G.H.A Pocket Guidelines

Committee for practice Guidelines
To improve the quality of clinical practice and patient care in GCC countries

GUIDELINES ON MANAGEMENT OF ACUTE CORONARY SYNDROMES IN PATIENTS PRESENTING WITH PERSISTENT ST-SEGMENT ELEVATION

2009
Writing Committee

Chairperson
Kadhim J. SULAIMAN.................................................................FRCPI, FRCP (Glasgow), FGHA,FESC.

CO-CHAIR
Mohammed ARAFAH .................................................................FACP, FRCPC, FACC.

Task members:
Fouad ABDELKADER.................................................................MBBS, FRCP(London), FGHA.
Wael ABDULRAHMAN AL MAHMEED........................................MD, ABIM, FCCP, FRCPC, FRCP(C), FACP, FACC.
Ibrahim R. AL-RASHDAN.................................................................MD, FRCPC, FACC, FGHA.
Jassim M. AL-SUWAIDI.................................................................MBChB, FACC, FGHA.
Abdullah SHEHAB.................................................................MBChB, DipMed, MMed, D.M, CCST, FACP, FRCP, FESC, FACC.
Mahmoud Ghanyem .................................................................MD, MRCP.
## Contents

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction</td>
<td>5</td>
</tr>
<tr>
<td>Initial Recognition and Management in the Emergency Department</td>
<td>7</td>
</tr>
<tr>
<td>Brief Physical Examination in the Emergency Department</td>
<td>8</td>
</tr>
<tr>
<td>Reperfusion therapy</td>
<td>9</td>
</tr>
<tr>
<td>- Primary PCI</td>
<td>9</td>
</tr>
<tr>
<td>- Fibrinolytic therapy</td>
<td>11</td>
</tr>
<tr>
<td>PCI after thrombolysis</td>
<td>12</td>
</tr>
<tr>
<td>Acute CCU Management</td>
<td>13</td>
</tr>
<tr>
<td>Emergency Management of Complicated STEMI</td>
<td>14</td>
</tr>
<tr>
<td>Characteristics of Ventricular Septal Rupture, Rupture of the Ventricular Free Wall, and Papillary Muscle Rupture</td>
<td>16</td>
</tr>
<tr>
<td>Algorithm for Management of Recurrent Ischemia/Infarction after STEMI</td>
<td>18</td>
</tr>
<tr>
<td>Secondary Prevention and Long-Term Management</td>
<td>19</td>
</tr>
<tr>
<td>Drugs Commonly Used in the Management of Patients With STEMI</td>
<td>20</td>
</tr>
</tbody>
</table>
**Introduction**

Acute Coronary Syndromes comprise a spectrum of increasingly severe ischemic conditions, including unstable angina, non ST-elevation myocardial infarction (NSTEMI) and ST-elevation myocardial infarction (STEMI).

In the Gulf, STEMI represents 39% of Acute Coronary Syndromes. Mean age of the patients is 54 years and majority are males (86%). 32% of patients with STEMI are diabetic, 33% are hypertensives; 52% are smokers and 18% have hyperlipidemia. According to the current practice, 82% of the patients receive thrombolytic therapy, while primary PTCA is performed in only 8% of patients.

Over the past few years, considerable improvement has occurred in the care for patients with STEMI. Newer and more sensitive and specific biochemical markers for the diagnosis of AMI were introduced which promoted the American College of Cardiology, American Heart Association and the European Society of Cardiology to redefine MI in 2002. Furthermore, newer therapeutic modalities including newer fibrinolytic, antithrombic and antiplatetelet agents were introduced. The Gulf Heart Association published its first STEMI guidelines in 2005, and it is felt now that these guidelines need to be updated to include the new modalities of treatment and promote better clinical practice.

These guidelines refer to the management of patients with STEMI. The guidelines should be used as «Guidelines», which will apply to the majority of cases.

