ACUTE MYOCARDIAL INFARCTION

DEFINITION

Acute myocardial infarction (MI) is a manifestation of coronary heart disease due to disruption of blood flow to a portion of the myocardium resulting in ischemia or infarction. It is further classified into STEMI and NSTEMI based on clinical symptoms and ECG findings.

Clinical evidence of NSTEMI/STEMI includes a rise and/or fall of cardiac Troponin-I values with one value above the 99th percentile and at least one of the following:

1) Symptoms of myocardial ischemia
2) New ischemic ECG changes
3) Development of pathological Q waves
4) Imaging evidence of new loss of viable myocardium or new regional wall motion abnormality in a pattern consistent with an ischemic etiology
5) Identification of a coronary thrombus by angiography or autopsy.[1,2]

EVALUATION

Signs & Symptoms

Acute MI in clinical settings can be identified by the patient's history and from ECG. Classic symptoms include:

- Crushing substernal chest pain that radiates to left hand and/or jaw
- Dyspnea, lightheadedness, syncope, and diaphoresis
- Atypical symptoms most associated with female gender, older age, and patients with diabetes

Factors in the history to ask about include questions related to diabetes, hypertension, smoking habits, dyslipidemia, family history of premature coronary artery disease, history of pregnancy-induced hypertension (PIH), gestational diabetes mellitus (GDM), menopause, prior episode of ischemic heart disease, or cerebrovascular Disease (CVD).

Examination

Check for and measure vitals, non-vitals, and relevant systematic examination as outlined below:

Vitals	**Relevant Systematic Examination**
Eyeball patient for signs of respiratory distress, impending cardiogenic shock, alertness, and consciousness	Cardiovascular system: Auscultate for first, second, and third heartsounds, murmur, pericardial rub
Blood pressure	Chest: Auscultate for crackles suggesting pulmonary edema
Heart rate	Central nervous system: check for obvious focal deficit
Respiratory rate	
Other Signs	
Oxygen saturation	Time-bound actions to be taken
Check for jugular venous pressure (JVP), pedal edema, cyanosis, and anemia.	Get 12 lead ECG within 10 minutes of patient arrival Give Aspirin within 60 minutes of patient arrival

DIAGNOSIS

A 12-lead diagnostic ECG should always be conducted in patients suspected of having Acute Coronary Syndrome (ACS) within 10 minutes of arrival.

In case initial ECG is non-diagnostic, serial ECGs every 15 to 30 minutes are recommended during the first hour to detect any ischemic changes. Additional diagnostics include serial Troponin-I levels up to 3-6 hours from symptom onset and serum pro-BNP and BNP levels to determine ACS prognosis. Characteristic ECG changes include:

- ST segment elevation myocardial infarction (STEMI): New ST segment elevation in two contiguous leads in a 12 lead ECG or new bundle branch block.
- Non-ST segment elevation myocardial infarction (NSTEMI): Transient ST-elevation, ST-depression, or new T-wave inversions on 12 lead ECG in the presence of chest discomfort and other ischemic symptoms.

MANAGEMENT

The treatment goals for acute MI involve a comprehensive approach that integrates acute reperfusion therapy, pharmacological interventions, cardiac rehabilitation, risk factor modification, and psychosocial support to optimize outcomes and improve quality of life for affected individuals. Early recognition, prompt intervention, and long-term management are crucial in reducing mortality and morbidity associated with AMI.

The mainstay of acute treatment for STEMI includes early reperfusion therapy, preferably Percutaneous Coronary Intervention (PCI) and/or fibrinolytics. Analgesics such as morphine or opioids may be administered to alleviate chest pain and discomfort. Additional pharmacological agents include dual antiplatelet therapy (DAPT), beta-blockers, ACE inhibitors and statin. This helps improve cardiac function and reduces the risk of arrhythmias and recurrent ischemia. For NSTEMI, initial management is similar to acute STEMI with one exception: fibrinolytic is not indicated in this case. Upon confirming the diagnosis, it is imperative to promptly initiate treatment with dual antiplatelet therapy (DAPT) and anticoagulation in all patients, as long as there are no absolute contraindications.

Following acute interventions, cardiac rehabilitation programs are recommended to optimize recovery, improve cardiovascular fitness and reduce the risk of recurrent events. Lifestyle modifications is essential for secondary prevention and long-term management. This includes smoking cessation, adoption of a heart-healthy diet, regular physical activity, weight management, control of hypertension, diabetes, and lipid levels, as well as adherence to prescribed medications. Psychological support and long-term monitoring are essential to monitor cardiac function, assess medication efficacy and tolerability, manage comorbid conditions, and provide ongoing education and support.

For detailed management, refer to the Table of Recommendations.

