PURPOSE:

Patient Care Goals

- Identify STEMI quickly by 12-lead ECG within 10 minutes for patients with chest pain or a suspected myocardial infarction..
- Determine the time of symptom onset.
- Activate hospital-based STEMI system of care.
- Monitor vital signs and cardiac rhythm and be prepared to provide CPR and defibrillation if needed.
- Administer appropriate medications.
- Transport to appropriate facility.

ABBREVIATIONS:

- STEMI - ST Elevated Myocardial Infarction
- ACS - Acute Coronary Syndrome
- NSTEMI - Non-ST Elevated Myocardial Infarction
- MI - Myocardial Infarction
- CHF - Congestive Heart Failure
- ECG - Electrocardiogram
- EMS - Emergency Medical Services
- PO - By Mouth
- IV - Intravenous
- AEMT - Advanced Emergency Medical Technician
- PARA - Paramedic
- SBP - Systolic Blood Pressure
- IO - Intraosseous
- mmHg - Millimeters of Mercury
- CP - Chest Pain
- SOB - Shortness of Breath
- LOC - Level of Consciousness
- GI - Gastrointestinal
- AVM - Arterial Venous Malformation
- ASA - Aspirin

ACUTE CORONARY SYNDROME (ACS)/ST-SEGMENT ELEVATION MYOCARDIAL INFARCTION (STEMI)/NON ST-SEGMENT ELEVATION MYOCARDIAL INFARCTION (NSTEMI)

Aliases

- Heart attack, myocardial infarction (MI)

Patient Presentation

Inclusion Criteria

- Patient presents with chest pain or discomfort in other areas of the body (e.g. arm, jaw, epigastrium) of suspected cardiac origin; shortness of breath; sweating; nausea; vomiting; and dizziness. Atypical or unusual symptoms are more common in women, the elderly and diabetic

patients. May also present with CHF, syncope and/or shock.
- Chest pain associated sympathomimetic use (e.g., cocaine, methamphetamine).
- Some patients will present with likely non-cardiac chest pain and otherwise have a low likelihood of ACS (e.g. blunt trauma to the chest of a child). For these patients, defer the administration of aspirin and nitrates per the Pain Management guideline.

Exclusion Criteria

- None recommended

Patient Management

Assessment, Treatment, and Interventions

1. Evaluate for signs and symptoms that include chest pain, congestive heart failure, syncope, shock, symptoms similar to a patient's previous MI.
2. Assess the patient's cardiac rhythm; treat pulseless rhythms , tachycardia, or symptomatic bradycardia [see Cardiovascular and Resuscitation guidelines]
3. If the patient is dyspneic, hypoxemic, or has obvious signs of heart failure, EMS providers should administer oxygen as appropriate with a target of achieving 94- 98% saturation [see Universal Care guideline]
4. Use the 12-lead ECG, it is the primary diagnostic tool that identifies a STEMI. It is imperative that EMS providers routinely acquire a 12-lead ECG within 10 minutes for all patients exhibiting signs and symptoms of ACS.
    - The ECG may be transmitted for remote interpretation by a physician or screened for STEMI by properly trained EMS providers with or without the assistance of computer-interpretation.
    - Advance notification should be provided to the receiving hospital for patients identified as having STEMI.
    - Deploy serial ECGs as clinically indicated for concerns of evolving acute coronary syndrome.
    - All ECGs should be made available to treating personnel at the receiving hospital, whether brought in or transmitted from the field.
5. Administer **Aspirin** ***162-325mg PO****, preferably chewed.*
6. Establish IV access ***[AEMT]***
    - If possible, avoid IV access from mid-forearm down, especially with the right arm in the event the cardiac catheterization needs to be performed via the radial artery
    - If accessing the veins within the antecubital fossa preferentially place an 18g in the event the hospital needs to obtain a CT pulmonary angiogram.
7. **Nitroglycerin**
    - Dosing
        - Sublingual **[AEMT] 0.4mg every 5min X 3** for ongoing chest pain
        - IV **[PARA] 5-10 mcg/min IV** increase by 5-10mcg/min every 5 minutes until chest pain controlled
    - Information
        - Hold Nitroglycerin if SBP less than 100mmHg
        - Sublingual preferred route for initial chest pain treatment
        - IV nitroglycerin is primarily intended for ongoing chest pain management or if there are concerns about using the sublingual route for initial treatment
        - Avoid the use of nitrates in any patient who has used a phosphodiesterase inhibitor within the past 48 hours. Examples are:
            - Sildenafil (Viagra®, Revatio®)
            - Vardenafil (Levitra®, Staxyn®)
            - Tadalafil (Cialis®, Adcirca®) which are used for erectile dysfunction and pulmonary hypertension.
        - Avoid use in patients receiving intravenous epoprostenol (Flolan®) or treporstenil (Remodulin®) which is used for pulmonary hypertension.

- Care should always be taken when giving nitroglycerin when the patient's blood pressure is marginal. If used in this setting, the clinician should weigh the risk and benefit of nitrate administration over the administration of an opiate analgesic and be ready to respond to hypotension with fluid bolus or pressor.

