STEMI, Chest Pain, Acute Coronary Syndrome
This protocol covers:

- ST elevation in 2 or more contiguous leads >1mm (1 small box)
- Presumed new onset Left Bundle Branch Block
- Non ST Elevated MI
- Unstable Angina
- Complaints of Chest Pain / Pressure, Shortness of Breath, Arm Pain, Jaw Pain, Dizziness, Nausea / Vomiting, Diaphoresis, Palpitations, Dysrhythmias, or weakness, any of which is felt to be directly involved with a Myocardial Infarction
Diagnosing ST Elevation

- J point (junction of QRS complex and ST interval) elevation greater than or equal to 1mm (1 small box) above the isoelectric line
- Elevation seen in 2 or more continuous leads
Diagnosing Left Bundle Branch Block

- Heart rhythm must be supraventricular
- QRS duration must be greater than or equal to 120 ms (3 small boxes)
- There should be a QS or rS complex in V1
- There should be RsR wave in V6
- A LBBB cannot be diagnosed without a 12 lead.
Diagnosing non-STEMI

• “Non-STEMI” does not mean “not a STEMI”, it means “non ST segment elevated myocardial infarction”
  – A myocardial infarction is still occurring, but ST elevation is not. This is usually a result of vasoconstriction, and responds best to aggressive NTG and MS therapy

• ST changes will still be present, but may not necessarily include elevation.
  – ST depression in contiguous leads can indicate reciprocal changes, or a subendocardial infarction

• Unstable angina
  – Cannot be objectively diagnosed in the field, but subjective symptoms we can assess for include:
    • Rest angina, which is usually more than 20 minutes in duration
    • New onset angina that markedly limits physical activity
    • Increasing angina that is more frequent, longer in duration, or occurs with less exertion than previous angina

• These are all things that should be treated aggressively with vasodilators, but routine fibrinolytic therapy is not recommended
Diagnosing Unstable Angina

- Do a thorough assessment, establish your patient’s baseline!
- Unstable vs. stable angina is different for every patient
- Unstable angina is any chest pain that differs from the patient’s normal symptoms

Examples:
Patient normally experiences chest pain with exertion, but today the chest pain started while at rest
Patient’s chest pain is normally relieved by rest and 1 nitro, but today the chest pain is not getting better with the nitro and rest
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CHEST PAIN/ACUTE CORONARY SYNDROME/STEMI

DESCRIPTION: Acute Coronary Syndrome refers to pain or discomfort likely associated with cardiac involvement. (Unstable angina, myocardial ischemia or infarction) Without a complete patient assessment, treatments can lead to devastating results for the patient. Quick Aspirin and nitrate administration is a must for the patient to have a good outcome. Accurate ECG interpretation allows the hospital to prepare for your arrival and you to appropriately treat your patient. Equally important is transport to an appropriate facility for further intervention.

DEFINITION: This protocol is for any patient presenting with ST Elevation in 2 or more contiguous leads greater than or equal to 1mm (1 small box), presumed new onset Left Bundle Branch Block, or patients with a Non ST Elevated MI or Unstable Angina. This protocol is for the patient presenting with or complaining of Chest Pain / Pressure, Shortness of Breath, Arm Pain, Jaw Pain, Dizziness, Nausea / Vomiting, Diaphoresis, Palpitations, Dysrhythmias, or weakness, any of which is felt to be directly involved with a Myocardial Infarction. Symptoms may be associated with or without chest discomfort.

*Remember that the time of onset of symptoms is defined as the beginning of continuous, persistent discomfort that prompted the patient to seek medical attention.

REQUIRED ASSESSMENT

- CHECK LEVEL OF CONSCIOUSNESS
- AIRWAY PATENT? No: Make immediate correction to provide airway!!
- BREATHING ADEQUATE? No: Provide appropriate oxygenation assistance.
- COMPLETE VITAL SIGNS, Blood pressure, pulse, respirations, pulse oximetry.
- HEAD TO TOE EXAM

Protocol specific assessment

- OPQRST Assessment
- 12 Lead ECG if available (If Inferior Infarct is suspected, complete V4 right to check on right ventricular involvement)
- Glucose Assessment
- Perform Blood Pressures on both arms.
- Supplemental Chest Pain Evaluation Form.
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Basic treatment guidelines
- Administer oxygen appropriate to patient condition. Combitube insertion if appropriate for patient condition.
- Administer Aspirin 324 mg PO. (If patient is on blood thinner medication or self-administered Aspirin, reduce to 81 mg)
- Assist patient with administration of their prescribed Nitroglycerin only if BP is >110 mmHg. Do not allow patient to repeat. Monitor BP every 5 minutes.
- Transport patient as soon as possible to the closest hospital that has interventional cardiac catheterization.

