

Global Challenges and Solutions



Role of Telemedicine in ST-Elevation Myocardial Infarction Interventions

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KEYWORDS

• Telemedicine • Primary PCI • Thrombolysis • Pharmaco-invasive • Door-to-balloon time • LATIN

KEY POINTS

- Primary percutaneous coronary intervention (PCI) is the most effective technique to treat acute myocardial infarction.
- Access to primary PCI is restricted in developing countries.
- Telemedicine greatly facilitates access of primary PCI to vast populations.

INTRODUCTION

Primary percutaneous coronary intervention (PCI) has revolutionized the management of acute myocardial infarction (AMI). Although thrombolysis is still the mainstay of treatment in various parts of the world, primary PCI is vastly superior. Scientific guidelines^{1,2} maintain a class I indication for treating AMI with primary PCI if performed in a timely manner by an experienced provider.³ To mandate the urgency in performing primary PCI, parameters of door-to-balloon (D2B) times have been added.⁴ Short D2B times (<90 minutes) are desirable, although this recommendation is not universal.

In developing countries, lack of infrastructure, insurance, facilities, and skilled providers greatly hamper the use of primary PCI. For example, in the entire continent of South America, less than 8% of the population has access to cardiac catheterization laboratories. In parts of Africa and some Asian countries, the situation is

similarly abysmal. In these developing parts of the world, thrombolysis, often with Streptokinase, is still the predominant modality. Other developing countries predominantly use a pharmaco-invasive approach. This strategy clearly has numerous advantages: a patient with AMI receives urgent thrombolysis and is then transported for possible PCI. In sharp contrast, in various developed countries, there is a comprehensive utilization of primary PCI for an entire population.^{5–8} These advanced countries use regional systems of care to optimize timeliness of reperfusion therapy.^{9–11} Pre-hospital management is the norm and considerable reduction in morbidity and mortality has been achieved.^{12–16}

The disparities of care between developed and developing countries for the management of AMI represent one of the largest global challenges in ST-elevation myocardial infarction (STEMI) interventions.

Conflicts of Interest: None.

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Telemedicine appears an effective modality for significantly increasing access for millions of patients to appropriate STEMI care.^{17,18} Remotely located experts guide accurate interpretation of the electrocardiogram (ECG) and enable teleconsultation of the patient with STEMI.¹⁹⁻²¹ A comprehensive utilization of thrombolysis, pharmaco-invasive management, and primary PCI is possible with the use of telemedicine.^{17,18} Reduction of D2B times and improvement in STEMI outcomes have been demonstrated.^{20,22-24} Telemedicine may also be cost-effective, in particular, when it facilitates prehospital triage.²⁵⁻²⁷

In this article, we discuss the various advantages of using telemedicine and our experience of using this technology to improve populated-based STEMI care in developing countries.

We tested the hypothesis that telemedicine has 4 distinct advantages in STEMI interventions.^{17,18} These included (1) increased accuracy, (2) increased access, (3) guidance of comprehensive STEMI management, and (4) increased cost-effectiveness.

AMI is unique in that its diagnosis can be instantaneously made on accurate interpretation of the presenting ECG. This accuracy can be augmented by a quick clinical evaluation. In the rapid STEMI evaluation, confirmation with cardiac biomarkers is often not required. Still, there are discrepancies in the accurate interpretation of the ECG. Fig. 1 is a graphic illustration of this disparity. The accuracy of ECG in diagnosing

STEMI dramatically increases between small clinics to tertiary cardiac centers. These remarkable characteristics of ECG interpretation make the use of telemedicine an exceptional modality for treating STEMI interventions. The remote cardiologist significantly augments the accuracy of ECG interpretation and STEMI diagnosis. This particular observation makes telemedicine a pragmatic and cost-effective strategy. In our experience with the Latin America Telemedicine Infarct Network (LATIN), the accuracy of ECG interpretation increased from less than 50% in small referral clinics to greater than 95% when interpreted by a remotely located, expert cardiologist. The increased accuracy is complemented by an ability to teleconsult the STEMI process as depicted in Fig. 2. With this methodology, the expert cardiologist navigates the patient with STEMI to a more scientific and pragmatic management.

There are numerous known methods to conduct the ECG analysis. These include transtelephonic, fax, and wireless transmission. Table 1 compares these modalities with telemedicine and it illustrates the relative merits of telemedicine. Numerous telemedicine protocols^{17,18,21} have been used to obtain remote consultation. We have used an integrated software platform to reliably transmit ECGs and safeguard patient privacy (Fig. 3). Often, an argument is advanced that simple and inexpensive mobile phone transmission (with applications such as WhatsApp) are comparable to using a

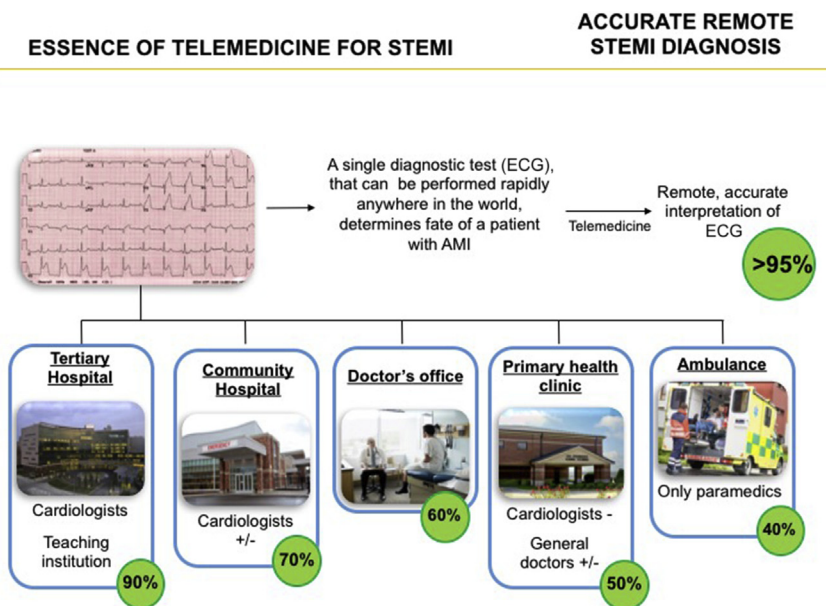


Fig. 1. Essence of telemedicine for STEMI interventions.

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