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Original Article

Confronting system barriers for ST- elevation MI in low and middle income countries with a focus on India

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ABSTRACT

Our previous research found seven specific factors that cause system delays in ST-elevation Myocardial infarction management in developing countries. These delays, in conjunction with a lack of organized STEMI systems of care, result in inefficient processes to treat AMI in developing countries.

In our present opinion paper, we have specifically explored the three most pertinent causes that afflict the seven specific factors responsible for system delays.

In doing so, we incorporated a unique strategy of global STEMI expertise. With this methodology, the recommendations were provided by expert Indian cardiologist and final guidelines were drafted after comprehensive discussions by the entire group of submitting authors.

We expect these recommendations to be utilitarian in improving STEMI care in developing countries.

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1. Introduction

The barriers for ST- elevation myocardial infarction (STEMI) systems in low and middle-income countries are markedly different than the traditional challenges to STEMI care in developed countries.¹ Low and middle-income countries, such as India, are stymied by late presentation and lack of STEMI systems of care.¹ Ambulance care is either insufficient, or absent

altogether. In addition, there are manifest financial, infrastructures and logistic constraints.¹ Comprehension of these significant challenges is paramount before designing STEMI programs in developing countries.

Fig. 1 summarizes the present and future challenges to STEMI interventions in developed countries, such as in the United States and in European nations.^{2–7} To confront these challenges, STEMI networks have been fastidiously created in individual communities. Legislative mandates require a STEMI patient to be taken to a PCI-capable institution rather than to the nearest hospital. As a construct of STEMI networks, hospitals have been designated as either a PCI-capable or PCI non-capable facility.^{6,7} Sophisticated

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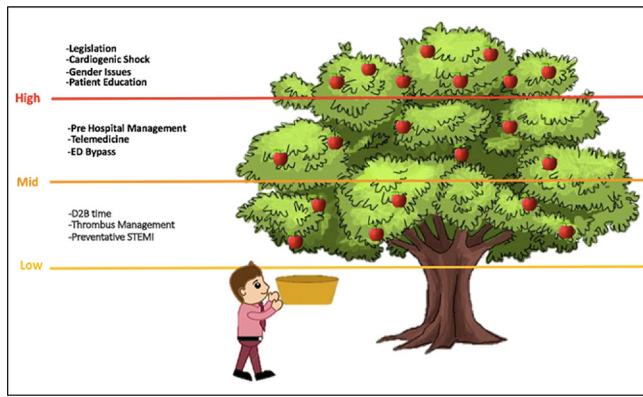


Fig. 1. Challenges in STEMI Care in Developed Countries.

ambulance networks exist and duration from chest pain to seeking care are declining (recently as low as 47 min in parts of New York State).^{6,7} Strict STEMI (24 h/7 day a week) on-call schedules and availability are required at each PCI facility and single page activation is increasingly common. Prehospital management has been improving, including ED bypass. Teamwork is encouraged and stakeholder support is constantly expanded. ACC/AHA STEMI guidelines are rigorously implemented and Mission Lifeline and STENT for Life quality initiatives exist at most hospitals.^{6,7} Feedback and quality assurance, critical to the success of STEMI initiatives, are routinely practiced. As a result of the above measures, the majority of STEMI patients have D2B times <90 min.^{7,8} These process advances are matched by procedural improvements including appropriate thrombus management, use of drug-eluting stents and optimal pharmacological therapy.

Despite these remarkable achievements that have contributed to decreasing morbidity and mortality from STEMI, systems in USA and Europe cannot be considered as being perfect.^{3,6} Challenges still exist – notable barriers in 2017 include gender disparities, delays in transfer from a non-PCI capable hospital, in-house STEMI, cardiac arrest and cardiogenic shock.^{5,9,10}

While reviewing the progress of STEMI care in developed countries, two important lessons can be gained by healthcare providers in low and middle-income countries:

- a Progress in USA and Europe did not occur overnight. It was a result of steadfast determination, focused directives from Cardiology Societies and Working Groups which resulted in step-by-step and incremental system improvements.
- b A fastidious “can do” attitude that permeated the mindset of each stakeholder and that contributed to steady progress, a systematic deconstruct of chaos and systems improvement.

In “Reducing System Delays in Treatment of ST Elevation Myocardial Infarction and Confronting the Challenges of Late Presentation in Low and Middle Income Countries”, Mehta et al. described seven specific system constraints in STEMI in low and middle income countries.^{1,11,12} These hurdles were comprehensively reviewed in a “Making a Difference Session” at the Lumen Global XVI Annual Scientific Meeting conducted in Jaipur, Rajasthan, on February 25–26th 2017. The deliberations during this remarkable session have been incorporated into Table 1.

2. Discussion

Based upon our previous research, we have focused on the following seven process constraints for STEMI interventions in low and middle-income countries, in particular, in India. These factors include – Patient Education, Lack of Insurance, Ambulance Deficits, Hospital-related Issues, Technology Gaps, Physician Issues and System Chaos, depicted in Fig. 2. Certainly there are additional system limitations, in particular, unique elements relevant in individual countries. However, we believe the factors above play a major role. It is for this precise reason that we have focused on these seven factors.¹

To investigate the impact of these factors and to find implementable solutions, a Lumen Foundation Task Force was created. This group comprised of an adept panel of global experts who collaborated on this research. These experienced cardiologists have vast experience in creating efficient models of population-

Table 1
Barriers and Solutions for Low and Middle Income Countries.

	Solution 1	Solution 2	Solution 3
Patient Education	Multi-pronged approach to educate; both cardiologist and family physician should provide unified strategy with clear delineation of care responsibilities	Effective communication tools to educate about warning symptoms and early diagnosis and treatment	Foster trust with patient and family
Lack of Insurance	Government sponsored insurance bundling all the costs of STEMI including transportation	Adequate coverage, including pre-existing disease and cashless facility (for more affording)	Awareness and education about treatment costs and importance of insurance (for all)
Ambulance Deficits	Approach private and public ambulance systems individually	Have strategic plan at each PCI center regarding ambulance system; continue to improve their reliability and efficiency	Essential components in both public and private ambulance systems include Telemetry monitoring and paramedic training?Prehospital EKG
Hospital related Issues	Data: If you don't measure, you cannot improve.	Stakeholders: develop trusting relationships with stakeholders; share progress, advances and challenges.	Feedback and Education: Disseminate STEMI management and its vital contribution to the community and to society
Technology Gaps	Making available high definition but low cost ECG machines at first medical contact	Tele-transportation of data from point of first contact to higher center	Organization of systems for first medical contact down to Cath-lab systems that work
Physician Issues	Empower the General Physician	Overcome financial disincentives or create financial incentives	24/7 Cath lab availability
Simply Chaos	ECG analysis program and continued training	Better penetration of benefit schemes	Bypassing hurdles at tertiary care & technology development

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