

Ebola Virus Disease Outbreak: A Global Approach for Health Systems

Brote de enfermedad por el virus del Ébola: enfoque global para el sistema de salud

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ABSTRACT

Introduction: Ebola virus disease is a severe, highly infectious, and often fatal illness. The pharmacists' experience regarding Ebola in Sierra Leon is valuable for other countries, insofar they can learn from it and benefit from it globally.

Objective: To describe the tasks carried out in Sierra Leone during the Ebola outbreak.

Methods: This is a documentary review based on the regulations developed and the technical documents published by the Sierra Leone Ministry of Health.

Conclusions: Health systems need collaborative work, especially in cases of epidemics or pandemics. The information presented shows what could be achieved in the Ebola epidemic for detecting emerging foci, as well as for guaranteeing communication among professionals, and for saving lives. This learning should be used, in the case of COVID-19, where interconnection among

professionals and health authorities is required, together with accurate and agile information targeted towards the population as well as coordinated progress to obtain the best treatments for patients.

Keywords: Ebola; health professionals; global approach; pharmacist: pharmaceutical care; COVID-19.

RESUMEN

Introducción: La enfermedad por el virus del Ébola es grave, muy infecciosa y, a menudo, mortal. La experiencia de los farmacéuticos en Sierra Leona en el enfrentamiento al ébola es valiosa para que otros países aprendan de estas prácticas y pueda haber un beneficio a nivel global.

Objetivo: Describir las tareas desarrolladas en Sierra Leona durante el brote del Ébola.

Métodos: Se trata de una revisión documental basada en la normativa desarrollada y los documentos técnicos publicados por el Ministerio de Salud de Sierra Leona.

Conclusiones: Los sistemas de salud necesitan un trabajo colaborativo, especialmente en casos de epidemias o pandemias. La información presentada muestra lo que se podría lograr en la epidemia del Ébola, para detectar focos emergentes, comunicación entre profesionales y salvar vidas. Este aprendizaje debe ser utilizado en el caso de COVID-19 donde se requiere la interconexión entre profesionales y autoridades sanitarias, información veraz y ágil hacia la población y avances coordinados para obtener los mejores tratamientos para los pacientes.

Palabras clave: Ébola; profesionales de la salud; enfoque global; farmacéutico; atención farmacéutica, COVID-19

Received: 11/10/2020

Accepted: 02/11/2020

Introduction

The nature of epidemics

The current COVID-19 pandemic has generated different changes in the countries the health system, standardized guides in the countries,^(1,2) reminding us that adverse reactions should be reported,^(3,4) and the urgent need to implement pharmaceutical care,⁽⁵⁾ as well as causing people and professionals to be affected,^(6,7,8,) generating false information.⁽⁹⁾

The epidemic of the Ebola virus showed the great speed with which an outbreak grows in a new environment. Ebola virus disease (EVD) was known among people in the tropical

regions of sub-Saharan Africa where the disease is endemic, unlike the inhabitants of Western Africa,^(10,11). During the outbreak in 2015 there were fears of a pandemic,⁽¹²⁾ there is no doubt that there are lessons to be learned from epidemics. In fact, mistakes were made in dealing with the EVD outbreak.^(13,14) That is, the course of an epidemic, its outbreak and its decline follow the same pattern as any other natural process.⁽¹⁵⁾

Ebola Virus Disease (EVD) is a severe, highly infectious, and often fatal illness. It is a viral hemorrhagic fever caused by a virus of the Ebolavirus genus, Filoviridae family (filovirus); the Zaire ebolavirus is the most dangerous of Ebola of this genus and has been caused most of the outbreaks so far, including the 2014 one and also, the mortality of previous outbreaks of EVD has been reported between 25% and 90%, with an average mortality rate of 50%.⁽¹⁶⁾ Mortality rates vary depending on the area of the epidemic. Centers for Disease Control and Prevention (CDC),⁽¹⁷⁾ established that diagnosing Ebola in a person infected for only a few days is difficult because of the preliminary symptoms, like fever, are nonspecific to infection by Ebola and often are detected in patients with more common infectious diseases, such as malaria and typhoid fever. Severely ill patients require intensive supportive care.

