



Tidewater EMS (TEMS) Regional STEMI Performance Improvement Plan – 2021

Vision

To develop a STEMI Emergency Care System that decreases cardiac mortality and morbidity in the TEMS region.

TEMS Information

[The TEMS Region](#) – Includes information regarding the layout, demographics and weather

[STEMI PI Committee Membership](#) – Includes purpose, roles, responsibilities and membership

[Hospital Capabilities by Region](#) – Includes easily identified, STEMI receiving hospitals

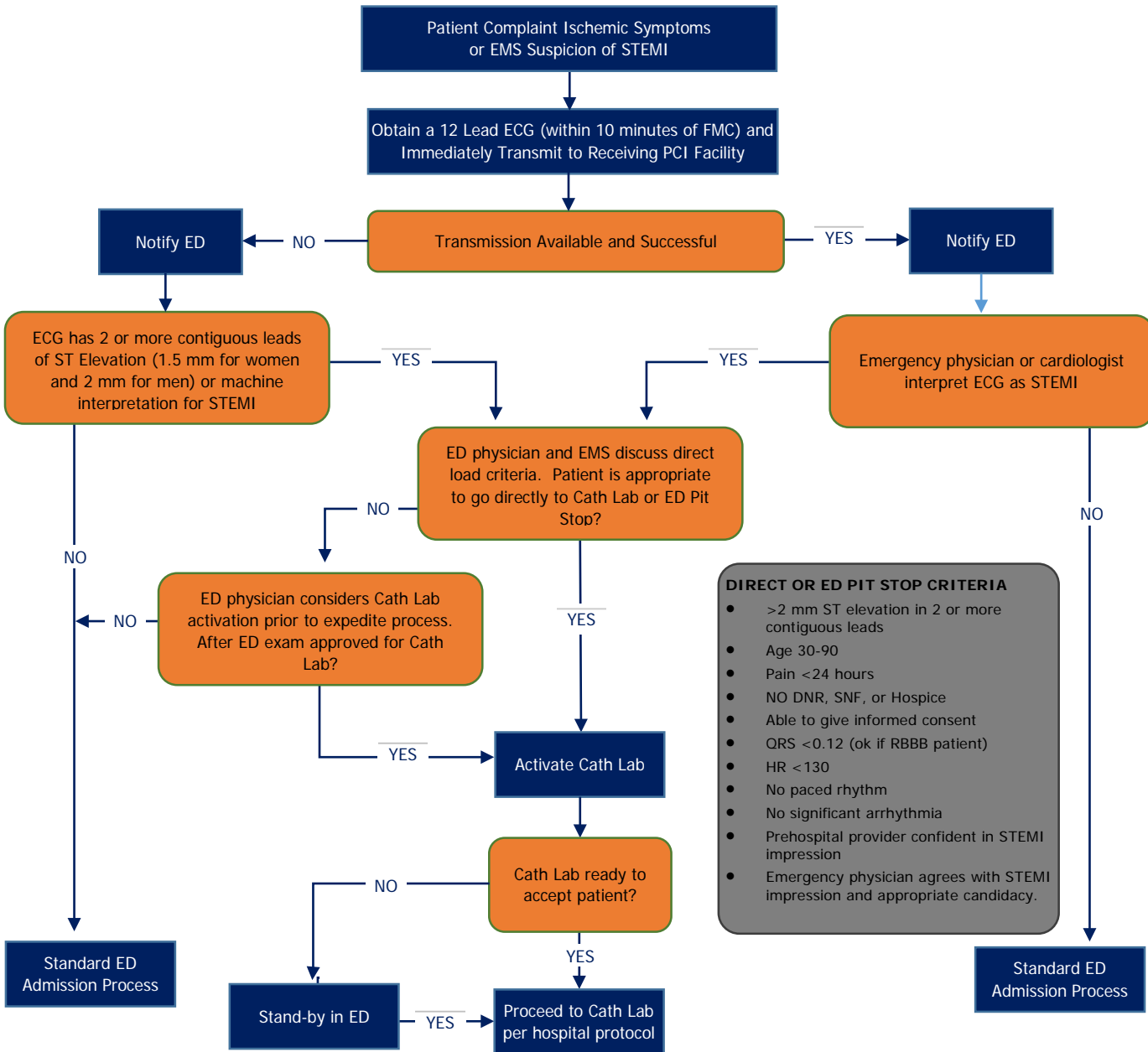
Goals

This Regional plan is assigned to the STEMI PI Committee for development, updating, monitoring, and working within the STEMI Systems of Care located on www.heart.org. Data has shown both morbidity and mortality are optimized when rapid interventional reperfusion is done within ninety minutes of EMS first medical contact (FMC); therefore, ST-Elevation Myocardial Infarction (STEMI) patients should be recognized as quickly as possible. Within compliance with the Code of Virginia and EMS Regulations, this plan:

- Δ Utilizes 12-lead ECG and pre-hospital notification to the receiving facility in tandem to reduce time to reperfusion
 - If ECG is unable to be transmitted, provider should deliver a hard copy to the ED with the patient
- Δ Patients must receive care in a hospital that has a STEMI treatment program in place, which is capable of providing immediate and comprehensive assessment, resuscitation, intervention, and definitive care
- Δ EMS personnel must be trained to accurately recognize, treat and transport STEMI patients rapidly
- Δ The Tidewater EMS Council must have continuous and effective region-wide coordination of pre-hospital and hospital care resources to ensure an expeditious transport to the closest available interventional center or facility capable of performing percutaneous coronary intervention (PCI)
- Δ Track and monitor the care capabilities by meeting at least quarterly with prehospital providers, emergency physicians, interventional cardiologists, nursing staff, receiving hospital representatives, and other appropriate individuals
- Δ Provide quality EMS service and patient care to the EMS Systems' citizens.
- Δ Review the quality of the process through continuous evaluation of the EMS System based on established STEMI EMS performance measures
- Δ Although physicians in the emergency departments will confirm this diagnosis, pre-hospital care providers are competent to apply STEMI diagnostic criteria by using their 12-lead monitor defibrillators to recognize a STEMI
- Δ ALS providers are proficient in pain management
- Δ Follow the Chest Pain/Acute Coronary Syndrome protocol for Goals, Treatment, Special Considerations and decision scheme and reference the 12-Lead ECG protocol for indications and procedure
- Δ Designates the [STEMI PI Committee Membership](#) responsible for execution



