

## Ebola virus disease in West Africa – South African perspectives



The outbreak of Ebola virus disease (EVD) in West Africa has been raging for nearly a year at the time of writing. The likely index case of the outbreak was a 2-year-old child who died on 6 December 2013, having acquired the infection late in November 2013, although the outbreak was only formally announced in March 2014.<sup>[1]</sup> On 13 October 2014, a total of 8 400 suspected and confirmed cases of EVD, culminating in more than 4 000 deaths, has been reported.<sup>[2]</sup> This case count is nearly three times the total number of cases of EVD reported in 20 earlier outbreaks from 1976 to 2013. Although it may seem logical to believe that the present virus has mutated to become more lethal and transmissible since previous outbreaks, this epidemic is widely recognised to be fuelled by socioeconomic and public health-related issues that have complicated conventional containment efforts.<sup>[3-5]</sup> Full genome characterisation of Ebola virus isolates from Guinea and Sierra Leone has revealed that they are *Zaire ebolavirus*.<sup>[1,6]</sup> This strain has been associated with haemorrhagic fever outbreaks in central African countries since 1976, with case fatality rates of up to 90%. The current fatality rate is estimated to be between 60% and 70%; describing it as 'the most lethal outbreak of EVD to date' therefore relates more to the scale of the epidemic than the actual death rate.<sup>[7]</sup>

In recent months, nations worldwide have been bolstering their capacity to detect and manage EVD. Although the outbreak remains largely confined to Guinea, Liberia and Sierra Leone, the exportation of EVD to Nigeria in July 2014 has fuelled international fears of further spread beyond the affected countries in West Africa. In retrospect, with the outbreak nearing the one-year time mark, only four cases of EVD have been introduced to countries outside Guinea, Liberia and Sierra Leone, of which three resulted in transmission to secondary cases.<sup>[2]</sup> The outbreak in Nigeria affected healthcare workers in contact with a patient who travelled to Lagos from Liberia. A total of 20 cases (19 confirmed) were reported, with no additional ones since 5 September. A case of EVD was confirmed in Dakar, Senegal, involving a Guinean national who travelled via bus to the city, with no secondary cases. All those linked to the EVD cases in Nigeria and Senegal have completed a 21-day follow-up period, so it may be reasonable to assume adequate containment of the outbreak in these countries. In September 2014, a patient travelling from Liberia (where he tended to sick family members) to the USA was diagnosed and hospitalised for EVD. To date, two additional cases of EVD have been noted in nurses who tended to this patient. Likewise, there has been a secondary infection involving a nurse who cared for a patient evacuated for treatment of EVD in Spain. These cases have highlighted some weaknesses in response to EVD in West Africa – for example, the cases that introduced EVD to Nigeria and the USA were known contacts of EVD patients in Liberia, and should have been prohibited from travelling in the first place. Nevertheless, it is clear that systems are available for the detection of EVD, at least in these countries affected by the importation of EVD, and the responses are reassuring in that these outbreaks were contained, as was the case in Nigeria.

The exportation of cases has coincided with the explosion of EVD in Liberia and Sierra Leone. On 2 July 2014, there was a cumulative total of 759 reported cases from the three affected countries. This total rose to 1 323 on 31 July, 3 069 on 28 August, and 8 400 in early October. It is reasonable to believe that the risk of exporting the disease will continue to rise as the epidemic evolves in these countries and containment measures struggle to keep up with it.

How does South Africa (SA) measure up to the challenge of responding to imported cases? A review of SA's track record in dealing with imported cases of haemorrhagic fever and rapid containment of these infections may provide some degree of reassurance.