1. Anderson JL, Morrow DA. Acute Myocardial Infarction. *N Engl J Med*. 2017;376(21):2053-2064. doi:10.1056/NEJMra1606915
2. Thygesen K, Alpert JS, Jaffe AS, et al. Fourth Universal Definition of Myocardial Infarction (2018). *J Am Coll Cardiol*. 2018;72(18):2231-2264. doi:10.1016/j.jacc.2018.08.1038

MANAGEMENT OF ACUTE MYOCARDIAL INFARCTION

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ACUTE MYOCARDIAL INFARCTION

Key to understanding level of evidence and strength of recommendation.

Levels of evidence (LOE)		
High level of evidence	Level A	Multiple (3-5) population risk strata evaluated
Moderate level of evidence	Level B	Limited (2-3) population risk strata evaluated
Low level of evidence	Level C	Very limited (1-2) population risk strata evaluated
Class of Recommendation		
Strong recommendation	Class I	**Benefit >>>Risk**
Moderate recommendation	Class IIa	**Benefit >>Risk**
Weak recommendation	Class IIb	**Benefit ≥Risk**
Strong recommendation - against	Class III	**Risk ≥ Benefit**

Table of Recommendations

Table 1: Non-ST-Elevation Myocardial Infarction

	Clinical Presentation
	Emergency Department Or Outpatient Facility Presentation
●	Refer patients with suspected ACS and **high-risk features** such as continuing chest pain, severe dyspnea, syncope/pre-syncope, or palpitations immediately to the **emergency department (ED)**. [Strong recommendation, low level of evidence]
	Patients with less severe symptoms can be **referred** to ED, a chest pain unit, or a facility capable of performing **adequate evaluation**. [Weak recommendation, low level of evidence]
	Diagnosis
	Clinical Assessment And Initial Evaluation
●	Stratify patients with suspected ACS based on the "**likelihood of ACS**" and "**adverse outcome(s)**" for hospitalization and treatment options. [Strong recommendation, moderate level of evidence]
	Prognosis—Early Risk Stratification
	Perform **12-lead electrocardiogram (ECG)** in patients with chest pain within 10 minutes of patient's arrival at emergency facility. [Strong recommendation, low level of evidence]
	If the initial ECG is **not diagnostic** perform **serial ECGs** to (e.g., 15- to 30-minute intervals during the first hour) detect ischemic changes. [Strong recommendation, low level of evidence]
	Obtain **serial cardiac troponin I** or **T levels** at presentation and 3 - 6 hours after symptom onset to identify a rising and/or falling pattern of values. [Strong recommendation, high level of evidence]
	Obtain additional troponin levels **beyond 6 hours** after symptom onset in patients with **normal troponin levels** on serial examination. [Strong recommendation, high level of evidence]

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	Use risk scores (TIMI, GRACE) to assess **prognosis** in patients with NSTE-ACS. [Strong recommendation, high level of evidence]
	Use risk-stratification models in **management**. [Moderate recommendation, moderate level of evidence]
	Obtain **supplemental electrocardiographic leads V7 to V9** (Posterior ECG) in patients whose initial ECG is non-diagnostic. [Moderate recommendation, moderate level of evidence]
	Continuous monitoring with 12-lead ECG (telemetry) may be a reasonable alternative in patients whose initial ECG is non-diagnostic. [Weak recommendation, moderate level of evidence]
	Consider measuring **B-type natriuretic peptide** or **N-terminal pro–B-type natriuretic peptide** to assess risk in patients with suspected ACS. [Weak recommendation, moderate level of evidence]
	Cardiac Biomarkers
	Consider the time of presentation as **time of onset** (if exact time is not known) for assessing troponin values. [Strong recommendation, high level of evidence]
	With contemporary troponin assays, creatine kinase myocardial isoenzyme (CK-MB) and myoglobin are **not** useful for diagnosis of ACS. [Strong recommendation, high level of evidence]
	Prognosis
	The presence and trend of troponin elevations are useful for **short-** and **long-term prognosis.** [Strong recommendation, moderate level of evidence]
	B-type natriuretic peptide, provide **additional prognostic** information. [Weak recommendation, moderate level of evidence]
	Treatment And Management
	Discharge From The Emergency Department Or Chest Pain Unit
	It is reasonable to observe patients with symptoms consistent with ACS in a chest pain or telemetry unit for **serial ECGs** and **cardiac troponin** at 3- 6-hour intervals. [Moderate recommendation, moderate level of evidence]
	Get a **treadmill ECG** in patients with suspected ACS and have normal serial ECGs and cardiac troponins. [Moderate recommendation, high level of evidence]
	Get a **stress myocardial perfusion imaging,** or **stress echocardiography** before discharge or within 72 hours after discharge. [Moderate recommendation, moderate level of evidence]
	Get **coronary computed tomography angiography (CCTA)** to assess coronary artery anatomy in patients with possible ACS and a normal ECG, normal cardiac troponins, and no prior history of CAD. [Moderate recommendation, high level of evidence] A **resting myocardial perfusion imaging** with a technetium-99m radiopharmaceutical to exclude myocardial ischemia. [Moderate recommendation, moderate level of evidence]
	Refer low-risk patients for outpatient testing, give **daily aspirin**, **short-acting nitroglycerin**, and other medication if appropriate (e.g., beta blockers) and instructions about activity level and clinician follow-up. [Moderate recommendation, low level of evidence]
	Cholesterol Management
	High-intensity statin therapy in all patients with NSTE-ACS and no contraindications to its use. [Strong recommendation, high level of evidence]
	Fasting lipid profile in patients with NSTE-ACS, preferably within 24 hours of

