

# **Acute coronary syndrome and Special resuscitation: Pregnancy & Intravenous Lipid Emulsion Therapy**

ACLSJC 2015 ACLS Update Course

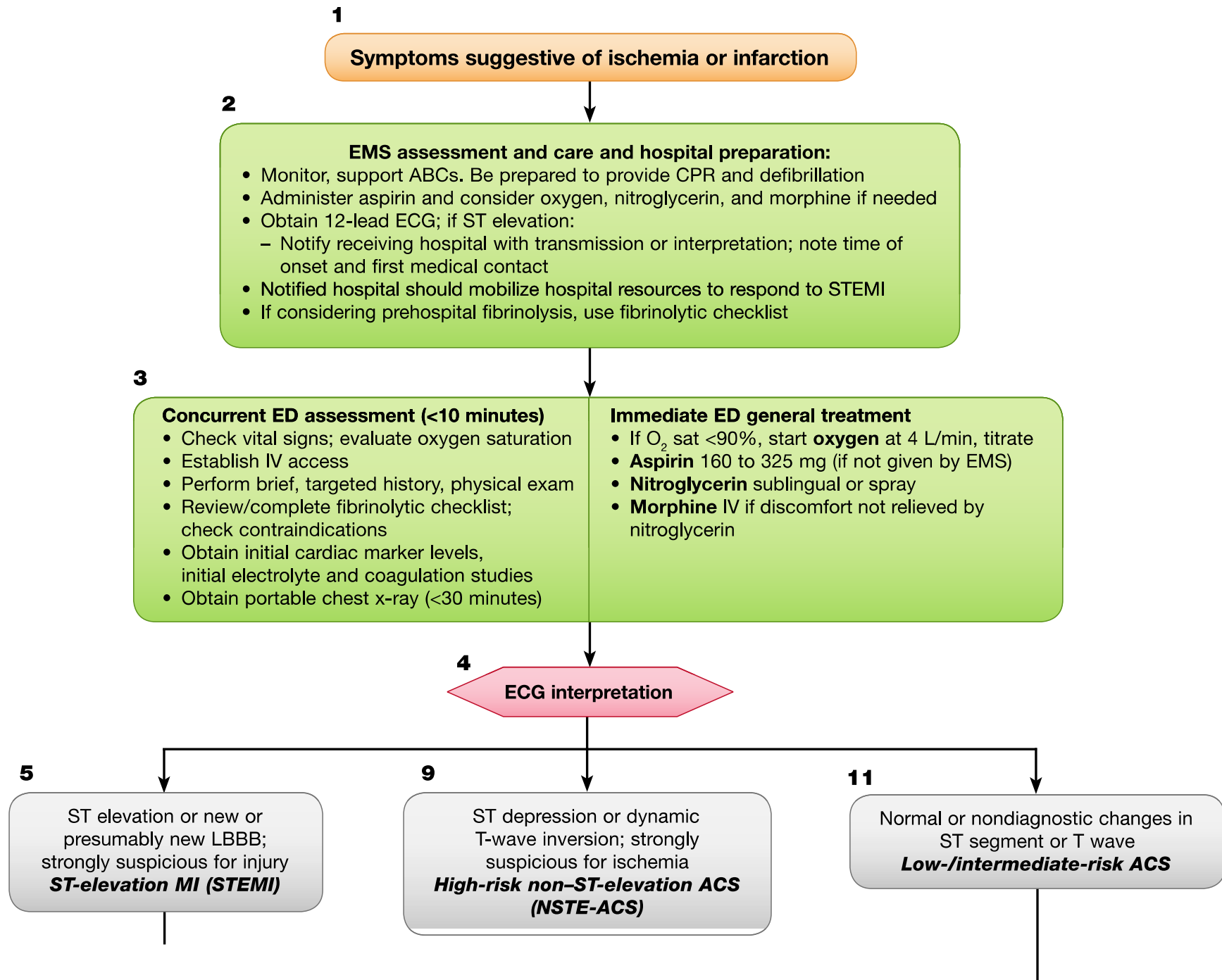
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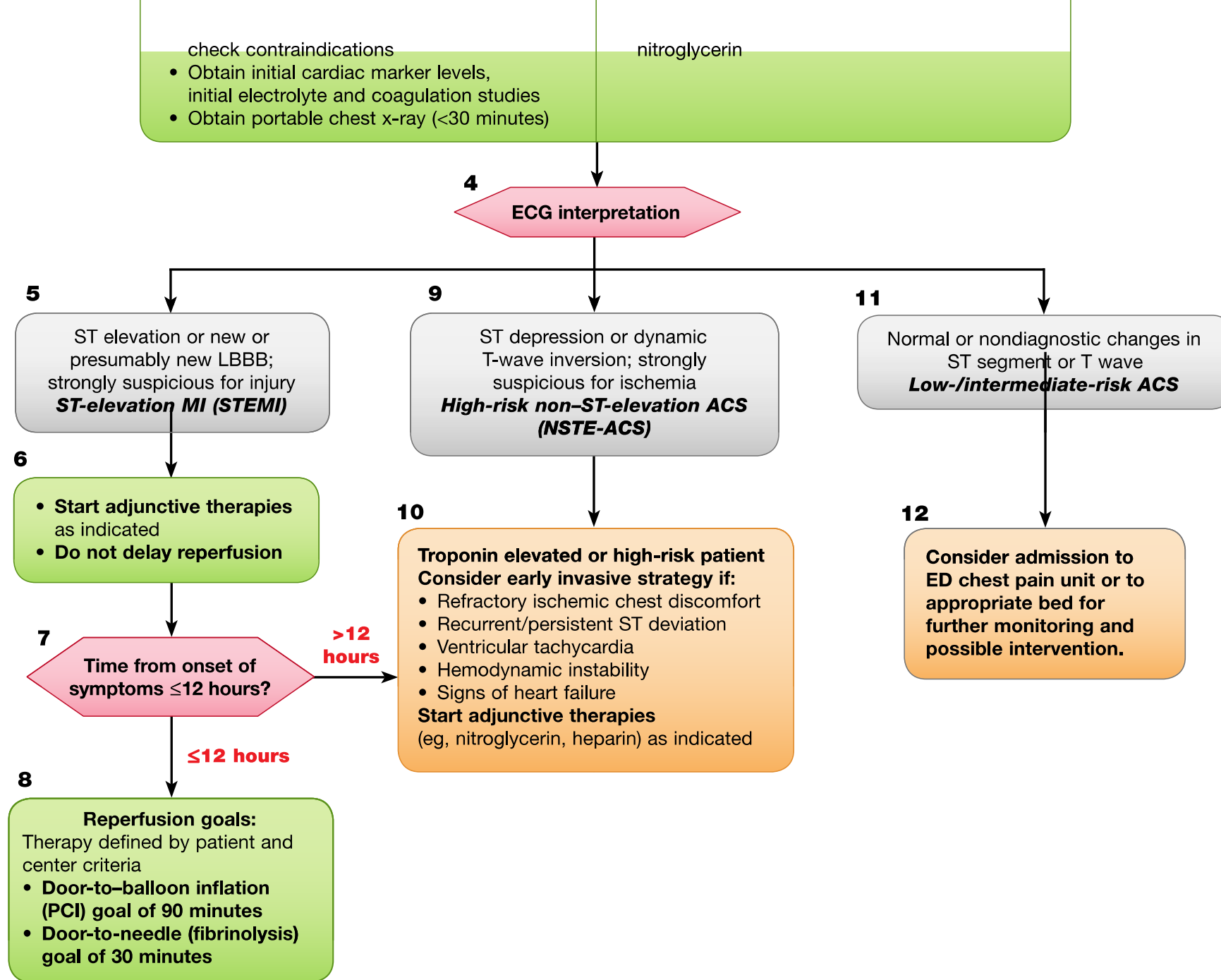
Sunny Chen-Hsu WANG M.D.