However it should be appreciated, that specific findings in individual patients may and should result in deviation from the proposed strategy. For every patient, the physician should make an individual decision taking into account the patient's history, presentation, findings during observation or investigation in hospital, and the available treatment facilities.
ACS with persistent ST-segment elevation

Adapted from Michael Davies

Elevated CK-MB or Troponin

ACS without persistent ST-segment elevation

Adapted from Michael Davies

Troponin elevated or not
Initial Recognition and Management in the Emergency Department

Onset of A.C.S. Symptoms

ED triage patient
- Patients with chest pain need prompt evaluation
- 12-lead ECG* (within 10 minutes of arrival in ED and reviewed immediately by MD)
- Repeat ECG in 5-10 min in case of persistent chest pain and non diagnostic ECG
- Brief, targeted history & Physical examination

Initial Emergency management

- Cardiac monitor
- Oxygen therapy
- IV Line
- cardiac markers
- Other lab evaluations
- Nitroglycerin**
- Clopidogrel 300mg
- Aspirin 150-300 mg chewable

Assess:
- Time since onset of symptoms
- Risk Stratification
- Risk of fibrinolysis
- Time required for transport to a skilled PCI center

Select and Implement Reperfusion Therapy

Administer Other Medical Therapy
- Morphine
- Aspirin‡
- UFH, LMWH (Enoxaparin), Fondaparinux
- Nitrates (as needed for chest pain or discomfort)**
- Beta-blockers

Admit to CCU

STEMI patient?

No

Yes

Refer to GHA NSTEMI Guidelines

* 1 mm ST elevation in two contiguous leads or presumed Left Bundle Branch Block

** Do not give if systolic blood pressure is less than 90 mm Hg or less than 30 mm Hg below baseline, heart rate is less than 50 bpm or right ventricular infarction is suspected.

STEMI = ST-elevation myocardial infarction; ED = emergency department; IV = intravenous; bpm = beats per minute.
## Brief Physical Examination in the Emergency Department

1. Airway, Breathing, Circulation (ABC)
2. Vital signs, general observation
3. Presence or absence of jugular venous distension
4. Pulmonary auscultation for rales
5. Cardiac auscultation for murmurs and gallops
6. Presence or absence of stroke
7. Presence or absence of pulses
8. Presence or absence of systemic hypoperfusion (cool, clammy, pale)

### Differential Diagnosis of STEMI

<table>
<thead>
<tr>
<th>Life-threatening</th>
<th>Cardiovascular and non-ischemic</th>
<th>Non - Cardiovascular</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aortic dissection</td>
<td>Pericarditis</td>
<td>Gastroesophageal reflux (GERD) and spasm</td>
</tr>
<tr>
<td>Pulmonary embolus</td>
<td>Atypical angina</td>
<td>Chest-wall pain</td>
</tr>
<tr>
<td>Perforating ulcer</td>
<td>Early repolarization</td>
<td>Pleurisy</td>
</tr>
<tr>
<td>Tension pneumothorax</td>
<td>Wolff-Parkinson-White syndrome</td>
<td>Peptic ulcer disease</td>
</tr>
<tr>
<td>Boerhaave syndrome (esophageal rupture with mediastinitis)</td>
<td>Deeply inverted T-waves suggestive of a central nervous system lesion or apical hypertrophic cardiomyopathy</td>
<td>Panic attack</td>
</tr>
<tr>
<td>LV hypertrophy with strain</td>
<td>Brugada syndrome</td>
<td>Biliary or pancreatic pain</td>
</tr>
<tr>
<td>Myocarditis</td>
<td>Hyperkalemia</td>
<td>Cervical disc or neuropathic pain</td>
</tr>
<tr>
<td>Hyperkalemia</td>
<td>Bundle-branch blocks</td>
<td>Somatization and psychogenic pain disorder</td>
</tr>
<tr>
<td>Vasospastic angina</td>
<td>Hypertrophic cardiomyopathy</td>
<td></td>
</tr>
</tbody>
</table>

STEMI = ST-elevation myocardial infarction; LV = left ventricular.
Reperfusion therapy:

Indications:
- Reperfusion therapy is indicated in all patients with history of chest pain of less than 12 hours and with persistent ST segment elevation or presumed new left bundle branch block.
- Reperfusion therapy should be considered if there is clinical and/or ECG evidence of ongoing ischemia even if, according to the patient, symptoms started more than 12 hours before.