	presentation. [Moderate recommendation, low level of evidence]
	Initial Antiplatelet/Anticoagulant Therapy In Patients With Definite Or Likely Non-ST Elevation-Acute Coronary Syndrome (NSTE-ACS)
	A **non–enteric-coated, chewable aspirin** (162 mg to 325 mg, [we have 300 mg Disprin]) is recommended to all patients with NSTE-ACS without contraindications as soon as possible after presentation and a **maintenance dose of aspirin** (81 mg/d to 325 mg/d should be continued **indefinitely** (we have 75mg Ascard and 81 mg available in Pakistan). [Strong recommendation, high level of evidence]
	A **loading dose** of **clopidogrel** (300-600 mg) is recommended, followed by a daily **maintenance dose** in patients with NSTE-ACS who are unable to take aspirin because of hypersensitivity or major gastrointestinal intolerance. [Strong recommendation, moderate level of evidence]
	A **P2Y12 inhibitor** (either clopidogrel or ticagrelor) in addition to aspirin up to 12 months is recommended to all patients with NSTE-ACS without contraindications who are treated with either an **early invasive** (Cardiac catheterization and revascularization) or **ischemia-guided strategy** (stress test followed by revascularization). Options include: • Clopidogrel: 300-600-mg loading dose, then 75mg daily. [Strong recommendation, moderate level of evidence] • Ticagrelor: 180-mg loading dose, then 90 mg twice daily. [Strong recommendation, moderate level of evidence]
	It is reasonable to use ticagrelor in preference to clopidogrel in patients with NSTE-ACS. [Moderate recommendation, moderate level of evidence]
	A **glycoprotein (GP) IIb/IIIa inhibitor** as part of initial antiplatelet therapy in patients with NSTE- ACS can be considered in **emergency unit** who are treated with an **early invasive strategy** and **dual antiplatelet therapy (DAPT)** with intermediate/high-risk features. Preferred options are eptifibatide or tirofiban. [Weak recommendation, moderate level of evidence]
	Initial Parenteral Anticoagulant Therapy In Patients With Definite Non-ST Elevation- Acute Coronary Syndrome (NSTE-ACS)
	Treatment options include: • **Enoxaparin**: 1 mg/kg subcutaneous (SC) every **12 hours** (reduce dose to 1 mg/kg SC once daily in patients with creatinine clearance <30 mL/min), continue for **duration of hospitalization** or until **percutaneous coronary intervention** is performed. An initial intravenous loading dose of 30 mg has been used in selected patients. [Strong recommendation, high level of evidence] • **Fondaparinux**: 2.5 mg SC daily, continue for **duration of hospitalization** or until **PCI** is performed. [Strong recommendation, moderate level of evidence] • **UFH IV**: Initial loading dose of 60 IU/kg (maximum 4,000 IU). Further maintenance dose is as per activated partial thromboplastin time at in patient unit. [Strong recommendation, moderate level of evidence]
	Do not give intravenous fibrinolytic therapy (Streptokinase or Tissue plasminogen activator) in patients with NSTE-ACS (i.e., without ST-elevation, true posterior MI, or left bundle-branch block not known to be old). [Strong recommendation, high level of evidence]
	Post Percutaneous Coronary Intervention (PCI), Oral And Intravenous

