EDITOR'S CHOICE

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# The Hub and Spoke model: Is it out of reach in South Africa?

Ischaemic heart disease, once thought to be uncommon in sub-Saharan Africa, is now the 8th leading cause of death among both men and women in the region.[1] In South Africa (SA), ischemic heart disease was one of the leading underlying natural causes of death in 2018, accounting for 13 598 deaths, which was 3.0% of all deaths.[2] It ranked as the 8th leading cause of death overall, and was more prevalent among males, ranking 9th among the leading causes of death for males, and 8th for females. The disease was among the top 10 leading causes of death in several provinces, including Western Cape, Northern Cape, KwaZulu-Natal, Gauteng, and Mpumalanga.[2] Data on deaths from acute coronary syndrome (ACS) in South Africa is limited, with a recent study from the Western Cape reporting a 30-day all-cause mortality rate of 6.1% for ACS patients in the region.[3]

In SA, thrombolytic therapy continues to be the main treatment for ST-elevation myocardial infarction (STEMI) due to the limited availability of percutaneous coronary intervention (PCI) in public health facilities, as well as for patients at private health facilities who cannot afford PCI.[4] There is a lack of sufficient data on the use of primary PCI in public health facilities across the country.[4] In this issue of the Journal a study by Beyers, et al. titled "Management and outcomes of patients with ST-segment elevation myocardial infarction in the Western Cape Province of South Africa", evaluated STEMI care within the Tygerberg Hospital (TBH) referral network in the Western Cape province of SA. The objectives included comparing the use of primary PCI vs. the pharmaco-invasive strategy, assessing mortality and ACS recurrence, and investigating reasons for not performing angiography or PCI. This retrospective analysis of STEMI data from the Tygerberg Registry of ACS (TRACS) included 292 patients admitted between April - December 2020. The pharmaco-invasive strategy was used in 65.1% of cases, while 18.5% received primary PCI. In-hospital mortality was 5.5%, and the 30-day mortality rate was 6.9%, with a 3.1% recurrence of ACS. They concluded that despite the healthcare challenges in SA, the pharmaco-invasive strategy, supported by a Hub-and-Spoke outreach model, produced outcomes comparable to those seen in international cohorts.

The study emphasises the importance of administering fibrinolytic therapy promptly at peripheral hospital or out of hospital facility (Spoke) before transferring patients to a PCI-capable centre (Hub). Although the mortality rate was lower in the primary PCI group (1.9%) compared to the pharmaco-invasive group (4.2%), most patients were in the pharmaco-invasive group (65.1%). Further, it was noted that the pharmaco-invasive group had lower mortality and ACS recurrence compared to the group that did not receive fibrinolysis or PCI (16%). The data highlights the importance of early thrombolysis in the SA setting. Meel, et al. and Tickley, et al. conducted similar prospective studies, a decade apart, at 2 large PCI-capable referral centres in Gauteng, focusing on STEMI patients and the time to thrombolysis.[4,5] Both studies concluded that an additional 30 - 32 lives per 1 000 could have been saved if all patients who received thrombolysis had been treated within the first hour. Tickley, et al. observed that half of the participants in their

study received thrombolysis, showing an improvement from the 37% reported by Meel, et al. a decade earlier. However, in both studies, the number of patients receiving thrombolysis within the first hour was extremely low, with only 2 patients in each study.[4,5]

The SA STEMI network conducted an observational study at private health facilities, revealing significant delays for patients needing interfacility transfers.[6] The study found that 70% of patients received reperfusion therapy at PCI-capable facilities, but only 34% received it when an interfacility transfer was necessary.

Stassen, et al. reported a total of 14 public PCI facilities in SA.[7] However, 3 provinces - North West, Northern Cape, and Limpopo - lack any PCI facilities in the public sector. As a result, thrombolysis remains the most commonly used treatment strategy for patients in the public health sector and will continue to be essential, as primary PCI requires a multidisciplinary team of skilled professionals, including an interventional cardiologist, radiographers, specialised nurses, a 24-hour PCI facility, and an efficient emergency medical service (EMS) system.[4] The pharmaco-invasive strategy facilitated by the Hub and Spoke outreach model has showed success in countries like India with resultant improved management of STEMI through a non-profit organisation, STEMI India.[8] Beyers, et al. implemented a similar model in the public health sector with positive results in the Western Cape province of South Africa. However, the question remains whether this model can be replicated in more disadvantaged provinces, which face numerous challenges. These challenges include delays in administering thrombolysis and the absence of PCI facilities in the public sector, further exacerbated by inadequate infrastructure. While South Africa's road network ranks as the 10th longest globally, many of its roads are in poor condition.[9] In the Indian Hub and Spoke model, the government financed the services, while the overall operation was managed by a private organisation.[8]

Data on the challenges in managing STEMI patients has been published by various groups in South Africa for over a decade.[3,4,5,6,7,8,10] It is now time for the government to recognise and address these reported issues by supporting and collaborating with groups such as the SA STEMI network in the development of region-specific Hub and Spoke models. STEMI care can only improve through close public and private partnership as exemplified from STEMI projects in low to middle income countries such as India, China, and Mexico.[8]

**Conflict of interest: none declared.**

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