebola EPR team during the discussion. (Nursing Officer)

We had training at the JNIA on general but was not about Ebola preparedness which was organized by administration. The training was on what happened in Liberia, symptoms, Signs which involved looking at sign such as fluid as key sign of Ebola to learn and support them to control the outbreak the diseases. (Officer 4)

Poor coordination of resources for EVD response

Inappropriate utilization of the isolation premise

The analysis of data revealed that an isolation place for the flight was identified and well-arranged, though these strategies and plans were not executed. Most of the informants reported that it was unfortunate that the isolation for the suspected cases was inappropriately utilized for luggage storage. This was common concern from most of the informants working in different isolation centers at the Airport that there was inadequate implementation of isolation measures, such as the use of PPE and ineffective screening measures.

"We here in our Isolation Centre have strategies and plans, but we execute none of them. The plans regarding Ebola prevention and quality of PPEs that were provided show clearly that we were not ready for the disease. Inadequate trained EVD personnel and our borders are porous making it difficult to screen travelers". (KI No.5)

Lack of dedicated transport for referral of suspected cases

Despite the availability of the standby ambulance for emergencies within the airport, the informants reported that there was lack of a dedicated transport in case of suspected case of Ebola

"You can see we had a standby ambulance for the emergence within the airport, but for the Ebola outbreak we had a mobile number for the district and region EPR coordinators which you can see here was written in board". (KI No 2)

DISCUSSION

We aimed to explore challenges facing preparedness of port of entries in Tanzania on prevention and

control of outbreaks from the experiences of Julius Nyerere International Airport (JNIA) during the 2018 EVD outbreak in DRC. Our study has revealed limited EVD information sharing among the Emergency Comprehensive Team, inadequate staff for EVD preparedness, poor coordination of resources for EVD, limited capacity building opportunities for staff at JNIA, inappropriate utilization of isolation place, and limited transport capacity for referral cases as major challenges for EVD preparedness. Information sharing is critical during implementation of response and preparedness measures for any highly infectious disease. Following Congo's tenth Ebola Virus Disease (EVD) outbreak in 2022, Tanzania was categorized as a high-risk country. This placed it under priority sub-category two due to its geographic proximity to the outbreak's epicenter, the high volume of cross-border movement, and shared transport routes (12). The limitation of information sharing was found to cover dimension such as language barrier which hindered the emergency response team from communicating EVD related risk in the language which to foreign passengers could understand and most IEC materials were not sufficient for the communication needs at the Airport. The same was also the case in a study from Uganda (13) where the cross-border communities could not comprehend the EVD risk information shared with them through non-trusted government officials and authoritative agencies. As recommended by WHO in the airport contexts, public health, civil aviation, airport authorities, safety and security agencies, airlines, medical and ambulance services, police, and other agencies that have a role in implementing the Public Health Emergency Preparedness and Response PHERP are all critical participants in developing, finalizing, exercising, and operationalizing the plan (14). Information sharing at micro and macro levels faces critical gaps which spans from lack of common reporting form/system, a single data entry system for multiple diseases, and common effective communication channels. As (3) commented that at many POEs, individual agencies often know appropriate procedures to take during a public health event, yet the procedures are not documented or shared for coordinated action. Deficiency of skilled personnel for EVD response at JNIA emerged as reflection of reliance on international funding and expertise for EVD preparedness which is usually triggered by a need to respond in times of an ongoing epidemic/outbreak declaration rather than national inborn efforts for strengthened health systems for resilient and sustainable readiness and preparedness mechanisms. Similar to what was found from other East African countries which had not encountered cases following EVD outbreak in Congo (12,13,15,16), where there was shortage of skilled workforce to plan, coordinate and implement public health response and preparedness actions. Public health measures observed were focused on supporting the operational readiness after emergence of a nearby outbreak risks declaration, thus undermined the importance and vigorous work required to build the foundation of preparedness within authorities particularly in contexts where there is a weak health system. In contrast a study from Uganda has documented a satisfactory capacity of their public health emergency system preparedness and response to communicable disease outbreaks (17). This could be due to the vast experiences of health workers and other stakeholders in fighting previous Ebola outbreaks in Uganda while Tanzania public health systems lack such exposures coupled with limited capacity building opportunities only scattered during seasons of high demand for response. Inappropriate utilization of the isolation premise and lack of arranged transport for EVD cases to the designated healthcare facilities were identified as gaps in resources coordination for public emergency preparedness and response at JNIA. A study done in Uganda during the EVD outbreak pointed out that there was duplication of activities aiming to address common objectives by various implementing partners (17).

Understanding the readiness on preparedness of EVD Epidemic

Similar findings regarding varying levels of awareness of EVD were demonstrated in this study, whereby knowledge gaps were observed among the study participants. However, the study also revealed that these findings were consistent with previous research, which has similarly reported diverse levels of EVD awareness across different populations and

healthcare settings.