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	Antiplatelet Agents
	Continue **DAPT** (Aspirin and P2Y12 inhibitor) **beyond 12 months** in patients undergoing stent implantation. [Weak recommendation, low level of evidence]
	Do not administer Prasugrel to patients with a **prior history** of stroke or transient ischemic attack. [Strong recommendation, moderate level of evidence]
	The recommended maintenance dose of aspirin to be used with **ticagrelor** is 81 mg daily. *(We have 75 and 81 mg available in Pakistan)*
	Medical Regimen At Discharge
	Continue medications required in hospital to control ischemia after hospital discharge in patients with NSTE-ACS who **do not** undergo coronary revascularization, patients with **incomplete** (culprit only) or **unsuccessful** (failed) revascularization, and patients with recurrent symptoms after revascularization. Titration of the doses may be required. [Strong recommendation, low level of evidence]
	All patients who are post-NSTE-ACS should be given **sublingual** or **spray nitroglycerin** with verbal and written instructions for its use. [Strong recommendation, low level of evidence]
	Late Hospital And Post Hospital Oral Antiplatelet Therapy
	Continue Aspirin **indefinitely**. The **maintenance dose** should be 81 mg daily in patients treated with ticagrelor and 81 mg to 325 mg daily in all other patients. [Strong recommendation, high level of evidence]
	In addition to aspirin, continue a **P2Y12 inhibitor** (either clopidogrel or ticagrelor) for up to 12 months in all patients with NSTE-ACS without contraindications who are treated with an **ischemia-guided strategy**. Options include: • Clopidogrel: 75 mg daily. [Strong recommendation, moderate level of evidence] • Ticagrelor: 90 mg twice daily. [Strong recommendation, moderate level of evidence]
	In patients receiving a **stent** during PCI for NSTE-ACS, give **P2Y12 inhibitor** therapy for at least 12 months. Options include: • Clopidogrel: 75 mg daily. [Strong recommendation, moderate level of evidence] or • Ticagrelor: 90 mg twice daily. [Strong recommendation, moderate level of evidence]
	Use an **aspirin maintenance dose** of 81 mg per day in preference to higher maintenance doses in patients with NSTE-ACS treated either **invasively** or with **coronary stent implantation**. [Moderate recommendation, moderate level of evidence]
	Use **ticagrelor** in preference to clopidogrel for maintenance P2Y12 treatment in patients with NSTE-ACS who undergo an **early invasive** or **ischemia-guided strategy**. [Moderate recommendation, moderate level of evidence]
	It is reasonable to **discontinue** P2Y12 inhibitor therapy after stent implantation, (e.g., <12 months) if risk of morbidity from **bleeding** outweighs anticipated benefit. [Moderate recommendation, low level of evidence]
	Continue **DAPT beyond 12 months** in patients undergoing stent implantation. [Weak recommendation, low level of evidence]
	Combined Oral Anticoagulant Therapy And Antiplatelet Therapy (Triple Antithrombotic Therapy) In Patients With Non-ST Elevation-Acute Coronary Syndrome (NSTE-ACS)
	Minimize duration of **triple antithrombotic therapy** with a vitamin K antagonist, aspirin, and a P2Y12 receptor inhibitor in patients with NSTE-ACS to **limit risk of bleeding**.

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	[Strong recommendation, low level of evidence]
	It is recommended to prescribe **proton pump inhibitors** in patients with NSTE-ACS with **history** of gastrointestinal bleeding requiring triple antithrombotic therapy. [Strong recommendation, low level of evidence]
	It is reasonable to use proton pump inhibitor in patients with NSTE-ACS **without a known history** of gastrointestinal bleeding requiring triple antithrombotic therapy. [Moderate recommendation, low level of evidence]
	A **lower target** of international normalized ratio (e.g., 2.0 to 2.5) is considered in patients with NSTE-ACS requiring triple antithrombotic therapy. [Weak recommendation, low level of evidence]
	Prevention And Screening
	Risk Reduction Strategies For Secondary Prevention
	Refer eligible patients with NSTE-ACS to a **comprehensive** cardiovascular rehabilitation program. [Strong recommendation, moderate level of evidence]
	Offer **pneumococcal vaccine** to patients 65 years of age and older and in high-risk patients with cardiovascular disease. [Strong recommendation, moderate level of evidence]
	Educate patients about **appropriate cholesterol management**, blood pressure (BP), smoking cessation, and lifestyle management. [Strong recommendation, low level of evidence]
	It is recommended to **counsel patients** who have undergone PCI or CABG that revascularization does not obviate the need for lifestyle changes. [Strong recommendation, low level of evidence]
	Assess patient's need for treatment of **chronic musculoskeletal discomfort** before discharge. **Avoid NSAIDs**. Begin with acetaminophen, non-acetylated salicylates, tramadol, or small doses of narcotics if these medications are not adequate. [Strong recommendation, low level of evidence]
	Nonselective NSAIDs, such as naproxen is reasonable to use if initial therapy as stated above fails. [Moderate recommendation, low level of evidence]
	Consider NSAIDs with increasing degrees of relative **cyclooxygenase-2 selectivity** for pain relief in situations in which intolerable discomfort persists despite above therapy. In all cases, use of the **lowest effective doses** for the shortest possible time is encouraged. [Weak recommendation, low level of evidence]
	Avoid use of antioxidant vitamin supplements (e.g., vitamins E, C, or beta carotene) for **secondary prevention** in patients with NSTE-ACS. [Strong recommendation, high level of evidence]
	Folic acid, with or without vitamins B6 and B12, should **not** be used for **secondary prevention** in patients with NSTE-ACS. [Strong recommendation, high level of evidence]
	Avoid Hormone therapy with estrogen plus progestin, or estrogen alone, as new drugs for **secondary prevention of coronary events** to **postmenopausal women** after NSTE-ACS and do not continue in previous users unless benefits outweigh risks. [Strong recommendation, high level of evidence]
	Comprehensive Post Hospital Plan Of Care For Patients With Non-ST Elevation-Acute Coronary Syndrome
	A post hospital systems of care designed to prevent **hospital readmissions** and facilitate transition to effective, coordinated **outpatient care** for all patients with NSTE-ACS is recommended. [Strong recommendation, moderate level of evidence]
	An **evidence-based plan of care** (e.g., GDMT) including medication adherence, timely follow-up with the healthcare team, appropriate dietary and physical activities, and