Hydrocortisone may be used in patients that have impaired steroid synthesis by viral disruption of adrenal glands. Additionally, it is relevant to keep blood pressure and oxygen status and to treat infections if they occur. Mild pain and fever must be treated with paracetamol when necessary. For moderate to severe pain, opioids must be used. Aspirin, diclofenac, ibuprofen, and other non-steroidal anti-inflammatory drugs (NSAIDs) or any medicine that can have an anticoagulant effect are contraindicated, given the issue of bleeding associated with EVD. These patients usually are dehydrated and need oral rehydration with solutions or intravenous fluids that contain electrolytes. The fluid selection must consider the patient electrolyte balance.

Prevention in population and health professionals

Prevention of EVD is an essential first step in infection control.⁽¹⁸⁾ In population, some prevention actions must be done as reducing the risk of wildlife-to-human transmission, reducing the risk of human-to-human transmission, outbreak containment measures, reducing the risk of possible sexual transmission and reducing the risk of transmission from pregnancy related fluids and tissue. Healthcare workers who may be exposed to people with Ebola should follow several steps to ensure prevention of EVD:

- Train health personnel in the use of validated personal protective equipment (PPE).
- Have Standardized Operational Procedures to ensure adequate measures of sterilization control and infections.
- Identify patients with Ebola from other patients. Likewise, it is necessary to detect the relatives of the patient who may have been in direct contact.
- To avoid that the personnel does not have due protection during the care patients' activities (diagnosis and dispensing drugs) and despite the security to prevent the direct contact with the bodies of the people killed by Ebola.

The previous information guide us to evaluate the strategies used in Sierra Leona in Ebola outbreak.

The objective of this review is to describe the information developed in Sierra Leone in the case of the Ebola outbreak.

Methods

It was carried out a documentary review based in tasks developed by pharmacists in Sierra Leona during Ebola outbreak.

This is a documentary review based on the regulations developed and the technical documents published by the Sierra Leone Ministry of Health, evaluating sources and strategies used.

Awareness of events. EVD statistics

Varkey et al. described uveitis caused by EVD between survivors. More specifically virus was detected in the aqueous humor 14 weeks after the onset of EVD and nine weeks after the clearance of viremia.⁽¹⁹⁾

EVD is still alive in some countries. EVD outbreaks in Sierra Leone and Guinea were declared over in November and December 2015, respectively.⁽²⁰⁾ However, the Ebola virus is still infecting people. Despite the Ebola Virus Disease (EVD) being at epidemic levels in West Africa, health professionals continue to be on the front of serving each patient, for example, which arrives in hospital and pharmacies – the usual first step of access into the healthcare system. Therefore, it is imperative that lessons be learned from countries where health professionals have been at the forefront of treatment and prevention of EVD. Table 1

shows EVD cases in Guinea, Liberia, and Sierra Leone, obtained from the World Health Organization (WHO).⁽²¹⁾

Table 1 - Confirmed, probable, and suspected EVD cases in Guinea, Liberia, and Sierra Leone until March 2nd, 2016⁽²¹⁾

Country	Case definition	Cumulative cases	Cases in past 21 days	Cumulative deaths
Guinea#	Confirmed	3351	0	2083
	Probable	453	*	453
	Suspected	0	0	‡
	Total	3804	---	2536
	Confirmed	3151	---	‡
	Probable	1879	---	‡
	Suspected	5636	---	‡
	Total	10 666	---	4806
Liberia**	Confirmed	9	0	3
	Probable	*	*	‡
	Suspected	*	*	‡
	Total	9	0	3
	Confirmed	8704	0	3589
	Probable	287	*	208
	Suspected	5131	*	158
	Total	14 122	0	3955
Sierra Leone§	Confirmed	2	0	1
	Probable	*	*	*
	Suspected	*	*	*
	Total	2	0	1
	Confirmed	15 217	0	‡
	Probable	2619	*	‡
	Suspected	10 767	*	‡
Total		28 603	0	11 301

*Not reported due to the high proportion of probable and suspected cases that are reclassified.

‡Data not available.

**Cases reported before 9 May 2015 are shaded blue.

§Sierra Leone was declared free of Ebola virus transmission in the human population on 7 November 2015, and has now entered a 90-day period of heightened surveillance.

