publichealth research&practice

December 2016; Vol. 26(5):e2651661
doi: http://dx.doi.org/10.17061/phrp2651661
www.phrp.com.au

In practice

Australia's response to Ebola virus disease in West Africa, 2014–15

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Article history

Publication date: December 2016
Citation: Gilbert GL. Australia's response to Ebola virus disease in West Africa, 2014–15. Public Health Res Pract. 2016;26(5):e2651661. doi: http://dx.doi.org/10.17061/phrp2651661

Key points

- The unprecedented West African Ebola virus disease (EVD) outbreak caused thousands of deaths and terrible, continuing societal damage, exacerbated by pre-existing structural and political failures and international neglect
- When the international community finally responded, Western countries, including Australia, were forced to examine their own preparedness to manage EVD – and were often found wanting
- Australia's internal response plan was never fully tested by actual cases, but the lessons must not be forgotten before the next infectious disease emergency

Abstract

In March 2016, the World Health Organization declared the 2014–15 Ebola virus disease (EVD) outbreak officially over. With around 29 000 cases and 11 000 deaths in 27 months, this EVD outbreak was more than 60 times larger than any before, and unique in its cross-border spread and involvement of urban centres.

Local and international responses were slow and initially inadequate, but establishment of the United Nations Mission for Ebola Emergency Response, 9 months after the outbreak began, allowed a coordinated effort that slowed and eventually controlled the spread of disease. Internationally, there were fears that EVD would spread widely beyond Africa, despite reassurances from public health authorities. However, after nurses in the US became infected, public fear and concern for the safety of healthcare workers led to political intervention and varied, sometimes excessive, border controls, quarantine arrangements and hospital preparations. Altogether, fewer than 30 EVD cases were managed in countries outside Africa, all but three of which were acquired in West Africa.

In Australia, the Australian Health Protection Principal Committee led the internal response, including enhanced screening of incoming passengers at international airports and development of public health and laboratory testing protocols by expert subcommittees. States and territories nominated designated hospitals to care for EVD patients. Development of EVD infection prevention and control (IPC) guidelines was initially poorly coordinated within and between jurisdictions, often with significant discrepancies, causing confusion and fear among healthcare workers. The Infection Prevention and Control Expert Advisory Group was established to develop national IPC guidelines.

There were no confirmed cases in Australia, but investigation of several people with suspected EVD provided valuable experience in use of protocols and high-level containment facilities. The Australian Government was initially reluctant to send aid workers to West Africa, but later contracted a private company to staff and manage a treatment centre in Sierra Leone, which treated 91 patients with EVD during 4 months of operation. Among the lessons learnt for Australia was the need to increase awareness of routine IPC practices in hospitals, where significant deficiencies were exposed, and to maintain a high enough level of preparedness to protect healthcare workers and the public from the next, inevitable, infectious disease emergency.

Introduction

On 29 March 2016, the World Health Organization (WHO) Director-General, Margaret Chan, declared the end of the Public Health Emergency of International Concern (PHEIC) regarding the Ebola virus disease (EVD) outbreak in West Africa, more than 2 years after it had begun. By the time the three most affected countries – Guinea, Liberia and Sierra Leone – had "met the criteria for confirming interruption of their original chains of Ebola virus transmission"[1], there had been 28 646 confirmed, probable and suspected EVD cases and 11 323 (39.5%) deaths. This outbreak was more than 60 times larger than any since EVD was first recognised in 1976, the largest of which (in Uganda in 2000–2001) had involved 425 infections and 225 (53%) deaths.[2]

The West African outbreak began in the Guékédou province of Guinea in December 2013, but was not recognised as EVD until March 2014, when the Guinean Ministry of Health notified WHO of a "rapidly evolving outbreak ... in forested areas of south-eastern Guinea".[3] By then, there had been 49 cases and 29 (59%) deaths, including among healthcare workers. Already, the outbreak was unique: it was the first time EVD had occurred in West Africa; it had spread widely in Guinea, including the capital, Conakry (population >1 million) and into neighbouring Liberia and Sierra Leone, where it would soon reach their capitals, Monrovia and Freetown, with devastating consequences.[4]

Outbreak

Despite increasingly urgent warnings from Médecins sans Frontières (MSF) that the outbreak was out of control[5], it was not until early August that WHO convened an Emergency Committee under the International Health Regulations, and Director-General Chan declared a PHEIC.[6] It was probably not coincidental that this followed reports that two American aid workers, who had become infected while caring for EVD patients in Liberia, had been evacuated to a special high-security isolation unit at Emory University Hospital in Atlanta, Georgia.[7] This was the first time that symptomatic patients with EVD had been cared for outside Africa, but staff at Emory University Hospital were well trained to manage dangerous infectious diseases safely and worked closely with experts from the Centers for Disease Control and Prevention (CDC), who had extensive experience in management of EVD outbreaks in Africa.[8] The CDC Director, Dr Tom Frieden, reassured Americans that the risk of spread within the US was minimal, so long as standard infection prevention and control (IPC) practices were scrupulously observed.[7]

