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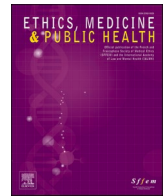


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Letter to the Editor

Comprehensive public health response and preparedness: key lessons from Rwanda's effective containment of the 2024 Marburg virus outbreak

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Dear Editor,

The emergence of Marburg Virus Disease (MVD) in Rwanda, officially declared on September 27, 2024, represents a significant public health event that demonstrates the evolution of Africa's response capabilities to viral hemorrhagic fevers [1]. The outbreak, Rwanda's first encounter with MVD, initially manifested as 62 confirmed cases and 15 deaths by October 15, 2024, yielding a case fatality rate of 24.2% [2]. This relatively lower fatality rate compared with historical outbreaks suggests improved clinical management and rapid response capabilities. The epidemiological pattern of the outbreak revealed concern among healthcare workers, comprising approximately 80% of cases and spanning seven districts: Gasabo, Gatsibo, Kamonyi, Kicukiro, Nyagatare, Nyarugenge, and Rubavu [2]. An extensive testing campaign, with 3,797 tests conducted by October 14, 2024, demonstrated Rwanda's commitment to comprehensive surveillance and early detection strategies [2]. Learning from the 2014–2016 Ebola outbreak in West Africa, Rwanda's response incorporated crucial lessons in vaccine development and emergency preparedness. The accelerated development of countermeasures against Zaire ebolavirus during this period has provided valuable insights for managing other filovirus outbreaks [3]. These experiences influenced Rwanda's approach to healthcare worker protection and isolation protocols.

The Tanzania outbreak in 2023 offers additional valuable lessons in the management of Marburg virus outbreaks. Key elements include the establishment of effective surveillance systems, stringent infection prevention and control measures, and the critical importance of international cooperation [4]. Rwanda's success in containing the outbreak built upon these experiences, implementing strong community engagement strategies, and leveraging the existing healthcare infrastructure. Rwanda's response framework has several innovative aspects. The country mobilized its extensive network of community health workers, implementing a decentralized surveillance system that enabled rapid case identification and contact tracing [5]. The healthcare system's ability to maintain effective isolation protocols while continuing essential services highlights the importance of healthcare system

resilience. The concurrent management of both the Marburg and Mpox outbreaks in the region highlighted the need for comprehensive approaches to control viral hemorrhagic fever [6,7]. Despite the initial hospital-based spread, Rwanda's success in preventing community transmission provides valuable insights for other countries facing similar challenges. The rapid containment, with no new cases reported since October 30, 2024, and the last patient discharged on November 8, 2024, demonstrates the effectiveness of their integrated approach [5]. Early detection and rapid response systems are essential for preventing widespread transmission. Rwanda's robust testing capabilities and swift case isolation were pivotal in containing the outbreak [8]. Additionally, the established community health networks played a key role in effective contact tracing and public health communication. Given the high proportion of affected healthcare workers, implementing stringent protection protocols for healthcare staff was also crucial to the response [5]. Importance of regional cooperation and information sharing in managing cross-border health threats.

Rwanda's experience offers several comprehensive recommendations for improving global preparedness for viral hemorrhagic fever outbreaks. The implementation of intensive healthcare worker training programs in infection prevention and control must be prioritized, with particular emphasis on personal protective equipment protocols, isolation procedures, and decontamination practices [9]. This training should be continuously and regularly updated to reflect emerging best practices and new scientific evidence. The enhancement of the laboratory capacity for rapid diagnostics requires substantial investment in both infrastructure and human resources. Rwanda's successful deployment of mobile testing units and rapid diagnostic capabilities demonstrate the importance of decentralized laboratory networks [5]. Countries should focus on developing sustainable laboratory systems capable of quick scale-up during outbreaks while maintaining quality control standards. Maintaining strong surveillance systems during non-outbreak periods is crucial for early detection and response. This includes establishing sentinel surveillance sites, implementing regular testing protocols, and maintaining active disease-monitoring networks [8]. Rwanda's integration of community health workers into the

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surveillance system provides a model for effective early warning systems in resource-limited settings. The containment of the outbreak within approximately 42 days represents a significant achievement in the public health response. This success story provides valuable lessons for other countries in resource-limited settings and emphasizes the importance of combining strong community engagement with effective clinical management protocols. The experience gained from this outbreak contributes significantly to the global knowledge base for managing emerging infectious diseases and strengthens the case for continued investment in public health infrastructure and emergency preparedness systems.

CRedit authorship contribution statement

MMA and OJO conceptualized and designed the study. AG conducted literature review and data collection. MMA wrote the first draft of the manuscript. All the authors critically revised the manuscript for important intellectual content. All authors have read and approved the final manuscript.

Ethical approval

Not applicable.

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Declaration of competing interest

The authors have no conflict of interest to declare.

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