2022 Sudan virus disease outbreak in Uganda: temporal variations in transmission

In their descriptive epidemiological study, Zainah Kabami and colleagues (August, 2024)[1] analysed epidemiological data from the 2022 Sudan virus disease outbreak in Uganda. The outbreak resulted in 164 cases with particularly severe infection outcomes in young children (aged <10 years). Kabami and colleagues estimated epidemiological quantities from the outbreak, including the basic reproduction number (R_0), the proportion of cases with specific symptoms (eg, fever, vomiting, weakness, and diarrhoea), and the case fatality rate.

A key conclusion of the article by Kabami and colleagues[1] is that, while Sudan virus has the potential to cause a devastating pandemic, it is less likely to do so than other ebolaviruses. This conclusion is supported by the authors' calculation of R_0. When calculating R_0, Kabami and colleagues[1] used the R software package EpiEstim[2–4] to infer the average level of virus transmissibility during the outbreak. In other words, their estimate is a single value (R_0=1·25; 95% credible interval 1·03–1·51), assumed to apply throughout the outbreak. However, transmission varies during outbreaks—eg, due to the introduction of public health measures. Inherent virus transmissibility, which is a factor that affects outbreak controllability,[5] might therefore be reflected most accurately by transmission in the initial, pre-intervention outbreak phase.

In fact, the principal use of EpiEstim[2–4] is to quantify variations in virus transmission during outbreaks, rather than to estimate a single value characterising transmission across the entire outbreak. When EpiEstim is instead applied to infer the time-dependent reproduction number (R_t) throughout the 2022 Sudan virus outbreak, different levels of transmission can be seen in different outbreak phases (figure). Early in the outbreak, substantial transmission arose, with R_t around 2–3 before the arrival of outbreak response teams. Immediately after response teams were deployed, transmissibility dropped (from late September to mid-October 2022), followed by a further period of high transmission as the virus spread more widely. Finally, the outbreak was brought under control from late October onwards (R_t<1). Notably, the estimated R_t range of 2–3 in the early stages of the outbreak is higher than the R_0 estimate of 1·25 obtained by Kabami and colleagues,[1] highlighting that substantial transmission would have been likely in the absence of effective public health measures.

The analysis by Kabami and colleagues[1] provides useful insights into Sudan virus transmission, and we support the authors' call for effective responses to future outbreaks. The importance of this call is emphasised further by considering estimates of R_t at different stages of the outbreak, which reveal periods with more substantial transmission than suggested by the single R_0 value of 1·25. Ebolaviruses have the potential to spread widely in host populations; swift action is required to identify and eliminate new outbreaks quickly.

We declare no competing interests.

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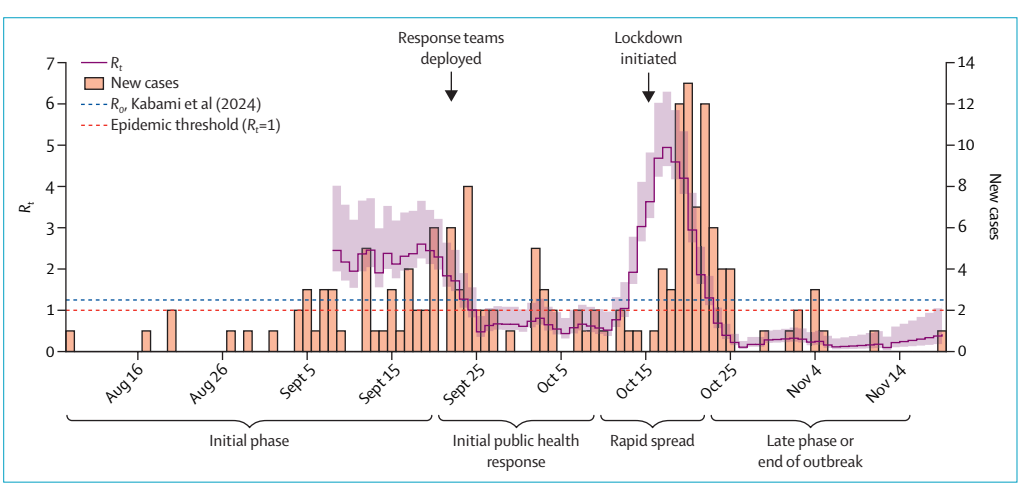

***Figure*: Inference of R_t during the 2022 Sudan virus disease outbreak in Uganda**
The EpiEstim R software package was used to estimate R_t, indicating that virus transmission varied substantially throughout the outbreak (mean estimate represented by the purple line and 95% credible interval by the shaded region). Due to low case numbers in the earliest outbreak stages, estimates are plotted from Sept 8, 2022 onwards. R_t was estimated using the parametric_si option in EpiEstim (assuming a serial interval with mean 13·8 days and standard deviation 7·6 days, as estimated by Kabami and colleagues,[1] and with a sliding window of length one week). R_t estimates (purple) are represented by the left y axis, and daily numbers of new cases (orange) are represented by the right y axis. R_t=time-dependent reproduction number.