HeartRescue Global

Policy Brief

STEMI: ST-segment elevation myocardial infarction

HeartRescue Global

MEDTRONIC FOUNDATION

RTI INTERNATIONAL

STEMI, or ST Segment Elevation Myocardial Infarction, is one form of cardiovascular disease (CVD) and is an enormous worldwide public health problem. For decades, STEMI has been a significant health problem in high-income countries, but now it has become an increasingly significant medical, social, and financial problem in low- and middle-income countries.

CVD
is a leading cause of mortality worldwide

32% of all global mortality, or about
18 MILLION DEATHS ANNUALLY
are caused by CVD

CVD is responsible for
2x
as many deaths as these three combined

HIV | malaria | tuberculosis

30-45%
of all heart attacks are caused by STEMI

1 out of 10 patients with STEMI dies with 24 hours

MANY STEMI SURVIVORS SUFFER LONG-TERM ILLNESSES AFTERWARDS,
SUCH AS HEART FAILURE

STEMI
and other ischemic heart diseases account for
9 MILLION
DEATHS EACH YEAR

STEMI and other CVD's are costly

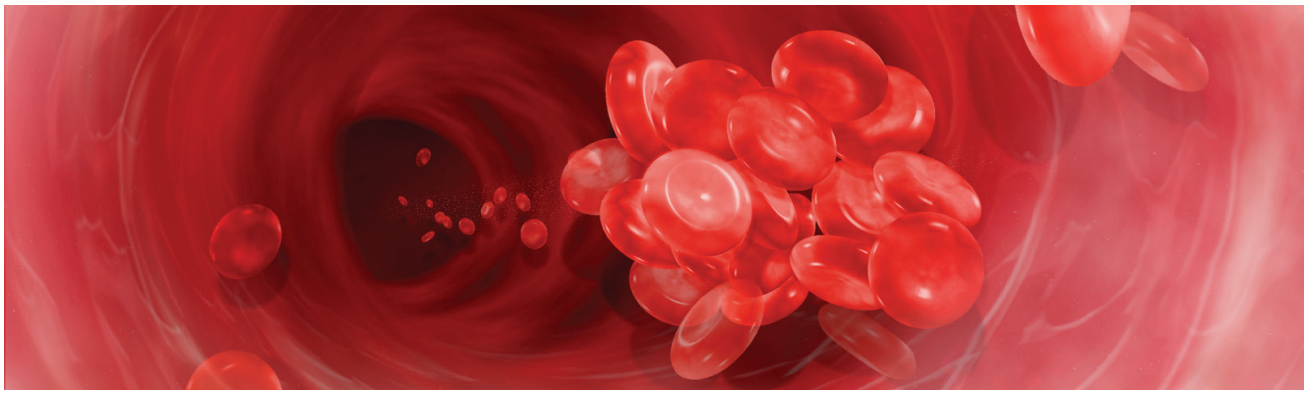
In 2006

$75 BILLION+
IN TOTAL COSTS

$142 BILLION
IN INDIRECT COSTS

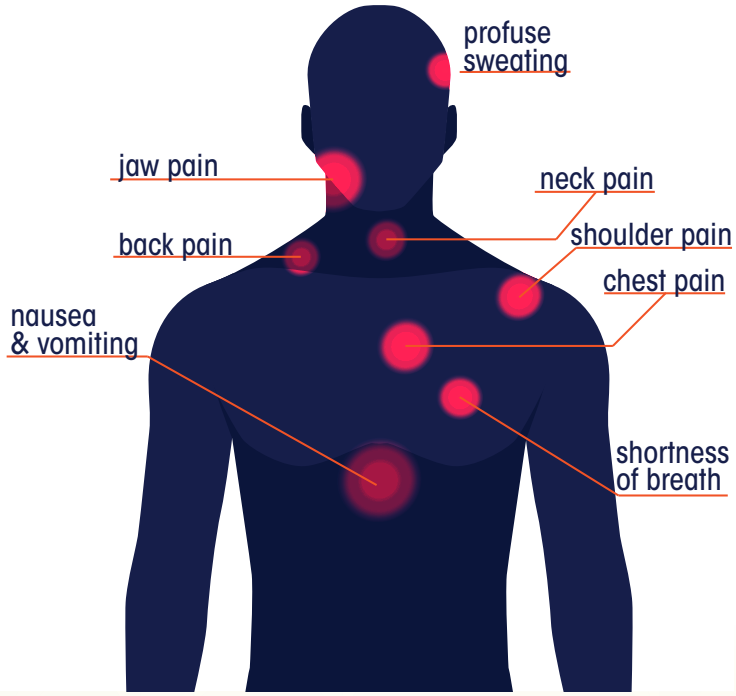
Timely treatment of STEMI is associated with significantly improved survival and other patient outcomes, and reduced costs. However, large socioeconomic, racial, and gender disparities in access to STEMI care and time to effective care exist worldwide.

