

2017 ESC Guidelines for the management of acute myocardial infarction in patients presenting with ST-segment elevation

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The Task Force for the management of acute myocardial infarction in patients presenting with ST-segment elevation of the European Society of Cardiology

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Classes of recommendations

Classes of recommendations	Definition	Suggested wording to use
Class I	Evidence and/or general agreement that a given treatment or procedure is beneficial, useful, effective.	Is recommended/ is indicated.
Class II	Conflicting evidence and/or a divergence of opinion about the usefulness/efficacy of the given treatment or procedure.	
<i>Class IIa</i>	<i>Weight of evidence/opinion is in favour of usefulness/efficacy.</i>	Should be considered.
<i>Class IIb</i>	<i>Usefulness/efficacy is less well established by evidence/opinion.</i>	May be considered.
Class III	Evidence or general agreement that the given treatment or procedure is not useful/effective, and in some cases may be harmful.	Is not recommended.

Level of evidence

Level of evidence A	Data derived from multiple randomized clinical trials or meta-analyses.
Level of evidence B	Data derived from a single randomized clinical trial or large non-randomized studies.
Level of evidence C	Consensus of opinion of the experts and/or small studies, retrospective studies, registries.

What is new in 2017 Guidelines on AMI-STEMI

2012	CHANGE IN RECOMMENDATIONS	2017
	Radial access	MATRIX
	DES over BMS	EXAMINATION, COMFORTABLE-AMI, NORSTENT
	Complete Revascularisation	PRAMI, DANAMI-3-PRIMULTI, CVLPRIT, Compare-Acute
	Thrombus Aspiration	TOTAL, TASTE
	Bivalirudin	MATRIX, HEAT-PPCI
	Enoxaparin	ATOLL, Meta-analysis
	Early Hospital Discharge	Small trials & observational data
Oxygen when SaO ₂ <95%	OXYGEN	Oxygen when SaO ₂ <90% AVOID, DETO2X
Same dose i.v. in all patients	TNK-tPA	Half dose i.v. in Pts ≥75 years STREAM

What is new in 2017 Guidelines on AMI-STEMI (continued)

2017 NEW RECOMMENDATIONS

- Additional lipid lowering therapy if LDL >1.8 mmol/L (70 mg/dL) despite on maximum tolerated statins. **IMPROVE-IT, FOURIER**
- Complete revascularization during index primary PCI in STEMI patients in shock. Expert opinion
- Cangrelor if P2Y₁₂ inhibitors have not been given. **CHAMPION**
- Switch to potent P2Y₁₂ inhibitors 48 hours after fibrinolysis. Expert opinion
- Extend Ticagrelor up to 36 months in high-risk patients. **PEGASUS-TIMI 54**
- Use of polypill to increase adherence. **FOCUS**
- Routine use of deferred stenting. **DANAMI 3-DEFER**

I

IIa

IIb

III

What is new in 2017 Guidelines on AMI-STEMI (continued)

2017 NEW / REVISED CONCEPTS

MINOCA AND QUALITY INDICATORS:

- New chapters dedicated to these topics.

STRATEGY SELECTION AND TIME DELAYS:

- Clear definition of first medical contact (FMC).
- Definition of “time 0” to choose reperfusion strategy (i.e. the strategy clock starts at the time of “STEMI diagnosis”).
- Selection of PCI over fibrinolysis: when anticipated delay from “STEMI diagnosis” to wire crossing is ≤ 120 min.
- Maximum delay time from “STEMI diagnosis” to bolus of fibrinolysis agent is set in 10 min.
- “Door-to-Balloon” term eliminated from guidelines.

TIME LIMITS FOR ROUTINE OPENING OF AN IRA:

- 0-12h (Class I); 12-48h (Class IIa); >48h (Class III).

ELECTROCARDIOGRAM AT PRESENTATION:

- Left and right bundle branch block considered equal for recommending urgent angiography if ischaemic symptoms.

TIME TO ANGIOGRAPHY AFTER FIBRINOLYSIS:

- Timeframe is set in 2-24h after successful fibrinolysis.

PATIENTS TAKING ANTICOAGULANTS:

- Acute and chronic management presented.

Initial diagnosis

Recommendations	Class	Level
ECG monitoring		
12-lead ECG recording and interpretation is indicated as soon as possible at the point of FMC, with a maximum target delay of 10 min.	I	B
ECG monitoring with defibrillator capacity is indicated as soon as possible in all patients with suspected STEMI.	I	B
The use of additional posterior chest wall leads (V7–V ₉) in patients with high suspicion of posterior myocardial infarction (circumflex occlusion) should be considered.	IIa	B
The use of additional right precordial leads (V ₃ R and V ₄ R) in patients with inferior myocardial infarction should be considered to identify concomitant RV infarction.	IIa	B
Blood sampling		
Routine blood sampling for serum markers is indicated as soon as possible in the acute phase but should not delay reperfusion treatment.	I	C

Atypical electrocardiographic presentations

Bundle branch block

Criteria that can be used to improve the diagnostic accuracy of STEMI in LBBB:

- Concordant ST-segment elevation ≥ 1 mm in leads with a positive QRS complex
- Concordant ST-segment depression ≥ 1 mm in V_1 - V_3
- Discordant ST-segment elevation ≥ 5 mm in leads with a negative QRS complex

The presence of RBBB may confound the diagnosis of STEMI.

Ventricular paced rhythm

During RV pacing, the ECG also shows LBBB and the above rules also apply for the diagnosis of myocardial infarction during pacing; however, they are less specific.

Atypical electrocardiographic presentations (continued)

Isolated posterior myocardial infarction

Isolated ST depression ≥ 0.5 mm in leads V_1 – V_3 and ST-segment elevation (≥ 0.5 mm) in posterior chest wall leads V_7 – V_9

Ischaemia due to left main coronary artery occlusion or multivessel disease

ST depression ≥ 1 mm in eight or more surface leads, coupled with ST-segment elevation in aVR and/or V_1 , suggests left main-, or left main equivalent- coronary obstruction, or severe three vessel ischaemia.

Relief of hypoxaemia and symptoms

Recommendations	Class	Level
Hypoxia		
Oxygen is indicated in patients with hypoxaemia (SaO ₂ <90% or PaO ₂ <60 mmHg).	I	C
Routine oxygen is not recommended in patients with SaO ₂ ≥90%.	III	B
Symptoms		
Titrated i.v. opioids should be considered to relieve pain.	Ila	C
A mild tranquillizer (usually a benzodiazepine) should be considered in very anxious patients.	Ila	C

Cardiac arrest

Recommendations	Class	Level
A primary PCI strategy is recommended in patients with resuscitated cardiac arrest and an ECG consistent with STEMI.	I	B
Targeted temperature management is indicated early after resuscitation of cardiac arrest patients who remain unresponsive.	I	B
It is indicated that healthcare systems implement strategies to facilitate transfer of all patients in whom a myocardial infarction is suspected directly to the hospital offering 24/7 PCI-mediated reperfusion therapy via one specialized EMS.	I	C

Cardiac arrest

Recommendations	Class	Level
It is indicated that all medical and paramedical personnel caring for suspected myocardial infarction have access to defibrillation equipment and are trained in basic cardiac life support.	I	C
Urgent angiography (and PCI if indicated) should be considered in patients with resuscitated cardiac arrest without diagnostic ST-segment elevation but with a high suspicion of ongoing myocardial ischaemia.	IIa	C
Prehospital cooling using a rapid infusion of large volumes of cold i.v. fluid immediately after return of spontaneous circulation is not recommended.	III	B

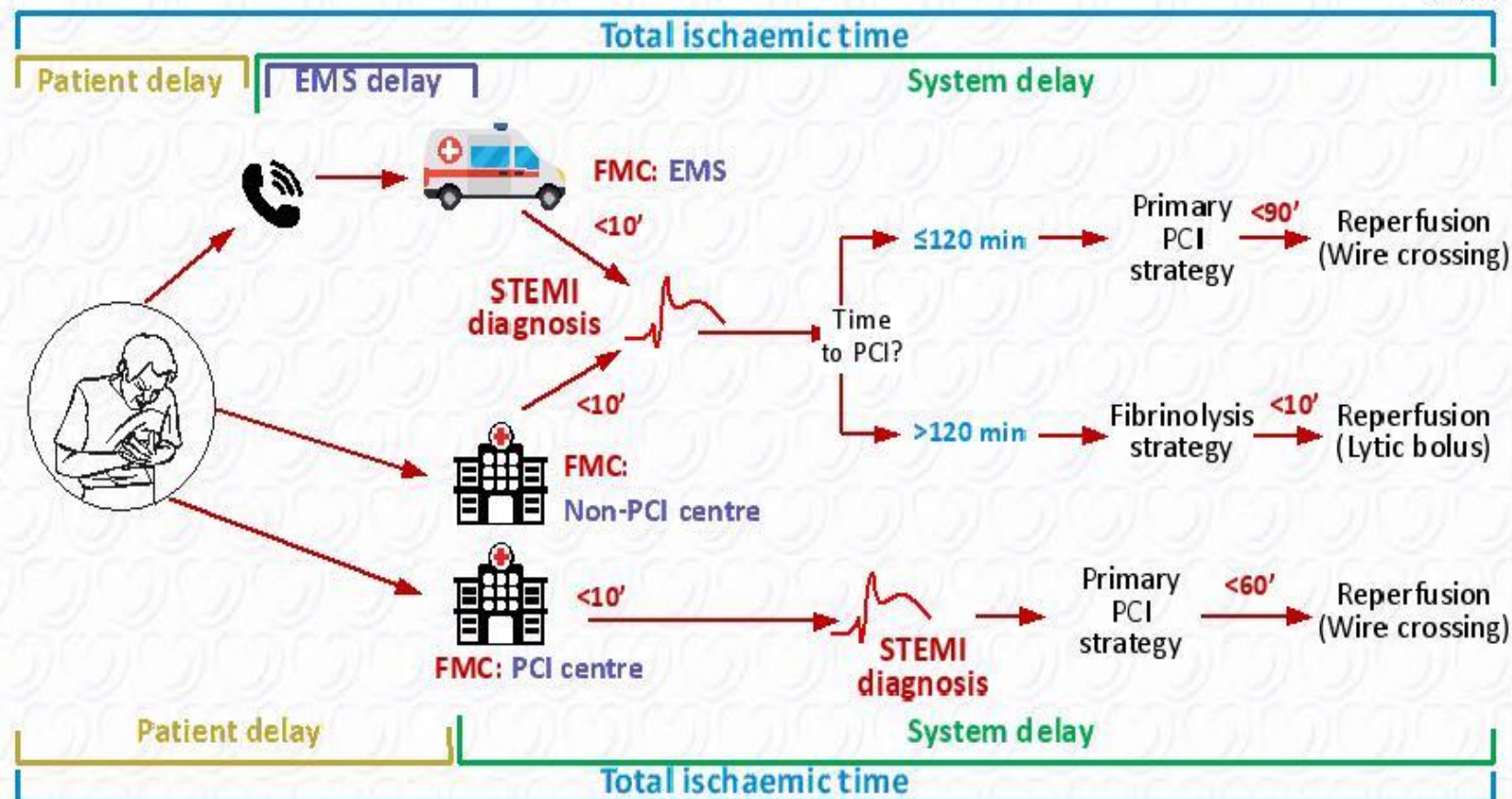
Survival at 90 days, the Coronary Angiography After Cardiac Arrest Trial (COACT) primary end point, was similar at about 66% in both the immediate- and delayed-cath groups. And there was no significant difference in the secondary end point of neurologic status at intensive-care-unit (ICU) discharge..