	compliance with interventions for secondary prevention to patients with NSTE-ACS is recommended. [Strong recommendation, low level of evidence]
	Specific instruction on **activities** such as lifting, climbing stairs, yard work, and household activities that are permissible and those to avoid in addition to detailed instructions for daily exercise is recommended. Specific mention should be made of resumption of driving, return to work, and sexual activity. [Strong recommendation, moderate level of evidence]
	An **annual influenza vaccination** for patients with cardiovascular disease is recommended. [Strong recommendation, low level of evidence]
	Special Patient Groups Recommendations
	NSTE-ACS In Older Patients ≥ 75 Years
	Treat patients with NSTE-ACS, with **Guideline Directed Medical Therapy**, an early invasive strategy, and revascularization as appropriate. [Strong recommendation, high level of evidence]
	Provide **individualized pharmacotherapy** and **adjust dose** by weight and/or CrCl to reduce adverse events caused by age-related changes in pharmacokinetics/dynamics, volume of distribution, comorbidities, drug interactions, and increased drug sensitivity. [Strong recommendation, high level of evidence]
	It is recommended to have **patient centered management decisions**. Keeping in front patient preferences/ goals, comorbidities, functional and cognitive status, and life expectancy. [Strong recommendation, moderate level of evidence]
	Diabetes Mellitus
	Medical treatment, decisions to perform stress testing, angiography, and revascularization is **similar** in patients with and without diabetes mellitus. [Strong recommendation, high level of evidence]
	Post–Coronary Artery Bypass Graft
	Offer **antiplatelet** and **anticoagulant therapy** according to GDMT and consider them for early invasive strategy in patients with prior CABG and NSTE-ACS because of their increased risk. [Strong recommendation, moderate level of evidence]
	Perioperative Non ST Elevation-Acute Coronary Syndrome Related To Non-Cardiac Surgery
	Similar GDMT as recommended for patients in the **general population** is advised but with modifications based on specific non-cardiac surgical procedure and the severity of NSTE-ACS. [Strong recommendation, low level of evidence]
	Chronic Kidney Disease
	It is recommended to **estimate CrCl** and **adjust doses** of renally cleared medications according to the pharmacokinetic data for specific medications. [Strong recommendation, moderate level of evidence]
	Women
	Offer early invasive strategy to **women** with NSTE-ACS and **high-risk features** (e.g., troponin positive). [Strong recommendation, high level of evidence]
	It is reasonable to offer myocardial revascularization to **pregnant women** if an ischemia-guided strategy is ineffective for management of life-threatening complications. [Moderate recommendation, low level of evidence]
	Do not offer early invasive treatment to women with NSTE-ACS and low-risk features, because of the lack of benefit and the possibility of harm. [Strong recommendation, moderate level of evidence]-

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	Anemia, Bleeding, And Transfusion
	Evaluate all patients with NSTE-ACS for **risk of bleeding** baseline and periodically. [Strong recommendation, low level of evidence]
	Use **weight-based anticoagulant** and **antiplatelet therapy** where appropriate and adjust when necessary for CKD to decrease risk of bleeding in patients. [Strong recommendation, moderate level of evidence]
	Avoid routine **blood transfusion** in hemodynamically stable patients with NSTE-ACS and hemoglobin levels greater than 8 g/dL. [Strong recommendation, moderate level of evidence]
	Cocaine And Methamphetamine User
	Treat patients with NSTE-ACS and recent history of **cocaine or methamphetamine use** same as patients **without** cocaine- or methamphetamine related NSTE-ACS. Avoid use of beta-blockers alone in patients with signs of acute intoxication (e.g., euphoria, tachycardia, and/ or hypertension). [Strong recommendation, low level of evidence]
	It is reasonable to manage hypertension and tachycardia in patients with NSTE-ACS and signs of **acute cocaine or methamphetamine** intoxication with **benzodiazepines** alone or in combination with **nitroglycerin**. [Moderate recommendation, low level of evidence]
	In patients with ACS with a **recent history** of **cocaine or methamphetamine use** who demonstrate signs of acute intoxication due to the risk of potentiating coronary spasm, **do not administer beta blockers**. [Strong recommendation, low level of evidence]
	Vasospastic (Prinzmetal) Angina
	CCBs alone or in combination with **long-acting nitrates** are useful to treat and reduce the frequency of vasospastic angina. [Strong recommendation, moderate level of evidence]