8. The location of the infarct does not preclude the use of nitrates. Right-sided leads are of no additional value if an inferior STEMI has been diagnosed and such findings (presumed RV infarct) do not preclude the use of nitroglycerin: however, continually monitor the patient's hemodynamic status and be prepared to resuscitate if hypotension occurs.
9. Adjunct analgesia is indicated when chest discomfort is unresponsive to nitrates. [See Pain Management Protocol for medications and dosing]. The role of opioid analgesics or benzodiazepines in the management ACS is to reduce sympathetic drive (tachycardia, hypertension) therefore are secondary to direct acting interventions such as nitrates.
10. If EKG consistent STEMI or high concern for STEMI equivalent
    - **Place defibrillator pads on patients and connect to monitor/defibrillator**
        - If EMS pads are compatible with destination hospital monitor/defibrillator place pads in anterior-lateral pattern
        - If EMS pads are NOT compatible with destination hospital monitor/defibrillator, recommend anterior-posterior placement to allow for both sets of pads to remain in place during care transition
    - Perform Heparin Screening questionnaire (Pre-hospital only)
        - If any YES responses, contact medical control/receiving hospital
        - If NO to all, proceed with Heparin and Clopidogrel
    - **Heparin [PARA]**
        - **Bolus: 60units/kg IV/IO (Max 4000 units)**
        - **Drip: 12 units/kg/hr IV/IO (Max 1000 units/hr) [PARA/Primarily Inter-Facility]**
            - Primarily for inter-facility transports but may be given pre-hospital if time allows and equipment present
            - Inter-facility: Continue Heparin infusion per sending facility parameters
    - AntiPlatelet Medication
        - **Clopidogrel [PARA] except for Portage Base**
            - Transport to Cardiac Cath Lab: **600mg PO**
            - Transport to hospital WITHOUT cardiac cath lab: **300mg PO (if patient greater than 75 years old: 75mg PO)**
    - Beta Blockers
        - **Labetalol [PARA] 10-20mg IV/IO:** Blood pressure greater than 160 mmHg OR HR greater than 120
            - May repeat every 10 minutes for continued tachycardiac or hypertension to a maximum of 300mg
            - Consider 10mg for moderate tachycardia and/or hypertension and 20mg for severe tachycardia and/or hypertension
            - Hold for HR less than 60 OR SBP less than 100

            ---OR---
        - **Metoprolol [PARA/Primarily Inter-Facility] 25mg PO:** General ACS treatment for cardiac optimization
            - Hold if SBP less than 120 or Heart Rate less than 60 or greater than 120 (see Labetalol) OR unable to take PO medications safely
    - **Atorvastatin [PARA/Primarily Inter-Facility] 80mg PO**
11. Transport and destination decisions should be based on local resources and system of care.
    - Suspect ACS/Cardiac Chest Pain: Consider/preferred transport to hospital with Cardiac Cath Capabilities
        - STEMI or high concern for STEMI equivalent: Transport to Hospital with Cardiac Cath Capabilities if within 45 minutes transport time (ground or using HEMS)
            - If Cardiac Cath Capable Hospital is greater than 45min transport, recommend transport to closer hospital for primary thromblytics

12. Inter-facility Transport
    - Prior to departure, review STEMI Order Checklist to ensure appropriate medications have been administered or contraindications documented and ensure defibrillation pads are on patient and connected to monitor/defibrillator

Patient Safety Considerations

- Observe for signs of clinical deterioration: dysrhythmias, CP, SOB, decreased LOC/syncope, or other signs of shock/hypotension.
- Perform serial 12-lead ECGs (especially any time clinical changes noted).

Notes and Educational Pearls Key Considerations

- Acute coronary syndrome may present with atypical pain, vague or only generalized complaints.
- A complete medication list should be obtained from each patient. It is especially important for the treating physician to be informed if the patient is taking beta- blockers, calcium channel blockers, clonidine, digoxin, blood thinners (anticoagulants), or medications for the treatment of erectile dysfunction or pulmonary hypertension.

Pre-Hospital Heparin Screening Checklist:

Any **YES** responses, contact medical control prior to administering Heparin or Clopidogrel

- Active bleeding within 10 days (to include GI)
- Surgery or trauma in the last 14 days
- CVA/stroke/other neurological symptoms
- New onset altered mental status.
- History of arteriovenous malformation (AVM)
- History of aneurysm
- Allergy to Heparin or Clopidogrel/Ticagrelor
- Pregnancy
- Severe hypertension (Systolic > 180 or diastolic > 110)
- Sharp or tearing chest pain that radiates to the shoulder blades (suspected aortic dissection)
- History of CVA, arteriovenous malformation (AVM), cerebral aneurysm

Quality Improvement

Associated NEMSIS Protocol(s) (eProtocol.01)

- 9914117—Medical-Cardiac Chest Pain
- 9914143—Medical-ST-Elevation Myocardial Infarction (STEMI)

Key Documentation Elements

- The time of symptom onset
- The time of patient contact by EMS to the time of 12-lead ECG acquisition
- The time ASA administered, or reason why not given
- The time of STEMI notification

Performance Measures

- The time of patient contact to the time of 12-lead ECG acquisition within 10 minutes
- The time from first diagnostic 12-lead ECG to STEMI notification
- Confirmation patient received Aspirin (taken Prior To EMS arrival, given by EMS, or substantiated by other pertinent negatives)
- The time of a STEMI patient's ultimate arrival to a receiving hospital
- The time of EMS notification to the time of activation of a cardiac catheterization laboratory*

- The time of arrival at the PCI center to the time of cardiac catheterization (door-to- balloon time) **or**—if patient not transported directly to PCI center—the time of arrival at receiving hospital to thrombolytics*
- The time of prehospital 12-lead ECG acquisition to the time of cardiac catheterization (ECG- to-balloon time)*

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SUPPORTING DOCUMENTS:

- None

ADDENDUM:

- None

COMMITTEE APPROVALS:

- None