Even so, there were signs that immediate angiography came at the cost of a significant 16% delay in time to achieving target body temperature during induced hypothermia.

Sending such patients right to the cath lab "we now know will not improve outcomes, and we saw that it delays a treatment that is one of the cornerstones of treating post-cardiac-arrest patients," Jorrit S. Lemkes, MD, Amsterdam University Medical Centre, told theheart.org | Medscape Cardiology.

"Routine immediate angiography in this patient population is not necessary," Lemkes said. "We might have to decide not to send them to the cath lab, but send them right to the ICU for target-temperature management. I think that's an important finding."

Modes of patient presentation, components of ischaemic time and flowchart for reperfusion strategy selection



Logistics of prehospital care

Recommendations	Class	Level
It is recommended that the prehospital management of STEMI patients is based on regional networks designed to deliver reperfusion therapy expeditiously and effectively, with efforts made to make primary PCI available to as many patients as possible.	I	B
It is recommended that primary PCI-capable centres deliver a 24/7 service and are able to perform primary PCI without delay.	I	B
It is recommended that patients transferred to a PCI-capable centre for primary PCI bypass the emergency department and CCU/ICCU and are transferred directly to the catheterization laboratory.	I	B
It is recommended that ambulance teams are trained and equipped to identify STEMI (with use of ECG recorders and telemetry as necessary) and administer initial therapy, including fibrinolysis when applicable.	I	C

Logistics of prehospital care *(continued)*

Recommendations	Class	Level
It is recommended that all hospitals and EMS participating in the care of patients with STEMI record and audit delay times and work to achieve and maintain quality targets.	I	C
It is recommended that EMS transfer STEMI patients to a PCI-capable centre, by-passing non-PCI centres.	I	C
It is recommended that EMS, emergency departments, and CCU/ICCU have a written updated STEMI management protocol, preferably shared within geographic networks.	I	C
It is recommended that patients presenting to a non-PCI-capable hospital and awaiting transportation for primary or rescue PCI are attended in an appropriately monitored area (e.g. the emergency department, CCU/ICCU, intermediate care unit).	I	C

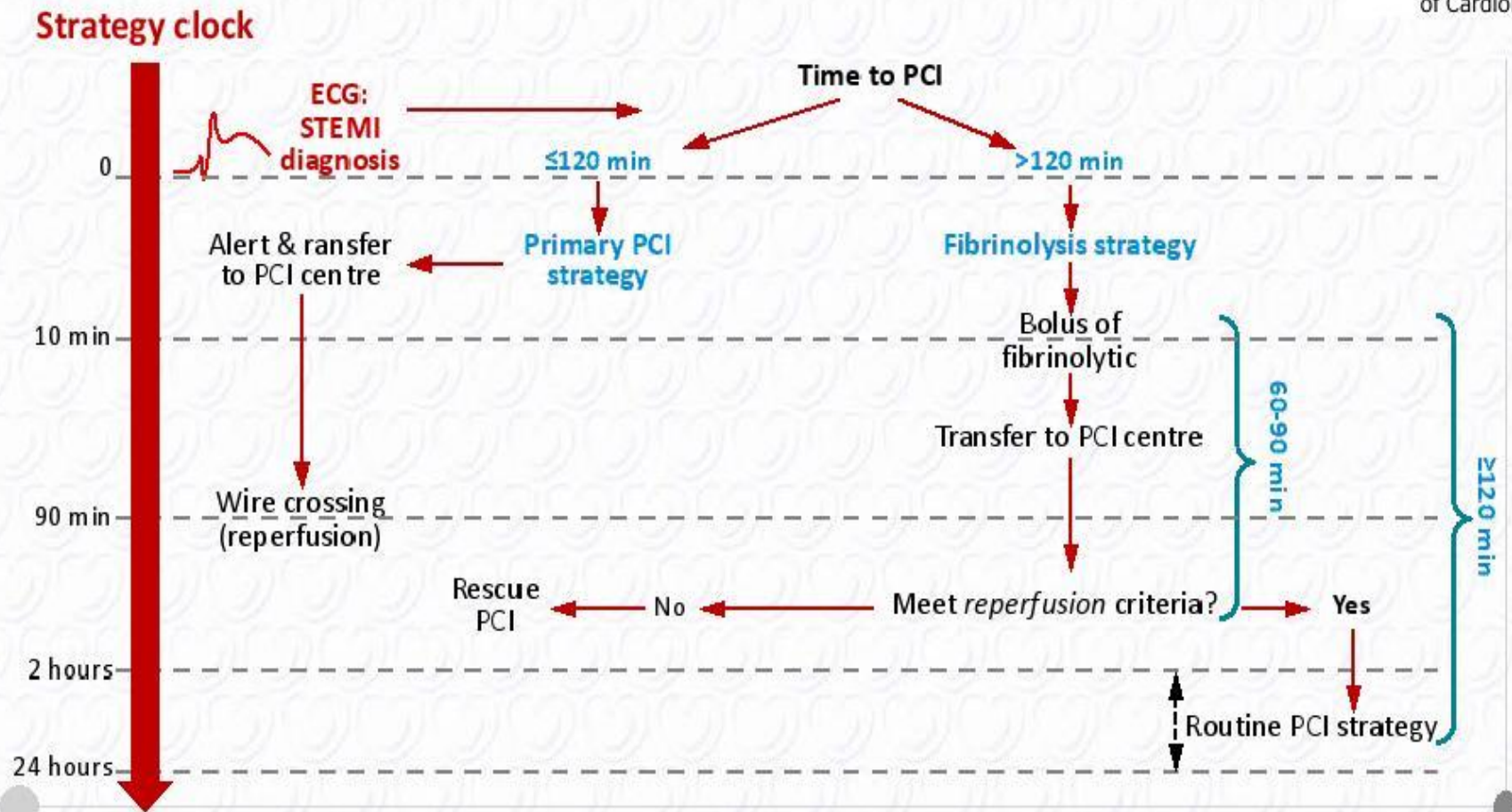
Definitions of terms related to reperfusion therapy

Term	Definition
FMC	The time point when the patient is either initially assessed by a physician, paramedic, nurse or other trained EMS personnel who can obtain and interpret the ECG, and deliver initial interventions (e.g. defibrillation). FMC can be either in the prehospital setting or upon patient arrival at the hospital (e.g. emergency department).
STEMI diagnosis	The time at which the ECG of a patient with ischaemic symptoms is interpreted as presenting ST-segment elevation or equivalent.
Primary PCI	Emergent PCI with balloon, stent, or other approved device, performed on the IRA without previous fibrinolytic treatment.

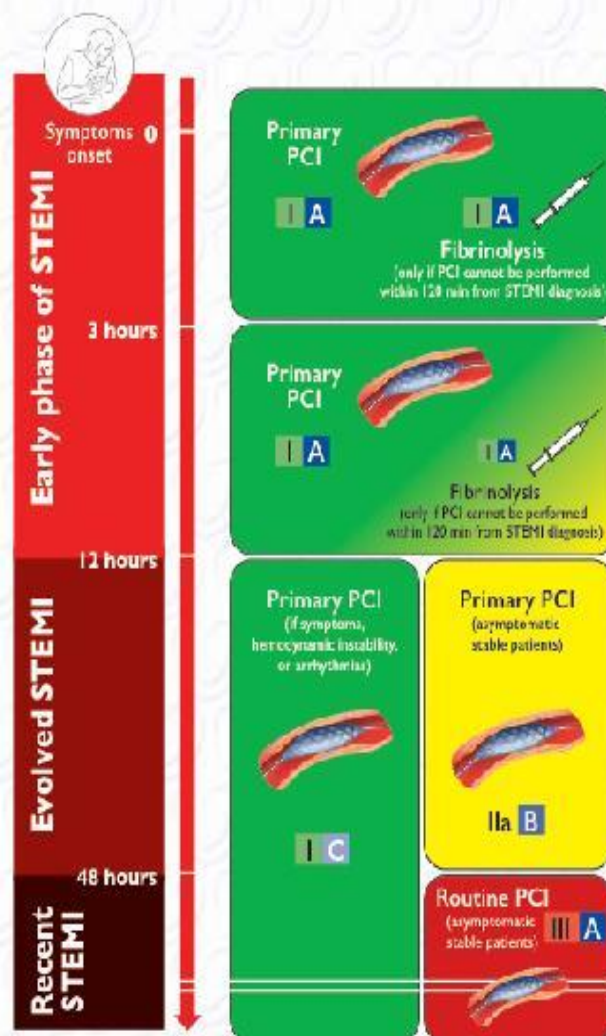
Definitions of terms related to reperfusion therapy *(continued)*

Term	Definition
Primary PCI strategy	Emergent coronary angiography and PCI of the IRA if indicated.
Rescue PCI	Emergent PCI performed as soon as possible in the case of failed fibrinolytic treatment.
Routine early PCI strategy after fibrinolysis	Coronary angiography, with PCI of the IRA if indicated, performed between 2 and 24 hours after successful fibrinolysis.
Pharmacoinvasive strategy	Fibrinolysis combined with rescue PCI (in case of failed fibrinolysis) or routine early PCI strategy (in case of successful fibrinolysis).