Action Plan: Field Triage Decision Scheme

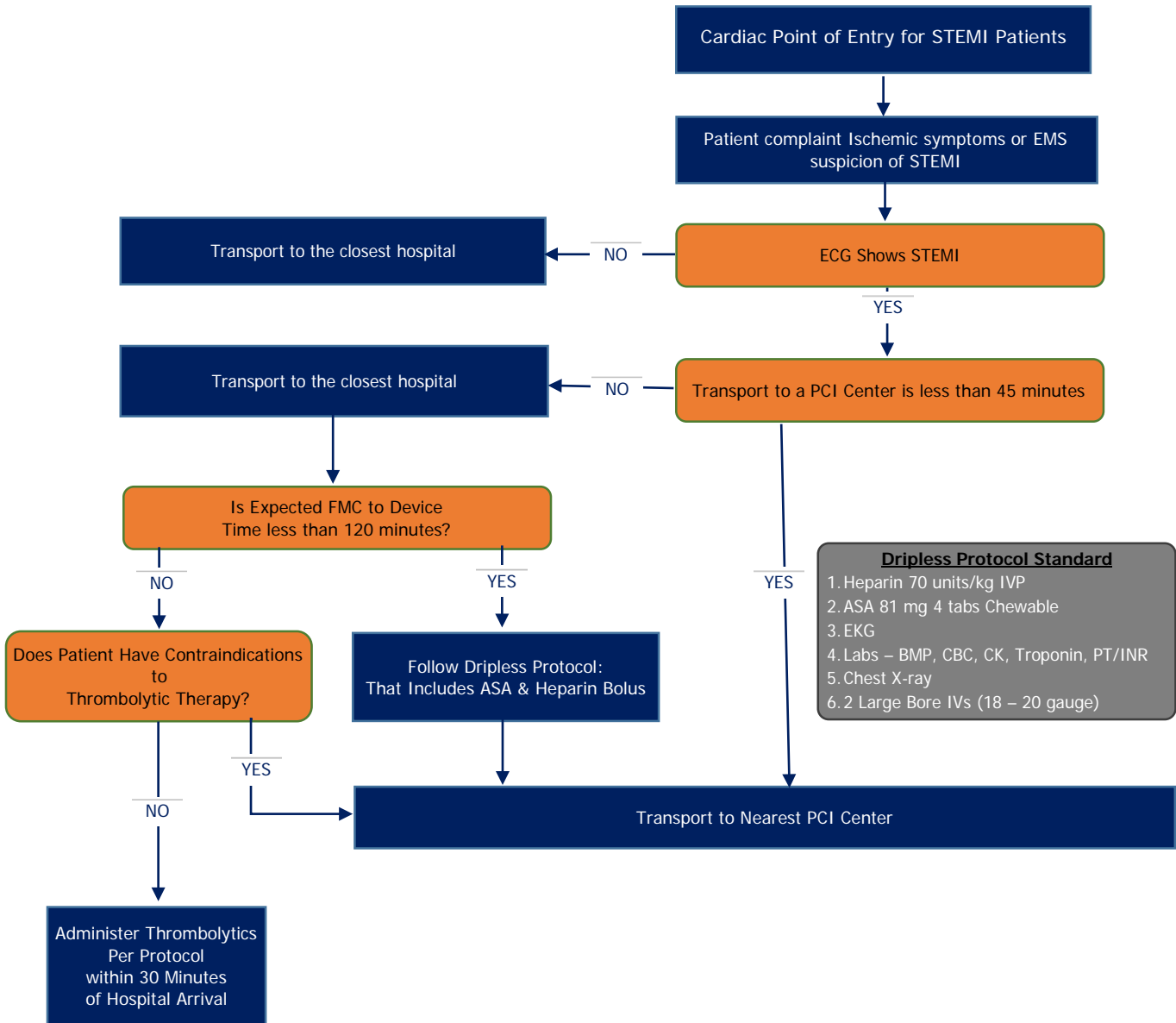


The purpose of this decision scheme is to:

1. Minimize the time from symptom onset to coronary reperfusion.
2. Rapidly identify potential STEMI patients by performing a timely 12-lead ECG per protocol.
3. Quickly recognize a STEMI by 12-lead ECG either by monitor interpretation for BLS providers or by recognition by ALS providers.
4. Early notification and transmission of 12-lead ECG insures timely Catheter Lab Team activation.
5. Rapidly identify the best Primary PCI Hospital/ STEMI-Receiving Center destination for the patient.
6. Minimize scene time to 15 minutes or less (including obtaining and transmitting a 12-lead ECG)



Non-PCI to PCI Algorithm



Inter-hospital transfer:

- Δ Establish single phone call to activate the interventional team and transportation
- Δ Travel time <45 minutes = Ground; >45 minutes = Helicopter
- Δ Arrival time from dispatch: Ground arrives within 30 minutes; Helicopter arrives within 45 minutes
- Δ Cath lab team is available within 30 minutes of notification



Mission: Lifeline – EMS Measurement Criteria

Each EMS system should maintain a standardized algorithm for evaluating and treating patients with symptoms suggestive of myocardial ischemia. The reporting measures give insight into possible gaps in care that warrant a stronger focus as well as planning for future measures. Current metrics include:

- △ % non-traumatic chest pain/ACS symptoms in patients ≥ 35 y/o, treated and transported by EMS who:
 - Received a pre-hospital ECG
 - % 12-Lead performed ≤ 10 minutes of FMC (85% target)
 - Transmission ≤ 12 minutes of obtaining ECG
 - Received aspirin: either by EMS or self-administration
- △ % hospital notifications or 12-lead ECG transmission suggesting a STEMI alert performed ≤ 10 minutes of first STEMI positive 12-lead ECG in the field
- △ % patients treated and transported directly to STEMI Receiving Center, with EMS FMC/arrival to device time ≤ 90 minutes (75% target) and/or EMS FMC/arrival to PCI ≤ 120 minutes (25% target) when transport time ≥ 45 minutes and Door to Balloon ≤ 30 minutes
 - % EMS FMC to PCI (75% target)
- △ % STEMI patients treated and transported directly to a STEMI referring hospital, for reperfusion:
 - With a Door to Needle time of ≤ 30 minutes – OR –
 - Initial EMS FMC to PCI of the transfer for PCI patients ≤ 120 minutes
- △ % of adult Out-Of-Hospital Cardiac Arrest (of suspected etiology), with ROSC in the field, with ROSC maintained to the ED, who has a 12 Lead ECG acquired
 - 12 lead obtained for sustained ROSC
 - Sudden Cardiac Arrest survival rate per Utstein parameters

Mission: Lifeline

All hospitals should consider being a part of [Get With The Guidelines \(GWTG\) Mission: Lifeline](#) program established by the American Heart Association, which tracks % ASA, % Beta Blocker; % High Intensity Statin; % ACE/ARB at Discharge; Cardiac Rehabilitation Referral from an Inpatient Setting (75% target for all)

All agencies should follow the [STEMI Systems of Care](#) guidelines

- △ There should be on-going multidisciplinary team meetings that include EMS, non-PCI hospitals/STEMI Referring Centers, and PCI hospitals/STEMI-Receiving Centers to evaluate outcomes and quality improvement data. Operational issues should be reviewed, problems identified, and solutions implemented
- △ Each STEMI System should include a process for pre-hospital identification and activation, destination protocols to STEMI Receiving Centers, and transfer for patients who arrive at STEMI Referring Centers and are primary PCI candidates, and/or are fibrinolytic ineligible and/or in cardiogenic shock
- △ Each system should have a recognized system coordinator, physician champion, and EMS medical director
- △ Each system component (EMS, STEMI Referring Centers and STEMI-Receiving Centers) should meet the appropriate criteria listed above

Destination Protocols

- △ Bypassing PCI Referring centers when transport is < 30 minutes; to achieve primary PCI within 90 minutes
- △ Emergency transfer by EMS or other agencies to a STEMI-Receiving Center of patients with STEMI who transport themselves to a STEMI Referring Center
- △ Air transport patients with anticipated long transport times and/or fibrinolytic ineligible and/or in cardiogenic shock

