

Sexual transmission and the probability of the end of the Ebola virus disease epidemic

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ABSTRACT

A declaration of the end of Ebola virus disease (EVD) epidemic has a substantial impact on the control strategies and economic cost. The criteria of the end of EVD outbreak defined by the World Health Organization led to erroneous declarations in West Africa from 2015-2016. While EVD is mainly transmitted through human-to-human, Ebola virus can persist in the semen of survivors even 9 months after onset of symptom. Thus, unprotected sexual behavior elevates the risk of recrudescence cases. The purpose of this research aims to suggest objective approach including sexual transmission to decide the time at which the end of an epidemic is appropriately declared. First, we propose a mathematical model accounting for both non-sexual and sexual transmission to compute the probability of the end of an EVD epidemic. Second, by employing maximum likelihood estimation method, the effective reproduction number is estimated. Finally, the appropriate time to declare is determined by computing the probability of the end of epidemic which refers to the absence of additional cases. Moreover, the sensitivity analysis is carried out. Varying parameter corresponding to the sexual behavior and other unknown parameters, we calculate the waiting time and the international cost effectiveness ratio (ICER) until the end of an epidemic can be declared to investigate how influential relatively parameters are.

REFERENCES

1. Lee, H. and Nishiura, H., "Recrudescence of Ebola virus disease outbreak in West Africa, 2014-2016," *International Journal of Infectious Diseases*, Vol. 64, 2017, pp. 90-92.
2. Nishiura, H., Miyamatsu, Y. and Mizumoto, K., "Objective determination of end of MERS outbreak, South Korea, 2015," *Emerg Infect Dis.*, Vol. 22, 2016, pp.146-8.
3. Abbate, J. L., Murall, C.L. and Richner, H. and Althaus, C.L., "Potential impact of sexual transmission on Ebola virus epidemiology: Sierra Leone as a case study," *PLOS Neglected Tropical Diseases*, Vol. 10, 2016, e0004676.