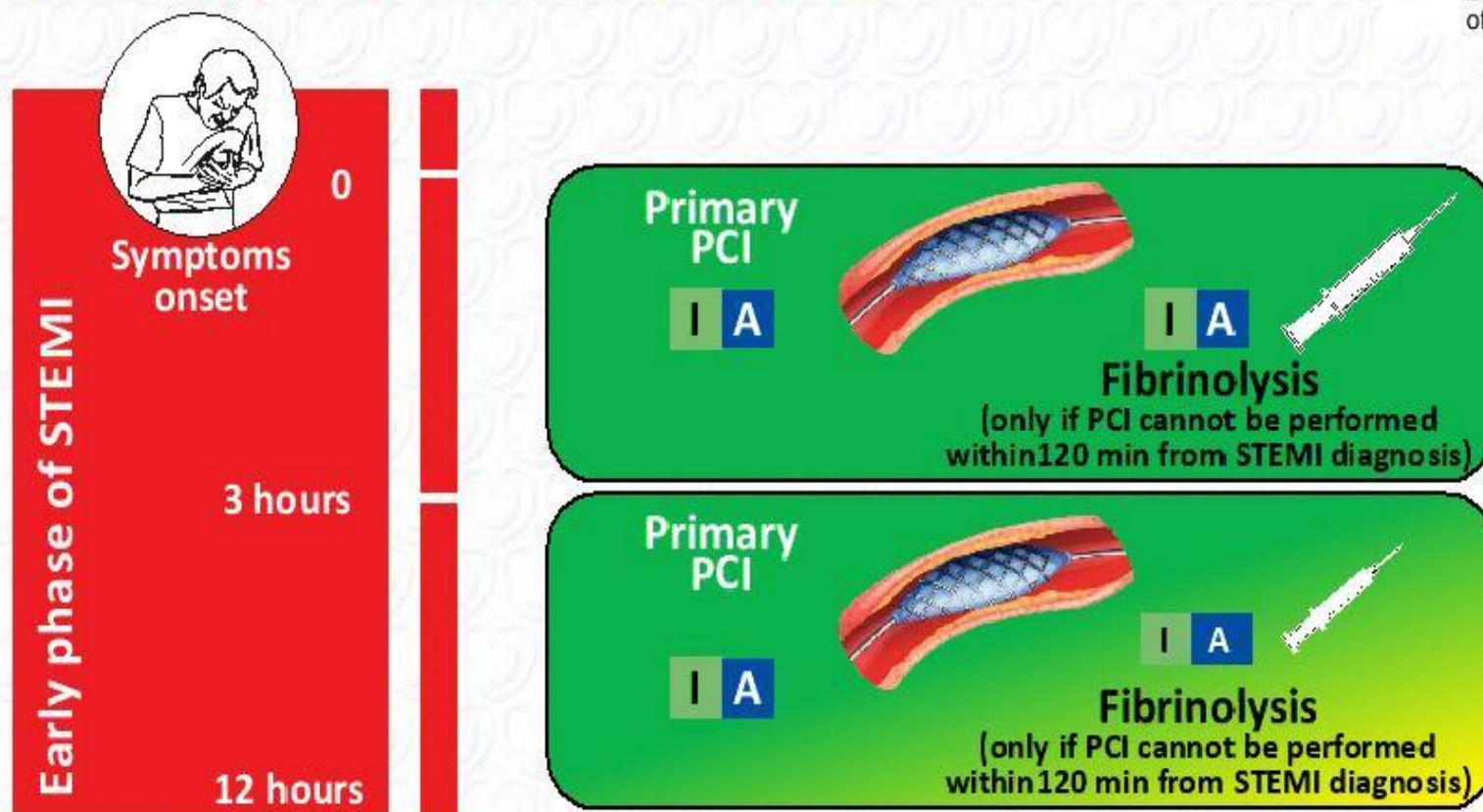
Maximum target times according to reperfusion strategy selection in patients presenting via EMS or in a non-PCI centre



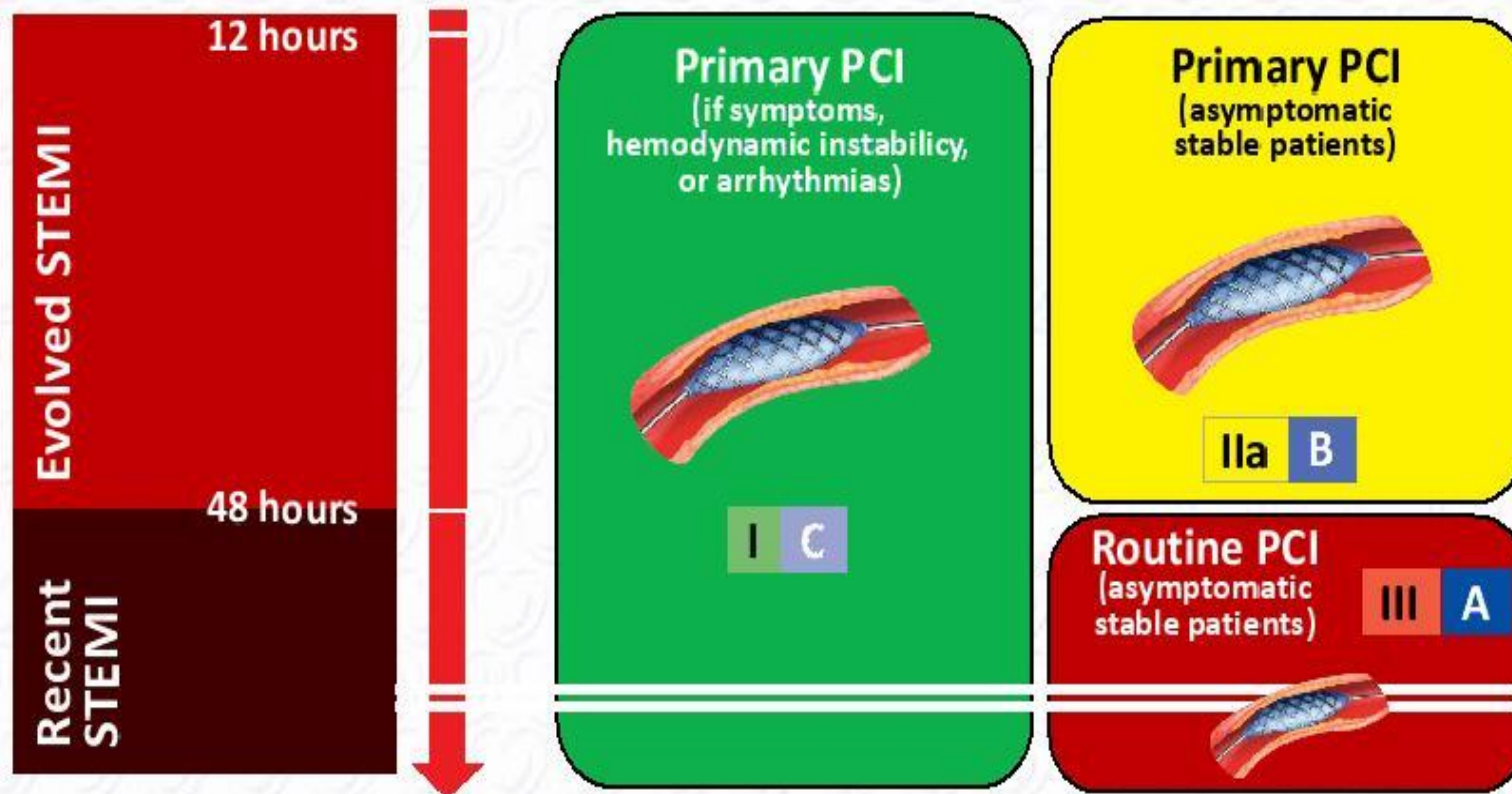
Reperfusion strategies in the infarct-related artery according to time from symptoms onset



Reperfusion strategies in the infarct-related artery according to time from symptoms onset



Reperfusion strategies in the infarct-related artery according to time from symptoms onset *(continued)*



Reperfusion therapy

Recommendations	Class	Level
Reperfusion therapy is indicated in all patients with symptoms of ischaemia of ≤ 12 hours duration and persistent ST-segment elevation.	I	A
A <i>primary PCI strategy</i> is recommended over fibrinolysis within indicated time frames.	I	A
If primary PCI cannot be performed timely after STEMI diagnosis, fibrinolytic therapy is recommended within 12 hours of symptom onset in patients without contra-indications.	I	A

Reperfusion therapy (*continued*)

Recommendations	Class	Level
In the absence of ST-segment elevation, a <i>primary PCI strategy</i> is indicated in patients with suspected ongoing ischaemic symptoms suggestive of myocardial infarction and at least one of the following criteria present: – haemodynamic instability or cardiogenic shock, – recurrent or ongoing chest pain refractory to medical treatment, – life-threatening arrhythmias or cardiac arrest, – mechanical complications of myocardial infarction, – acute heart failure, – recurrent dynamic ST-segment or T-wave changes, particularly with intermittent ST-segment elevation.	I	C

Reperfusion therapy *(continued)*

Recommendations	Class	Level
Early angiography (within 24 hours) is recommended if symptoms are completely relieved and ST-segment elevation completely normalized spontaneously or after nitroglycerin administration (provided there are no recurrence of symptoms or ST-segment elevation).	I	C
In patients with time from symptom onset >12 hours, a <i>primary PCI strategy</i> is indicated in the presence of ongoing symptoms suggestive of ischaemia, haemodynamic instability, or life-threatening arrhythmias.	I	C
A routine <i>primary PCI strategy</i> should be considered in patients presenting late (12-48 hours) after symptom onset.	IIa	B
In asymptomatic patients, routine PCI of an occluded IRA >48 hours after onset of STEMI is not indicated.	III	A

Summary of important time targets

Intervals	Time targets
Maximum time from FMC to ECG and diagnosis.	≤10 min
Maximum expected delay from STEMI diagnosis to primary PCI (wire crossing) to choose primary PCI strategy over fibrinolysis (if this target time cannot be met, consider fibrinolysis).	≤120 min
Maximum time from STEMI diagnosis to wire crossing in patients presenting at primary PCI hospitals.	≤60 min
Maximum time from STEMI diagnosis to wire crossing in transferred patients.	≤90 min

Summary of important time targets (continued)

Intervals	Time targets
Maximum time from STEMI diagnosis to bolus or infusion start of fibrinolysis in patients unable to meet primary PCI target times.	≤10 min
Time delay from start of fibrinolysis to evaluation of its efficacy (success or failure).	60-90 min
Time delay from start of fibrinolysis to angiography (if fibrinolysis is successful).	2-24 hours

Procedural aspects of the primary percutaneous coronary intervention strategy

Recommendations	Class	Level
IRA strategy		
Primary PCI of the IRA is indicated.	I	A
New coronary angiography with PCI if indicated is recommended in patients with symptoms or signs of recurrent or remaining ischaemia after primary PCI.	I	C
IRA technique		
Stenting is recommended (over balloon angioplasty) for primary PCI.	I	A
Stenting with new-generation DES is recommended over BMS for primary PCI.	I	A
Radial access is recommended over femoral access if performed by an experienced radial operator.	I	A

Procedural aspects of the primary percutaneous coronary intervention strategy

Recommendations	Class	Level
IRA technique (<i>continued</i>)		
Routine use of thrombus aspiration is not recommended.	III	A
Routine use of deferred stenting is not recommended.	III	B
Non-IRA strategy		
Routine revascularization of non-IRA lesions should be considered in STEMI patients with multivessel disease before hospital discharge.	IIa	A
Non-IRA PCI during the index procedure should be considered in patients with cardiogenic shock.	IIa	C
CABG should be considered in patients with ongoing ischaemia and large areas of jeopardized myocardium if PCI of the IRA cannot be performed.	IIa	C

CULPRIT-SHOCK Trial Challenges Routine Multivessel PCI in MI With Shock

DENVER, CO — Same-session multivessel PCI is usually a bad idea in patients with acute MI and cardiogenic shock who have obstructive lesions in multiple coronaries, suggests a major randomized trial that seems to challenge common practice[1]. It saw significantly better survival after culprit-lesion-only PCI compared with the more aggressive approach in close to 700 such patients at centers throughout Europe.