A. primary PCI

Primary PCI is the preferred treatment if performed by an experienced team as soon as possible after first medical contact.

Time between first medical contact to balloon inflation should be less than 2 hours in any case and less 90 minutes in patients presenting early (less than 2 hours) with large infarct and low bleeding risk.

It is indicated in patients with shock and those with contraindications to fibrinolytic therapy irrespective of time delay.
Pharmacological therapy with primary PCI.

<table>
<thead>
<tr>
<th>Unfractionated Heparin</th>
<th>No GP IIb/IIIa Inhibitor</th>
<th>GP IIb/IIIa Inhibitor Used</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Bolus:</strong></td>
<td>70-100 U/kg</td>
<td>With either device: 200 s 50-70 U/kg</td>
</tr>
<tr>
<td><strong>Target ACT:</strong></td>
<td>HemoTec: 250-300 s</td>
<td>Hemochron: 300-350 s</td>
</tr>
</tbody>
</table>

**Thienopyridine**

- **Clopidogrel**
  - Administer loading dose of 300 mg - 600 mg (if not already given)
  - Maintenance dose: 75 mg orally per day
  - **Duration:**
    - i) Bare metal stent—1 month minimum
    - ii) Drug-eluting stent—minimum of 12 months.

**GP IIb/IIIa Inhibitors**

- It is reasonable to start abciximab as early as possible before primary PCI (with or without stenting). The recommended dosage of abciximab in adults is a 0.25 mg/kg intravenous bolus administered 10 to 60 minutes before the start of PCI, followed by a continuous intravenous infusion of 0.125 mcg/kg/min (to a maximum of 10 mcg/min) for 12 to 18 hours.

- Treatment with tirofiban (bolus dose of 10 mcg per kilogram of body weight, followed by an infusion of 0.15 mcg/kg/min for 18 to 24 hours) or eptifibatide (for patients with serum creatinine less than 2.0 mg/dL, *an intravenous bolus of 180 mcg/kg administered immediately before the initiation of PCI followed by a continuous infusion of 2.0 mcg/kg/min and a second 180 mcg/kg bolus 10 minutes after the first bolus. Infusion should be continued 18 to 24 hours.

- *For patients with a serum creatinine greater than 2.0 mg/dL, an intravenous bolus of 180 mcg/kg administered immediately before initiation of the procedure, immediately followed by a continuous infusion of 1.0 mcg/kg/min and a second 180 mcg/kg bolus administered 10 minutes after the first.

GP=glycoprotein; ACT=activated clotting time; U=units; s=seconds.
**B. fibrinolytic therapy**

Fibrinolytic therapy is indicated in all patients who present within the window time in the absence of contraindications and if primary PCI cannot be performed within the recommended time.

---

**Pharmacological therapy with Fibrinolytic agents:**

1. **Antiplatelet therapy:**
   
   If not already on Aspirin, oral (soluble or chewable non enteric-coated) or IV dose of Aspirin plus Clopidogrel oral loading dose of 300mg if less or equal to 75 years of age. If age is more than 75 years, Clopidogrel loading dose should be omitted.

2. **Antithrombin therapy:**

   With alteplase, reteplase or tenecteplase;

   *Enoxaparin IV bolus followed 15 minutes later by first SC dose.*

   “If age more than 75 years, no IV bolus and start with reduced first SC dose.”

   If Enoxaparin is not available, a weight adjusted bolus of IV heparin followed by a weight adjusted IV infusion with first aPTT control after 3 hours.