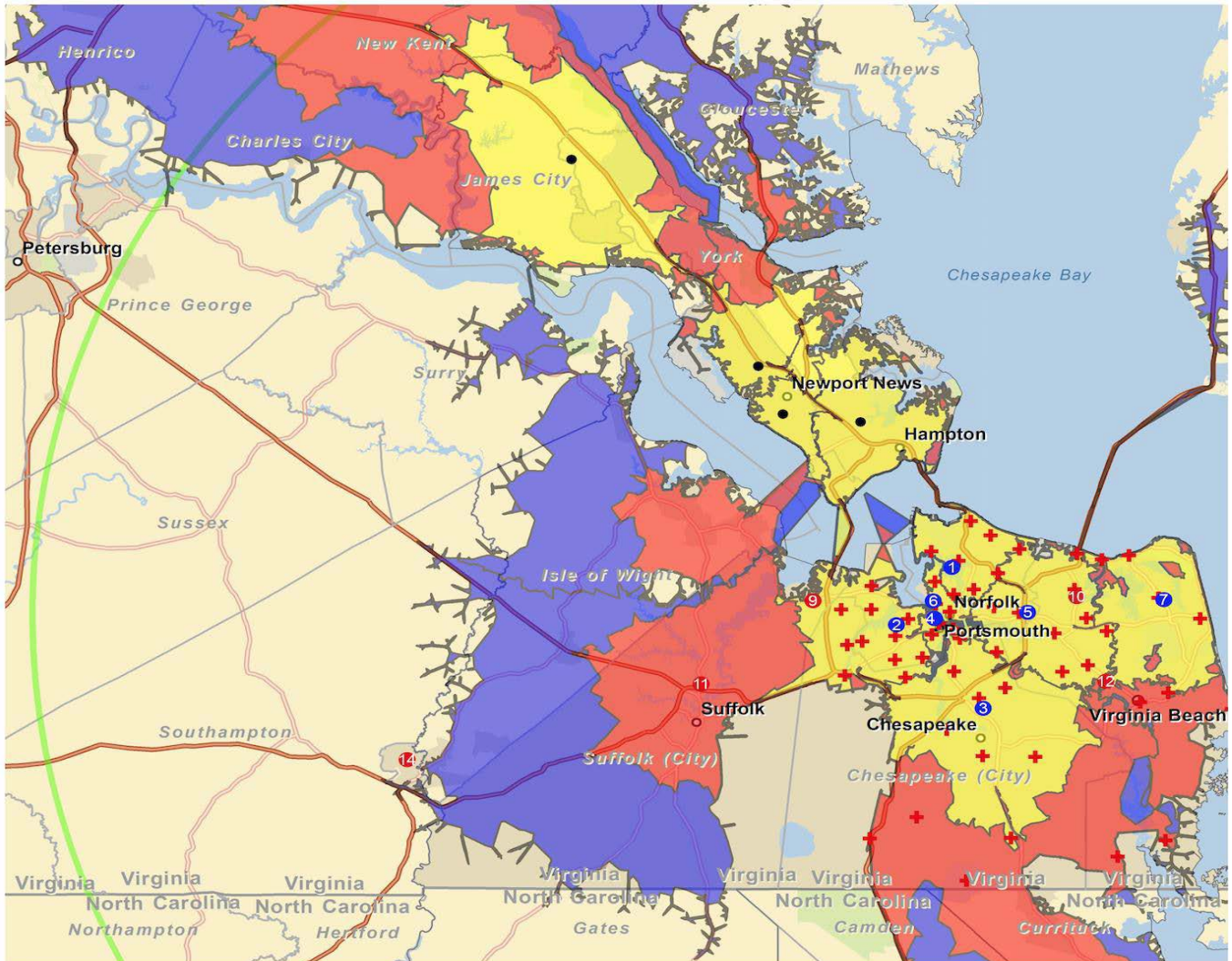


-
- Δ Administration of fibrinolytic therapy prehospital or in STEMI Referring Center for fibrinolytic eligible patients with time to primary PCI >90 minutes
 - Δ Emergency transfer to STEMI Receiving Center of patients who develop STEMI while in a non-PCI hospital
- Non-PCI Hospital/ STEMI Referring Center
- Δ Each ED should maintain a standardized reperfusion STEMI care pathway that designates primary PCI as the preferred reperfusion strategy if transfer of patients to a primary PCI hospital/STEMI-Receiving Center can be achieved within times consistent with ACC/AHA guidelines (within 120 minutes from arrival to referring hospital to PCI)
 - Δ Each ED should maintain a standardized reperfusion STEMI care pathway that designates fibrinolysis in the ED (for eligible patients) when the system cannot achieve times consistent with ACC/AHA guidelines for primary PCI
 - Δ If reperfusion strategy is for primary PCI transfer, a streamlined, standardized protocol for rapid transfer and transport to a STEMI-Receiving Center should be operational
 - Δ If reperfusion strategy is for primary PCI transfer, all patients should be transported to the most appropriate STEMI-Receiving Center where the expected first door-to-balloon (first device used) time should be within 90 minutes (considering ground versus air transport, weather, traffic)
 - Δ The STEMI Referring Center should have an ongoing quality improvement process, including data measurement and feedback, for the STEMI population and collect and submit Mission: Lifeline required data elements in GWTG
 - Δ A program should be in place to track and improve treatment (acutely and at discharge) with ACC/AHA guideline based Class I therapies