The 30-day risk of death from any cause or renal-replacement therapy, the primary end point of the Culprit Lesion Only PCI vs Multivessel PCI in Cardiogenic Shock (CULPRIT-SHOCK) trial, was reduced by 17% ($P=0.01$) with the culprit-only approach.

The difference seemed to be driven by significantly fewer deaths in the culprit-lesion-only group, while the higher rate of renal-replacement therapy in the multivessel-PCI group fell short of significance.

Integrating the results of the CULPRIT-SHOCK trial in the
2017 ESC ST-elevation myocardial infarction guidelines:
viewpoint of the task force

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Periprocedural and postprocedural antithrombotic therapy in patients undergoing primary percutaneous coronary intervention

Recommendations	Class	Level
Antiplatelet therapy		
A potent P2Y ₁₂ inhibitor (prasugrel or ticagrelor), or clopidogrel if these are not available or are contra-indicated, is recommended before (or at latest at the time of) PCI and maintained over 12 months unless there are contra-indications such as excessive risk of bleeding.	I	A
Aspirin (oral or i.v, if unable to swallow) is recommended as soon as possible for all patients without contra-indications.	I	B
GP IIb/IIIa inhibitors should be considered for bailout if there is evidence of no-reflow or a thrombotic complication.	IIa	C
Cangrelor may be considered in patients who have not received P2Y ₁₂ receptor inhibitors.	IIb	A

Periprocedural and postprocedural antithrombotic therapy in patients undergoing primary percutaneous coronary intervention

Recommendations	Class	Level
Anticoagulant therapy		
Anticoagulation is recommended for all patients in addition to antiplatelet therapy during primary PCI.	I	C
Routine use of UFH is recommended.	I	C
In patients with heparin-induced thrombocytopenia, bivalirudin is recommended as the anticoagulant agent during primary PCI.	I	C
Routine use of enoxaparin i.v. should be considered.	IIa	A
Routine use of bivalirudin should be considered.	IIa	A
Fondaparinux is not recommended for primary PCI.	III	B

Doses of antiplatelet and anticoagulant co-therapies in primary PCI

Doses of antiplatelet and parenteral anticoagulant co-therapies in primary PCI	
Antiplatelet therapies	
Aspirin	Loading dose of 150-300 mg orally or of 75-250 mg i.v. if oral ingestion is not possible, followed by a maintenance dose of 75-100 mg/day.
Clopidogrel	Loading dose of 600 mg orally, followed by a maintenance dose of 75 mg/day.
Prasugrel	Loading dose of 60 mg orally, followed by a maintenance dose of 10 mg/day. In patients with body weight ≤ 60 kg, a maintenance dose of 5 mg/day is recommended. Prasugrel is contra-indicated in patients with previous stroke. In patients ≥ 75 years, prasugrel is generally not recommended, but a dose of 5 mg/day should be used if treatment is deemed necessary.

Doses of antiplatelet and anticoagulant co-therapies in primary PCI(*continued*)

Doses of antiplatelet and parenteral anticoagulant co-therapies in primary PCI

Antiplatelet therapies (*continued*)



Ticagrelor	Loading dose of 180 mg orally, followed by a maintenance dose of 90 mg b.i.d.
Abciximab	Bolus of 0.25 mg/kg i.v. and 0.125 µg/kg/min infusion (maximum 10 µg/min) for 12 hours.
Eptifibatide	Double bolus of 180 µg/kg i.v. (given at a 10-min interval) followed by an infusion of 2.0 µg/kg/min for up to 18 hours.
Tirofiban	25 µg/kg over 3 min i.v., followed by a maintenance infusion of 0.15 µg/kg/min for up to 18 hours.

November 3, 2017

Better Early Platelet Inhibition With Chewable Ticagrelor

HealthDay News — For patients with ST-segment elevation myocardial infarction (STEMI), chewing a loading dose (LD) of ticagrelor facilitates better early platelet inhibition, according to a study published in JAMA Cardiology.

Elad Asher, MD, MHA, from Sheba Medical Center in Israel, and colleagues conducted a clinical trial involving 50 adult patients with STEMI who were randomized to chew an LD of ticagrelor (180 mg) or receive standard oral administration of the same dose.

The researchers found that at baseline, 30 minutes, and 1 and 4 hours after ticagrelor LD, the mean of P2Y12 reaction units in the chewing vs the standard group were 224 vs 219 (95% confidence interval [CI], -16.77 to 27.73; $P = .26$), 168 vs 230 (95% CI, -103.77 to -19.75; $P = .003$), 106 vs 181 (95% CI, -125.15 to -26.29; $P = .005$), and 43 vs 51 (95% CI, -36.34 to 21.14; $P = .3$), respectively.

Doses of antiplatelet and anticoagulant co-therapies in primary PCI(*continued*)

Doses of antiplatelet and parenteral anticoagulant co-therapies in primary PCI	
Parenteral anticoagulant therapies	
UFH	70-100 IU/kg i.v. bolus when no GP IIb/IIIa inhibitor is planned 50-70 IU/kg i.v. bolus with GP IIb/IIIa inhibitors.
Enoxaparin	0.5 mg/kg i.v. bolus.
Bivalirudin	0.75 mg/kg i.v. bolus followed by i.v. infusion of 1.75 mg/kg/hour for up to 4 hours after the procedure.

Doses of antiplatelet and anticoagulant co-therapies in not reperfused patients

Doses of antiplatelet and parenteral anticoagulant therapies in patients not receiving reperfusion therapy

Antiplatelet therapies

Aspirin	Loading dose of 150-300 mg orally followed by a maintenance dose of 75-100 mg/day.
Clopidogrel	Loading dose of 300 mg orally, followed by a maintenance dose of 75 mg/day orally.

Parenteral anticoagulant therapies

UFH	Same dose as with fibrinolytic therapy.
Enoxaparin	Same dose as with fibrinolytic therapy.
Fondaparinux	Same dose as with fibrinolytic therapy.

Fibrinolytic therapy

Recommendations	Class	Level
When fibrinolysis is the reperfusion strategy, it is recommended to initiate this treatment as soon as possible after STEMI diagnosis, preferably in the prehospital setting.	I	A
A fibrin-specific agent (i.e. tenecteplase, alteplase, reteplase) is recommended.	I	B
A half-dose of tenecteplase should be considered in patients ≥ 75 years of age.	IIa	B
Antiplatelet co-therapy with fibrinolysis		
Oral or i.v. aspirin is indicated.	I	B
Clopidogrel is indicated in addition to aspirin.	I	A
DAPT (in the form of aspirin plus a P2Y ₁₂ inhibitor) is indicated for up to 1 year in patients undergoing fibrinolysis and subsequent PCI.	I	C

Fibrinolytic therapy (*continued*)

Recommendations	Class	Level
Anticoagulation co-therapy with fibrinolysis		
Anticoagulation is recommended in patients treated with lytics until revascularization (if performed) or for the duration of hospital stay up to 8 days. The anticoagulant can be:	I	A
• Enoxaparin i.v. followed by s.c. (preferred over UFH).	I	A
• UFH given as a weight-adjusted i.v. bolus followed by infusion.	I	B
• In patients treated with streptokinase: fondaparinux i.v. bolus followed by an s.c. dose 24 hours later.	IIa	B
Transfer after fibrinolysis		
Transfer to a PCI-capable centre following fibrinolysis is indicated in all patients immediately after fibrinolysis.	I	A

Fibrinolytic therapy (*continued*)

Recommendations	Class	Level
Interventions following fibrinolysis		
Emergency angiography and PCI if indicated is recommended in patients with heart failure/shock.	I	A
Rescue PCI is indicated immediately when fibrinolysis has failed (< 50% ST-segment resolution at 60-90 min) or at any time in the presence of haemodynamic or electrical instability, or worsening ischaemia.	I	A
Angiography and PCI of the IRA, if indicated, is recommended between 2 and 24 hours after successful fibrinolysis.	I	A
Emergency angiography and PCI if needed is indicated in the case of recurrent ischaemia or evidence of reocclusion after initial successful fibrinolysis.	I	B

Doses of fibrinolytic agents and antithrombotic co-therapies

Drug	Initial treatment	Specific contra-indications
Doses of fibrinolytic therapy		
Streptokinase	1.5 million units over 30–60 min i.v.	Previous treatment with streptokinase or anistreplase
Alteplase (tPA)	15 mg i.v. bolus 0.75 mg/kg i.v. over 30 min (up to 50 mg) then 0.5 mg/kg i.v. over 60 min (up to 35 mg)	
Reteplase (rPA)	10 units + 10 units i.v. bolus given 30 min apart	
Tenecteplase (TNK-tPA)	Single i.v. bolus: 30 mg (6000 IU) if <60 kg 35 mg (7000 IU) if 60 to <70 kg 40 mg (8000 IU) if 70 to <80 kg 45 mg (9000 IU) if 80 to <90 kg 50 mg (10000 IU) if ≥90 kg It is recommended to reduce to half-dose in patients ≥75 years of age.	