**With streptokinase:**

   an IV bolus of fondaparinux followed by SC dose 24 hours later or Enoxaparin IV bolus followed 15 minutes later by first SC dose. If age more than 75 years, no IV bolus and start with reduced first SC dose, or a weight adjusted dose of IV heparin followed by a weight adjusted infusion.
PCI after thrombolysis:

I PCI is recommended in:
1. patients less than 75 years of age with cardiogenic shock who are suitable candidates for revascularization
2. patients with severe congestive heart failure and/or pulmonary oedema (Killip class III)
3. patients with haemodynamically compromising ventricular arrhythmias

II PCI is reasonable in:
1. patients 75 years of age or older who are in cardiogenic shock provided that they are suitable candidates for revascularization
2. patients with haemodynamic or electrical instability
3. patients with persistent ischemic symptoms
4. patients in whom fibrinolytic therapy has failed (ST segment elevation less than 50% resolved after 90 minutes following initiation of fibrinolytic therapy in the lead showing maximum initial elevation) and a moderate or large area of myocardium at risk (anterior MI, inferior MI with right ventricular involvement or precordial ST segment depression)
5. patient with haemodynamically significant stenosis in a patent infarct artery greater than 24 hours after STEMI (as part of invasive strategy)

III PCI of a totally occluded infarct artery greater than 24 hours after STEMI:
is not recommended in asymptomatic patients with one or two vessel disease if they are haemodynamically and electrically stable and do not have evidence of severe ischemia

Non steroidal anti-inflammatory drugs:
Non steroidal anti-inflammatory drugs (except for Aspirin), both non-selective as well as COX-2 selective agents, should not be administered during hospitalization for STEMI because of the increased risk of mortality, re-infarction, hypertension, heart failure and myocardial rupture associated with their use. They should be stopped if already taken.
Acute CCU Management

Sample Admitting Orders for Patients With STEMI

1. **IV: NS** on D5W to keep vein open. Start a second IV if IV medication is being given. This may be a saline lock.

2. **Vital signs**: Every 30 minutes until stable, then every 4 hours and as needed. Notify physician if HR is less than 60 bpm or greater than 100 bpm, BP is less than 100 mm Hg systolic or greater than 150 mm Hg diastolic, respiratory rate is less than 8 or greater than 22 bpm.

3. **Monitor**: Continuous ECG monitoring for arrhythmia and ST-segment deviation.

4. **Diet**: NPO except for sips of water until stable. Then start diet with 2 g of sodium per day, low saturated fat (less than 7% of total calories/day), low cholesterol (less than 200 mg/day), such as Total Lifestyle Change (TLC) diet.

5. **Activity**: Bedside commode and light activity when stable.

6. **Oxygen**: Continuous oximetry monitoring. Nasal cannula at 2 L/min when stable for 6 hours, reassess for oxygen need (i.e., O2saturation less than 90%), and consider discontinuing oxygen.

Appendix

STEMI = ST-elevation myocardial infarction; IV = intravenous; NS = normal saline; DsW = 5% dextrose in water; HR = heart rate; BP = blood pressure; NPO = nothing by mouth; NTG = nitroglycerin; CHF = congestive heart failure; ED = emergency department; ACE = angiotensin converting enzyme; LVEF = left ventricular ejection fraction; SBP = systolic blood pressure; ARB = angiotensin receptor blocker; CBC = complete blood count; INR = international normalized ratio; aPTT = activated partial thromboplastin time; BUN = blood urea nitrogen.
Emergency Management of Complicated STEMI

Clinical Signs: shock, hypoperfusion, congestive heart failure, acute pulmonary edema
Most likely major underlying disturbance?

Acute pulmonary edema
Hypovolemia

First line of action
Administer
- Furosemide IV 0.5 to 1.0 mg/kg
- Morphine IV 2 to 4 mg
- Oxygen/intubation as needed
- Nitroglycerin SL, then 10 to 20 mcg/min IV if SBP greater than 100 mm Hg
- Dopamine 5 to 15 mcg/kg per minute IV if SBP 70 to 100 mm Hg and signs/symptoms of shock present
- Dobutamine 2 to 20 mcg/kg per minute IV if SBP 70 to 100 mm Hg and NO signs/symptoms of shock

Second line of action

Check blood pressure

Systolic BP greater than 100 mm Hg and not less than 30 mm Hg below baseline

ACE Inhibitors
Short-acting agent

Further diagnostic/therapeutic considerations:
(should be considered in non-hypovolemic shock)

