

Saving lives from cardiovascular diseases in Africa

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November 4, 2025

Professor Derek Yellon from the Hatter Cardiovascular Institute at University College London and Professor Mpiko Ntsekhe from the University of Cape Town discuss the increasing prevalence of cardiovascular diseases (CVD) in Africa and the associated treatment challenges

By the year 2030, the UN Sustainable Development Goals aim to reduce premature mortality from non-communicable diseases through prevention and treatment by a third. ⁽¹⁾

Increase in cardiovascular diseases in Africa

Although historically infectious diseases such as HIV/AIDS, malaria, and tuberculosis have been major causes of death in Africa, studies and reports from the World Health Organization (WHO) and other health organizations indicate that cardiovascular diseases (CVD), including Acute Myocardial Infarction (AMI) and Heart Failure (HF), are rising in prevalence and importance as causes of death and disability throughout Africa. Indeed, cardiovascular diseases (CVDs) are the most common non-communicable diseases globally, responsible for an estimated 17.8 million deaths in 2017, of which more than three-quarters are in low and middle-income countries (LMICs). ⁽²⁾ Furthermore, CVDs, including stroke, hypertension, acute myocardial infarction, and heart failure, have become the leading cause of death in Africa since 2019, despite Africa being the youngest continent in the world with a median age of 19.7 years. ⁽³⁾ In addition to the above, the prevalence of ischaemic heart disease (IHD) and related mortality is predicted to rise in African and other low- and middle-income countries by 70% in men and 74% in women by 2030. ^(4,5)

The challenges when treating heart conditions

Heart attacks diagnosed by ST segment elevation myocardial infarction (STEMI) and the heart failure that often follows, are among growing causes of death and disability across Africa. A heart attack is best treated by removing the blood clot in the coronary artery and restoring blood flow to the heart as rapidly as possible (preferably within six hours), using techniques such as primary angioplasty (PPCI). However, in most African countries, PPCI is not available. Instead, those patients who can receive treatment receive thrombolytic drugs, with the aim of dissolving the offending clot. However, this results in a significantly slower restoration of coronary blood flow to the heart and is only successful in restoring blood flow in 60% of cases. ⁽⁶⁾ Compounding this less effective means of removing the clot, patients across Africa face a much higher risk factor burden, compared to developed countries, and have limited access to hospitals, especially in rural areas, resulting in prolonged transfer times. Furthermore, in the hospitals, there may be limited treatment options. In addition, the population is characterised by

a high underlying prevalence of cardiac risk factors such as diabetes, high blood pressure, stroke, and HIV. Therefore, there is an urgent need to discover treatments to improve health outcomes for these high-risk patients.

Remote Ischaemic Conditioning (RIC)

In 2015, the ERIC-LYSIS study was the first to investigate the effect of a non-invasive, low-cost treatment strategy termed Remote Ischaemic Conditioning (RIC), with the potential to improve clinical outcomes following heart attacks. ⁽⁷⁾ This study in high-risk STEMI patients reperfused by thrombolysis. ⁽⁵⁾ This multi-centre, single-blinded, 'proof-of-concept' trial undertaken in Mauritius, randomised 519 high-risk STEMI patients. Patients who received RIC upon arrival at the hospital and received thrombolytic therapy experienced a significant reduction in enzymatic MI size compared to controls. The size of this cardioprotective effect is comparable to that observed in STEMI patients treated by PPCI. This 'proof-of-concept' study demonstrated the potential for this procedure as an attractive option to improve heart attack-related outcomes in resource-limited healthcare systems, where higher-risk patients are treated with thrombolytic therapy. In 2019, RIC was later examined in a large outcome study, CONDI-2/ERIC-PPCI, across Western Europe and published in *The Lancet*. ⁽⁸⁾ Importantly, this study showed RIC was not able to improve clinical outcomes, but notably it demonstrated that the mortality from CV death in the control group was only 2.7%. This effectively suggests that low-risk patients, with access to optimal care, were treated so effectively in the trial that additional therapy was unlikely to demonstrate any further benefit. Importantly, following the outcomes of this study, senior investigators proposed an international call for this intervention to be undertaken in developing countries where patients are at significantly higher risk. ^(9,10,11,12)