Doses of fibrinolytic agents and antithrombotic co-therapies (*continued*)

Drug	Initial treatment	Specific contra-indications
Doses of antiplatelet co-therapies		
Aspirin	Starting dose of 150–300 mg orally (or 75–250 mg intravenously if oral ingestion is not possible), followed by a maintenance dose of 75–100 mg/day	
Clopidogrel	Loading dose of 300 mg orally, followed by a maintenance dose of 75 mg/day. In patients ≥ 75 years of age: loading dose of 75 mg, followed by a maintenance dose of 75 mg/day.	

Doses of fibrinolytic agents and antithrombotic co-therapies (*continued*)

Drug	Initial treatment	Specific contra-indications
Doses of anticoagulant co-therapies		
Enoxaparin	In patients <75 years of age: 30 mg i.v. bolus followed 15 min later by 1 mg/kg s.c. every 12 hours until revascularization or hospital discharge for a maximum of 8 days. The first two s.c. doses should not exceed 100 mg per injection.	
	In patients ≥75 years of age: no i.v. bolus; start with first s.c. dose of 0.75 mg/kg with a maximum of 75 mg per injection for the first two s.c. doses. In patients with eGFR <30 mL/min/1.73 m ² , regardless of age, the s.c. doses are given once every 24 hours.	

Doses of fibrinolytic agents and antithrombotic co-therapies (*continued*)

Drug	Initial treatment	Specific contra-indications
UFH	60 IU/kg i.v. bolus with a maximum of 4000 IU followed by an i.v. infusion of 12 IU/kg with a maximum of 1000 IU/ hour for 24-48 hours. Target aPTT: 50-70 s or 1.5 to 2.0 times that of control to be monitored at 3, 6, 12 and 24 hours.	
Fondaparinux (only with streptokinase)	2.5 mg i.v. bolus followed by a s.c. dose of 2.5 mg once daily up to 8 days or hospital discharge.	

Contra-indications to fibrinolytic therapy

Absolute

Previous intracranial haemorrhage or stroke of unknown origin at anytime.

Ischaemic stroke in the preceding 6 months.

Central nervous system damage or neoplasms or arteriovenous malformation.

Recent major trauma/surgery/head injury (within the preceding month).

Gastrointestinal bleeding within the past month.

Known bleeding disorder (excluding menses).

Aortic dissection.

Non-compressible punctures in the past 24 hours (e.g. liver biopsy, lumbar puncture).

Contra-indications to fibrinolytic therapy

Relative
Transient ischaemic attack in the preceding 6 months.
Oral anticoagulant therapy.
Pregnancy or within 1 week postpartum.
Refractory hypertension (SBP >180 mmHg and/or DBP >110 mmHg).
Advanced liver disease.
Infective endocarditis.
Active peptic ulcer.
Prolonged or traumatic resuscitation.

Logistical issues for hospital stay

Recommendations	Class	Level
It is indicated that all hospitals participating in the care of STEMI patients have a CCU/ICCU equipped to provide all aspects of care for STEMI patients, including treatment of ischaemia, severe heart failure, arrhythmias, and common comorbidities.	I	C
Transfer back to a referring non-PCI hospital		
Same-day transfer should be considered appropriate in selected patients after successful primary PCI, i.e. those without ongoing myocardial ischaemia, arrhythmia, or haemodynamic instability, not requiring vasoactive or mechanical support, and not needing further early revascularization.	IIa	C

Logistical issues for hospital stay *(continued)*

Recommendations	Class	Level
Monitoring		
It is indicated that all STEMI patients have ECG monitoring for a minimum of 24 hours.	I	C
Length of stay in the CCU		
It is indicated that patients with successful reperfusion therapy and uncomplicated clinical course are kept in the CCU/ICCU for a minimum of 24 hours whenever possible, after which they may be moved to a step-down monitored bed for an additional 24-48 hours.	I	C
Hospital discharge		
Early discharge (within 48-72 hours) should be considered appropriate in selected low-risk patients if early rehabilitation and adequate follow-up are arranged.	IIa	A



CADILLAC risk score

Base line LVEF < 40%	4
Renal insufficiency	3
Killip class 2, 3	3
Final TIMI flow 0-2	2
Age > 65	2
Anemia	2
Three vessel disease	2
Total points (0-18)	

Patients are stratified into three risk groups that predict 30-day and one-year mortality:

- ☐ **Low risk (score 0 to 2)** – 0.1 to 0.2% at 30 days and 0.8 to 0.9% at one year
- ☐ **Intermediate risk (score 3 to 5)** – 1.3 to 1.9% at 30 days and 4.0 to 4.5% at one year
- ☐ **High risk (score ≥ 6)** – 6.6 to 8.1% at 30 days and 12.4 to 13.2% at one year

Doses of antithrombotic agents in chronic kidney disease

Agent	Normal renal function and stage 1-3 CKD (eGFR ≥ 30 mL/min/1.73 m ²)	Stage 4 CKD (eGFR 15 to <30 mL/min/1.73 m ²)	Stage 5 CKD (eGFR <15 mL/min/1.73 m ²)
Aspirin	Loading dose of 150-300 mg orally followed by a maintenance dose of 75-100 mg/day.	No dose adjustment	No dose adjustment
Clopidogrel	Loading dose of 300-600 mg orally followed by 75 mg/day.	No dose adjustment	No information available
Ticagrelor	Loading dose of 180 mg orally followed 90 mg twice a day.	No dose adjustment	Not recommended
Prasugrel	Loading dose of 60 mg orally followed by 10 mg/day.	No dose adjustment	Not recommended
Enoxaparin	1 mg/kg s.c. twice a day, 0.75 mg/kg s.c. twice daily in patients ≥ 75 years old.	1 mg/kg s.c. once a day	Not recommended

Doses of antithrombotic agents in chronic kidney disease (*continued*)

Agent	Normal renal function and stage 1-3 CKD (eGFR ≥ 30 mL/min/1.73 m ²)	Stage 4 CKD (eGFR 15 to <30 mL/min/1.73 m ²)	Stage 5 CKD (eGFR <15 mL/min/1.73 m ²)
UFH	<i>Before coronary angiography:</i> Bolus 60-70 IU/kg i.v. (maximum 5000 IU) and infusion (12-15 IU/kg/hour, maximum 1000 IU/hour), target aPTT 1.5-2.5 x control. <i>During PCI:</i> 70-100 IU/kg i.v. (50-70 IU/kg if concomitant with GP IIb/IIIa inhibitors).	No dose adjustment	No dose adjustment
Fondaparinux	2.5 mg s.c. once a day.	Not recommended if eGFR <20 mL/min/1.73 m ² or dialysis.	Not recommended

Doses of antithrombotic agents in chronic kidney disease *(continued)*

Agent	Normal renal function and stage 1-3 CKD (eGFR ≥ 30 mL/min/1.73 m ²)	Stage 4 CKD (eGFR 15 to < 30 mL/min/1.73 m ²)	Stage 5 CKD (eGFR < 15 mL/min/1.73 m ²)
Bivalirudin	Bolus 0.75 mg/kg i.v., infusion 1.75 mg/kg/hour. <i>If eGFR ≥ 30 and ≤ 60 mL/min/1.73 m² reduce infusion dose to 1.4 mg/kg/hour.</i>	Not recommended	Not recommended
Abciximab	Bolus of 0.25 mg/kg i.v. followed by 0.125 μ g/kg/min infusion (maximum 10 μ g/min).	Careful consideration of bleeding risk.	Careful consideration of bleeding risk.

Doses of antithrombotic agents in chronic kidney disease (*continued*)

Agent	Normal renal function and stage 1-3 CKD (eGFR ≥ 30 mL/min/1.73 m ²)	Stage 4 CKD (eGFR 15 to <30 mL/min/1.73 m ²)	Stage 5 CKD (eGFR <15 mL/min/1.73 m ²)
Eptifibatide	Bolus of 180 μ g/kg i.v. followed by an infusion of 2.0 μ g/kg/min for up to 18 hours. If eGFR <50 mL/min/1.73 m ² reduce infusion dose to 1.0 μ g/kg/min	Not recommended	Not recommended
Tirofiban	Bolus 25 μ g/kg i.v. followed by 0.15 μ g/kg/min.	Reduce infusion rate to 50%.	Not recommended

Management of hyperglycaemia

Recommendations	Class	Level
It is recommended to measure glycaemic status at initial evaluation in all patients, and perform frequent monitoring in patients with known diabetes or hyperglycaemia (defined as glucose levels ≥ 11.1 mmol/L or ≥ 200 mg/dL).	I	C
In patients on metformin and/or SGLT2 inhibitors, renal function should be carefully monitored for at least 3 days after coronary angiography/PCI.	I	C
Glucose-lowering therapy should be considered in ACS patients with glucose levels >10 mmol/L (>180 mg/dL), while episodes of hypoglycaemia (defined as glucose levels ≤ 3.9 mmol/L or ≤ 70 mg/dL) should be avoided.	IIa	C
Less stringent glucose control should be considered in the acute phase in patients with more advanced cardiovascular disease, older age, longer diabetes duration, and more comorbidities.	IIa	C

Summary of indications for imaging and stress testing in ST-elevation myocardial infarction patients

Recommendations	Class	Level
At presentation		
Emergency echocardiography is indicated in patients with cardiogenic shock and/or haemodynamic instability or suspected mechanical complications without delaying angiography.	I	C
Emergency echocardiography before coronary angiography should be considered if the diagnosis is uncertain.	IIa	C
Routine echocardiography that delays emergency angiography is not recommended.	III	C
Coronary CT angiography is not recommended.	III	C

Summary of indications for imaging and stress testing in ST-elevation myocardial infarction patients *(continued)*

Recommendations	Class	Level
During hospital stay (after primary PCI)		
Routine echocardiography to assess resting LV and RV function, detect early post-MI mechanical complications, and exclude LV thrombus is recommended in all patients.	I	B
Emergency echocardiography is indicated in haemodynamically unstable patients.	I	C
When echocardiography is suboptimal/inconclusive, an alternative imaging method (CMR preferably) should be considered.	IIa	C
Either stress echo, CMR, SPECT, or PET may be used to assess myocardial ischaemia and viability, including in multivessel CAD.	IIb	C

Summary of indications for imaging and stress testing in ST-elevation myocardial infarction patients *(continued)*

Recommendations	Class	Level
After discharge		
In patients with pre-discharge LVEF $\leq 40\%$, repeat echocardiography 6-12 weeks after MI, and after complete revascularization and optimal medical therapy, is recommended to assess the potential need for primary prevention ICD implantation.	I	C
When echo is suboptimal or inconclusive, alternative imaging methods (CMR preferably) should be considered to assess LV function.	IIa	C