Intermediate treatment guidelines
- Intubate if necessary for airway control.
- Establish IV of Normal Saline with Twin Cath rate appropriate to condition.
- Draw baseline labs in appropriate facility blood tubes obtaining Blood Glucose Level.
- Establish second IV if time permits.

Paramedic treatment options
Patients WITHOUT right side ST elevation (BP above 90 mmHg Systolic)
- Administer Nitroglycerin 0.4mg SL, may repeat x3 if BP remains >90 mmHg.
- Administer 1 inch Nitro Paste on chest as long as BP remains above 100 mmHg. If systolic pressure drops below 100 mmHg, remove nitro paste immediately. Do not apply below elbow or knee. Do not rub or massage into skin. Use gloved hands when applying. Do not defibrillate or cardiovert over NTG paste.
- Administer Morphine Sulfate 2mg to 5mg IV for pain every 5 minutes until pain is completely relieved. Total dose not to exceed 20mg.
- IF PATIENTS BP DROPS BELOW 90 mmHg. DISCONTINUE NITRO AND FURTHER MORPHINE ADMINISTRATION.

Patients WITH right side ST elevation
- Administer Normal Saline bolus of 10 to 20 ml/kg if systolic BP drops below 90 mmHg. Withhold nitrates and morphine administration. Discontinue fluid bolus if pulmonary edema begins to develop or is present.

ALL PATIENTS
- Transport 12 Lead ECG (if equipment is available) to the receiving facility and follow additional orders as instructed by the Emergency Department Physician.
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Supervisor treatment options

Patients WITH EKG Positive for STEMI

- Ensure that Supplemental Chest Pain Evaluation Form has been completed prior to beginning any of the Supervisor treatment options.
- Ensure BILAT blood pressure are taken, if there is a 10mmHg difference between arms, do no administer any further medications.
- Administer Clopidogrel (Plavix) 300mg (4 tablets) by mouth
- Administer Heparin 5,000 Units Bolus IVP.
- Administer Vasotec 1.25 mg IVP. Do not give Vasotec if the patient has hypotension (systolic blood pressure <100 mm Hg)
- Rapid Sequence Induction Intubation as needed for airway control.

Specific Protocol Notes

- Acute Coronary Syndrome patients require Rescue Catheterization ability at the receiving facility if there are any contraindications to Fibrinolytic reperfusion therapy. Require your patient to be transported to the appropriate facility.
- Contact the receiving facility when you transmit the ECG. Speak to the ER physician if there is any question as to AMI diagnosis. Follow physician orders.
- Right sided involvement in an Acute MI indicates that there is a reduction in cardiac preload. Aggressive fluid resuscitation is indicated in these patients if they present with hypotension. The patient could become irreversibly hypotensive with the administration of nitrates and morphine.
- Use caution when treating diabetics and female patients. These patients have atypical symptoms and may be difficult to assess.
- Minimize patient movement if the patient complains of chest pain or has had chest pain within the past 12 hours.
- If the patient has taken sildenafil nitrate (Viagra, Revatio) or other phosphodiesterase inhibitors for erectile dysfunction in the past 24 hours, do not administer nitroglycerin products.
Basic Treatment

• Administer O2 as needed (AHA recommends SaO2 ≥94%, other guidelines recommend >90% or if respiratory distress is present)

• Obtain bilateral blood pressures

• Administer Aspirin 324 mg PO (only give 81 mg if patient self administered Aspirin prior to EMS arrival or is on blood thinners)

• If patient has prescribed Nitro, assist them with ONE dose if BP >110 systolic, and patient has NOT taken an erectile dysfunction medication in the past 24 hr.

• Transport to appropriate facility
Intermediate Treatment

- Administer O2 as needed, managed airway as needed
- Obtain bilateral blood pressures
- Administer Aspirin and Nitro as prescribed in Basic Treatment
- Establish IV (bilateral preferred) rate appropriate to condition
- Draw baseline labs and check blood glucose
- Transport to appropriate facility
Paramedic Treatment

- Administer O2 as needed, manage airway as needed
- Establish IV (bilateral preferred) rate appropriate to condition
- Administer Aspirin 324 mg PO (only give 81 mg if patient self administered Aspirin prior to EMS arrival or is on blood thinners)
Right Side MI