Key to understanding level of evidence and strength of recommendation.

Levels of evidence (LOE)		
High level of evidence	Level A	Multiple (3-5) population riskstrata evaluated
Moderate level of evidence	Level B	Limited (2-3) population riskstrata evaluated
Low level of evidence	Level C	Very limited (1-2) populationrisk strata evaluated.
Class of Recommendation		
Strong recommendation	Class I	**Benefit >>>Risk**
Moderate recommendation	Class IIa	**Benefit >>Risk**
Weak recommendation	Class IIb	**Benefit ≥Risk**
Strong recommendation – against	Class III	**Risk ≥ Benefit**

Table of Recommendations

Table 2: ST-Elevation Myocardial Infraction

	Treatment And Management
	Regional Systems Of ST Elevation Myocardial Infarction (NSTEMI) Care, Reperfusion Therapy, And Time-To-Treatment Goals
	Perform a **12-lead electrocardiogram (ECG)** at the site of first medical contact (FMC) in patients with symptoms consistent with STEMI. [Strong recommendation, moderate level of evidence]
	Administer reperfusion therapy to all eligible patients with STEMI with symptom onset within the prior 12 hours. [Strong recommendation, high level of evidence]
	Perform primary PCI in a timely manner by experienced operators. [Strong recommendation, high level of evidence]
	At a PCI capable hospital for primary PCI for patients with STEMI, an ideal FMC-to-device time goal of **90 minutes or less (Door to Balloon time).** [Strong recommendation, moderate level of evidence]
	At a "**non–PCI-capable hospital,"** for primary PCI immediately transfer to PCI capable hospital but with an FMC-to-device time goal of 120 minutes or less (Door to Balloon time). [Strong recommendation, moderate level of evidence]
	Administer fibrinolytic therapy, in the absence of contraindications, to patients with STEMI at non–PCI-capable hospitals when the anticipated FMC-to-device time at a PCI capable hospital exceeds 120 minutes because of unavoidable delays. [Strong recommendation, moderate level of evidence]
	When fibrinolytic therapy is indicated or chosen as the primary reperfusion strategy, administer within **30 minutes of hospital arrival.** [Strong recommendation, moderate level of evidence]
	Reperfusion therapy is "reasonable" in STEMI and symptom **onset more than 12 hours**, but they have clinical (symptoms of angina) and/or ECG evidence (dynamic ECG changes) of ongoing ischemia.