The first importation of haemorrhagic fever to SA was in 1975. The case involved an Australian backpacker who travelled from Zimbabwe (then Rhodesia) to SA. The cause of death was Marburg virus disease, and two secondary cases (neither fatal) were identified and managed.<sup>[8]</sup> In 1996, a Gabonese doctor working with EVD patients during an outbreak in Gabon fell ill, travelled to SA and presented to a Johannesburg hospital. The patient did not reveal his connections to the EVD outbreak and was discharged from hospital undiagnosed. When a nurse involved in his management presented with signs and symptoms of haemorrhagic fever, laboratory and epidemiological investigations indicated EVD as the cause of her death.<sup>[9]</sup> In 2007, a Nigerian doctor was evacuated to SA for medical treatment and admitted to a Pretoria hospital with a presumptive diagnosis of complicated typhoid fever. Upon admission, the risk of viral haemorrhagic fever was recognised. Immediate isolation and rapid laboratory confirmation of Lassa fever ensued. The outcome was fatal, but the infection was contained and no secondary cases occurred. In 2008, an SA expatriate living in Zambia was evacuated to SA for medical treatment, and died without a definitive diagnosis. When a contact presented with a similar clinical picture within 2 weeks of the death of the first patient, the possibility of a viral haemorrhagic fever was followed up. Within a 3-week period, three further cases were recognised. Initial specific laboratory testing was confounding and provided limited insights. Nevertheless, isolation procedures and contact tracing were followed, and the total case tally was limited to five (including the index case). Intensive laboratory investigation attributed the outbreak to a novel arenavirus, dubbed 'Lujo' (i.e. Lusaka-Johannesburg) virus.<sup>[10]</sup>

SA's capacity to deal with haemorrhagic fever cases has developed against the backdrop of endemic Crimean-Congo haemorrhagic fever (CCHF). Since it was originally diagnosed in SA in 1981, nearly 200 cases have been recognised and managed at various hospitals and confirmed by specialised laboratory testing at the National Institute for Communicable Diseases (NICD).<sup>[11]</sup> Each of these cases has involved isolation management and intensive case tracing and monitoring. Apart from two small nosocomial outbreaks and one secondary case of CCHF in a laboratory worker, cases have not resulted in secondary spread.<sup>[12,13]</sup> Importantly, the NICD has the only biosafety level 4 laboratory in Africa, a facility with established experience in dealing with haemorrhagic fever viruses.<sup>[9-11]</sup> Notably, this facility and all other core work at the NICD is in fact funded directly by the National Health Laboratory Service and the National Department of Health (NDoH), and not through external funding as was recently suggested in the *SAMJ*.<sup>[14]</sup> Similarly, the NICD has been at the forefront of supporting laboratory diagnostics for EVD by deployment of a staffed mobile laboratory to Sierra Leone, which too is funded by the NDoH.

In an interconnected world, while any country runs the risk of importation of EVD, the risk of a community outbreak will be low if the index case is recognised early and appropriate infection prevention and control measures are applied. SA is well prepared for the possibility of imported EVD, including traveller health screening at entry points and training of air, sea and land port health staff. There are 11 designated public sector health facilities (at least one in each province), with staff trained and provided with personal

protective equipment, but realistically, we must understand that patients may arrive at any hospital or clinic. The most important factor is early recognition of potential cases and especially protection of front-line health workers, who are the most vulnerable. In patients with unexplained acute febrile illness, a history of travel involving the three affected countries, together with the likelihood of exposure to blood and body fluids of ill persons, should raise the suspicion of EVD. There would seem to be high awareness of EVD among health practitioners in SA, fuelled by intense publicity from West Africa. Malaria remains the commonest cause of febrile illness in travellers for whom Ebola virus testing has been requested of the NICD. It is important that the threshold for laboratory testing be at a level that provides a degree of confidence and assurance to health workers, while balancing the absolute need for accurate histories, exclusion and management of other common infectious diseases, and unnecessary testing and waste of expensive resources.

At this stage it is not possible to predict either a timeline or number of cases as the outbreak continues unabated in Guinea, Sierra Leone and Liberia. Safety and efficacy trials of experimental vaccines are currently in progress. The value of experimental therapeutic agents such as monoclonal antibodies (ZMapp) remains unclear, and convalescent sera have been used with some success on a limited number of cases. While measures to prevent the introduction of EVD into countries are important, the focus has to be on ensuring an accelerated, co-ordinated and intense international response, using well-tried methods to break the chain of transmission in the three affected countries, where a humanitarian, health and economic disaster is unfolding. It is important, however, not to lose sight of other high-burden communicable diseases that continue to exact a far greater annual toll on the African continent, including millions of deaths annually from HIV, tuberculosis, malaria, pneumonia and diarrhoeal diseases, even as Ebola captures the headlines. The public health response to the Ebola outbreak must be used to strengthen surveillance and response to other communicable disease threats.

**Acknowledgement.** The authors thank Prof. John Freaan for his expertise and advice in preparation of this editorial.

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