Cases reported before 7 November 2015 are shaded blue.

#Guinea was declared free of Ebola virus transmission in the human population on 29 December 2015, and has now entered a 90-day period of heightened surveillance.

Activities in Ebola Virus Disease by pharmacists

Table 2 shows the EVD management activities, which can be conducted by pharmacists

Table 2 - EVD management activities and the role of pharmacists

EVD Management activities	Goals
1. Collaborating with establishment of treatment and holding centres.	<ul style="list-style-type: none"> - Share knowledge about how to create a new holding center. - Develop list of medicines and medical devices needed for EVD treatment.
2. Deployment and training of pharmacy staff and other non-health care workers.	<ul style="list-style-type: none"> - Provide information on the epidemiology and transmission of Ebola virus disease (EVD) and the current Ebola epidemic. - Describe infection prevention and control principles as they pertain to working in Ebola Treatment Unit (ETU) in Africa. - Demonstrate the skills needed to work safely and efficiently in a well-designed ETU. - Describe how to evaluate personal and environmental safety within an ETU environment. - Describe the basic principles of clinical care and management of the patient with EVD. - Describe patient and community assessment and intervention strategies for Ebola treatment and control.
3. Development of policy documents in the case management and treatment of EVD victims and survivors of EVD, infection prevention and control procedures and preparation of disinfectants and antiseptics.	<ul style="list-style-type: none"> - Develop requirements to register new drugs and to import drugs. - Develop documents and training for healthcare workers for the preparation of disinfectants and antiseptics.
4. Emergency supply management of medicines and other consumables.	<ul style="list-style-type: none"> - Negotiate with providers to ensure medicines are in stock and correctly stored. - Describe infection prevention and control principles as they pertain to working in ETUs in Africa.

The pharmacist plays a relevant role in more specific preventive activities related with people traveling without information about vaccinations needed for their destinations and recognition of travellers with symptoms suspicious of EVD.

Some information strategies have been identified internationally. Regulatory agencies around the world have released information specifically on EVD. International Pharmaceutical Federation (FIP) has developed an advisory for EVD to assist and educate pharmacists globally on the prevention of EVD. Reports in different languages (English, Spanish, French, and German) are available on FIP's Website.⁽¹⁶⁾

Efforts of the pharmaceutical industry in conjunction with the WHO^(22,23,24)

Response and lessons from Sierra Leone's about EVD⁽²⁵⁾

Strategy 1: Strengthening of the health sector in emergencies.

The national response included setting up holding and treatment centres, ensuring partnership with international and local organizations. Also pooling of resources, recruitment of all available health care professionals including recalling retired health personnel, training and deployment of healthcare professionals, mechanisms for disease alerts and information gathering, contact tracing, quarantine, and emergency burials. Additionally, recent vaccination, restriction of movement of the population from and within the affected zones and survivor re-integration and clinical case management care and follow up.

Strategy 2: Mass public health education and awareness raising, population acceptability of the disease and behavior change.

It was put together with the aim of involving religious leaders, politicians, local councils, traditional rulers, professional bodies, citizens, trade and business organizations, mass media (all forms from print to electronic and community announcements). Also, to ensure that accurate and correct information is disseminated to as wide and broad an audience as possible.

Strategy 3: Pharmacy regulation and enforcement of proper pharmacy practice.

It was aimed to assist pharmacists at the national medicines regulatory agency to build capacity rapidly through early training and development of rules and guidelines for evaluating and monitoring clinical trials in anticipation that new interventions for the diagnosis, prevention, and treatment of the Ebola Virus Disease would be brought into the country. Some pharmaceutical companies have been interested in registering experimental medicines against Ebola in Pharmacy Board of Sierra Leone (PBSL). Sierra Leone's Ethics and Scientific Review Committee (SLERSC) is in charge of ethics approval of each clinical trial, ensuring a rigorous and ethical approach to the tests. Some of these products are Nanosilver, Zyphine compound, Immune formulation 200 (glutathione), NatuALA (5-aminolevulinic acid), Synerzap (Doxycycline + garlic), Brincidofovir, EVD 003 (Azithromycin, Irbesartan, Atorvastatin, Sunitinib).⁽²⁵⁾

Technology use in EVD response

Currently, technology is used for mapping and geolocation of Ebola outbreaks and to collect and share data in near real-time.⁽²⁶⁾ Other types of technological innovations - including gears for point-of-care diagnostics, patient-case management, administrative management, community displacement, paying and financial backing, and big data for analytics solutions from Ebola patients and affected human groups, ought to be used in the response.

