

# Cardiovascular Risks of Emerging Infectious Diseases: Preparing for the Future

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## Introduction

Emerging Infectious Diseases (EIDs) pose a significant global health challenge, particularly in their impact on cardiovascular health. The COVID-19 pandemic has highlighted the potential for infectious diseases to exacerbate cardiovascular risks, but the issue extends beyond this single event. This article explores the cardiovascular risks associated with emerging infectious diseases, focusing on the mechanisms of infection, the long-term effects on the cardiovascular system and the strategies for preparation and response. By understanding these risks and developing robust healthcare strategies, it is possible to mitigate the cardiovascular consequences of future pandemics. Emerging Infectious Diseases (EIDs) are infections that have newly appeared in a population or have existed but are rapidly increasing in incidence or geographic range. These diseases, including those caused by viruses like SARS-CoV-2, Zika and Ebola, present complex challenges to global health systems. While the primary focus is often on the acute management of these infections, there is growing recognition of their long-term health impacts, particularly on the cardiovascular system. The cardiovascular risks associated with EIDs are multifaceted, involving direct viral effects on the heart and blood vessels, as well as indirect effects related to inflammation, stress and the broader systemic response to infection. Understanding these risks is crucial for preparing healthcare systems to respond effectively to future pandemics and to protect those most vulnerable to cardiovascular complications [1].

## Description

Many viruses can directly infect cardiac tissues, leading to myocarditis, pericarditis and other forms of heart damage. Myocarditis, an inflammation of the heart muscle, can result from a direct viral invasion, leading to cardiac dysfunction, arrhythmias and even heart failure. For example, SARS-CoV-2, the virus responsible for COVID-19, has been found to enter cardiac cells via the angiotensin-converting enzyme 2 receptor, causing direct myocardial injury. Similarly, other viruses like Coxsackievirus, influenza and HIV have been implicated in cases of viral myocarditis, often leading to significant long-term cardiac complications. These conditions can have a lasting impact, with some patients developing chronic heart conditions that require on-going management. The systemic inflammatory response triggered by infections can also contribute to cardiovascular risks. In severe infections, a "cytokine storm" may occur, where the body's immune system releases an excessive amount of cytokines, leading to widespread inflammation. This inflammation can damage blood vessels, promote clot formation and destabilize existing atherosclerotic plaques, increasing the risk of heart attacks and strokes. COVID-19 has

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been particularly notorious for causing a hyper inflammatory state, leading to increased rates of thromboembolic events, including deep vein thrombosis, pulmonary embolism and ischemic strokes. These complications have been observed even in younger patients without prior cardiovascular conditions, highlighting the broad impact of systemic inflammation on cardiovascular health [2].

Beyond the acute phase of infection, EIDs can have lasting effects on cardiovascular health. Long-term sequelae may include persistent inflammation, on-going myocardial damage and accelerated atherosclerosis. The phenomenon of "long COVID," where patients experience prolonged symptoms and health issues after the acute phase of infection, includes a significant proportion of cases with cardiovascular involvement, such as persistent chest pain, palpitations and dyspnoea. These long-term effects raise concerns about the potential for future pandemics to create a significant burden of chronic cardiovascular disease. Patients recovering from severe infections may require long-term monitoring and management to prevent or mitigate the development of chronic heart conditions. Early identification of cardiovascular involvement in patients with EIDs is critical. This requires a multidisciplinary approach, involving cardiologists, infectious disease specialists and primary care providers. Biomarkers like troponin, which indicate myocardial injury and imaging techniques like echocardiography and cardiac MRI, can be used to assess the extent of cardiovascular damage and guide treatment decisions. For patients with known cardiovascular risk factors, aggressive management of these conditions during and after infection is essential. This includes optimizing control of hypertension, diabetes and hyperlipidaemia, as well as ensuring adherence to cardiovascular medications. Early intervention can reduce the risk of acute complications and improve long-term outcomes [3,4].

Public health preparedness is crucial for mitigating the cardiovascular impact of future pandemics. This includes not only the development of vaccines and antiviral therapies but also the creation of protocols for the early identification and management of cardiovascular complications in infected patients. Healthcare systems should be equipped with the necessary resources and training to manage the cardiovascular aspects of EIDs, including the ability to rapidly deploy cardiac care units and provide specialized care for affected individuals. Additionally, public health campaigns should focus on educating the public about the cardiovascular risks associated with infectious diseases and the importance of maintaining cardiovascular health during pandemics. This includes promoting healthy lifestyles, such as regular exercise, a balanced diet and smoking cessation, which can help reduce baseline cardiovascular risk and improve resilience to infections. On-going research into the cardiovascular effects of EIDs is essential for understanding the mechanisms of disease and developing effective treatments. Surveillance systems should be established to monitor the long-term cardiovascular outcomes of patients who have recovered from EIDs, particularly those who experienced severe infections. This data can inform future public health strategies and guide the allocation of resources to areas most in need. Collaborative research efforts that bring together virologists, immunologists, cardiologists and epidemiologists will be key to advancing our understanding of how emerging infections impact cardiovascular health. This multidisciplinary approach can also help identify potential therapeutic targets and preventative strategies that can be deployed in future pandemics [5].

## Conclusion

The cardiovascular risks associated with emerging infectious diseases

represent a significant challenge for global health. As the COVID-19 pandemic has demonstrated, these risks are not limited to the acute phase of infection but can have lasting effects on cardiovascular health. Preparing for the future requires a comprehensive approach that includes early identification and management of cardiovascular complications, robust public health preparedness and on-going research into the mechanisms of disease. By understanding and addressing the cardiovascular risks of EIDs, we can improve outcomes for patients and reduce the long-term burden of cardiovascular disease associated with future pandemics. As we move forward, a coordinated effort at the intersection of infectious disease and cardiovascular health will be essential for protecting public health in an increasingly interconnected world.

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## Acknowledgement

None.

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## Conflict of Interest

None.

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