Primary PCI Hospital/ STEMI-Receiving Center

- Δ Protocols for triage, diagnosis and Cardiac Catheterization Laboratory (Cath Lab) activation should be established within the primary PCI hospital/STEMI-Receiving Center
- Δ A single activation phone call should alert the STEMI team
- Δ Criteria for EMS activation of the Cath Lab should be established in conjunction with EMS offices
- Δ The STEMI-Receiving Center should be available 24 hours/7 days a week to perform primary PCI
- Δ The Cath Lab staff including interventional cardiologist should arrive within 30 minutes of activation call
- Δ There should be universal acceptance of STEMI patients (no diversion). There should be a plan for triage and treatment for simultaneous presentation of STEMI patients
- Δ Interventional cardiologists should meet ACC/AHA criteria for competence and perform at least 11 primary PCI procedures per year and 75 total PCI procedures per year
- Δ The STEMI-Receiving Center should meet ACC/AHA criteria for volume and perform a minimum of 36 primary PCI procedures and 200 total PCI procedures annually
- Δ The STEMI-Receiving Center should participate in the Mission: Lifeline-approved data collection tool, GWTG
- Δ A program should be in place to track and improve treatment (acutely and at discharge) with ACC/AHA guideline based Class I therapies
- Δ There should be a recognized STEMI-Receiving Center liaison/system coordinator to the system and a recognized physician champion

Tidewater EMS STEMI Region



EMERGENCY MEDICAL SERVICES

+ EMERGENCY MEDICAL SERVICES

DRIVE TIME TO PPCI HOSPITAL

- 15 minutes
- 30 minutes
- 45 minutes

HELICOPTER FLIGHT RADIUS

60



Definitions

- 12-Lead electrocardiogram (ECG)** – a test using a device that measures the electrical activity of the heartbeat and can help medical personnel determine if a heart attack has occurred and whether the heart attack was a STEMI or non-STEMI event. When a 12-lead ECG is done, 10 wires ("leads") are attached to the arms, legs and chest. These wires each record electrical impulses, but from a different position in relation to the heart.
- Acute Myocardial Infarction (AMI)** – the medical term for a heart attack, which occurs when the blood supply to part of the heart muscle itself - the myocardium - is severely reduced or stopped.
- Angioplasty aka Balloon Inflation** – a procedure used to treat patients with a partially or completely blocked artery that restricts blood flow through the heart. A type of percutaneous coronary intervention (PCI), this procedure requires a slender balloon-tipped tube to be threaded from an artery in the groin to a trouble spot in the artery of the heart. The balloon is inflated, which compresses the blockage and widens the narrowed artery to restore blood flow.
- Cath Lab** – the department in a medical facility that specializes in cardiac catheterization, which is a procedure to examine blood flow to the heart and test how well the heart is pumping.
- Cardiogenic shock** – inadequate organ perfusion due to low heart output. This condition is frequently a precursor to death, and can be recognized by the presence of hypotension (systolic blood pressure of 90 mmHg or less) in the setting of a myocardial infarction.
- Diversion plan** – an emergency medical service protocol to divert patients with ST elevation myocardial infarction from the closest non-PCI hospital to a PCI capable hospital. Diversion protocols are particularly useful when patients have a contraindication to fibrinolysis, or first medical contact to device deployment at the PCI hospital can be achieved within 90 minutes on a consistent basis.
- Door-to-Balloon Time (D2B)** – the amount of time between a heart attack patient's arrival at the hospital to the time he/she receives percutaneous coronary intervention (PCI), such as angioplasty.
- Door-to-Needle Time (D2N)** – the amount of time between a heart attack patient's arrival at the hospital to the time he/she receives clot-busting medications, referred to in medical terms as fibrinolytics or thrombolytics.
- Electrocardiogram (ECG/EKG)** – a recorded tracing of the electrical activity of the heart.
- Emergency Medical Treatment and Active Labor Act (EMTALA)** – a statute that governs when and how a patient may be (1) refused treatment or (2) transferred from one hospital to another when in unstable condition. The EMTALA was passed as part of the Comprehensive Omnibus Budget Reconciliation Act of 1986, and is sometimes referred to as "the COBRA law."
- Fibrinolysis** – the breakdown of fibrin, usually by the enzymatic action of plasmin. Fibrin is a protein necessary for blood clotting that forms a web-like mesh that traps red blood cells and platelets and holds clots together. In the case of myocardial infarction, the administration of drugs that facilitate fibrin breakdown is referred to as "fibrinolysis."
- Fibrinolytic Therapy** – the use of pharmaceuticals or injections of medication to break up a blood clot inside an artery or cavity of the heart so that blood flow can be improved or restored. Also called thrombolytics, this type of treatment is widely available at hospitals across the US.
- Fibrinolytic** – an agent used to facilitate fibrin breakdown by activating plasminogen.
- FMC-to-Device Time (FMC2D)** – the amount of time between EMS making First Medical Contact (FMC) with a heart attack patient in the pre-hospital system to device activation, or "balloon" time, which is the first attempt to mechanically open the culprit lesion and restore blood flow.
- Left Bundle Branch Block** – a condition in which ventricular contraction is not completely synchronized due to a block in conduction of an electrical impulse to the ventricles; in LBBB, right ventricular endocardial activation begins before, and is often completed before, initiation of left ventricular endocardial activation; *benign LBBB is rare*; preexisting LBBB in absence of clinical evidence of heart disease is rare.
- Percutaneous coronary intervention (PCI)** – a procedure used to open or widen narrowed or blocked blood vessels supplying the heart. The blood vessels are accessed through the skin over the leg (femoral) or arm (radial or brachial) arteries. A thin catheter is advanced over a soft-tipped guide-wire through the arterial tree to the base of the heart where the coronary arteries arise. A smaller guide-wire is then advanced into the coronary artery and across the blockage, followed by balloon-dilation catheters, stents, and other artery opening devices as needed.
- PCI-Capable Hospital** – a hospital that has the equipment, expertise and facilities to administer percutaneous coronary intervention (PCI), a mechanical means of treating heart attack patients.
- Point of Entry (POE)** – the part of the healthcare community where treatment of a patient begins, such as when emergency medical services arrive on the scene or the patient walks into the emergency department at a hospital.
- Reperfusion** – the restoration of blood flow to an organ or tissue that has had its blood supply cut off, as after a myocardial infarction.
-



