

Perspective Article

Marburg Virus Disease in Rwanda: The Role of Infection Prevention and Control in Reducing Transmission of Infectious Disease Outbreaks among Healthcare Professionals

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Abstract

Rwanda's first Marburg Virus Disease (MVD) outbreak resulted in 58 infections and 13 deaths within the first two weeks. Over 70% of cases occurred among healthcare professionals, highlighting the vulnerability of frontline workers and exposing critical gaps in the country's healthcare system, particularly in infection prevention and control (IPC) practices. Healthcare workers are essential to sustaining functional healthcare systems. However, they face a higher risk of infection and death at the onset of outbreaks, potentially due to lapses in IPC practices, thereby weakening the healthcare system. Routine and strict adherence to IPC measures would have protected healthcare workers and prevented the transmission of both known and emerging diseases. Thus far, Rwanda has successfully implemented containment strategies such as early detection, contact tracing, and isolation. However, this article argues that long-term investment in IPC protocols is essential to safeguard healthcare workers and ensure system resilience. Strengthening IPC measures and fostering a culture of safety are vital steps toward building a healthcare system capable of effectively managing future infectious disease outbreaks. This perspective article aims to raise awareness about the role of infection prevention and control in reducing the transmission of infectious disease outbreaks among healthcare professionals, motivated by the devastating consequences of the MVD outbreak on the health workforce in Rwanda.

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Introduction

Infectious disease outbreaks can overwhelm healthcare systems, particularly when they emerge unexpectedly in a single country. During the initial stages of such outbreaks, healthcare facilities often receive patients presenting symptoms resembling familiar diseases, which leads to misdiagnoses. [1,2] This diagnostic error can result in overcrowded facilities and increased exposure risks for healthcare professionals, leaving them vulnerable to infection and even death.[2]

Global outbreaks, such as COVID-19, have underscored the vulnerability of even well-resourced health systems.[2] By early March 2020, more than 3,000 healthcare professionals in China had contracted COVID-19, and 62 of them died.[2] Rwanda faced a similar challenge following the declaration of the recent Marburg Virus Disease (MVD) outbreak on September 27, 2024. During the first two weeks, 58 cases were reported, with 13 deaths, and more than 70% of those infected were healthcare workers.[3,4]

The numbers demonstrate a high infection rate among healthcare professionals at the onset of the outbreak, highlighting serious gaps in infection prevention and control (IPC) measures and the broader healthcare system's preparedness. Although the Rwandan government has taken significant steps to contain the outbreak through early detection, testing, contact tracing, and isolation,[1] the outbreak is a stark reminder of the need to reinforce the healthcare system. Strengthening preparedness and ensuring the safety of healthcare workers is essential to mitigate the risks of future outbreaks. Healthcare system preparedness includes ensuring adequate staffing of healthcare professionals, developing robust infrastructure and supply chains, and guaranteeing the availability of necessary facilities, equipment, and medical supplies, such as personal protective equipment (PPE) and testing kits. It also involves having efficient surveillance systems to

rapidly identify, isolate, and treat cases. [5] Furthermore, strong IPC measures are essential to prevent the spread of infections within healthcare facilities. This article aims to raise awareness about the role of infection prevention and control in reducing the transmission of infectious disease outbreaks among healthcare professionals. It argues that consistent adherence to IPC measures could minimize the transmission of yet unknown disease among healthcare workers, particularly in the early phases of an outbreak.

The Marburg Virus Disease Outbreak in Rwanda and Its Implications

The Marburg virus, a highly virulent pathogen closely related to Ebola, has a case fatality rate that ranges from 23% to 90%, making it one of the deadliest viral diseases. [6,7] On September 27, 2024, Rwanda's Ministry of Health confirmed the first-ever outbreak of MVD in the country, marking a significant public health challenge.[6] While the virus had previously affected neighboring countries like the Democratic Republic of Congo, Uganda, and Tanzania, Rwanda had not encountered the virus until this time.[3] Early detection was hampered because the initial symptoms of MVD; such as severe headaches, fever, fatigue, and muscle pain, which mimic those of malaria, a disease common in the region. [1,3] A similar situation occurred in China when COVID-19 first emerged, as it was initially misidentified as pneumonia.[2] This diagnostic confusion delayed an appropriate response, underscoring the importance of early disease surveillance and differentiated diagnosis during outbreaks.

Although MVD and malaria share several early symptoms, their modes of transmission and treatment options differ significantly. The spread of MVD is through direct contact with the blood, bodily fluids, or tissues of infected humans or animals, as well as through contaminated surfaces or objects like bedding and clothing.[3] In contrast, malaria is transmitted by the bite of an infected female *Anopheles* mosquito,

which limits its contamination.[8] Effective treatments are well-established for malaria. However, no approved vaccine or cure currently exists for MVD, making the outbreak even more scary and challenging to manage.[1] These distinctions highlight the need to routinely and strictly adhere to IPC measures to prevent the transmission of even unknown diseases within healthcare facilities.

Many healthcare workers may have initially believed they were treating malaria patients, a common endemic disease in Rwanda, and unknowingly exposed themselves to MVD. Their dedication to perilous patient care, highlights the immense commitment of these professionals.