WHAT IS STEMI?



STEMI is one type of heart attack caused by a sudden blood clot in a major coronary artery. Because of a sudden interruption of blood supply to the heart, the full thickness of the heart muscle is damaged. STEMI is a more serious form of heart attack compared with other forms of heart attack in which only partial thickness damage of the heart muscle occurs.

STEMI symptoms typically include chest pain or chest tightness. Other symptoms include pain radiating to the neck, jaw, shoulder, back or arms; shortness of breath; nausea and vomiting; or profuse sweating.



STEMI is diagnosed using clinical symptoms and electrocardiogram (ECG) findings, blood markers for heart damage, and coronary angiograms looking for blocked arteries.

In some STEMI cases, the patient also suffers out-of-hospital cardiac arrest (OHCA). This occurs when the heart completely stops pumping blood and the person requires CPR within 10 minutes and defibrillation—using controlled electric shock to restore the heart's normal rhythm—or they will die.

WHY IS TIME TO TREATMENT SO CRITICAL?

Time to treatment for someone suffering a STEMI event is a matter of life and death. The amount of a person's heart muscle that is lost from a lack of blood supply with STEMI is directly related to the length of time from symptom onset to definitive treatment. All STEMI care centers on getting the patient to a hospital as fast as possible to get the blocked artery open and restore blood flow to the heart.

HOW IS STEMI TREATED?

The preferred treatment for STEMI is to open a blocked artery, which is called **reperfusion**. This is done in the hospital by a doctor who places a stent, a temporary tubular support, inside the blocked artery.

The goal of treatment—known as percutaneous coronary intervention (PCI)—is to open the artery as soon as possible. Ideally, this is done within 90 minutes of the patient arriving at the emergency department (ED). This time is referred to as the **Door-to-Balloon** time.

If PCI is not available, then the patient receives a drug to dissolve the blood clot. The drug is given intravenously. These drugs are effective up to 12 hours after symptom onset, but they are most effective if given sooner. The goal is to administer the drug within 30 minutes of arrival at the ED. This time is called the **Door-to-Drug** or **Door-to-Needle** time.

WHY IS IT SO IMPORTANT FOR PATIENTS AND THEIR FAMILY MEMBERS TO SEEK MEDICAL CARE FAST?

One of the most important factors that has an impact on STEMI treatment is **when** the patient decides to seek medical care after first feeling the symptoms. If the patients or their family members delay too long in calling emergency medical services (EMS) or traveling to the hospital, then the speed of the hospital in performing PCI or administering drugs to dissolve the blood clot may be much less effective.

WHO GETS STEMI ?

STEMI happens more frequently to:

Older people

Men

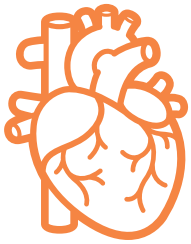
People with previous CVD

People with diabetes

People who smoke

People with high blood pressure

People with high cholesterol



People with a family history of premature heart disease

WHY DO WE NEED A GLOBAL STEMI SYSTEM OF CARE?

Because STEMI is such a time-sensitive medical emergency, a planned system of care must be established to rapidly diagnose STEMI and to quickly initiate treatment and deliver STEMI patients to hospitals ready to treat them.

Four key steps comprise this STEMI system of care:

- **Step 1** involves the **community**
- **Step 2** involves the **EMS system**
- **Step 3** involves the **hospital**
- **Step 4** involves a **data system** that includes the community, EMS, and hospitals

STEP 1:
Community Response to STEMI

The first step is for the patient, family member, or a bystander to call the emergency telephone number to activate the EMS system. A major challenge in all countries around the world is to educate and motivate patients, family members, and bystanders about the urgency of calling EMS as quickly as possible when symptoms of a possible STEMI or another medical emergency occur.

