EDITORIAL

Ebola: Impact and Response

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Epidemiology

Ebola Virus Disease (EVD) is a severe illness caused by Ebola viruses affecting man and non-human primates. This viral hemorrhagic fever, also known as Ebola Hemorrhagic Fever (EHF) or simply Ebola, is often deadly in nature. The virus is transmitted to man from wild animals such as fruit bats and then spreads in the human population through direct contact with the blood, secretions, organs or other bodily fluids (vomit, faeces or urine) of infected people and with surfaces and materials (e.g. bedding, or clothing) contaminated with these fluids. It is thought that fruit bats of the Pteropodidae family are natural Ebola virus host and act as normal carrier in nature, able to spread the virus without being affected by it. (1) Ebola can stay in some body parts like the eyes, breasts, and testicles after infection. (2) Semen or breast milk of a person after recovery from EVD may carry the virus for several weeks to months. (3) Sexual transmission after recovery has been suspected to be a rare event. (4) The virus was first discovered in 1976 and the first EVD outbreaks occurred in remote villages in Central Africa, near tropical rainforests. The 2014–2016 Ebola outbreaks in West Africa were the largest and most complex. The Ebola Zaire strain is responsible for the recent outbreak declared on 1st August 2019 in the Democratic Republic of the Congo's (DRC's) North and South Kivu and Ituri provinces causing more than 3,100 cases, including 2,100 deaths as reported by World Health Organization (WHO). (5) The case fatality rates have varied from 25% to 90% in past outbreaks. The WHO affirmed the EVD outbreak as a "Public Health Emergency of International Concern" on August 8th, 2014. Indian population is an impending threat to EVD, as India falls in the home range of Pteropodidae family of fruit bats. It has also been reported that in Northeast India, bats, as well as humans who work in close proximity to bats, carry antibodies that recognize several filo viruses. (6) The Indian Council of Medical Research and the National Centre for Disease Control have identified Ebola as an emerging viral

infection that could pose a threat to public health in India.

Symptoms, Treatment and Prevention

EVD is manifested by fever, fatigue, muscle, pain, headache, and sore throat. This is followed by vomiting, diarrhea, rash, symptoms of impaired kidney and liver function, and occasionally bleeding (e.g. oozing from the gums, blood in the stools). Other viral hemorrhagic fevers may resemble EVD. It can be difficult to clinically distinguish EVD from other infectious diseases such as malaria, typhoid fever and meningitis. Laboratory findings include low white blood cell and platelet counts and elevated liver enzymes. Blood samples are tested for viral RNA, viral antibodies or for the virus itself to confirm the diagnosis. (1) A new rapid Ebola virus diagnostic kit/test was developed by British military scientists and NHS in Sierra Leone. (7) One issue which hinders control of Ebola is that diagnostic tests which are currently available require specialized equipment and highly trained personnel. Availability of a few suitable testing centers can lead to delay in diagnosis. There is no proven treatment for Ebola. As of August 2019, two experimental treatments known as REGN-EB3 and mAb-114 were found to be 90% effective. (3) Simple interventions early on can significantly improve chances of survival. For past and current Ebola epidemics, treatment has been primarily supportive in nature. This includes rehydration with fluids and body salts and symptomatic treatment. A range of potential treatments including blood products, immune therapies and drug therapies are currently being evaluated. Rehydration may be via the oral or intravenous route. Blood products such as packed red blood cells, platelets, or fresh frozen plasma may also be used. (8) Intensive care is often used in the developed world. (9) EVD has a risk of death in those infected, between 25% and 90%. (1) Death, if it occurs, follows typically six to sixteen days after symptoms appear and is often due to low blood pressure from fluid loss. (10)

Rapid geographic dissemination, nonspecific clinical presentation, lack of vaccine, and specific diagnostic test are the possible challenges to combat this dreaded public health menace. Hand hygiene is the most effective way to prevent the spread of the Ebola virus. During an outbreak, interventions applied are case management, surveillance, contact tracing, laboratory testing, safe burials and community engagement working with communities to reduce risk factors for Ebola transmission and operational readiness of neighbouring countries is critical to control outbreaks. Contact tracing is considered important to contain an outbreak. It involves finding everyone who had close contact with infected individuals and monitoring them for signs of illness for 21 days. If any of these contacts comes down with the disease, they should be isolated, tested & treated. Then the process is repeated, tracing the contacts' contacts. (11)

Development of Vaccines

Ebola vaccine candidates against Ebola have been developed in the decade prior to 2014, but none have yet been approved for clinical use in humans. (1) One, rVSV-ZEBOV, has been used extensively in 2018-2019 under a compassionate use protocol, (12) and in September 2019, the FDA accepted a Biologics License Application and granted priority review for the vaccine. (13) rVSV-ZEBOV was proved highly protective against the deadly virus in a major trial in Guinea in 2015. It is being used in response to the current outbreak in the DRC using a ring vaccination protocol. Several promising vaccine candidates such as rEBOVΔVP30 (non-replicating) and r VSV/ΔGP (replicating) have been shown to protect nonhuman primates against lethal infection. (14) There were some other efforts to have a recognizable vaccine for EBOLA but all were not completely fruitful.