Behavioural aspects after ST-elevation myocardial infarction

Recommendations	Class	Level
It is recommended to identify smokers and provide repeated advice on stopping, with offers to help with the use of follow-up support, nicotine-replacement therapies, varenicline, and bupropion individually or in combination.	I	A
Participation in a cardiac rehabilitation programme is recommended.	I	A
A smoking-cessation protocol is indicated for each hospital participating in the care of STEMI patients.	I	C
The use of the polypill and combination therapy to increase adherence to drug therapy may be considered.	IIb	B

Maintenance antithrombotic strategy after ST-elevation myocardial infarction

Recommendations	Class	Level
Antiplatelet therapy with low-dose aspirin (75–100 mg) is indicated.	I	A
DAPT in the form of aspirin plus ticagrelor or prasugrel (or clopidogrel if ticagrelor or prasugrel is not available or is contra-indicated) is recommended for 12 months after PCI unless there are contra-indications such as excessive risk of bleeding.	I	A
A PPI in combination with DAPT is recommended in patients at high risk of gastrointestinal bleeding.	I	B
In patients with an indication for oral anticoagulation, oral anti-coagulants are indicated in addition to antiplatelet therapy.	I	C

Maintenance antithrombotic strategy after ST-elevation myocardial infarction *(continued)*

Recommendations	Class	Level
In patients who are at high risk of severe bleeding complications, discontinuation of P2Y ₁₂ inhibitor therapy after 6 months should be considered.	Ila	B
In STEMI patients with stent implantation and an indication for oral anticoagulation, triple therapy should be considered for 1–6 months (according to a balance between the estimated risk of recurrent coronary events and bleeding).	Ila	C
DAPT for 12 months in patients who did not undergo PCI should be considered unless there are contra-indications such as excessive risk of bleeding.	Ila	C
In patients with LV thrombus, anticoagulation should be administered for up to 6 months guided by repeated imaging.	Ila	C

Maintenance antithrombotic strategy after ST-elevation myocardial infarction (*continued*)

Recommendations	Class	Level
In high ischaemic risk patients who have tolerated DAPT without a bleeding complication, treatment with DAPT in the form of ticagrelor 60 mg twice a day on top of aspirin for longer than 12 months may be considered for up to 3 years.	IIb	B
In low bleeding risk patients who receive aspirin and clopidogrel, low-dose rivaroxaban (2.5 mg twice daily) may be considered.	IIb	B
The use of ticagrelor or prasugrel is not recommended as part of triple antithrombotic therapy with aspirin and oral anticoagulation.	III	C

Routine therapies in the acute, subacute and long-term phases

Recommendations	Class	Level
Beta-blockers		
Oral treatment with beta-blockers is indicated in patients with heart failure or LVEF $\leq 40\%$ unless contra-indicated.	I	A
Intravenous beta-blockers should be considered at the time of presentation in patients undergoing primary PCI without contra-indications, with no signs of acute heart failure, and with an SBP >120 mmHg.	IIa	A
Routine oral treatment with beta-blockers should be considered during hospital stay and continued thereafter in all patients without Contra-indications.	IIa	B
Intravenous beta-blockers must be avoided in patients with hypotension, acute heart failure or AV block or severe bradycardia.	III	B

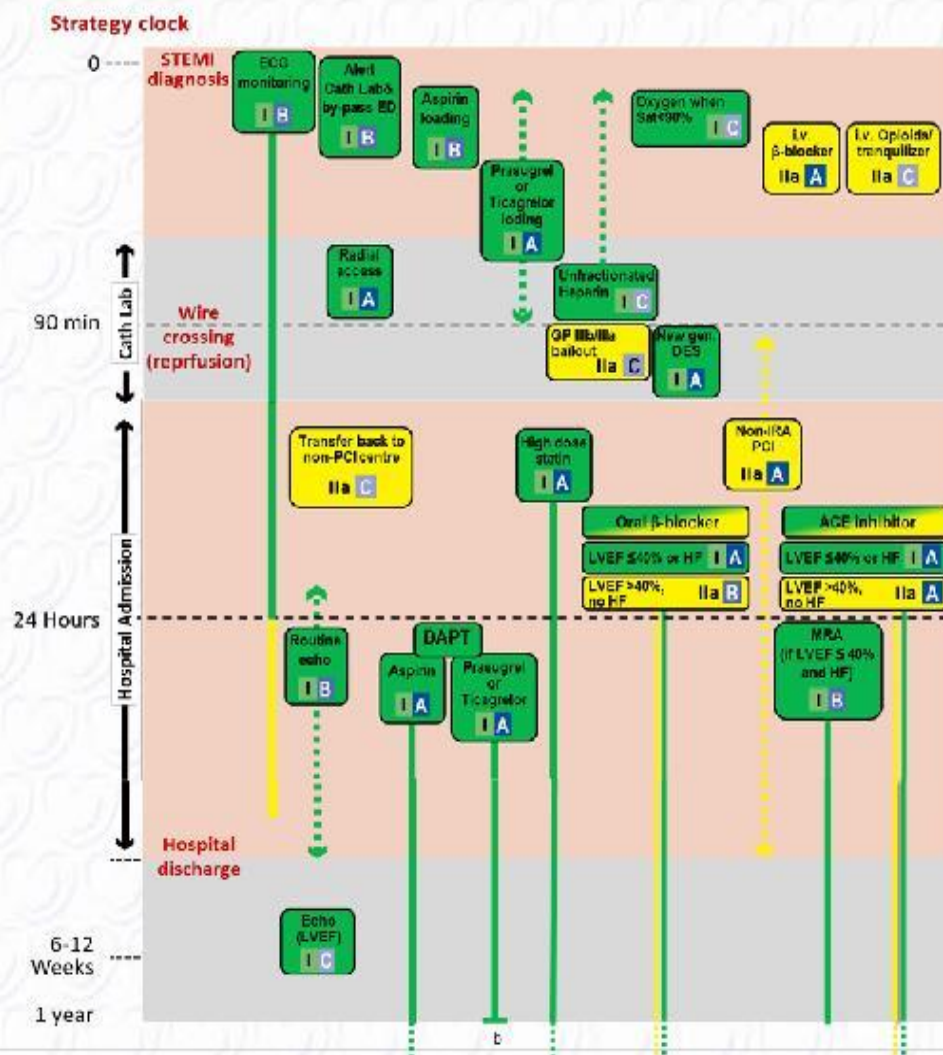
Routine therapies in the acute, subacute and long-term phases (*continued*)

Recommendations	Class	Level
Lipid lowering therapies		
It is recommended to start high-intensity statin therapy as early as possible, unless contra-indicated, and maintain it long term.	I	A
An LDL-C goal of < 1.8 mmol/L (70 mg/dL) or a reduction of at least 50% if the baseline LDL-C is between 1.8 and 3.5 mmol/L (70 and 135 mg/dL) is recommended.	I	B
It is recommended to obtain a lipid profile in all STEMI patients as soon as possible after presentation.	I	C
In patients with LDL-C ≥ 1.8 mmol/L (≥ 70 mg/dL) despite a maximally tolerated statin dose who remain at high risk, further therapy to reduce LDL-C should be considered.	Ila	A

Routine therapies in the acute, subacute and long-term phases (*continued*)

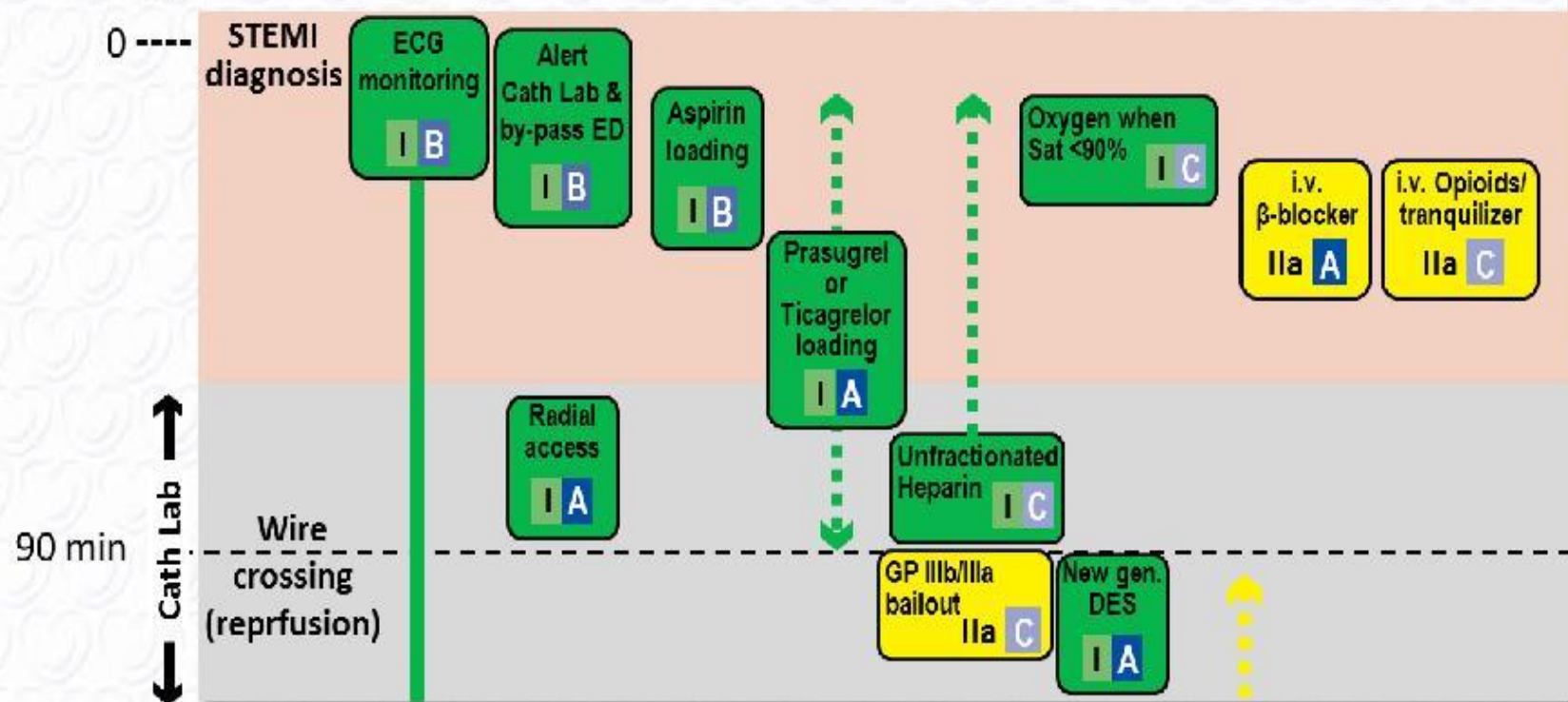
Recommendations	Class	Level
ACE inhibitors/ARBs		
ACE inhibitors are recommended, starting within the first 24 hours of STEMI in patients with evidence of heart failure, LV systolic dysfunction, diabetes, or an anterior infarct.	I	A
An ARB, preferably valsartan, is an alternative to ACE inhibitors in patients with heart failure or LV systolic dysfunction, particularly those who are intolerant of ACE inhibitors.	I	B
ACE inhibitors should be considered in all patients in the absence of contra-indications.	IIa	A
MRAs		
MRAs are recommended in patients with an LVEF $\leq 40\%$ and heart failure or diabetes, who are already receiving an ACE inhibitor and a beta-blocker, provided there is no renal failure or hyperkalaemia.	I	B