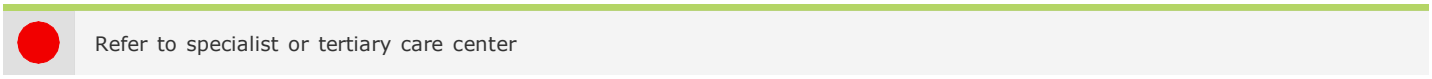
	Primary PCI is preferred over thrombolysis. [Moderate recommendation, moderate level of evidence]
	Evaluation And Management Of Patients With ST Elevation Myocardial Intervention (NSTEMI) And Out-Of-Hospital Cardiac Arrest
	Therapeutic hypothermia is recommended as soon as possible in comatose patients with STEMI and out-of-hospital cardiac arrest caused by ventricular fibrillation or pulseless ventricular tachycardia, including patients who undergo primary PCI. [Strong recommendation, moderate level of evidence] Immediate angiography and PCI are recommended in resuscitated out-of-hospital cardiac arrest patients with STEMI. [Strong recommendation, moderate level of evidence]
	Antiplatelet Therapy To Support Primary Percutaneous Coronary Intervention (PCI) For ST Elevation Myocardial Infarction (STEMI)
	Aspirin 162 to 325 mg before primary PCI [Strong recommendation, moderate level of evidence] and **continue indefinitely after PCI**. [Strong recommendation, high level of evidence] **Loading dose of a P2Y12 receptor inhibitor** as early as possible or at time of primary PCI. Options include: **Clopidogrel 600 mg** [Strong recommendation, moderate level of evidence] **Prasugrel 60 mg** [Strong recommendation, moderate level of evidence] **Ticagrelor 180 mg**. [Strong recommendation, moderate level of evidence]
	Continue **P2Y12 inhibitor therapy** for 1 year to patients with STEMI who receive a stent (bare-metal or drug-eluting) using following maintenance doses: Clopidogrel 75 mg daily [Strong recommendation, moderate level of evidence] Ticagrelor 90 mg twice a day [Strong recommendation, moderate level of evidence]
	81 mg of aspirin once daily is preferred **over higher maintenance doses** after primary PCI. [Moderate recommendation, moderate level of evidence]
	Use of P2Y12 inhibitor beyond 1 year in patients undergoing **drug-eluting stent placement** can be considered. [Weak recommendation, low level of evidence]
	Reperfusion At A Non–Percutaneous Coronary Intervention (PCI)-Capable Hospital
	Fibrinolytic Therapy When There Is An Anticipated Delay To Performing Primary PCI Within 120 Minutes Of First Medical Contact (FMC)
	In the absence of contraindications, give fibrinolytic therapy to patients with STEMI and onset of ischemic symptoms within the previous 12 hours when it is anticipated that primary PCI cannot be performed **within 120 minutes of FMC**. [Strong recommendation, high level of evidence]
	In the absence of contraindications and when PCI is not available, **fibrinolytic therapy** is reasonable to be administered in STEMI if there is clinical and/or electrocardiographic evidence of ongoing ischemia within 12 to 24 hours of symptom onset and a large area of myocardium is at risk or is hemodynamic instability. [Moderate recommendation, low level of evidence]
	Do not administer fibrinolytic therapy to patients with ST depression except when a true posterior (inferobasal) STEMI is suspected (perform ECG with LEAD V7-V9 as posterior ECG leads) or when associated with ST elevation in lead aVR. [Strong recommendation, moderate level of evidence]
	Adjunctive Antithrombotic Therapy With Fibrinolysis
	Give Aspirin (162- to 325-mg loading dose) and clopidogrel (300-mg loading dose for patients **up to 75 years of age** (risk of bleeding is more after 75 years of age)) with STEMI who receive fibrinolytic therapy. [Strong recommendation, high level of evidence]
	Continue aspirin indefinitely. [Strong recommendation, high level of evidence] Give clopidogrel (75 mg daily) with aspirin for **at least 14 days** [Strong recommendation, high level of evidence] however, it may be **continued up to 1 year,** [Strong recommendation, low level of evidence] in STEMI after fibrinolysis
	It is reasonable to use aspirin 81 mg per day in preference to **higher maintenance doses** after fibrinolytic therapy.

	[Moderate recommendation, moderate level of evidence]
	Transfer To A Percutaneous Coronary Intervention (PCI) -Capable Hospital After Fibrinolytic Therapy
	Immediate transfer to a PCI-capable hospital for coronary angiography for suitable patients with STEMI who develop cardiogenic shock or acute severe HF, irrespective of the **time delay** from **MI onset.** [Strong recommendation, moderate level of evidence]
	Urgent transfer to a PCI-capable hospital for coronary angiography is reasonable for STEMI after **failed reperfusion/reclusion** after fibrinolytic therapy. [Moderate recommendation, moderate level of evidence]
	It is reasonable to transfer STEMI to a PCI-capable hospital for coronary angiography after fibrinolytic therapy even if the hemodynamic are stable and there is clinical evidence of **successful reperfusion** (resolution of chest pain) **Angiography** can be performed ideally within 24 hours but should not be performed within the first 2 to 3 hours after administration of fibrinolytic therapy. [Moderate recommendation, moderate level of evidence]
	Antiplatelet Therapy To Support Percutaneous Coronary Intervention (PCI) After Fibrinolytic Therapy
	Continue **Aspirin indefinitely.** [Strong recommendation, high level of evidence]
	Provide clopidogrel as follows: **300-mg loading dose** before or at the time of PCI to those who did not receive a previous loading dose and are undergoing PCI within 24 hours of receiving fibrinolytic therapy. [Strong recommendation, low level of evidence] **600-mg loading dose** before or at the time of PCI to patients who did not receive a previous loading dose and who are undergoing PCI more than 24 hours after receiving fibrinolytic therapy [Strong recommendation, low level of evidence] **75 mg daily** should be given after PCI. [Strong recommendation, low level of evidence] Use **81 mg of aspirin per day** in preference to higher maintenance doses. [Moderate recommendation, moderate level of evidence]
	Routine Medical Therapies
	Beta Blockers
	Initiate oral beta blockers in first 24 hours in patients with STEMI who do not have any of the following: • Signs of Heart Failure • Evidence of a low-cardiac output state • Increased risk for cardiogenic shock • Contraindications to use of oral beta blockers (PR interval more than 0.24 seconds, second- or third-degree heart block, active asthma, or reactive airways disease). [Strong recommendation, moderate level of evidence]
	Continue beta blockers during and after hospitalization for all patients with STEMI and with no contraindications to their use. [Strong recommendation, moderate level of evidence]
	Reevaluate patients with initial contraindications to the use of beta blockers in the first 24 hours after STEMI to determine their subsequent eligibility before discharge. [Strong recommendation, low level of evidence]
	It is reasonable to **administer intravenous beta blockers** at time of presentation to patients with STEMI and no contraindications to their use who are hypertensive or have ongoing ischemia. [Moderate recommendation, moderate level of evidence]
	Renin-Angiotensin-Aldosterone System Inhibitors
	Administer ACE inhibitor **within the first 24 hours** to all patients with STEMI with anterior wall location, HF, or ejection fraction less than or equal to 0.40 (40%), unless contraindicated. [Strong recommendation, high level of evidence]
	Give an **angiotensin receptor blocker (ARB)** to patients with STEMI who are intolerant of

