Observational study

The unprecedented scale of the West African Ebola virus disease outbreak is due to environmental and sociological factors, not special attributes of the currently circulating strain of the virus

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Commentary on: WHO Ebola Response Team. Ebola virus disease in West Africa—the first 9 months of the epidemic and forward projections. *N Engl J Med* 2014;371:1481–95.

Context

An outbreak of Ebola virus disease (EVD), caused by Zaire ebolavirus, beginning in south-eastern Guinea in December 2013,[1] but not formally identified until 23 March 2014, has spread to the neighbouring countries of Liberia, Sierra Leone and Mali, with limited transmission to Nigeria, USA, Spain and Senegal. The cumulative total of cases and deaths is 14 413 and 5177, respectively as of 11 November 2014, making this outbreak around 45 times larger than any previous one. No validated treatment is yet available, although numerous experimental therapies are being employed following the decision of the WHO Panel on Unregistered Interventions. Quarantine, contact tracing and symptomatic therapy remain the main weapons in the fight against the outbreak. This paper summarises 4010 cases where clinical data are available, providing the largest clinical analysis to date of EVD.

Methods

For each of the 4010 cases, demographic characteristics, as well as signs and symptoms were recorded. The prognostic indication for each symptom was calculated as an OR between its occurrence in patients with fatal outcome versus survivors. Epidemiological variables were calculated from the data and projections of future case incidence derived.

Findings

The case fatality ratio (CFR) in the 4010 cases was estimated at 71% (95% CI 69% to 73%), within the range of CFRs reported for previous outbreaks (60–88%). Contagiousness is quantified by reproduction number (R, the average number of new cases resulting from each existing case) and, although found to vary slightly between countries, lies within the range 1.71–2.02 (95% CI 1.44 to 2.26) for the early stages of the outbreak and 1.38–1.81 (95% CI 1.27 to 2.03) by September 2014. On this basis, projected cases for 2 November 2014 were calculated at 5740 in Guinea, 9890 in Liberia, and 5000 in Sierra Leone. Haemorrhagic symptoms had the greatest association with likely fatal outcome with OR of 8.02 for bloody nose (95% CI 1.54 to 148.62) and 6.69 for bleeding gums (95% CI 1.35 to 121.32).

Commentary

The raw case numbers for 2 November 2014 are now available and the projections in the paper are seen in retrospect to have been slightly pessimistic for Guinea and Liberia but essentially accurate for Sierra Leone, with actual cases being 1731, 6525 and 4759, respectively. Other researchers have produced estimates of R, based on previous outbreaks, ranging from 1.34 to 1.83,[2] indicating that the present strain, at 1.71–2.02, is not more contagious than previous ones, thus eliminating one obvious hypothesis for the unprecedented size of the epidemic. The clinical data emphasise the diffuse nature of early-stage EVD, with only fever, fatigue, anorexia, vomiting, diarrhoea and headache present in more than 50% of cases (confirmed by two smaller studies).[3 4] This underscores the difficulty of early diagnosis in environments where febrile illnesses are commonplace, and perhaps, along with the fact that no previous EVD outbreak had been reported in Guinea, contributed to the 3-month lag between the first fatality and recognition of the problem.

Implications for practice

In summary, the current EVD strain is shown to be a typical Zaire ebolavirus in terms of its contagiousness and clinical presentation. The reasons for the magnitude of the West African epidemic are therefore likely to lie with non-virological factors such as population density, poverty, lack of access to medical care, funerary practices, and failure to recognise the outbreak early. R of around two implies that a reduction in transmission of 50% or more would bring the outbreak under control, but this may be difficult to achieve under present circumstances, raising the prospect of a long battle to eliminate EVD in West Africa. Limitation of future outbreaks depends on rapid response, development of health infrastructure, and infusion of human and material resources. Physicians in endemic areas need to be aware of the diffuse presentation of EVD in its early stages.

Competing interests None.

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