“Do not forget” interventions in STEMI patients undergoing a primary PCI strategy

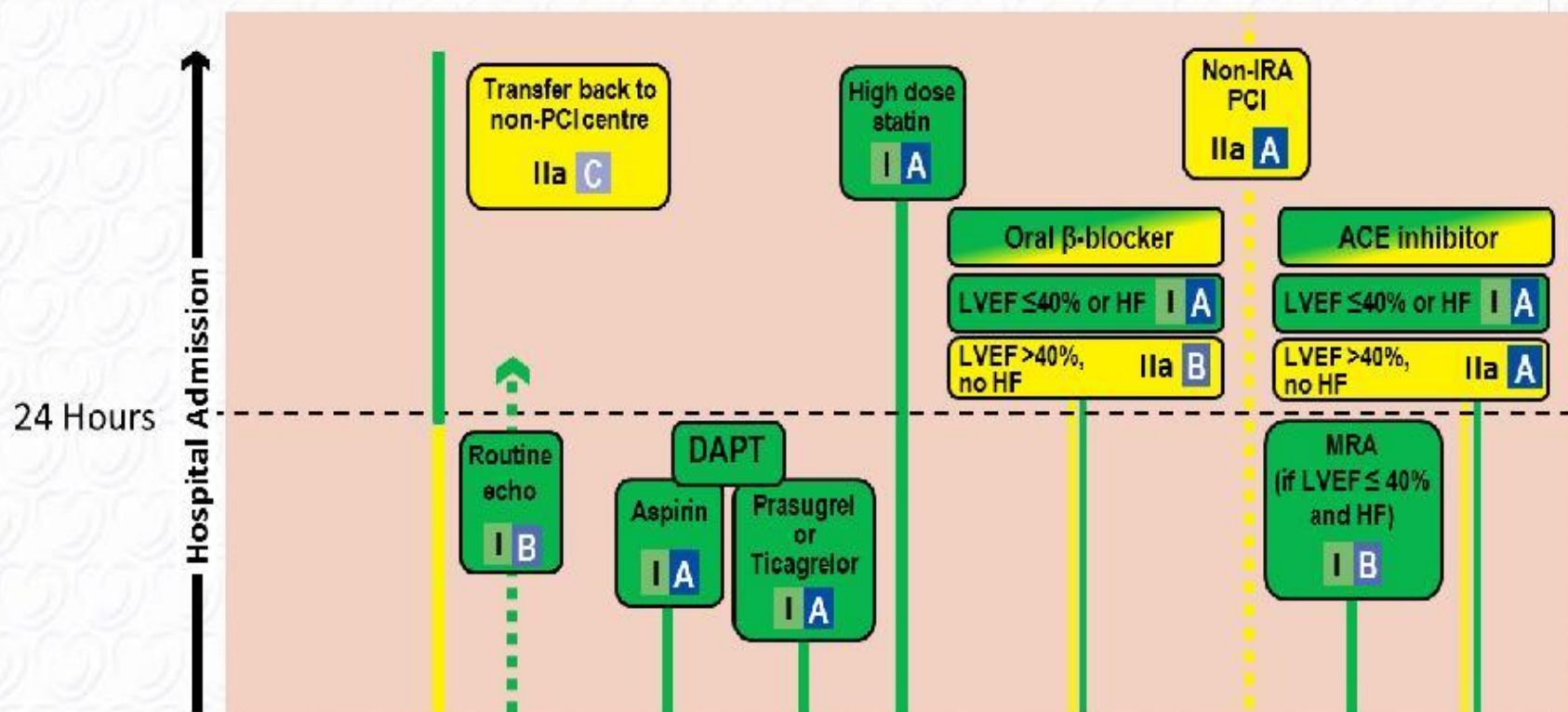


“Do not forget” interventions in STEMI patients undergoing a primary PCI strategy

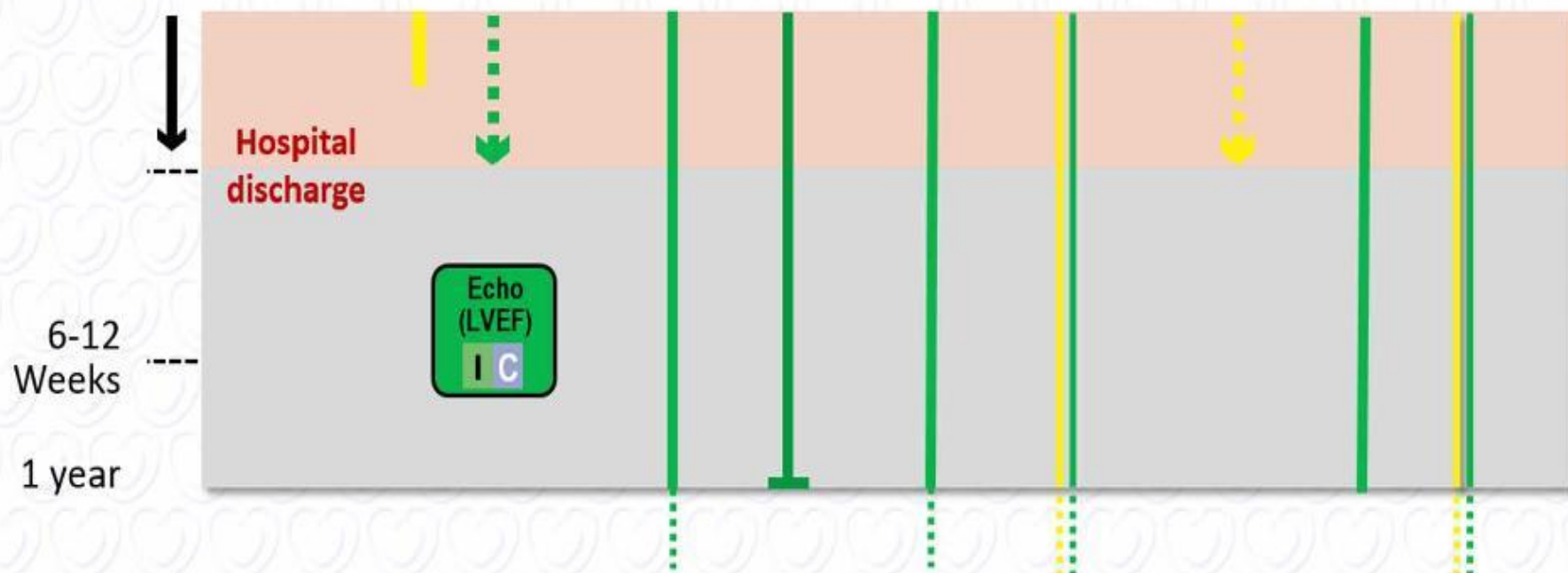
Strategy clock



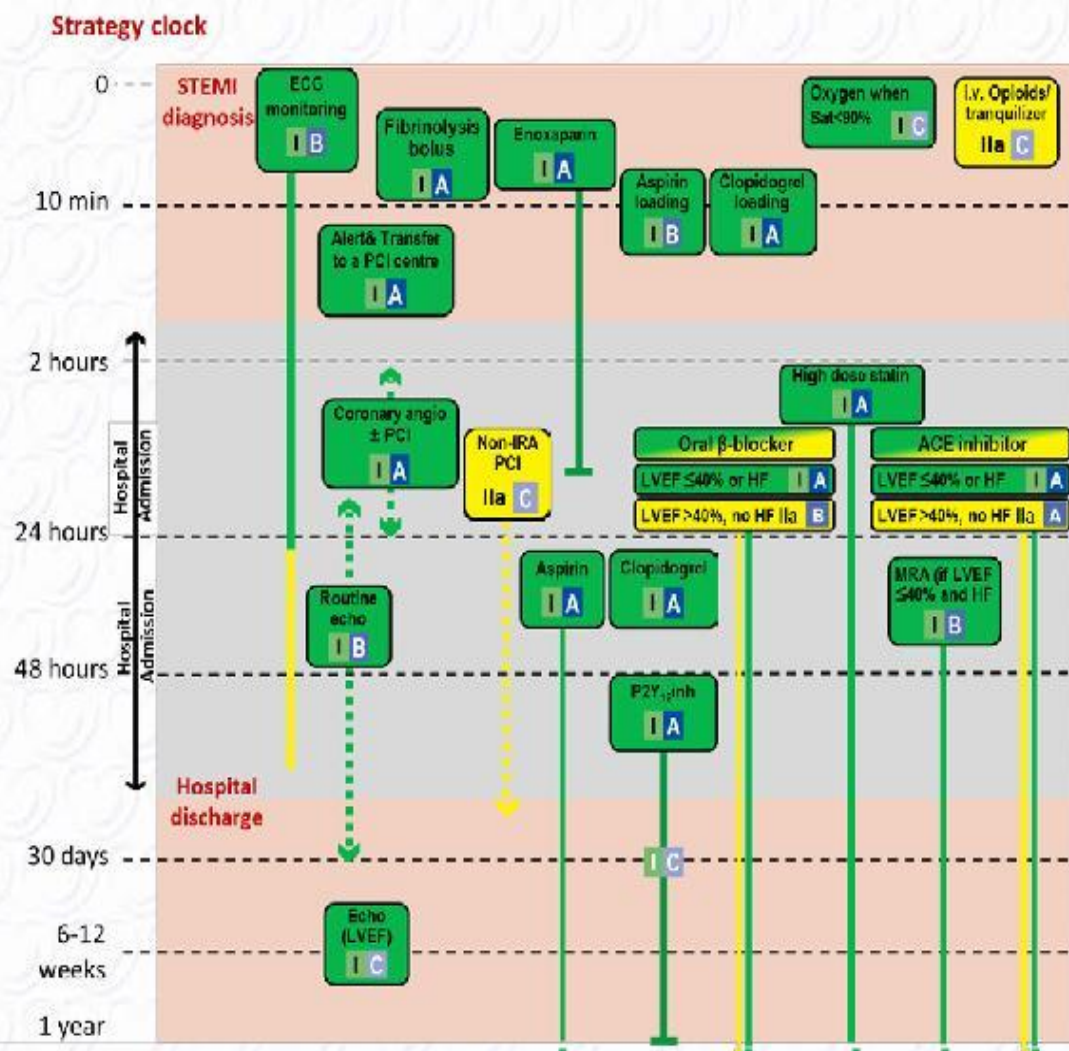
“Do not forget” interventions in STEMI patients undergoing a primary PCI strategy