Everyone needs to be trained to call the emergency telephone number (for example, 120 in China, 108 in India, 192 in Brazil, and 911 in the United States) as soon as they see someone suffering what looks like it could be STEMI or some other medical emergency. This will allow EMS to arrive and start treatment as soon as possible. Delays in calling EMS can result in needless suffering and unnecessary deaths of STEMI patients.

In most nations around the world, this step is usually delayed because of multiple factors. Some of the most common reasons for delays include:

- Lack of understanding of STEMI symptoms
- Lack of understanding of the time urgency for calling EMS for treatment
- Fears about financial burdens that EMS and medical treatment might mean for the family
- Lack of confidence in EMS response time or the quality of care
- Low social status of some patients in the community
- Cultural preferences for informal healers.

STEP 2:
High-Quality Emergency Medical Services

The second step is to organize a rapid response and high-quality EMS system that can identify, stabilize, and transport STEMI patients to an appropriate hospital. It is vital that the EMS dispatcher send the correct level of medical rescuers. Consequently, EMS dispatchers at emergency call centers need to have the necessary medical training, to use nationally developed protocols, and to have a quality-improvement system in place to ensure compliance with protocols.

For this step, each EMS system should maintain a standardized method, such as an algorithm, for evaluating and treating patients with symptoms that suggest a STEMI event. This includes acquiring a 12-lead ECG and communication of the ECG findings in advance to the receiving hospital. This can be done via direct EMS staff voice communication, automated computer algorithm interpretation, or wireless transmission and physician interpretation.

STEP 3:
Rapid STEMI Response at the Hospital

The third step is for the hospital to be prepared with a rapid STEMI response to deliver the appropriate reperfusion therapy, with PCI as the preferred treatment. The hospital should have a streamlined STEMI treatment process to reduce the time required to open the affected artery. If patients arrive at a hospital that is not equipped to rapidly treat STEMI, there should be protocols to transport patients as fast as possible to the closest appropriate hospital equipped for STEMI treatment.

For this step, protocols for triage, diagnosis, and cardiac catheterization laboratory activation for PCI should be established within hospitals identified for EMS staff as STEMI-Receiving Centers. These hospitals should be available 24 hours per day and 7 days a week to perform primary PCI.

STEP 4:
The Data System

The fourth step involves developing a data system across the community and healthcare system. This system should include a STEMI patient registry or health information systems to collect and link EMS and hospital data on access to care, processes of care, speed of care at each of Steps 1 through 3, and outcomes for all STEMI patients. These data should be reviewed regularly and shared with EMS and hospital staff to track progress in improving access, response time, and quality of care for STEMI events. These data will also help to identify barriers to improvements.

Community Level

Common Barriers	Potential Solutions
Low community knowledge of STEMI symptoms and the importance of rapid treatment Inadequate recognition of STEMI symptoms and when to call EMS Inadequate awareness of the life-saving benefits of rapid reperfusion treatment and the importance of time to PCI or clot-dissolving drug intervention	Increase public information and communications about STEMI signs and symptoms and actions required
Lack of confidence and use of EMS services	Increase public training on the benefits of using EMS system for suspected STEMI
Inadequate access to primary prevention treatment for heart disease in general	Enhance heart disease screening and prevention

EMS Level

Common Barriers	Potential Solutions
Inadequate mobile phone coverage and/or lack of EMS dispatch centers	Improve telecommunication and dispatch center infrastructure
EMS system limitations, such as availability of services, response times, costs to patients or family members, and quality of care, equipment, and services	Increase public and private funding and support for high-quality EMS care

Hospital Level

Common Barriers	Potential Solutions
Variable quality and speed of STEMI care delivered by hospital staff	Use existing, established performance measures for hospital STEMI care
Challenges in patient involvement in consent and decision-making	Increase public awareness about the need for rapid STEMI treatment
Delays in diagnosis and treatment in the emergency department and in activation of the hospital's PCI team	Establish treatment protocols
Delays in transfers between hospitals, if the initial hospital is not PCI-capable	Establish hospital transfer agreements between hospitals
Inadequate coordination of care and post-discharge instructions for secondary prevention	Abide by existing guidelines for post-STEMI care and secondary prevention
Cost of hospital treatment to the patients and their family members	Increase public and private funding and support for high-quality STEMI care

Health System Level

Common Barriers	Potential Solutions
Conflicting interests of hospitals, EMS, and government agencies	Establish cooperative agreements between hospitals and EMS systems
No data collection or reporting system for STEMI	Implement continuous data collection and evaluation of STEMI incidence, process of care, and outcomes

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