Contemporary Clinical Trials Communications 10 (2018) 105–110

Contents lists available at ScienceDirect

Contemporary Clinical Trials Communications

journal homepage: www.elsevier.com/locate/conctc

Implementing a STEMI system of care in urban Bangalore: Rationale and Study Design for heart rescue India

Aruna Ramesh[a], Kenneth A. LaBresh[b,*], Rhea Begeman[c], Bentley Bobrow[d], Teri Campbell[c], Nayanjeet Chaudhury[e], Marcia Edison[c], Timothy B. Erickson[f], John D. Manning[g], Bellur S. Prabhakar[c], Pavitra Kotini-Shah[c], Naresh Shetty[b], Pamela A. Williams[b], Terry Vanden Hoek[c]

[a] M.S. Ramiah Medical College, MSR Nagar, MSRIT Post Bengaluru 56004, India
[b] RTI International, Research Triangle Park, NC, USA, 3040 Cornwallis Rd Research Triangle Park, NC 27709, USA
[c] University of Illinois at Chicago Department of Emergency Medicine and Center for Global Health, 1940 Taylor M/C 584, Chicago, IL, USA
[d] University of Arizona Department of Emergency Medicine, 1609 N. Warren Ave., Room 118, PO Box 245057, Tucson, AZ 85724-5057, USA
[e] Medtronic Philanthropy, Delhi, India
[f] Brigham and Woman's Hospital, Harvard Medical School, Harvard Humanitarian Initiative, 75 Francis St, Boston, MA 02115 USA
[g] Carolinas HealthCare System, Charlotte, NC, USA

ARTICLE INFO

Keywords:
STEMI
Quality improvement
Angioplasty
Thrombolysis

ABSTRACT

Background: A system of care designed to measure and improve process measures such as symptom recognition, emergency response, and hospital care has the potential to reduce mortality and improve quality of life for patients with ST-elevation myocardial infarction (STEMI).

Objective: To document the methodology and rationale for the implementation and impact measurement of the Heart Rescue India project on STEMI morbidity and mortality in Bangalore, India.

Study Design: A hub and spoke STEMI system of care comprised of two interventional, hub hospitals and five spoke hospitals will build and deploy a dedicated emergency response and transport system covering a 10 Km. radius area of Bangalore, India. High risk patients will receive a dedicated emergency response number to call for symptoms of heart attack. A dedicated operations center will use geo-tracking strategies to optimize response times including first responder motor scooter transport, equipped with ECG machines to transmit ECG's for immediate interpretation and optimal triage. At the same time, a dedicated ambulance will be deployed for transport of appropriate STEMI patients to a hub hospital while non-STEMI patients will be transported to spoke hospitals. To enhance patient recognition and initiation of therapy, school children will be trained in basic CPR and signs and symptom of chest pain. Hub hospitals will refine their emergency department and cardiac catheterization laboratory protocols using continuous quality improvement techniques to minimize treatment delays. Prior to hospital discharge, secondary prevention measures will be initiated to enhance long-term patient outcomes.

1. Introduction

Cardiovascular disease (CVD) is now the leading cause of morbidity and mortality worldwide [1]. In India, CVD is the leading cause of death, approaching 4–5 million deaths annually; a rate that has doubled over the past two decades. By 2020, 2.6 million Indians are predicted to die due to coronary artery disease (CAD), which constitutes 54% of all CVD deaths [2]. In addition, by 2020, nearly 60% of patients with cardiovascular disease worldwide will be of Indian descent as Indians have a higher genetic predisposition for and earlier risk of CVDs than other global ethnicities [3,4].

The increase in acute ST-elevation myocardial infarction (STEMI and mortality in India is an expanding public health problem. The Heart Rescue India Project addresses this by using a system of care improvement approach shown to improve outcomes in other CVD conditions [5–7]. This approach includes enhancing patient recognition and

* Corresponding author. 61 Skyline Dr., Hinsdale, MA 01235. USA.
E-mail addresses: arunacr2@gmail.com (A. Ramesh), klabesh@rti.org (K.A. LaBresh), Bentley.Bobrow@azdhs.gov (B. Bobrow), nayanjeet.chaudhury@medtronic.com (N. Chaudhury), marciae@uic.edu (M. Edison), timothybericksen@gmail.com (T.B. Erickson), john.d.manning@gmail.com (J.D. Manning), bprabhak@uic.edu (B.S. Prabhakar), pkotini@gmail.com (P. Kotini-Shah), pamwilliams@rti.org (P.A. Williams), tvh@uic.edu (T. Vanden Hoek).

https://doi.org/10.1016/j.conctc.2018.04.002
Received 5 January 2018; Received in revised form 29 March 2018; Accepted 4 April 2018
Available online 05 April 2018

timely response to symptoms, improving acute treatment, and initiating secondary prevention therapies prior to hospital discharge. In this context, prehospital delay remains a major hurdle in the institution of early reperfusion therapy, which is crucial in salvaging 'at-risk' myocardium and reducing adverse cardiovascular events following STEMI and has not been well addressed in prior studies [8]. Low public awareness, inadequate emergency transportation infrastructure, and the lack of a coordinated Emergency Medical Services (EMS) system are major contributors to problem [9]. Despite efforts aimed at reducing the prehospital time and treatment delay, a considerable proportion of patients with STEMI present late and receive delayed or no reperfusion therapy. Prehospital delay in India is also associated with difficulty in arranging financial means to cover medical costs, place of symptom onset, symptom interpretation, and mode of transportation [10].