• Any patient with symptoms of an ACS and electrocardiographic evidence of inferior wall ischemia or infarction, as evidenced by abnormalities of the ST segment or T wave in leads II, III, and aVF, should have right-sided leads V4R, V5R, and V6R obtained to assess for a possible right ventricular infarct.
  – If elevation seen in lead IV in right sided ECG withhold NTG and MS, administer normal saline bolus as needed to maintain BP >90 systolic
Paramedic Treatment

All other patients:
• Administer Nitro 0.4 mg SL, repeat x3 if BP >90 systolic
• Administer 1 in. Nitro Paste on chest if BP >100 systolic
• Administer Morphine Sulfate 2-5mg IVP for pain, repeat every 5 min. to a max dose of 20 mg

If patient has taken an erectile dysfunction medication in the past 24 hr. do not give Nitro. If systolic BP drops below 90 systolic discontinue further Nitro & Morphine treatment.
Heparin Reperfusion Therapy
Heparin Reperfusion Therapy

- Supervisor treatment only
- For patients with EKG positive for ST elevation in two or more contiguous leads, complete supplemental chest pain form
- Obtain bilateral blood pressures – if there is a 10mmHg or greater difference between arms NO further medications can be given
- If no absolute contraindications (listed on chest pain form) present, contact the supervisor regarding the following medications:
  - Clopidogrel (Plavix) 300 mg by mouth
  - Heparin 5,000 units bolus IVP
  - Vasotec 1.25 mg IVP (withhold if BP <100 systolic)
- If relative contraindications (on chest pain form) present, transmit 12-lead and consult with ER physician at receiving facility
Contiguous Leads

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<td>aVL</td>
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<tr>
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<td>aVF</td>
<td>V3</td>
<td>V6</td>
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<td>Inferior</td>
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Absolute Contraindications for Heparin

- CVA: history of any cerebrovascular event, intracranial neoplasm, arteriovenous malformation or aneurysm
- Recent (within 2 mo) cranial or spinal cord injury or trauma
- Past or present bleeding disorder (ex. Thrombocytopenia)
- Recent (within 10 days) severe trauma or major surgery at a non-compressible site (ex. CABG, intra-abdominal surgery, obstetrical delivery)
- Uncontrolled hypertension with systolic greater than 180 mmHg, diastolic greater than 110 mmHg
- Recent (within 10 days) traumatic cardiopulmonary resuscitation
- Hypersensitivity to Heparin
- Altered mental status
- Pericarditis or suspected aortic dissection
- Acute neurological findings
Relative Contraindications for Heparin

- Recent (within 10 days) puncture of a non-compressible blood vessel
- Diabetic eye problems or other hemorrhagic ophthalmic condition
- Poorly controlled hypertension of several years duration
- Currently receiving anticoagulant therapy? (i.e. Coumadin, Warfarin, Lovenox)
- Pregnancy
- Advanced liver or kidney disease
- Active peptic ulcer disease
- Endocarditis
- Known or strongly suspected left heart thrombus? (i.e. New Onset / Untreated Atrial Fibrillation)
- Any other pathology with a predisposition to bleeding? (i.e. ulcerative colitis, polycystic kidneys, vascular tumors
- Right Arm vs. Left Arm Systolic BP difference greater than 15mm/Hg?
- CPR greater than 10 minutes?
• Individuals can have very unique 12 lead presentations, and may not always present in a textbook manner.
• ST changes can have many causes, be sure to establish both a good history on the patient and specific events leading to patient presentation.
• Fax your 12 lead and consult with receiving MD, and discuss what your intended treatment will be, and if they would like to modify your proposed treatment.
Other Causes of ST Elevation or Depression

- Electrolyte abnormalities
- Post-cardiac surgical state
- Anemia
- Fever
- Acidosis or alkalosis
- Endogenous catecholamines
- Drugs, such as digoxin
- Acute abdominal process
- Endocrine abnormalities
- Metabolic changes
- pH changes
- Cerebrovascular accidents
- Increased oxygen demand or decreased supply (e.g., coronary endothelial dysfunction, coronary artery spasm, coronary artery embolus, anemia, tachy- /brady- arrhythmias, anemia, respiratory failure, hypertension or hypotension)

- Diseases such as myocarditis, pericarditis, cardiomyopathy, pulmonary emboli, infections, amyloidosis, systemic diseases, lung diseases
- Myocardial ischemia
- Flat T waves and small ST segment changes may also be seen in healthy individuals, including well trained athletes, leading to mistaken diagnosis of heart disease. T wave inversions, however, are more concerning for cardiomyopathy or other cardiac syndrome, depending on the clinical context.