Diagnostic
- Pulmonary artery catheter
- Echocardiography
- Angiography for MI/ischemia
- Additional diagnostic studies

Therapeutic
- Intra-aortic balloon pump
- Reperfusion/revascularization

Consider vasopressors

Administer
- Fluids
- Blood transfusions
- Cause-specific interventions

Systolic BP greater than 100 mm Hg

Nitroglycerin
10 to 20 mcg/min IV
Low Output—Cardiogenic Shock

Arrhythmia

Check blood pressure

Bradycardia

Tachycardia

Treat as per ACLS Protocol

Systolic BP 70 to 100mm Hg
NO signs/symptoms of shock

Dobutamine
2 to 20 mcg/kg per minute IV

Systolic BP 70 to 100mm Hg
Signs/symptoms of shock

Dopamine
5 to 15 mcg/kg per minute IV

Systolic BP less than 70 mm Hg
Signs/symptoms of shock

Norepinephrine
0.5 to 30 mcg/min IV

STEMI= ST-elevation myocardial infarction; IV = intravenous; SL=sublingual; SBP=systolic blood pressure; BP=blood pressure; ACE=angiotensin converting enzyme.
# Characteristics of Ventricular Septal Rupture, Rupture of the Ventricular Free Wall, and Papillary Muscle Rupture

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Ventricular Septal Rupture</th>
</tr>
</thead>
<tbody>
<tr>
<td>Incidence</td>
<td>1-3% without reperfusion therapy, 0.2-0.34% with fibrinolytic therapy, 3.9% among patients with cardiogenic shock</td>
</tr>
<tr>
<td>Time course</td>
<td>Bimodal peak; within 24 hours and 3-5 days; range 1-14 days</td>
</tr>
<tr>
<td>Clinical manifestations</td>
<td>Chest pain, shortness of breath, hypotension</td>
</tr>
<tr>
<td>Physical findings</td>
<td>Harsh holosystolic murmur, thrill (+), S₃, accentuated 2nd heart sound, pulmonary edema, RV and LV failure, cardiogenic shock</td>
</tr>
<tr>
<td>Echocardiographic findings</td>
<td>Ventricular septal rupture, left-to-right shunton color flow Doppler echocardiography through the ventricular septum, pattern of RV overload</td>
</tr>
<tr>
<td>Right-heart catheterization</td>
<td>Increase in oxygen saturation from the RA to RV, large V-waves</td>
</tr>
</tbody>
</table>

**PTCA** = percutaneous transluminal coronary angioplasty; **RV** = right ventricular/ventricle; **LV** = left ventricular; **RA** = right atrium.
<table>
<thead>
<tr>
<th><strong>Rupture of Ventricular Free Wall</strong></th>
<th><strong>Papillary Muscle Rupture</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>0.8-6.2%, Fibrinolytic therapy does not reduce risk; primary PTCA seems to reduce risk</td>
<td>About 1% (posteromedial more frequent than anterolateral papillary muscle)</td>
</tr>
<tr>
<td>Bimodal peak; within 24 hours and 3-5 days; range 1-14 days</td>
<td>Bimodal peak; within 24 hours and 3-5 days; range 1-14 days</td>
</tr>
<tr>
<td>Anginal, pleuritic, or pericardial chest pain, syncope, hypotension, arrhythmia, nausea, restlessness, hypotension, sudden death</td>
<td>Hypotension and pulmonary edema; abrupt onset of shortness of breath</td>
</tr>
<tr>
<td>Jugulovenous distention (29% of patients), pulsus paradoexus (47%), electromechanical dissociation, cardiogenic shock</td>
<td>A soft murmur in some cases, no thrill, variable signs of RV overload, severe pulmonary edema, cardiogenic shock</td>
</tr>
<tr>
<td>Greater than 5 mm pericardial effusion not visualized in all cases, layered, high-acoustic echoes within the pericardium (blood clot), direct visualization of tear, signs of tamponade</td>
<td>Hypercontractile LV, torn papillary muscle or chordae tendineae, flail leaflet, severe MR on color flow Doppler echocardiography</td>
</tr>
<tr>
<td>Ventriculography insensitive, classic signs of tamponade not always present (equalization of diastolic pressures among the cardiac chambers)</td>
<td>No increase in oxygen saturation from the RA to RV, large V-waves,* very high pulmonary-capillary wedge pressures</td>
</tr>
</tbody>
</table>