Cathay General Hospital

# **Part 9: Acute Coronary Syndromes**

# Acute Coronary Syndromes Algorithm—2015 Update





# **1. Highlights**

**Summary of Key Issues and Major Changes**

**1.1. Prehospital ECG Acquisition and Interpretation**

**1.2. Reperfusion**

**1.3. Troponin to Identify Patients Who Can Be Safely Discharged From the Emergency Department**

**1.4. Other Interventions**

# Summary of Key Issues & Major Changes

Key issues with major changes in 2015 Guidelines

Update recommendations for ACS:

- Prehospital ECG acquisition & interpretation
- Reperfusion strategy when prehospital fibrinolysis is available
- Reperfusion strategy at non PCI-capable hospital
- Troponin to identify patients who can be safely discharged from emergency department
- Interventions that may or may not be of benefit if given before hospital arrival

# 1.1. Prehospital ECG Acquisition & Interpretation

- **2015 (New):** Prehospital 12-lead ECG should be acquired early for possible ACS patients.
- **2015 (New):** Trained nonphysicians may perform ECG interpretation to determine whether or not the tracing shows evidence of STEMI.
- **2015 (Updated):** Computer-assisted ECG interpretation may be used in conjunction with interpretation by physician or trained provider to recognize STEMI.
- **2015 (Updated):** Prehospital notification of receiving hospital and/or prehospital activation of catheterization laboratory should occur for all patients with STEMI identified on prehospital ECG.
- **2010 (Old):** If providers are not trained to interpret 12-lead ECG, field transmission of ECG or a computer report to receiving hospital was recommended.
- **2010 (Old):** Advance notification should be provided to receiving hospital for patients identified as having STEMI.

## 1.2. Reperfusion

- **2015 (New):** Prehospital fibrinolysis is available as part of STEMI system of care and direct transport to PCI center is available, prehospital triage & transport directly to PCI center may be preferred because it results in a small relative decrease in incidence of intracranial hemorrhage. There is, however, no evidence of mortality benefit of one therapy over the other.
- **2015 (New):** In adult patients presenting with STEMI in emergency department of non-PCI-capable hospital, we recommend immediate transfer without fibrinolysis from initial facility to a PCI center, instead of immediate fibrinolysis at initial hospital with transfer only for ischemia-driven PCI.
- **2015 (New):** When STEMI patients cannot be transferred to PCI-capable hospital in a timely manner, fibrinolytic therapy with routine transfer for angiography (see below) may be an acceptable alternative to immediate transfer to primary PCI.
- **2015 (New):** When fibrinolytic therapy is administered to STEMI patient in non PCI-capable hospital, it may be reasonable to transport all post fibrinolysis patients for early routine angiography in 1<sup>st</sup> 3-6 hrs & up to 24 hrs rather than transport post fibrinolysis patients only when they require ischemia-guided angiography.
- **2010 (Old):** Transfer of high-risk patients who have received primary reperfusion with fibrinolytic therapy is reasonable.



# 1.3. Troponin to Identify Patients Who Can Be Safely Discharged From ED

- **2015 (New):** High-sensitivity (hs) troponin T (TnT) & troponin I (TnI) alone measured at 0 & 2 hrs (without performing clinical risk stratification) should not be used to exclude ACS, but hs-TnI measurements that are <99th percentile, measured at 0 & 2 hrs, may be used together with low-risk stratification (TIMI score 0/1, or low risk per Vancouver rule) to predict a <1% chance of 30-day MACE. Also, negative TnI or TnT measurements at 0 & between 3 & 6 hrs may be used together with very low-risk stratification (TIMI score 0, low risk score per Vancouver rule, North American Chest Pain score 0 & age <50 yrs, or low-risk HEART score) to predict a <1% chance of 30-day MACE.
- **2010 (Old):** If biomarkers are initially negative within 6 hrs of symptom onset, it was recommended that biomarkers should be remeasured between 6 to 12 hrs after symptom onset.

## 1.4. Other Interventions

- Adenosine diphosphate (ADP) inhibition for hospital patients with suspected STEMI has been recommended for many years. Administration of ADP inhibitor in prehospital setting provides neither additional benefit nor harm compared with waiting to administer it in hospital.
- Unfractionated heparin (UFH) administered to patients with STEMI in prehospital setting has not been shown to provide additional benefits to giving it in hospital. In systems where prehospital administration of UFH already occurs, it is reasonable to continue to use it. Where it is not already used in prehospital setting, it is just as reasonable to wait to give UFH until hospital arrival.

## 1.4. Other Interventions

- Before 2010, oxygen (O<sub>2</sub>) was routinely administered to all patients suspected ACS regardless of SaO<sub>2</sub> or respiratory condition. In 2010, weak evidence of no benefit & possible harm prompted recommendation that O<sub>2</sub> supplement was not needed for patients with ACS who had SaO<sub>2</sub> ≥ 94% (i.e., no hypoxemia) & no evidence of respiratory distress. Further evidence that routine supplementary O<sub>2</sub> administration may be harmful, supported by a multicenter RCT published since 2015 systematic review, strengthens recommendation that O<sub>2</sub> be withheld from patients with possible ACS who have normal SaO<sub>2</sub> (ie, who are without hypoxemia).
- For STEMI patients, prehospital administration of UFH or bivalirudin is reasonable.
- For suspected STEMI patients who are being transferred for PPCI, enoxaparin is a reasonable alternative to UFH.