Soon, more EVD-infected foreign aid workers were being evacuated to Europe or North America, one of whom was a Spanish priest who died a few days after being transferred to Madrid. When one of the nurses who had cared for him became ill with EVD[9], health workers and the media in Western countries questioned how this could have happened in a high-security containment unit, casting doubt on the CDC's reassurances.[10] Despite growing concern about the extent of the West African outbreak and potential global risks, the international response was still sluggish – a situation described by MSF President, Joanne Liu, as a "global coalition of inaction". On 18 September 2014, the United Nations Security Council unanimously adopted resolution 2177 (2014), declaring the outbreak "a threat to international peace and security". The United Nations Mission for Ebola Emergency Response (UNMEER) had powers similar to those of a peacekeeping mission, allowing urgent coordination of its own agencies and those of the many international, government and nongovernment organisations that had sent or committed resources and personnel.[11]

Meanwhile, concern about the risk of international spread was increasing. Public health officials and healthcare providers in many countries began to prepare for the increasing likelihood that they would need to manage returning aid workers with EVD. Despite reservations about its efficacy, many countries, including Australia, introduced enhanced screening of international passengers returning from Africa.[12] IPC guidelines for managing patients with proven or suspected viral haemorrhagic fevers, including EVD, were updated or developed. Recommendations from different sources differed; however, they were based on past experience that Ebola virus does not spread from asymptomatic people incubating infection, is unlikely to spread in the early ('dry') stage of disease and is transmitted primarily by direct contact with blood or body fluids of a sick ('wet') patient, and that transmission can be prevented by strict adherence to contact/droplet transmission–based precautions.[13] Since there is no evidence of airborne transmission, most guidelines recommended use of surgical masks, rather than N95/P2 respirators/masks, and covering of clothing, hands and face to prevent droplet contamination of skin or mucous membranes.

When a Liberian–American man who had recently returned from Liberia presented to hospital in Dallas, Texas, on 25 September 2014 complaining of headache and nausea, the possibility of EVD was not considered. He was sent home but returned a few days later seriously ill with what was then diagnosed as EVD, from which he died on 5 October.[14] CDC experts supervised tracing and follow-up of contacts and other aspects of IPC, but, when two nurses who had cared for the patient in hospital became ill with EVD, the CDC's capacity to protect Americans was questioned. The CDC strengthened its IPC guidelines to include use of N95/P2 or powered air-purifying respirators; double gloving; complete cover of face, hair, all skin and clothes with impervious material; supervised donning and removal of personal protective equipment (PPE) by a 'buddy' while caring for confirmed, or suspected but unstable, EVD patients.[15] Public health

authorities elsewhere followed suit, despite anecdotal evidence that many healthcare workers were concerned that additional PPE would be restrictive, hot and difficult to remove safely.

Response

In many countries, screening of incoming passengers at international airports was upgraded, but demands from some members of the US Congress to ban flights from West Africa and impose 21-day quarantine for Americans returning from affected countries were strongly opposed by the CDC. However, when a New York doctor was admitted to hospital with EVD a few days after returning from Guinea, some states unilaterally imposed 21-day quarantine periods for all (asymptomatic) returning aid workers "out of an abundance of caution".[16]

In Australia on 26 October, the Immigration Minister announced a freeze on processing of visas for immigrants from affected countries[17], and border screening was upgraded. All incoming passengers were asked to indicate, on new travel-history cards, whether they had visited an affected country; if they had, a border security officer questioned them about potential exposure and checked the temperature of anyone at risk. An elevated temperature or other concern prompted assessment by a public health practitioner and, if necessary, transfer to a designated hospital for further management. Others were informed about EVD and asked to monitor their temperature and remain in contact with local public health units during the 3-week incubation period. Other than that, they were free to go about their business, except in Queensland, where returning aid workers were asked to remain in voluntary quarantine in Brisbane.[18]

The Australian Government Department of Health led the domestic response through the Australian Health Protection Principal Committee (AHPPC), chaired by the Chief Medical Officer and comprising state and territory chief health officers and representatives of expert subcommittees, including the Communicable Diseases Network Australia (CDNA) and the Public Health Laboratory Network (PHLN). The CDNA and the PHLN rapidly developed or updated public health and laboratory testing guidelines. Among other things, they provided guidelines for risk assessment, referral and transport of people with suspected EVD; laboratory testing, including for more likely conditions, such as malaria; and collection, packaging and transport of specimens.[19,20] States and territories nominated designated hospitals to manage people with suspected or proven EVD, and major public health laboratories rapidly developed EVD diagnostic capability.