*Large V-waves are from the pulmonary capillary wedge pressure.*
Algorithm for Management of Recurrent Ischemia/Infarction After STEMI

Recurrent ischemic-type discomfort at rest after STEMI

- Escalation of medical therapy (nitrates, beta blockers)
- Anticoagulation if not already given
- Consider IABP for hemodynamic instability, poor LV function, or a large area of myocardium at risk
- Correct secondary causes of ischemia

Obtain 12-lead ECG

STEMI elevation?

Yes

PCI if available
Thrombolytic if PCI not available

No

Refer to Non-STEMI guidelines

IABP = intra-aortic balloon pump; LV = left ventricular;
PCI = percutaneous coronary intervention.
Secondary Prevention for Patients With STEMI

GOALS

Smoking
Complete cessation

Blood pressure control
Less than 140/90 mm-Hg or less than 130/80 mm-Hg if chronic kidney disease or diabetes

Lipid management
LDL-C substantially less than 100 mg/dL, TG less than 150 mg/dl
HDL-C greater than 40 mg/dl in men & 50 mg/dl in women

Physical activity
30 minutes 3 to 4 days per week; Optimal daily

Weight management
BMI 18.5-24.9kg/m2
Waist circumference: Women; less than 35 inches; Men; less than 40 inches

Diabetes management
HbA1c less than 7%

BMI= body mass index; HDL-C= high-density lipoprotein cholesterol; LDL-C= low-density lipoprotein cholesterol; TG= triglycerides.
<table>
<thead>
<tr>
<th>Drug</th>
<th>First 24 Hours</th>
<th>During Hospitalization</th>
<th>At Discharge and Long-Term Follow-Up</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aspirin</td>
<td>Chewed (non-enteric-coated) in the emergency department (150 to 300 mg)</td>
<td>75 to 150 mg daily</td>
<td>75 to 150 mg per day indefinitely</td>
</tr>
</tbody>
</table>
| Clopidogrel                 | 300 mg loading dose                                                           | 75 mg until discharge       | * If PCI patients, 75 mg Duration:  
  i) Bare metal stent—1 month minimum  
  ii) Drug-eluting stent—minimum of 3 months after sirolimus and 6 months after paclitaxel  
  Continue up to 12 months after stent implantation (both types of stents) in patients who are not at risk of bleeding.  
  *If allergy to Aspirin, 75 mg daily indefinitely |
| Fibrinolytic Therapy†       | Alteplase, IV bolus 15 mg, infusion 0.75 mg/kg times 30 min (maximum 50 mg), then 0.5 mg/kg not to exceed 35 mg over the next 60 min to an overall maximum of 100 mg  
  Retepase, 10 U IV over 2 min; 30 min after the first dose, give 10 U IV over 2 min  
  Streptokinase, 1.5 MU IV over 30-60 min  
  Tenecteplase, IV bolus over 10-15 seconds, 30 mg for weight less than 60 kg; 35 mg for 60-69 kg; 40 mg for 70-79 kg; 45 mg for 80-89 kg; 50 mg for 90 kg or more | 75 mg until discharge       |                                      |
<p>| Unfractionated Heparin      | 60 U/kg (max 4000 U) as IV bolus, infusion 12 U/kg/hr (max 1000 U/hr) to maintain aPTT at 1.5 to 2.0 times control (approximately 50 to 70 seconds) | Maintain aPTT at 1.5 to 2.0 times control (approximately 50 to 70 seconds) for at least 48 hours | Antithrombotic therapy recommendations |
| LMWH (Enoxaparin) for patients less than 70 years | 30 mg bolus + 1 mg/kg twice daily | 1 mg/kg twice daily |                                      |</p>
<table>
<thead>
<tr>
<th>Drug</th>
<th>First 24 Hours</th>
<th>During Hospitalization</th>
<th>At Discharge and Long-Term Follow-Up</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beta-Blockers*</td>
<td>Oral daily</td>
<td>Oral daily</td>
<td>Oral daily indefinitely</td>
</tr>
<tr>
<td>ACE Inhibitors</td>
<td>ACE inhibitor to all patients with anterior infarction, pulmonary congestion, or LVEF less than 0.40 in the absence of hypotension or known contraindications; titrate and adjust for blood pressure and creatinine</td>
<td>Oral daily</td>
<td>Oral daily indefinitely</td>
</tr>
<tr>
<td>Angiotensin Receptor Blockers (ARB)</td>
<td>An ARB should be administered to patients intolerant of ACE inhibitors and with either clinical/radiological signs of heart failure or LVEF less than 40%</td>
<td>Same as first 24 hours</td>
<td>Same as first 24 hours</td>
</tr>
<tr>
<td>Aldosterone Blockade</td>
<td>Potassium sparing diuretics: in the absence of contradictions if pulmonary congestion, or LVEF less than 40%</td>
<td>Same as first 24 hours</td>
<td>Same as first 24 hours</td>
</tr>
<tr>
<td>Nitroglycerin</td>
<td>Sublingual NTG 0.4 mg every 5 min as needed for chest pain or discomfort. Intravenous NTG for CHF, hypertension, or persistent ischemia that responds to nitrate therapy</td>
<td>Oral for ongoing ischemia or uncontrolled hypertension</td>
<td></td>
</tr>
<tr>
<td>Statins</td>
<td>Start without lipid profile</td>
<td>Same as first 24 hours</td>
<td>Indefinitely if LDL-C is 100 mg/dL or greater; titrate until LDL-C is substantially less than 100 mg/dL</td>
</tr>
<tr>
<td>Morphine Sulfate</td>
<td>Intravenous morphine sulfate 2 to 4 mg with increments of 2 to 8 mg IV at 5- to 15-min intervals as needed to control pain</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Contraindications and Cautions for Fibrinolysis in STEMI*