## 2. Introduction – 2015 Updated

- Web-based Integrated Guidelines incorporate relevant recommendations from 2010 & new/updated recommendations from 2015.
- ILCOR ACS Task Force did not review areas in which it found a paucity of new evidence between 2010 & 2015; therefore, 2010 Guidelines for unreviewed areas remain current.
  - For example, acetylsalicylic acid administration has been shown to be of benefit in ACS & was recommended by 2010 Guidelines. Acetylsalicylic acid was not reviewed by ACS Task Force in 2015, so recommendations from 2010 should be used.
  - Note: The First Aid section of this 2015 Guidelines Update makes recommendations on acetylsalicylic acid administration by nonmedical personnel—see “Part 15: First Aid”
- Recommendations that were not reviewed in 2015 will either be reviewed & included in future *AHA Guidelines for CPR and ECC* or will be in the most recent ACC/AHA Guidelines.

# 3. Methodology – 2015 Updated

- 2015 update uses newest AHA Class of Recommendation and LOE classification system
  - Contains modifications to Class III recommendation
  - And introduces LOE B-R (randomized studies) and B-NR (nonrandomized studies), as well as LOE C-LD (limited data) and LOE C-EO (consensus of expert opinion).
- For further information, see “[Part 2: Evidence Evaluation and Management of Conflicts of Interest.](#)”

## **4. Patient and Healthcare Provider Recognition of ACS**

- Prompt diagnosis & treatment offers greatest potential benefit for myocardial salvage in 1<sup>st</sup> hours of STEMI; early, focused management of UA & NSTEMI reduces MACEs & improves outcome.
- Potential delays to therapy occur during 3 intervals: from onset of symptoms to patient recognition, during prehospital transport, and during emergency department (ED) evaluation.

## 4. Patient and Healthcare Provider Recognition of ACS

- Public education campaigns increase patient awareness & knowledge of ACS symptoms, yet have only transient effects on time to presentation. For patients at risk for ACS (and for their families), primary care physicians & other healthcare providers should consider discussing appropriate use of aspirin & EMS system activation.
- Furthermore, awareness of location of nearest hospital that offers 24-hr emergency cardiovascular care can also be included. Previous guidelines have recommended that the patient, family member, or companion activate EMS system rather than call their physician or drive to hospital if chest discomfort is unimproved or worsening 5 mins after taking 1 nitroglycerin treatment.

## 5. Initial EMS Care

- *(As'10) Because ASA should be administered ASAP after symptom onset to patients with suspected ACS, it is reasonable for EMS dispatchers to instruct patients with no history of ASA allergy & without signs of active or recent GI bleeding to chew an aspirin (160~325 mg) while awaiting EMS providers arrival. (Class IIa, LOE C)*
- *(As'10) If patient is dyspneic, hypoxemic, or has obvious signs of heart failure, providers should titrate therapy, based on monitoring of oxyhemoglobin saturation, to  $\geq 94\%$ . (I, C)*



## 5. Initial EMS Care

- *(As'10) EMS providers should administer nonenteric aspirin (160~325 mg). (I, B)*
- *(As'10) Morphine is indicated in STEMI when chest discomfort is unresponsive to nitrates. (I, C)*
- *(As'10) Morphine should be used with caution in UA/NSTEMI due to an association with increased mortality in a large registry. (IIa, C)*

# **6. Diagnostic Interventions in ACS – 2015 Updated**

## **6.1. Prehospital ECG & Prehospital STEMI**

### **Activation of Cath. Lab. – ACS 873,336**

- ***(New'15) Prehospital 12-lead ECG should be acquired early for patients with possible ACS. (I, B-NR)***
- ***(New'15) Prehospital notification of receiving hospital (if fibrinolysis is the likely reperfusion strategy) and/or prehospital activation of catheterization laboratory should occur for all patients with a recognized STEMI on prehospital ECG. (I, B-NR)***
- ***(As'10) Implementation of 12-lead ECG diagnostic programs with concurrent medically-directed quality assurance is recommended. (I, B)***
- ***(As'10) If providers are not trained to interpret 12-lead ECG, field transmission of ECG or a computer report to receiving hospital is recommended. (I, B)***

## **6.3. Computer-Assisted ECG STEMI Interpretation – ACS<sup>559</sup>**

- ***(New'15) Because of high false-negative rates, we recommend that computer-assisted ECG interpretation not be used as a sole means to diagnose STEMI. (III: Harm, B-NR)***
- ***(New'15) We recommend that computer-assisted ECG interpretation may be used in conjunction with physician or trained provider interpretation to recognize STEMI. (IIb, C-LD)***