Major Milestone

Most recently, the European Medicines Agency (EMA) has approved the first ever Ebola vaccine (rVSV-ZEBOV-GP vaccine). The Food and Drug Administration (FDA) is also reviewing the licensure application for this vaccine. The vaccine has been used since 2015 under the project of WHO in many outbreaks and has proved to be effective against Ebola virus. This vaccine has been developed by the scientists involved at National Microbiology Laboratory of Canada with adequate funding from the Biomedical Advanced Research and Development Authority of USA. Using an unlicensed vaccine in an outbreak is not a hassle-free process but once the vaccine gets a license then its use will not be cumbersome. This newly authorized licensed vaccine approved by the EMA (EU) is the result of multi-national action in relatively shorter duration of time which is funded by USA, developed in a lab at Canada and tested in the Democratic Republic of Congo gives an expectation that FDA will also

approve it and this move will not only help in curbing Ebola problem in Congo but also in its neighboring countries. (15) This development has been appreciated from all the corners as it is in the interest of mankind and will always be considered as an important milestone in the field of public health with immense hope to deal with Ebola - a public health problem of great concern all over.

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References

1. "Ebola virus disease" (Press release). World Health Organization (WHO). 12 February 2018.
2. Varkey JB, Shantha JG, Crozier I, Kraft CS, Lyon GM, Mehta AK, Kumar G, Smith JR, Kainulainen MH, Whitmer S, Ströher U, Uyeki TM, Ribner BS, Yeh S. Persistence of Ebola Virus in Ocular Fluid during Convalescence. N Engl J Med. 2015 Jun 18;372(25):2423-7. doi: 10.1056/NEJMoa1500306. Epub 2015 May 7. PubMed PMID: 25950269; PubMed Central PMCID: PMC4547451.[PubMed]
3. "Recommendations for Breastfeeding/Infant Feeding in the Context of Ebola". Centers for Disease Control and Prevention (CDC). 19 September 2014. Archived from the original on 24 October 2014. Retrieved 26 October 2014.
4. Sprecher A. Handle Survivors with Care. N Engl J Med. 2017 Oct 12;377(15):1480-1482. doi: 10.1056/NEJMe1512928. Epub 2015 Oct 14. PubMed PMID: 26465064.[PubMed]
5. Available on https://www.who.int/emergencies/diseases/ebola/drc-2019 Last accessed on 19th November 2019.
6. Dovih P, Laing ED, Chen Y, Low DHW, Ansil BR, et al. Filovirus-reactive antibodies in humans and bats in Northeast India imply zoonotic spillover. Filovirus-reactive antibodies in humans and bats in Northeast India imply zoonotic spillover. PLOS Neglected Tropical Diseases 2019; 13(10): e0007733. https://doi.org/10.1371/journal.pntd.0007733
7. Wu, Brian (2 May 2015). "Ebola Can Be Transmitted Through Sex". Science Times. Archived from the original on 2 May 2015. Retrieved 3 May 2015.
8. Clark DV, Jahrling PB, Lawler JV. Clinical management of filovirus-infected patients. Viruses. 2012 Sep;4(9):1668-86. doi: 10.3390/v4091668. Epub 2012 Sep 21. Review. PubMed PMID: 23170178; PubMed Central PMCID: PMC3499825.[PubMed].
9. Feldmann H, Geisbert TW. Ebola haemorrhagic fever. Lancet. 2011 Mar 5;377(9768):849-62. doi: 10.1016/S0140-6736(10)60667-8. Review. PubMed PMID: 21084112; PubMed Central PMCID: PMC3406178.[PubMed]
10. Singh SK, Ruzek D, eds. (2014). Viral hemorrhagic fevers. Boca Raton: CRC Press, Taylor & Francis Group. p. 444. ISBN 9781439884294. Archived from the original on 29 April 2016.
11. "What is Contact Tracing?" (PDF). Centers for Disease Control and Prevention (CDC). Archived (PDF) from the original on 12 September 2014. Retrieved 15 September 2014.
12. "As Ebola outbreak rages, vaccine is 97.5% effective, protecting over 90K people". 16 April 2019.
13. "FDA Accepts Merck's Biologics License Application (BLA) and Grants Priority Review for V920, the Company's Investigational Vaccine for Ebola Zaire Virus" (Press release). 17 September 2019. Retrieved 17 September 2019 – via Business Wire.
14. Hoenen T, Groseth A, Feldmann H. Current ebola vaccines. Expert Opin Biol Ther. 2012 Jul;12(7):859-72. doi: 10.1517/14712598.2012.685152. Epub 2012 May 5. Review. PubMed PMID: 22559078; PubMed Central PMCID: PMC3422127.[PubMed]
15. Available on https://www.statnews.com/2019/10/18/with-european-backing-the-world-is-on-the-brink-of-the-first-approved-ebola-vaccine/?utm_source=STAT+Newsletters&utm_campaign=9de79e8b15-Daily_Recap&utm_medium=email&utm_term=0_8cab1d7961-9de79e8b15-151218197 Last assessed on 19/11/2019