Despite guidelines, preparations were far from straightforward. Transport of specimens and patients between hospitals and laboratories was often delayed because of uncertainty about logistics. How and where routine laboratory tests should be done was contentious because of concerns about laboratory safety, despite reassurances that, with appropriate precautions, risk was minimal.[21] As far as possible, point-of-care tests were recommended for monitoring sick patients with proven EVD to avoid delays and risks of transport to, and processing of, specimens in routine laboratories. Intensive care specialists debated – often with very different conclusions – to what extent EVD patients should be intensively monitored or managed with invasive procedures, given the high mortality (hence, futility) and occupational risks to healthcare workers.[22]

Meanwhile, in the absence of national IPC guidelines for EVD, individual hospitals and state and territory health departments developed their own. The degree of coordination varied within and between states and territories. Anecdotally, specialists in IPC, infectious diseases, intensive care and emergency medicine independently consulted colleagues caring for EVD patients overseas. As a result, there were differences of opinion about (for example) the use of PPE, environmental cleaning and waste disposal, which were difficult to resolve in the absence of national leadership. This caused confusion and fear among hospital staff, many of whom were unwilling to volunteer for training to prepare for the care of potential EVD patients. Moreover, it became clear that there were major deficiencies in the knowledge of many hospital staff, at all levels, about even routine transmission-based precautions. In early November, a new AHPPC subcommittee – the Infection Prevention and Control Expert Advisory Group – was established to develop evidence based IPC practice guidelines for management of EVD in the Australian healthcare setting.[23]

Control

Initially, progress towards outbreak control in West Africa was slow but, as UNMEER and WHO coordinated the establishment of treatment centres and mobile laboratories, as well as training and supervision of local and foreign clinicians, aid workers, epidemiologists, contact tracers and safe burial teams[24], the tide began to turn. But it would still be many months before the outbreak could be considered under control, and many years before the countries and people affected by it would recover.

The Australian Government was widely criticised, internationally and locally, for failing to send aid teams to West Africa, despite requests from the US, the UK, Liberia and Sierra Leone as early as September 2014, apparently because of fear that healthcare workers who became ill could not be guaranteed treatment or prompt evacuation.[25-27] However, in November, the Australian Government contracted private healthcare provider Aspen Medical to run an EVD treatment facility near Freetown, Sierra Leone, which opened in December and closed 4 months later after the outbreak's peak had passed. A total of 216 patients were treated, of whom 91

had EVD; 36 recovered and 55 (60%) died. Five patients died from other causes and 120 were discharged after EVD had been excluded.[28]

Enormous outlays of time, effort and financial resources were spent on preparations – including healthcare worker education and training, stockpiling equipment, mock patient management exercises and physical upgrading of isolation facilities – but there were no cases of EVD in Australia. However, several people with suspected infection were transferred to designated hospitals for investigation, which provided valuable experience in the application of protocols and use of high-level containment facilities.

Conclusion

What has been learnt? Several wide-ranging reviews have documented the lack of preparedness, noncompliance with the International Health Regulations, chaotic responses in affected countries and delayed action by the international community, which led to so much preventable loss of life, health system disintegration, and social and economic devastation in affected countries.[29-31] WHO, particularly, has been severely criticised for its delayed and inadequate response, and has acknowledged the need for change.[32] However, contrary to predictions of thousands of deaths internationally, only 26 patients with EVD were treated outside Africa, 5 (19%) of whom died. Much has been learnt about the natural history of the disease and the benefits of supportive management in reducing mortality and long-term sequelae.[33] Candidate vaccines have been trialled with promising results.[34] Many questions remain, of which the most important, now, is whether such a terrible catastrophe could happen again. Will the health systems, particularly in the poorest developing countries, be strengthened enough in time to respond to the next, inevitable, infectious disease emergency? Will the international community provide adequate resources to support WHO in its resolve to develop better infectious disease response capacity and be prepared to deploy personnel rapidly when the need arises? Will health systems in rich countries maintain the increased awareness of the need for better routine and nationally consistent IPC policies and practices, that can be rapidly upgraded, when necessary, to protect healthcare workers and the community?

Competing interests

None declared

Author contributions

GG is the sole author of this manuscript

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