Reperfusion Therapy – one or more techniques to restore blood flow to part of the heart muscle damaged during a heart attack. It may include clot-dissolving drugs (thrombolysis), balloon angioplasty or surgery.

ST-elevation myocardial infarction (STEMI) – a severe heart attack caused by a prolonged period of blocked blood supply that affects a large area of the heart. These attacks carry a substantial risk of death and disability and call for a quick response by many individuals and systems.

STEMI Alert – a communication from EMS personnel that provides early notification to a PCI Capable Hospital that a patient with a prehospital 12-lead interpretation of STEMI is in route to their institution.

STEMI System – an integrated group of separate entities focused on reperfusion therapy for STEMI within a region that typically includes emergency medical services (EMS) providers, at least one community (non-PCI or STEMI-referral) hospital and at least one tertiary (PCI- capable or STEMI-receiving) hospital. The system may include one or more of the following components: leadership teams of EMS, emergency medicine, cardiology, nursing and administration; standardized communication (i.e., STEMI alert system); standardized transportation; and data collection and feedback. Please note: In some systems, there may be a single hospital with PCI capabilities that has established protocols with EMS providers and contains at least one of the components stated above.

Thrombolytics – the use of pharmaceuticals or injections of medication to break up a blood clot inside an artery or cavity of the heart so that blood flow can be improved or restored. Also called fibrinolytic therapy, this type of treatment is widely available at hospitals across the United States.

VHAC – [Virginia Heart Attack Coalition](#)

Document History

Triennial Update by TEMS Council STEMI Committee

Original – 2012; Adopted 09/2012

Revised and Readopted 03/2015

Revised and Readopted 12/2018

Revised and Readopted 03/2021