Moreover, the study identified deficiencies in information sharing among the Emergency Preparedness and Response (EPR) team, hindering the efficient utilization of limited resources for Ebola Virus Disease (EVD) prevention and control. In contrast, there was insufficient advocacy directed towards airport leadership, which could have facilitated better support and resource allocation for EVD preparedness measures. Also (16) insisted there was a need for global preparedness plan/ protocol implementation to prevent and control EVD and other emerging diseases as well as preventing diseases transmission to health care workers HCWs. To maximize efficiency and ensure consistent information across all disease prevention and control programs and stakeholders, it is essential to effectively utilize human resources and standardize methods, software, data collection forms, standards, and case definitions. Where feasible, countries can further enhance this by implementing a common reporting form, a single data entry system for multiple diseases, and common communication channels. Training and supervision are integrated, a common feedback bulletin is used, and other resources, such as computers and vehicles are shared. Integrated Disease Surveillance and Response (IDSR) involves full-time coordination of surveillance activities and joint action (planning, implementation, monitoring and evaluation), whenever possible and useful (18).

Inadequate number of trained Health personnel

Skilled personnel in combating EVD prevention and control in the country were facing many challenges. The training may have been provided to only a few individuals due to limited financial resources, and it was also not conducted regularly. The study revealed that no regular training was conducted after the West Africa EVD epidemic. It was provided for the identified comprehensive EPR team only, and advocacy was done to JNIA leaders.

Experience from Ghana shows, the initiation of the training was generally met with relief as health workers had heard and seen the devastating effects of Ebola in the media (19). In their earlier trainings, there were some discontent among some participants as they had selected to attend were not there by choice (20). Therefore, according to Annan, Yar and Denis (19), their study found that, "the need for training was strong among HCWs and there are calls for concerted efforts of health institutions and facilities to fully equip and prepare HCWs with the requisite tools and knowledge and ensuring competency to handle any epidemic-prone disease".

Capacity for cascade training and orientation of other staff at JNIA

The EVD training conducted should be comprehensive regarding the involvement of risk population at JNIA. The study revealed that specific training or orientation regarding the disease should be cascaded to JNIA subordinates. The training should also insist on when to declare for end of the disease, as per national and WHO guidelines. Contradicting clear information, POE, which is officially announced, should be well known to all POE leaders for effective surveillance.

According to (21). Some studies on the cascade method for staff training have revealed its major role. It prepares community members for their new roles as promoters, advocates, planners, and monitors most expediently, also it rapidly transfers responsibility from project staff to government master trainers and to community members. Furthermore, it improves the knowledge and skill base of the public and private sector as well as builds community awareness toward the essential actions such as EVD preparedness at JNIA staff to build the capacity for the organizational process necessary to make effectiveness of EVD preparedness for prevention and control.

Need for organized logistics of Ebola suspect cases

Arranging logistics for preparedness is very important in control and prevention of the disease. In this study it was observed that despite the availability of all required logistics for EVD, isolation places were identified. Person Protective Equipment (PPE), and supplies and isolation place for the flight was well arranged. Perhaps the isolation place for the suspected cases was utilized for other purposes rather than EVD. Therefore, to prevent and control EVD at point of entry there are standards which supposed to be followed. According to WHO (9), recommended various measure to be taken such as to transfer the patient (or the body) to an isolation center. Identify all contacts of the case and inform them of the medical follow up that will be initiated, contacts must be isolated and receive appropriate

care as soon as they show symptoms, during the investigation, interact appropriately with local communities, respecting social and cultural customs and hierarchies at the isolation center, collect a clinical specimen and ship it to the pre-identified center. According to WHO (22), all public health emergencies of international concern should be detected, assessed and responded to promptly, using an adapted response rather than pre-set measures. The International health regulations IHR (2005) guidelines include the measures at points of entry (airports, ports and ground crossings) and containment at the source of public health events (23).

CONCLUSION

Preparedness of Ebola disease in Tanzania faces several challenges as depicted in this study. The challenges include shortage of adequate number of trained staff on EVD preparedness, poor coordination of resources that would have been better used for the production and dissemination of IEC material, low understanding of preparedness of EVD among staff and low-capacity building cascade training and orientation to other staff. The available resources can be coordinated, and with the existence of a few trained staff to build capacity to the available staff on EVD preparedness. The traveler's forms should be reviewed to reflect the reality in the presentation of EVD. Passengers on arrival should be asked about symptoms and signs of EVD for the past 3 days and countries visited for the past week. This information should be used to compare with that available through the scanner for detecting fevers.

The surveillance forms should be well filled by travelers with close monitored of a skilled person and make sure all required information are well filled and corresponds with the available information in the passport.

Authors' contributions

Amina Kingo (AK) and Nathanael Sirili (NS), conceived the idea and design of the study. AK, and Notikela Nyamle (NN), drafted the original manuscript and revised the manuscript. NS reviewed the analysis, data presentation and review of the manuscript. All authors read and approved the final manuscript.

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