By October 10, 2024, the Rwanda Ministry of Health reported that 58 individuals had contracted MVD during the first two weeks of the outbreak, resulting in 13 deaths. Notably, more than 70% of the confirmed cases were healthcare professionals.[3,4] Sadly, both junior and senior healthcare professionals, including those in leadership positions, succumbed to the disease. Colleagues and families were left grieving. The MVD outbreak has exposed significant vulnerabilities in Rwanda's healthcare system, particularly in protecting healthcare workers during public health emergencies. The loss of a substantial number of healthcare professionals has not only distressed families but also undermined the functioning of the healthcare system. This tragedy underscores the urgent need for robust IPC protocols and preparedness measures to safeguard healthcare workers, whose safety is essential for the continuity of care during outbreaks and beyond. Strengthening these systems is critical to ensuring that healthcare professionals are equipped to save lives and are protected from avoidable risks.

The Importance of Protecting Healthcare Professionals

The global healthcare workforce is already under strain, with an anticipated shortage of 10 million healthcare workers by 2030.

The World Health Organization (WHO) projects that the African region will account for 52% of this shortfall.[9] In response to this persistent crisis, Rwanda's Ministry of Health approved the "4x4" program on 13th July 2023, which aims to quadruple the number of healthcare professionals within four years. The program also seeks to align Rwanda's healthcare worker-to-population ratio with WHO recommendations.[10]

While expanding the workforce is crucial, retaining and protecting existing healthcare workers is equally important. Healthcare professionals are critical in delivering patient care, training, and mentoring future generations. Therefore, safeguarding their well-being is essential for the long-term sustainability of the healthcare system.

Protecting healthcare workers is vital for maintaining functional healthcare systems, especially during infectious disease outbreaks. The tragic loss of healthcare workers during the MVD outbreak illustrates the personal and professional consequences of inadequate protection. Families are left grieving, survivors and colleagues are at potential risk of suffering from mental health issues, and many individuals may be discouraged from entering or continuing in the healthcare field, further exacerbating workforce shortages.

The safety of healthcare professionals is a key indicator of a healthcare system's preparedness to manage infectious disease outbreaks.[5] Healthcare workers are on the front lines of response efforts and face the highest risk of exposure. If these professionals feel unprotected or unsupported, it may deter others from pursuing careers in healthcare, weakening the system's ability to respond effectively to future outbreaks. [11] Ensuring that healthcare workers are equipped with the necessary tools and training to protect themselves is essential for building a resilient healthcare workforce.

The role of infection prevention and control in reducing disease transmission

Infection Prevention and Control is a practical, evidence-based strategy aimed at

protecting patients and healthcare workers from preventable infections.[12] Research shows that well-implemented IPC programs can reduce hospital-acquired infections by nearly 50%.[13] Strengthening IPC at both national and healthcare facility levels is essential for curbing infections and managing outbreaks of highly infectious diseases like MVD. Effective IPC practices are vital to improving healthcare quality and patient safety by minimizing the risk of disease transmission within healthcare settings. Successful implementation of IPC measures reflects a health system's preparedness to manage outbreaks while promoting patient safety and healthcare quality.

Consistent adherence to IPC practices requires the collaboration of multiple stakeholders, including healthcare workers, administrators, and policymakers. Rwanda's success in curbing MVD transmission reflects the importance of coordinated efforts between national and local authorities. The Ministry of Health played a pivotal role through timely detection, contact tracing, isolation, immunization, and treatment efforts, demonstrating its commitment to protecting both the population and healthcare workers. Presently, the proper use of IPC measures—such as hand hygiene and PPE—is widely observed across healthcare facilities, showcasing the impact of IPC protocols on infection prevention. However, a critical challenge remains how healthcare professionals can sustain these high standards of IPC practices beyond outbreaks to prevent future infections and save lives.

During infectious disease outbreaks, healthcare professionals are at the front line and face the highest risk of exposure. Therefore, it is imperative that they prioritize their safety while delivering patient care. Although providing care is their professional duty, healthcare workers must protect themselves by following IPC guidelines, such as consistently wearing appropriate PPE and practicing hand hygiene.

These IPC protocols are grounded in the principle that all bodily fluids, including blood, secretions, and excretions, may carry infectious agents. Since diseases like MVD can present with symptoms similar to less transmissible illnesses, universal adherence to IPC measures is essential in minimizing the risk of exposure to healthcare workers. Healthcare facilities must ensure the availability of essential resources, including PPE, disinfectants, and isolation units, to support IPC efforts. Regular refresher courses on IPC practices are also critical to maintaining staff preparedness. By fostering a culture of safety and encouraging healthcare workers to prioritize their own well-being, healthcare systems can better protect their workforce. Consistent adherence to IPC guidelines reduces transmission risks and ensures the functionality and sustainability of healthcare systems during outbreaks.

Conclusion

Rwanda's response to its first Marburg Virus Disease outbreak demonstrates the country's capacity to manage infectious disease outbreaks through early detection and coordinated interventions. However, the high infection rate among healthcare professionals reveals critical gaps in the healthcare system's preparedness and underscores the need for stronger infection prevention and control measures. Embedding IPC protocols into the daily practices of healthcare facilities is essential to protect healthcare workers and reduce the risk of disease transmission. Understanding the barriers to consistent adherence to IPC measures is essential for maintaining a resilient healthcare system. Healthcare leaders must take immediate steps to enhance IPC efforts and support the physical and mental well-being of healthcare professionals. A robust healthcare system depends on the safety and readiness of its workforce. By prioritizing the protection of healthcare workers, Rwanda can build a resilient healthcare system capable of responding effectively to future outbreaks and safeguarding the essential professionals on the front lines.

Authors' contribution

DR, JM, FU, and GN contributed to the conceptualization of the ideas. DR drafted the initial manuscript, and JM, FU, and GN provided critical revisions to the first draft. All authors reviewed and approved the final version of the manuscript.

Conflict of interest Declaration

The authors declare that there is no conflict of interest

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