## **6.4. Nonphysician STEMI ECG Interpretation – ACS<sup>884</sup>**

- ***(New'15) While transmission of prehospital ECG to ED physician may improve positive predictive value (PPV) & therapeutic decision-making regarding adult patients with suspected STEMI, if transmission is not performed, it may be reasonable for trained nonphysician ECG interpretation to be used as the basis for decision-making, including activation of catheterization laboratory, administration of fibrinolysis, and selection of destination hospital. (IIa, B-NR)***

## 6.5. Biomarkers in ACS – ACS <sup>737</sup>

- ***(New'15) We recommend against using hs-cTnT and cTnI alone measured at 0 & 2 hrs (without performing clinical risk stratification) to identify patients at low risk for ACS. (III: Harm, B-NR)***
- ***(New'15) We recommend that hs-cTnI measurements that are less than the 99th percentile, measured at 0 & 2 hrs, may be used together with low-risk stratification (TIMI score of 0/1 or low risk per Vancouver rule) to predict a <1% chance of 30-day MACE. (IIa, B-NR)***
- ***(New'15) We recommend that negative cTnI or cTnT measurements at 0 & between 3 and 6 hrs may be used together with very low-risk stratification (TIMI score of 0, low-risk score per Vancouver rule, North American Chest Pain score of 0 & age <50 yrs, or low-risk HEART score) to predict a <1% chance of 30-day MACE. (IIa, B-NR)***

# **7. Therapeutic Interventions in ACS – 2015 Updated**

## ***7.1. ADP Inhibition: Adjunctive Therapy in Patients With Suspected STEMI—ADP Inhibitors – ACS<sup>335</sup>***

- ***(New'15) In patients with suspected STEMI intending to undergo PPCI, initiation of ADP inhibition may be reasonable in either the prehospital or in-hospital setting. (IIb, C-LD)***



## **7.2. Prehospital Anticoagulants Versus None in STEMI – ACS<sup>562</sup>**

- ***(New'15) We recommend that EMS systems that do not currently administer heparin to suspected STEMI patients do not add this treatment, whereas those that do administer it may continue their current practice. (Iib, B-NR)***
- ***(New'15) In suspected STEMI patients for whom there is a planned PCI reperfusion strategy, administration of unfractionated heparin (UFH) can occur either in the prehospital or in-hospital setting. (Iib, B-NR)***

## **7.3. Prehospital Anticoagulation for STEMI - ACS<sup>568</sup>**

- ***(New'15) It may be reasonable to consider the prehospital administration of UFH in STEMI patients or the prehospital administration of bivalirudin in STEMI patients who are at increased risk of bleeding. (IIb, B-R)***
- ***(New'15) In systems in which UFH is currently administered in the prehospital setting for patients with suspected STEMI who are being transferred for PPCI, it is reasonable to consider prehospital administration of enoxaparin as an alternative to UFH. (IIa, B-R)***

## ***7.4. Routine Supplementary Oxygen Therapy in Patients Suspected of ACS – ACS<sup>887</sup>***

- *2010 AHA Guidelines for CPR and ECC noted that there was insufficient evidence to recommend the routine use of oxygen therapy in patients who had an uncomplicated ACS without signs of hypoxemia or heart failure and that older literature suggested harm with supplementary oxygen administration in uncomplicated ACS without demonstrated need for supplementary oxygen.*
- *2010 Guidelines, however, did recommend that oxygen be administered to patients with breathlessness, signs of heart failure, shock, or an oxygen saturation less than 94%.*

## **7.4. Routine Supplementary Oxygen Therapy in Patients Suspected of ACS – ACS<sup>887</sup>**

- *In 2015, the ILCOR systematic review specifically addressed the use of oxygen as an adjunctive medication in the treatment of patients who had normal oxygen saturation but had suspected ACS. The 2 treatment approaches (either providing or withholding oxygen) were compared with respect to outcomes: rate of death, infarction size, resolution of chest pain, and ECG abnormality resolution.*
- ***The new recommendation in this 2015 Guidelines Update applies only to the use of oxygen for patients suspected of ACS who have normal oxygen saturations.***