Primary percutaneous coronary intervention (PCI) is the current standard of care for acute ST elevation myocardial infarction. Although most of the data on primary PCI in acute STEMI is from western countries, a recent study describes the outcomes of primary PCI for acute STEMI at a tertiary care center in Northern India [11]. Primary PCI was associated with high success rate, low mortality in non-shock patients, and low complication rates.

The goal of HRI is to adapt tested strategies of working systems of care from the United States to build a replicable sustainable model of STEMI care in a defined 10 km radius geographical area in Bangalore, India. This project aims to demonstrate improved outcome in patients diagnosed with STEMI through a multi hospital integrated Hub & Spoke model of STEMI care. This will be accomplished by creating a novel, dedicated prehospital emergency response program which includes prehospital diagnosis and transport to appropriate hospitals capable of providing timely revascularization, and post-acute treatment preventive care to improve patient outcomes and reduce the likelihood of STEMI recurrence (Table 1).

Table 1
Critical elements for prehospital response to STEMI and related cardiac arrest.

1. Hub and Spoke model of care with a pharmacoinvasive strategy using a tiered response system with first responder motor scooters complemented ambulance response for stabilization and transport.
2. Registration process to identify at-risk patients with the use of hospital help desks and a school program to reach potential patients via their children.
3. Initialization of secondary prevention prior to discharge with primary care provider CME programs to enhance continued prevention therapies and behavior change with opportunities for continued engagement of these high risk and post MI patients through texting, calls, and community events.
4. Electronic data collection and process communication via a unique online system for coordination of emergency response, and data collection and continuous feedback to monitor and improve STEMI care.
5. Coordinated emergency response, equipment and personnel from both private and government systems used in a coordinated system.

2. Methods

2.1. Professional engagement

A professional advisory group has been constituted to share expertise and experience in formulating process recommendations for the conduct of Heart Rescue India (HRI) program, provide ongoing feedback on the conduct of HRI and serve as a vehicle to inform policy makers and the cardiology community in India about the progress and findings from the program. The advisory group is composed of prominent cardiologists, cardiac surgeons, and emergency room physicians from across India involved in both private and government healthcare facilities. In addition, there are representatives from health and family welfare, the government of Karnataka Community Services Groups, Road Transport Department, secondary high school principals, Civil Defense, Home Guards, Red Cross Society, and other non-governmental organizations.

2.2. Patient engagement

Help desks in each of the hub and spoke hospitals will be used to screen, identify, and engage patients at risk for CVD in the HRI catchment area communities, educate them on the signs and symptoms of acute CVD. Help desk staff will teach patients how to access the HRI system of care and motivate them to call the toll-free emergency phone number when they or someone they witness is experiencing symptoms of STEMI. The focus will be on high-risk patients because the information will be more personally relevant and engaging for them since they are more likely to develop heart attack symptoms.

Knowing that simply raising awareness does not necessarily lead to behavior change [12–14], the HRI Program will incorporate formative research (e.g., focus groups) with patients into the development of our education strategies. Patients in the catchment area face several barriers beyond lack of awareness that may prevent behavior change (i.e., calling the toll-free number), such as lack of confidence in emergency medical service response time or the quality of care, and fears about financial burdens that emergency medical services and medical treatment might mean for the family. Formative research will help us develop a better understanding of what educational message(s) and modalities who will motivate them, what influences them, and how they like to receive information, and learn more about the context surrounding patient response to symptom onset so that we can develop more effective messages which can lead to reduction in delays in seeking treatment.

2.3. Engaging school children

One important lesson learned during the implementation of HRI was the impact that children can have in helping their parents recognize the need for cardiac care. As a result, Heart Rescue India (HRI) includes school children in its plans for community engagement by forming a task force of local physicians, teachers and principals. Goals for the program include education to identify CVD risk factors, recognize signs and symptoms of acute CVD and understand when and how to call for help. Students will also be trained in cardiopulmonary resuscitation (CPR) and the use of an automatic external defibrillator (AED). After completing the program, they will be asked to educate their parents by bringing the emergency phone number home, and encourage their parents to enroll in the HRI system and call the HRI emergency phone number if they develop heart attack symptoms.

2.4. Prehospital response

As noted above, delay in treatment of STEMI is a major contributor to morbidity and mortality [15]. Though several factors contribute to prehospital delay, two critical factors are patient's delay in seeking help and transportation delay. In the HRI catchment area, we will increase awareness of heart attack symptoms by organizing community educational outreach events In addition, we will reach higher risk patients through the use of “help desks”, manned by volunteers, at the two hub and seven spoke hospitals involved in this project. These high-risk patients, identified through simple World Health Organization (WHO) cardiovascular risk score screenings, will be targeted for continued text messaging and other communication vehicles to reinforce our messaging over time, since heart attack symptoms may develop over the months and years following their initial educational opportunities.

To reduce prehospital delays in the heavy traffic of Bangalore, Motor scooters will be used to transport a first responder nurse or paramedic who will assess and stabilize the patient, perform and transmit an ECG to the MS Ramaiah command center. If there is evidence of STEMI, the cardiac catheterization laboratory personnel will be activated at the nearest available hub hospital. At the same time an ambulance will be dispatched to transport the patient to the hospital for urgent PCI.