Absolute Contraindication

Any prior intracranial hemorrhage
Known structural cerebral vascular lesion (e.g., arteriovenous malformation)
Known malignant intracranial neoplasm (primary or metastatic)
Ischemic stroke within 3 months EXCEPT acute ischemic stroke within 3 hours
Suspected aortic dissection
Active bleeding or bleeding diathesis (excluding menses)
Significant closed-head or facial trauma within 3 months

Relative Contraindications

History of chronic, severe, poorly controlled hypertension
Severe uncontrolled hypertension on presentation (SBP greater than 180 mm Hg or DBP greater than 110 mm Hg)**
History of prior ischemic stroke greater than 3 months, dementia, or known Intracranial pathology not covered in contraindications
Traumatic or prolonged (greater than 10 minutes) CPR or major surgery (within less than 3 weeks)
Recent (within 2 to 4 weeks) internal bleeding
Non-compressible vascular punctures
For streptokinase/ anistreplase: prior exposure (more than 5 days ago) or prior allergic reaction to these agents
Pregnancy
Active peptic ulcer
Current use of anticoagulants: the higher the INR, the higher the risk of bleeding

STEMI = ST-elevation myocardial infarction; SBP = systolic blood pressure; DBP = diastolic blood pressure; INR = international normalized ratio.

*Viewed as advisory for clinical decision making and may not be all-inclusive or definitive.

**Could be an absolute contraindication in low-risk patients with STEMI.
References:

1- ACC/AHA 2007 STEMI guideline focused update.

2- 2008 ESC guideline; management of STEMI

3- Management and outcomes of Middle Eastern patients admitted with acute coronary syndromes in the Gulf Registry of Acute Coronary Events (Gulf RACE) Acta Cardiol 2009; 64:439-46
G.H.A

P.O. Box 22708
Doha, Qatar
e-mail: hg@gulfheart.org

Distributed through an educational grant from

Sanofi Aventis