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STEMI Care in LMIC – Obstacles and Opportunities

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Over the past few decades, there has been an intense focus on improving health systems in developed countries, with a particular focus on cardiovascular disease (CVD). However, low- and middle-income countries (LMICs) with their rapid economic growth, increasingly sedentary lifestyles, and calorie-rich diets now are experiencing a growing burden of CVD. In India, for example, CVD already accounts for more than a fourth of all deaths over age 25 years.[1]

ST-elevation myocardial infarction (STEMI) - the common presentation of acute myocardial infarction (AMI) in many LMICs - presents a particular challenge for these countries. In India, STEMI accounts for more than 60% of AMI hospitalizations.[2] In China the number of patients with STEMI quadrupled over the past decade and accounts for 80% of AMI hospitalizations.[3–4]

STEMI care requires timely intervention and coordination of systems and people, but there are distinctive challenges to implementing effective systems in resource-poor settings; it is not possible to simply transport successful strategies from more economically advanced countries. These challenges include inadequate emergency medical services (EMS),[5] a paucity of specialists[6], inadequate access to percutaneous coronary intervention (PCI)-capable facilities, which are largely limited to cities,[7] and perhaps most importantly, a large number of patients who cannot afford vital treatments. These structural issues, among others, conspire against the delivery of rapid and effective care for patients with STEMI.

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India is a prototypical country that experiences these challenges. Patients with STEMI in India take a median of 300 minutes to reach a hospital, far longer than in the West, with only 5% of patients arriving via ambulance. Ultimately only two-thirds receive reperfusion therapy – and only 8% of patients with STEMI are able to receive PCI.[2]

Addressing these aspects, in this issue Alexander and colleagues describe a hub-and-spoke model for STEMI care in India combining two strategies: 1) primary PCI for patients in the vicinity of a PCI-capable facility, or 2) a pharmacoinvasive strategy for those with long transit times to a PCI-capable facility, where patients would first receive fibrinolytic therapy followed by PCI within 3–24 hours.[8] This model was successfully implemented in a pilot program in 4 clusters in the state of Tamil Nadu, India by the authors, in itself a laudable achievement. The program was able to increase the receipt of pharmacoinvasive therapy among patients presenting to spoke hospitals from 13% to 58%. Their model seeks to overcome several challenges by forging a unified STEMI network with the involvement of leading physician societies, state governments, ambulance agencies and hospitals. However, as the authors note, universal health insurance is critical for the success of such a STEMI program at a national level.

India is heavily reliant on the private sector for health care, where payments are almost entirely out-of-pocket.[9] Three quarters of patients with acute coronary syndrome in India pay the expenses on their own.[2] The cost of PCI with a drug-eluting stent at a private hospital can cost more than \$2000,[10] which is higher than the per capita income in India. [11] Given that 75% of patients with STEMI are from either poor or low-middle income families,[2] STEMI can be financially devastating. It is this fear that prevents many patients from seeking care, and even if they do present seeking acute care, poor patients face disparities in the provision of life saving therapies; rates of PCI are 7 times lower among poor patients compared with the affluent.[2] Another single-center study reported that 50% of the door-to-balloon time was spent in sorting out the financial process, which demonstrates the enormity of this problem.[12] Given cost constraints, poor patients frequently present to government hospitals where care is provided at a nominal charge; yet, except in large cities, care at government hospitals is often substandard due to deficient infrastructure and manpower.[9]

In an ideal world, the choice between primary PCI versus fibrinolytic therapy would be influenced by the transit time; in reality, the cost of PCI is prohibitive for a majority of patients. In their pilot study the authors leveraged the social insurance system available in the state of Tamil Nadu, but given that universal health care in India is not on the immediate horizon, fibrinolytic therapy alone may be the only viable reperfusion strategy for most patients. However, as with PCI, the benefit conferred by fibrinolytic therapy declines rapidly with time since symptom onset, and timely transport to the hospital remains vital. Investments to develop an organized EMS system with rapid identification and transport can pay immediate dividends and ensure that millions receive timely reperfusion therapy. At the same time, parallel efforts must be made to improve awareness regarding cardiac disease and the importance of seeking timely care.

In another article in this issue, Gupta et al. present results of the implementation of an eICU system on STEMI care at a single hospital.[13] The intervention resulted in a dramatic increase in administration of fibrinolytic therapy from 50% to 100% and reductions in mean door-to-needle time from 3 hours to <30 minutes, which translated to a 70% reduction in mortality. These findings highlight how provision of specialist supervision from a remote location can elevate care at facilities lacking such expertise. These findings are especially pertinent to a setting like India where the quality of care and the expertise available at hospitals is highly variable. However, this also makes one wonder about what truly is the level of expertise and training required to identify patients appropriately and deliver fibrinolytic therapy. Given the adverse doctor-patient ratio in India,[1] in the face of the ever-growing burden of STEMI, it is imperative that every physician regardless of training be able to identify and treat patients with STEMI, including the delivery of fibrinolytic therapy.

Nationalized programs have successfully reduced morbidity from infectious diseases like tuberculosis and malaria in India. These programs incorporate training and support for physicians and other health care professionals, and in addition provide clear guidelines for identifying and treating patients suffering from these illnesses. Given that coronary artery disease and STEMI is the next epidemic in India, it calls for a similar nationalized program, which apart from providing guidelines tailored for different health care settings, incorporates training of health care professionals such that even physicians working in small hospitals without a cardiologist on-call are able to identify appropriate patients and deliver fibrinolytic therapy.

It is commendable that these studies are beginning to develop systems of care to confront the STEMI epidemic, but there are fundamental problems in infrastructure and cost underlying the effective treatment of patients with STEMI that need to be addressed. These problems apply not just to India, but to other LMICs that similarly face a greater burden of CVD and STEMI. Although these obstacles are many, they are not insurmountable. Ultimately, the solutions need to be attentive to the unique restrictions and challenges present in India and other LMICs in order to try to achieve the same results after investments in improving systems as in the West.

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Biographies



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Harlan Krumholz is the Harold H. Hines, Jr. Professor of Medicine at Yale University School of Medicine. His research focuses on improving patient outcomes, health system performance and population health. His work has had wide ranging impact on health care delivery, shifting paradigms of clinical care, and increasing the accountability of the health care system through the application of targeted measurements, incentives, and improvement strategies. Some of the accomplishments include reductions in delays associated with lifesaving heart attack care, increases in the use of guideline-endorsed treatments of patients requiring acute and chronic care, identification and elimination of wasteful health care practices, and improvements in the outcomes of patients recently discharged from the hospital. His work with health care companies has led to new models of transparency and data sharing. His work with the U.S. government has led to the development of a portfolio of national, publicly reported measures of hospital performance.