

Lessons Learned from the Ottawa Regional STEMI Program

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KEYWORDS

• STEMI • Primary angioplasty • Pharmacoinvasive strategy • Acute myocardial infarction

KEY POINTS

- Availability of a prehospital ECG is critical for early identification of ST-segment elevation myocardial infarction (STEMI) patients.
- Trained paramedics can identify STEMI patients in the field and directly transfer these patients to a percutaneous coronary intervention (PCI)-capable hospital for primary PCI. This process shortens the door-to-balloon time.
- Empowering emergency medicine physicians to activate the code STEMI without consultation with a cardiologist is required when patients are transferred from non-PCI-capable hospitals to a PCI center.
- Incorporating a pharmacoinvasive strategy for community hospitals in which transfer for primary PCI is not an option improves clinical outcomes.
- Standardization is the key to a successful STEMI program: it allows the process to move more quickly and more efficiently. It reduces the likelihood of errors in the medication prescribed to patients and leads to faster reperfusion.

Primary PCI has become the dominant strategy for the treatment of STEMI when rapid access to a catheterization facility is available. In communities where primary PCI is not feasible, a pharmacoinvasive strategy has become a recommended option. At the University of Ottawa Heart Institute (UOHI), a care delivery model has been developed in which primary PCI and pharmacoinvasive strategies are applied for an entire region. This article reviews the lessons learned in setting up and maintaining a regional STEMI program.

USING EVIDENCE-BASED MEDICINE TO OBTAIN CONSENSUS

In the province of Ontario, Canada, the government has created 14 local health integration networks

(LHINs) to plan, integrate, and fund local health services in each region. The UOHI is a tertiary cardiac center located in the city of Ottawa. The UOHI works in collaboration with 16 other hospitals within the Champlain LHIN for the purposes of delivering cardiac care to a geographic area of approximately 1.2 million people. All of the region's cardiac catheterization laboratories are located at this designated cardiac center. Within the context of the LHIN, a care delivery model has been developed to improve access to this specialized cardiac center to ensure timely reperfusion for patients with STEMI. The model uses systematic primary PCI for patients within the metropolitan area and a pharmacoinvasive approach for patients presenting to community hospitals outside the metropolitan area. This regional model was an outgrowth of

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a citywide STEMI program, because primary PCI became the standard of care in May of 2005 for the city of Ottawa.

In 2003, 2 landmark studies^{1,2} that compared primary PCI to fibrinolysis established primary PCI as the dominant strategy because it reduces important clinical events, such as death, stroke, and reinfarction. Also, at the UOHI, compared with fibrinolytic therapy, primary PCI was shown a cost-saving strategy.³ The combination of clinical efficiency and cost savings of primary PCI compared with fibrinolysis became a valuable argument in convincing hospital administrators of the need for change.

Before July 2004, patients presenting with STEMI within the UOHI region were managed on a case-by-case basis, because there was no existing program defining the standards of practice. Fibrinolytic therapy was by far the dominant strategy for managing STEMI patients in non-PCI-capable hospitals. Patients who presented to a non-PCI-capable hospital were immediately transferred to the PCI center only if the administration of fibrinolytic therapy was contraindicated. They likewise were transferred if rescue PCI were required because of failed fibrinolytic therapy or if they were enrolled in a clinical trial that mandated immediate transfer. The usual practice was for an emergency medicine physician to consult with the on-site hospital cardiologist. If there was a need to transfer a patient to the PCI center, it was also the practice to discuss the case with the receiving interventionalist, who authorized the transfer and alert the catheterization team. Finally, a significant proportion of patients did not receive any reperfusion therapy because of relative contraindications to fibrinolytic therapy (such as advanced age or prior stroke) and because access to primary PCI was limited. STEMI patients visiting Ottawa emergency departments between 2002 and 2004—prior to initiation of the STEMI program—experienced a 10% mortality rate, representing an increase over previous years.

In January 2004, recruitment was completed in the CAPITAL AMI study.⁴ The results of this trial subsequently showed that a pharmacoinvasive strategy was better than a fibrinolysis-alone approach. In hindsight, this fibrinolytic-based trial paved the way for the early deployment of the STEMI system. The CAPITAL AMI design led to developing transfer protocols between the city hospitals because patients who were assigned to the tenecteplase-facilitated PCI arm required immediate transfer from the local emergency department to the PCI center. In addition, the study fostered a good relationship with the Ottawa Base Hospital and the Ottawa Paramedic Service. This

strong working relationship with the emergency medical service (EMS) led to a collaborative effort to evaluate the ability of paramedics to interpret ECG in the field.

With the timely completion of the CAPITAL AMI trial, evidence provided by the DANAMI-2 trial¹ and Keeley and colleagues' quantitative review of 23 randomized trials,² we became convinced that primary PCI should become the dominant reperfusion strategy for management of STEMI within the city boundaries and that a pharmacoinvasive strategy should be applied to community hospitals within our region where rapid transfer for primary PCI is not be possible.

The first step in developing a STEMI program, the goal of which is improved survival outcomes, was to obtain a general consensus among all stakeholders that primary PCI should become the dominant strategy for the entire city.

A general meeting was organized in spring 2004 and the directors of the local emergency departments and representatives of the Base Hospital and EMS, as well as cardiologists, nurse coordinators, and the chief executive officers of each hospital, were invited. As part of the initial agenda, the evidence supporting primary PCI over fibrinolytic therapy was reviewed, emphasizing the better survival outcomes with primary PCI and the relevance to survival advantage of short door-to-balloon times. STEMI is a medical emergency in which minutes to reperfusion strongly correlate with survival, and delays in door-to-balloon times are associated with increased mortality.⁵⁻⁷ Each 30 minutes of added delay increases the relative risk of 1-year mortality by 7.5%.⁷ The 2004 American College of Cardiology (ACC)/American Heart Association (AHA) guidelines strongly recommended that a door-to-balloon time of less than 90 minutes be achieved in patients managed with primary PCI. The use of evidence-based medicine gave credibility to the task, and the logistic steps to make the STEMI system work followed.

There was a need to change the fundamental approach to STEMI management, and this required a complete re-engineering of the protocols and pathways for delivering STEMI care. From the beginning, the project required the development of new ambulance transport protocols and changes to physician referral patterns. Because the paramedics were successfully trained at interpreting the ECG in STEMI patients, it was agreed that the first phase of the program would feature a paramedic-referred pathway (ie, prehospital triage). The Ontario Ambulance Act stipulates that, unless otherwise directed by a communications officer, the ambulance driver should transport patients to the closest medical facility that can provide the

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