## ***7.5. Adjunctive Therapy in Patients Suspected of ACS: Oxygen - Updated***

- ***(New'15) The usefulness of supplementary oxygen therapy has not been established in normoxic patients. In the prehospital, ED, and hospital settings, the withholding of supplementary oxygen therapy in normoxic patients with suspected or confirmed acute coronary syndrome may be considered. (IIb, C-LD)***

## **7.6. Aspirin and Nonsteroidal Anti-Inflammatory Drugs**

- *(As'10) Therefore, unless the patient has a known aspirin allergy or active gastrointestinal hemorrhage, nonenteric aspirin should be given as soon as possible to all patients with suspected ACS. (I, A)*
- *(As'10) Other nonsteroidal anti-inflammatory medications (NSAIDs) are contraindicated and should be discontinued in patients who are taking these medications. NSAIDs (except for aspirin), both nonselective as well as COX-2 selective agents, should not be administered during hospitalization for STEMI because of the increased risk of mortality, reinfarction, hypertension, heart failure, and myocardial rupture associated with their use. (III-Harm, C)*

## **7.7. Nitroglycerin (or Glyceryl Trinitrate)**

- *(As'10) Patients with ischemic discomfort should receive up to 3 doses of sublingual or aerosol nitroglycerin at 3- to 5-minute intervals until pain is relieved or low blood pressure limits its use. (I, B)*
- *(As'10) The use of nitrates in patients with hypotension (III: Harm, C)*

## ***7.8. Analgesia***

- *(As'10) Providers should administer analgesics, such as intravenous morphine, for chest discomfort unresponsive to nitrates. Morphine is the preferred analgesic for patients with STEMI. (I, C)*



## **8. Reperfusion Decisions in STEMI Patients – 2015 Updated**

*(As'10) In summary, for patients presenting within 12 hrs of symptom onset & ECG findings consistent with STEMI, reperfusion should be initiated ASAP – independent of the method chosen. (I, A)*

# **8.1. Fibrinolytics & Percutaneous Coronary Intervention (PCI) Overview**

## **8.1.1. Fibrinolytics**

- *(As'10) If fibrinolysis is chosen for reperfusion, the ED physician should administer fibrinolytics to eligible patients as early as possible according to a predetermined process of care developed by the ED and cardiology staff. (I, A)*
- *(As'10) In fact, fibrinolytic therapy is generally not recommended for patients presenting between 12 and 24 hours after onset of symptoms based on the results of the LATE and EMERAS trials, unless continuing ischemic pain is present with continuing ST-segment elevation. (IIb, B)*
- *(As'10) Fibrinolytic therapy should not be administered to patients who present greater than 24 hours after the onset of symptoms. (III: Harm, B)*

# **8.1. Fibrinolytics & Percutaneous Coronary Intervention (PCI) Overview**

## **8.1.2. PCI**

- *(As'10) Coronary angioplasty with or without stent placement is the treatment of choice for the management of STEMI when it can be performed effectively with a door-to-balloon time 75 PCIs per year) at a skilled PCI facility (performing >200 PCIs annually, of which at least 36 are primary PCI for STEMI). (I, A)*
- *(As'10) Primary PCI performed at a high-volume center within 90 minutes of first medical contact by an experienced operator that maintains an appropriate expert status is reasonable, as it improves morbidity and mortality as compared with immediate fibrinolysis (I, A)*
- *(As'10) For those patients with a contraindication to fibrinolysis, PCI is recommended despite the delay, rather than foregoing reperfusion therapy. (I, A)*

## **8.2. Prehospital Fibrinolysis, Hospital Fibrinolysis, & Prehospital Triage to PCI Center – ACS <sup>338,341</sup>**

- ***(New'15) Where prehospital fibrinolysis is available as part of a STEMI system of care, and in-hospital fibrinolysis is the alternative treatment strategy, it is reasonable to administer prehospital fibrinolysis when transport times are more than 30 minutes. (IIa, B-R)***
- ***(New'15) Where prehospital fibrinolysis is available as part of the STEMI system of care and direct transport to a PCI center is available, prehospital triage and transport directly to a PCI center may be preferred because of the small relative decrease in the incidence of intracranial hemorrhage without evidence of mortality benefit to either therapy. (IIb, B-R)***

## **8.2. Prehospital Fibrinolysis, Hospital Fibrinolysis, & Prehospital Triage to PCI Center – ACS <sup>338,341</sup>**

- *(As'10) It is strongly recommended that systems which administer fibrinolytics in prehospital setting include following features: protocols using fibrinolytic checklists, 12-lead ECG acquisition & interpretation, experience in advanced life support, communication with receiving institution, medical director with training & experience in STEMI management, & continuous quality improvement. (I, C)*
- *(As'10) If PCI is the chosen method of reperfusion for prehospital STEMI patient, it is reasonable to transport patients directly to nearest PCI facility, bypassing closer EDs as necessary, in systems where time intervals between first medical contact & balloon times are (IIa, B)*