	angiotensin-converting enzyme inhibitors. [Strong recommendation, moderate level of evidence]
	Use an **aldosterone antagonist** in patients with STEMI and no contraindications and they are already receiving an angiotensin-converting enzyme inhibitor and beta blocker and have an ejection fraction less than or equal to 0.40(40%) and either symptomatic HF or diabetes mellitus. [Strong recommendation, moderate level of evidence]
	ACE inhibitors are reasonable for all patients with STEMI and no contraindications to their use. [Moderate recommendation, high level of evidence]
	Lipid Management
	Initiate or continue (if already taking) **high-intensity statin therapy** in all patients with STEMI and no contraindications to its use. [Strong recommendation, moderate level of evidence]
	Obtain a **fasting lipid profile** in patients with STEMI, preferably within 24 hours of presentation. [Moderate recommendation, low level of evidence]
	Anticoagulation
	Anticoagulant therapy with a vitamin K antagonist is recommended to patients with STEMI and below clinical situations: Atrial fibrillation with CHADS2# score greater than or equal to 2 Mechanical heart valves Venous thromboembolism Hypercoagulable disorder [Strong recommendation, low level of evidence]
	Minimize duration of **triple-antithrombotic therapy** (vitamin K antagonist, aspirin, and a P2Y12 receptor inhibitor) to limit the risk of bleeding. [Strong recommendation, low level of evidence]
	Anticoagulant therapy with a vitamin K antagonist is reasonable for patients with STEMI and asymptomatic (absence of systemic embolization) LV thrombi. [Moderate recommendation, low level of evidence]
	Anticoagulant therapy in patients with STEMI and anterior apical akinesis or dyskinesis can be considered. [Weak recommendation, low level of evidence]
	A lower target of **international normalized ratio (e.g., 2.0 to 2.5)** is considered in patients with STEMI requiring triple antithrombotic therapy. [Weak recommendation, low level of evidence]
	Post-Hospitalization Plan Of Care Recommendations In ST Elevation Myocardial Infarction (STEMI)
	A **post hospital system of care** is recommended to prevent hospital readmissions and facilitate transition to effective, coordinated "outpatient care" for all patients with STEMI. [Strong recommendation, moderate level of evidence]
	Exercise-based cardiac rehabilitation and **secondary prevention program** is recommended to patients with STEMI. [Strong recommendation, moderate level of evidence]
	At discharge and in outpatient care provide a clear and detailed, evidence-based plan of care about following aspects: Medication adherence **Timely follow-up** with healthcare team Appropriate diet and physical activities Compliance with interventions for secondary prevention (as above stated a-c) [Strong recommendation, low level of evidence]
	Encourage and advise to **stop smoking** and to **avoid second-hand smoke** to patients with STEMI. [Strong recommendation, high level of evidence]

Note: Due to resource limitations, some recommendations in the guidelines may not be universally applicable.

KEY



ACRONYMS AND ABBREVIATIONS

ACS	Acute Coronary Syndrome	JVP	Jugular Venous Pressure
CCB	Calcium Channel Blockers	HF	Heart Failure
CrCl	Creatinine Clearance	NSTEMI	Non-ST Elevation Myocardial Infarction
CABG	Coronary Artery Bypass Graft Surgery	PCI	Percutaneous Coronary Intervention
CAD	Coronary Artery Disease	PIH	Pregnancy Induced Hypertension
ECG	Electrocardiogram	STEMI	ST Elevation Myocardial Infarction
FMC	First Medical Contact		
GDMT	Guideline-Directed Medical Therapy		

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