Based on the above, we proposed a large-scale outcome trial, termed the RIC-AFRICA study, using RIC to investigate clinical outcomes following heart attacks in high-risk patients in Africa. ⁽¹³⁾ Initially, our RIC-AFRICA trial began as a small pilot for recruitment in 2022 to assess the feasibility of undertaking a study of this kind across multiple African countries. Twenty hospital sites were selected across South Africa, Uganda, Sudan, and Kenya. Ethical Board approvals were obtained from local hospitals and national regulatory bodies, and governments. In this pilot, we demonstrated strong recruitment capability and that both medical and government participation is achievable. With the subsequent support of the Novo Nordisk Foundation, we are now undertaking the second stage of the study, focusing in greater depth across 17 clinical sites in countries including South Africa, Namibia, Senegal, Mauritius, Kenya, Mozambique, and Uganda. In addition, our aim is not only to undertake this study as described, but to demonstrate accurate and robust data collection from recruited STEMI patients. This includes a significant number of patients with comorbidities such as diabetes, hypertension, obesity, vascular disease, and HIV. Importantly, we shall collect a complete medical history of each patient. Such data acquisition on non-communicable diseases will provide novel information on the risk factors and comorbidity burden of STEMI patients and their outcomes in the countries where the trial will be conducted, thereby providing an improved understanding of healthcare and health infrastructure capacity. Finally, we aim to develop a sustainable cardiovascular research network across Africa by providing training in research practices, including data

capture and safety protocols, enabling future trials to further address local healthcare needs. The researchers leading the study have a strong track record of clinical trial leadership in the African continent.

The need for more comprehensive research

It is important to appreciate that cardiovascular research in Africa is still in its early stages and focused mainly on epidemiology and the burden of disease. The few completed outcomes trials and genomic studies only contribute to 3% of the global CVD research output despite bearing a disproportionate burden of CVDs that could provide robust resources for data science to unravel health challenges and proffer adaptable control measures. ⁽¹⁴⁾ It is therefore essential that research, data acquisition, and implementation of improved approaches/therapies can appropriately fit within LMIC environments and capabilities to better understand the patient populations and clinical needs. In this regard, it is important to not only investigate ways to (i) address the pathology of the disease but also to (ii) define the patient demographics and cardiovascular health challenges.

Worrying outcomes for heart disease patients in Africa and LMICs

In summary, the prevalence of ischaemic heart disease and related mortality is predicted to rise in African and other low-and middle-income countries by 70% in men and 74% in women by 2030. ^(4,5) For patients presenting with STEMI, the treatment priority for limiting MI size and preventing the onset of heart failure is timely restoration of coronary artery blood flow, which is best achieved by PPCI. However, across Africa, PPCI is not widely available, and most patients are treated using thrombolysis, which takes significantly longer to dissolve the clot, thus producing further death of cardiac muscle. Other factors contributing to worse outcomes in STEMI patients in Africa include: (i) inadequate access to hospital facilities, especially in rural areas, ⁽¹⁵⁾ (ii) increased prevalence of cardiovascular risk factors such as hypertension (up to 60% of patients) and diabetes (up to 40% of patients), which remains undiagnosed and untreated; ⁽¹⁵⁾ (iii) suboptimal use and compliance with secondary preventative therapy (e.g. anti-platelet therapy, beta-blockers, renin-angiotensin blockers and statins) for improving clinical outcomes post-STEMI, (iii) delayed presentation to hospital is common with 70% of patients presenting after six hours of chest pain onset, resulting in increased myocardial ischaemic times. ⁽¹⁶⁾ As such, clinical studies have reported high in-patient mortality rates in STEMI patients in developing countries in Africa, ranging from 15-21%. (15,16)

It is envisaged that the RIC-AFRICA study will facilitate new and improved research foundations and capacity across participating African sites, eliminating barriers, creating new research networks and partnerships with an underlying aim of Saving Lives from Heart Attacks in Africa.

[CLICK HERE for references](#)

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