### **8.3. ED Fibrinolysis and Immediate PCI Versus Immediate PCI Alone – ACS<sup>882</sup>**

- ***(New'15) In the treatment of patients with suspected STEMI, the combined application of fibrinolytic therapy followed by immediate PCI (as contrasted with immediate PCI alone) is not recommended. (III-Harm, B-R)***

## ***8.4. Delayed PCI Versus Fibrinolysis Stratified by Time From Symptom Onset – ACS<sup>337</sup>***

- ***(New'15) Regardless of whether time of symptom onset is known, interval between 1<sup>st</sup> medical contact & reperfusion should not > 120 mins. (I, C-EO)***
- ***(New'15) In STEMI patients presenting <2 hrs of symptom onset, immediate fibrinolysis rather than PPCI may be considered when expected delay to PPCI is > 60 mins. (IIb, C-LD)***

## **8.4. Delayed PCI Versus Fibrinolysis Stratified by Time From Symptom Onset – ACS<sup>337</sup>**

- ***(New'15) In STEMI patients presenting within 2~3 hrs after symptom onset, either immediate fibrinolysis or PPCI involving a possible delay of 60~120 mins might be reasonable. (IIb, C-LD)***
- ***(New'15) In STEMI patients presenting within 3~12 hrs after symptom onset, performance of PPCI involving a possible delay of up to 120 mins may be considered rather than initial fibrinolysis. (IIb, C-LD)***



## ***8.4. Delayed PCI Versus Fibrinolysis Stratified by Time From Symptom Onset – ACS<sup>337</sup>***

- ***(New'15) In STEMI patients, when delay from 1<sup>st</sup> medical contact to PPCI is anticipated to >120 mins, a strategy of immediate fibrinolysis followed by routine early (within 3~24 hrs) angiography & PCI if indicated may be reasonable for patients with STEMI. (IIb, B-R)***

## ***8.5. Interfacility Transfer***

- *(As'10) These include patients who are ineligible for fibrinolytic therapy or who are in cardiogenic shock. (I, C)*
- *(As'10) Transfer of high-risk patients who have received primary reperfusion with fibrinolytic therapy is reasonable. (IIa, B)*

## **8.6. Reperfusion Therapy for STEMI in Non-PCI-Capable Hospitals – ACS 332,334,779**

- ***(New'15) In adult patients presenting with STEMI in ED of a non-PCI-capable hospital, we recommend immediate transfer without fibrinolysis from initial facility to a PCI center instead of immediate fibrinolysis at initial hospital with transfer only for ischemia-driven PCI. (I, B-R)***
- ***(New'15) When STEMI patients cannot be transferred to a PCI-capable hospital in a timely manner, fibrinolytic therapy with routine transfer for angiography may be an acceptable alternative to immediate transfer to PPCI. (IIb, C-LD)***
- ***(New'15) When fibrinolytic therapy is administered to a STEMI patient in a non-PCI-capable hospital, it may be reasonable to transport all post fibrinolysis patients for early routine angiography in the 1<sup>st</sup> 3~6 hrs & up to 24 hrs rather than transport post fibrinolysis patients only when they require ischemia-guided angiography. (IIb, B-R)***

# **9. Hospital Reperfusion Decisions After ROSC – 2015 Updated**

## **9.1. PCI After ROSC With and Without ST Elevation – ACS 340,885**

- ***(New'15) Coronary angiography should be performed emergently (rather than later in the hospital stay or not at all) for OHCA patients with suspected cardiac etiology of arrest & ST elevation on ECG. (I, B-NR)***
- ***(New'15) Emergency coronary angiography is reasonable for select (eg, electrically or hemodynamically unstable) adult patients who are comatose after OHCA of suspected cardiac origin but without ST elevation on ECG. (IIa, B-NR)***
- ***(New'15) Coronary angiography is reasonable in post-cardiac arrest patients where coronary angiography is indicated regardless of whether the patient is comatose or awake. (IIa, C-LD)***