The World Health Organization (WHO) and other agencies are adapting existing eHealth tools to Ebola and building capacity to use them. Moreover, some technology firms are deploying short-term communication infrastructure solutions to boost broadband connectivity. Some of the available technologies to be used in EVD outbreak are shown in Table 3. For example, DHIS2 have been successfully used in some countries as Sir Lanka,⁽²⁷⁾ Kenya,⁽²⁸⁾ Peru,⁽²⁹⁾ and Liberia.⁽³⁰⁾

Table 3 - Technology use in EVD response

Technology proposal	Website	Application overview
District Health Information Software (DHIS)	https://www.dhis2.org	Explore and understand your data through great visualization features. Get the complete overview through the pivot table feature, spot trends in data with charting and visualize geographical data aspects using the Geographic Information System (GIS) functionality
RapidPro	https://community.rapidpro.io	It is a free and open source framework designed to send and receive data using basic mobile phones, manage complex workflows, automate analysis, and present data in real-time
Frontline SMS	http://www.frontlinesms.com	Builds professional Short Message Service (SMS) management tools that help you reach more than 3 billion people with the phone already in their pocket
Magpi	http://home.magpi.com	Mobile technology makes data collection, collaboration, and communication of data using mobile phone
WhatsApp Ebola	---	Easy and personal communication to spread information one to one or create groups for spread easier and faster using WhatsApp app.
WHO DCP	https://whodcp.org	WHO Data Coordination Platform (DCP) for Secure management of electronic forms and data in real-time between health and development partners
iHRIS	http://www.ihris.org	It is free and open source software for managing health workforce information. This information helps countries address health workforce shortages and solve other challenges across the health sector
U-Report	http://www.ureport.ug	It is a free SMS social monitoring tool for community participation, designed to address issues that people care about

This kind of tools shown are so useful in different kind of health emergencies. In some cases, just a SMS can be needed to inform to population about behaviour expected to protect their self, especially because are free for users. Standard information can be developed and stored in this app to share in different situation: epidemic, pandemic, tsunami, etc. WhatsApp Ebola concretely have been an interesting way to share real-time information, using groups to spread information in seconds.

During the September 2014 UN General Assembly meetings, UNICEF announced its investment in an open-source communication platform called RapidPro,⁽³¹⁾ to enhance real-time information flow in the field. In a NetHope Solutions Center webinar, the UNICEF Innovation team explained how they have adopted RapidPro,⁽³¹⁾ and how other institutions can use it. RapidPro supply information live-saving information during natural disasters and epidemias/pandemias. Mercy Corps also shared a short presentation on how they are utilizing the solution in Liberia as part of their Ebola Community Action Platform (ECAP) program.⁽³¹⁾

Health care systems around the world must encourage health professionals to engage in prevention activities with the population and the identification of EVD patients in healthcare system. This type of infection requires maximum efforts for control and avoidance of loss of lives, money, and reduces development in countries affected.

It needs to use guidelines available mentioned in this article to improve performance in future prevention and treatment interventions to benefit patients with EVD.

Conclusion

Health systems need collaborative work, especially in cases of epidemics or pandemics. The information presented shows what could be achieved in the Ebola epidemic, to detect emerging foci, communication between professionals and save lives. This learning should be used in the case of COVID-19 where the interconnection between professionals and health authorities is required, accurate and agile information towards the population and coordinated progress to obtain the best treatments for patients.

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Conflicts of Interest

The Authors declares that they have no conflicts of interest to disclose.

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Mohamed Conteh-Barrat: resources; writing – original draft.

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Shyla Del-Aguila-Arcenales: conceptualization; data curation; methodology; supervision; validation; visualization; writing – original draft.

Santiago Diaz-Risco: conceptualization; data curation; investigation; methodology; supervision; validation; visualization; writing – original draft.