## **9.1. PCI After ROSC With and Without ST Elevation – ACS <sup>340,885</sup>**

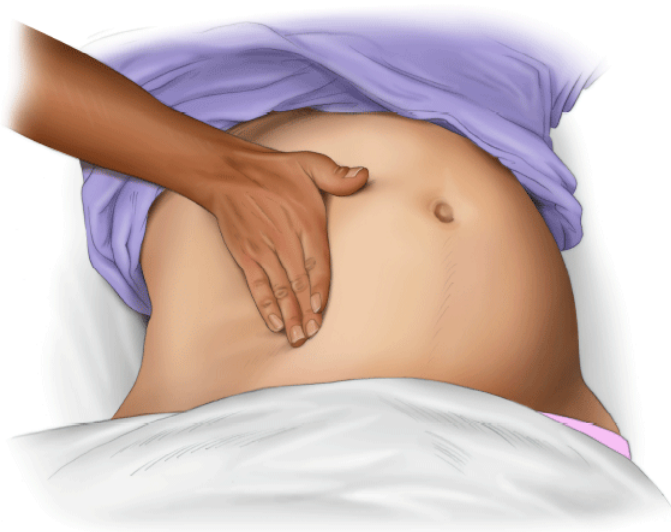
- *(As'10) It is reasonable to include cardiac catheterization & coronary angiography in standardized post–cardiac arrest protocols as part of an overall strategy to improve neurologically intact survival in this patient group (IIa, B) & appropriate treatment of ACS or STEMI, including PCI or fibrinolysis, should be initiated regardless of coma. (I, B)*
- *(As'10) Angiography and/or PCI need not preclude or delay other therapeutic strategies including therapeutic hypothermia. (IIa, B)*
- *(As'10) A 12-lead ECG should be performed as soon as possible after ROSC. (I, A)*

# **Part 10: Special Circumstances of Resuscitation**

- 2. Cardiac Arrest Associated With Pregnancy -  
Updated ALS 436
- 5. Role of Intravenous Lipid Emulsion Therapy  
in Management of Cardiac Arrest Due to  
Poisoning - Updated ALS 834

## ***2.1.1. Patient Positioning During CPR - Updated***

A



B



**A**, Manual LUD, performed with one-handed technique. **B**, Two-handed technique during resuscitation.



## **2.2.1. BLS Modification: Relief of Aortocaval Compression - Updated**

- ***(New'15) Priorities for the pregnant woman in cardiac arrest are provision of high-quality CPR and relief of aortocaval compression. (I, C-LD)***
- ***(New'15) If the fundus height is at or above the level of the umbilicus, manual LUD can be beneficial in relieving aortocaval compression during chest compressions. (IIa, C-LD)***

## **2.2.2. ALS Modification: Emergency Cesarean Delivery in Cardiac Arrest - Updated**

- ***(New'15) Because immediate ROSC cannot always be achieved, local resources for a PMCD should be summoned as soon as cardiac arrest is recognized in a woman in the second half of pregnancy. (I, C-LD)***
- ***(New'15) Care teams that may be called upon to manage these situations should develop and practice standard institutional responses to allow for smooth delivery of resuscitative care. (I, C-EO)***

## **2.2.2. ALS Modification: Emergency Cesarean Delivery in Cardiac Arrest - Updated**

- ***(New'15) During cardiac arrest, if pregnant woman with a fundus height at or above umbilicus has not achieved ROSC with usual resuscitation measures plus manual LUD, it is advisable to prepare to evacuate the uterus while resuscitation continues. (I, C-LD)***
- ***(New'15) In situations such as nonsurvivable maternal trauma or prolonged pulselessness, in which maternal resuscitative efforts are obviously futile, there is no reason to delay performing PMCD. (I, C-LD)***
- ***(New'15) PMCD should be considered at 4 minutes after onset of maternal cardiac arrest or resuscitative efforts (for the unwitnessed arrest) if there is no ROSC. (IIa, C-EO)***

**5. Role of Intravenous Lipid  
Emulsion Therapy in Management  
of Cardiac Arrest Due to Poisoning -  
Updated ALS <sup>834</sup>**

## **5.2.1. ACLS Modifications - Updated**

- ***(New'15) It may be reasonable to administer ILE, concomitant with standard resuscitative care, to patients with local anesthetic systemic toxicity and particularly to patients who have premonitory neurotoxicity or cardiac arrest due to bupivacaine toxicity. (IIb, C-EO)***
- ***(New'15) It may be reasonable to administer ILE to patients with other forms of drug toxicity who are failing standard resuscitative measures. (IIb, C-EO)***

***Thanks for your attention~~***