“Do not forget” interventions in STEMI patients undergoing a primary PCI strategy

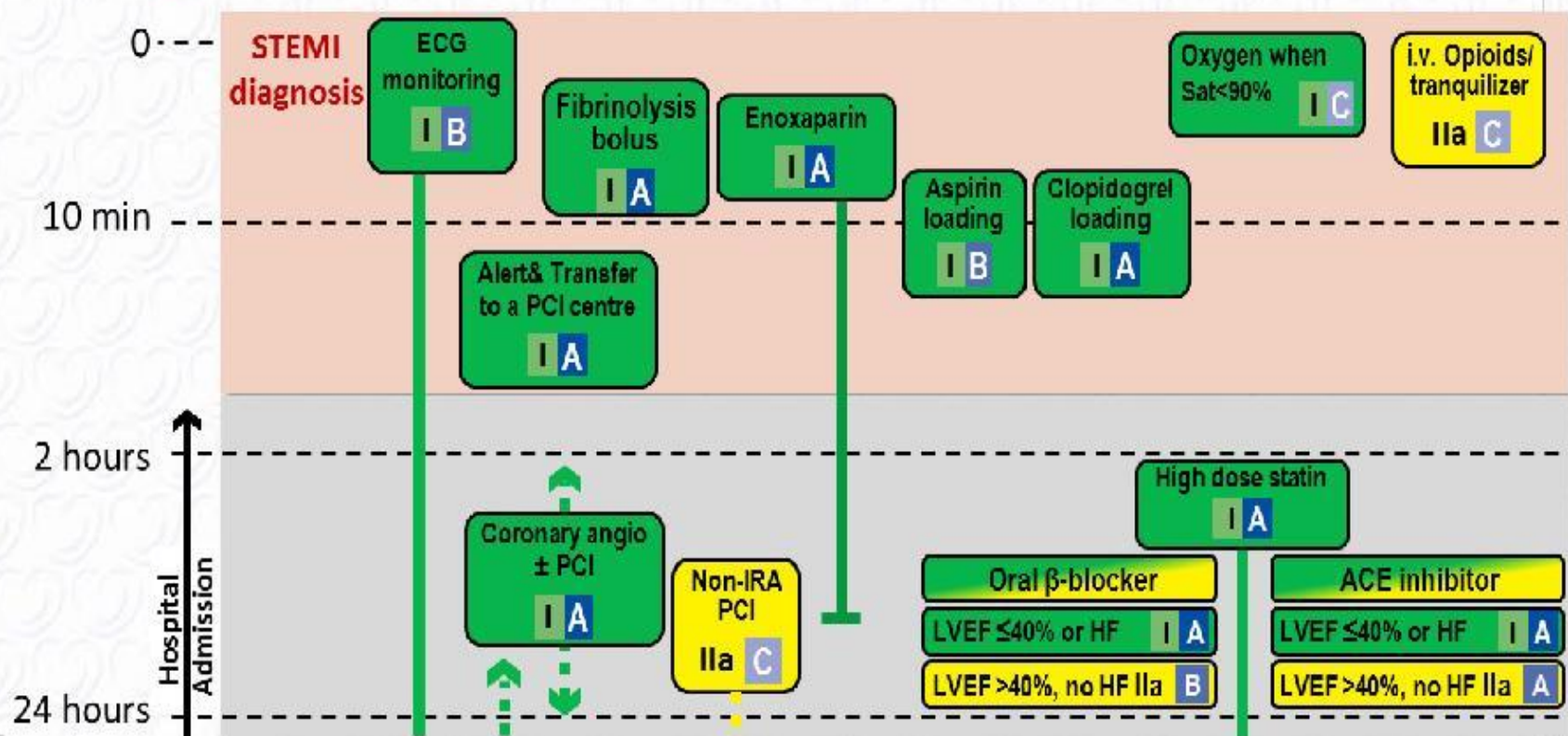


**“Do not forget”
interventions
in STEMI patients
undergoing
a successful
fibrinolysis
strategy**

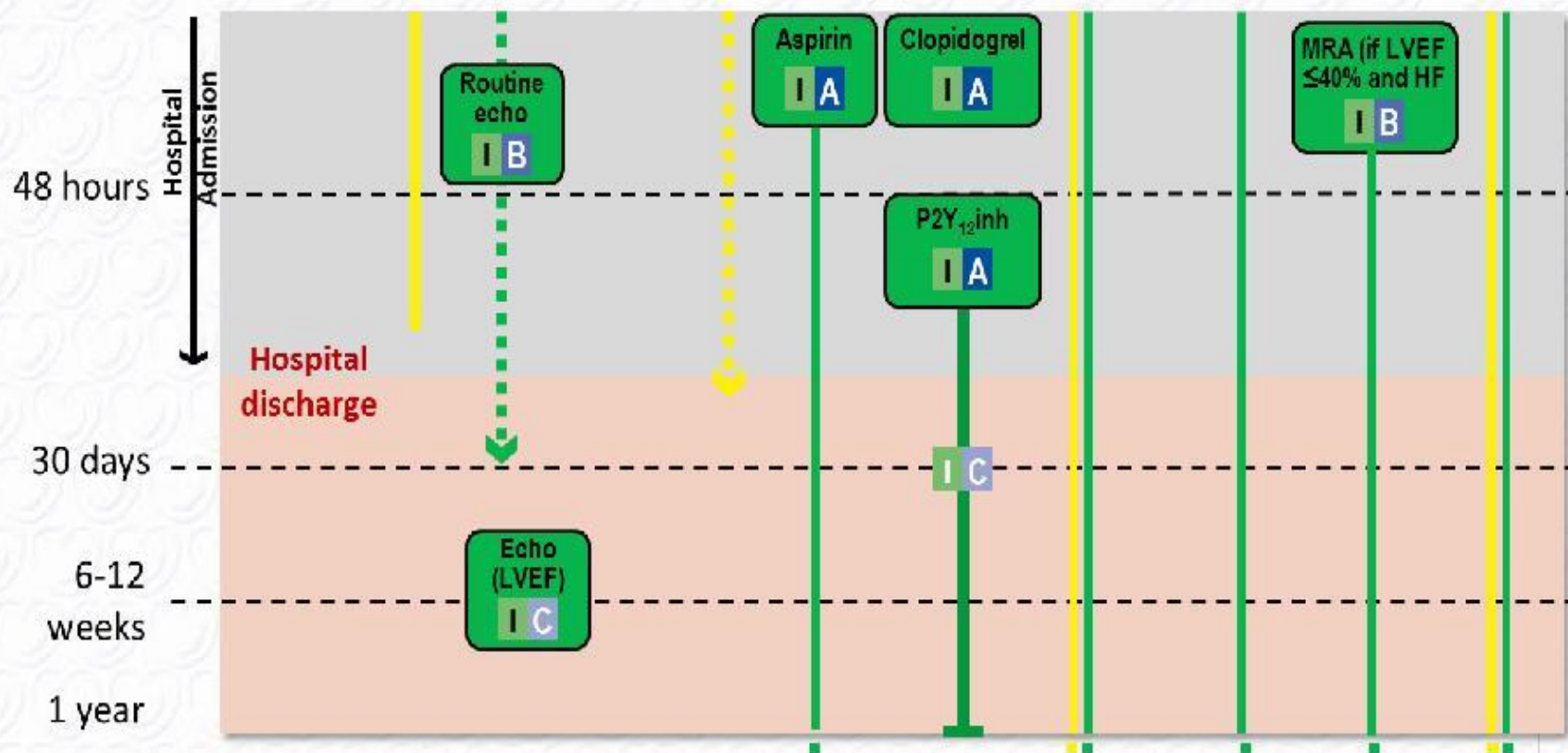


“Do not forget” interventions in STEMI patients undergoing a successful fibrinolysis strategy

Strategy clock



“Do not forget” interventions in STEMI patient undergoing a successful fibrinolysis strategy



Management of left ventricular dysfunction and acute heart failure in ST-elevation myocardial infarction

Recommendations	Class	Level
ACE inhibitor (or if not tolerated, ARB) therapy is indicated as soon as haemodynamically stable for all patients with evidence of LVEF $\leq 40\%$ and/or heart failure to reduce the risk of hospitalization and death.	I	A
Beta-blocker therapy is recommended in patients with LVEF $\leq 40\%$ and/or heart failure after stabilization, to reduce the risk of death, recurrent MI, and hospitalization for heart failure.	I	A
An MRA is recommended in patients with heart failure and LVEF $\leq 40\%$ with no severe renal failure or hyperkalaemia to reduce the risk of cardiovascular hospitalization and death.	I	B
Loop diuretics are recommended in patients with acute heart failure with symptoms/signs of fluid overload to improve symptoms.	I	C

Management of left ventricular dysfunction and acute heart failure in ST-elevation myocardial infarction *(continued)*

Recommendations	Class	Level
Nitrates are recommended in patients with symptomatic heart failure with SBP >90 mmHg to improve symptoms and reduce congestion.	I	C
Oxygen is indicated in patients with pulmonary oedema with SaO ₂ <90% to maintain a saturation >95%.	I	C
Patient intubation is indicated in patients with respiratory failure or exhaustion, leading to hypoxaemia, hypercapnia, or acidosis, and if non-invasive ventilation is not tolerated.	I	C
Non-invasive positive pressure ventilation (continuous positive airway pressure, biphasic positive airway pressure) should be considered in patients with respiratory distress (respiratory rate >25 breaths/min, SaO ₂ <90%) without hypotension.	IIa	B

Management of left ventricular dysfunction and acute heart failure in ST-elevation myocardial infarction (*continued*)

Recommendations	Class	Level
Intravenous nitrates or sodium nitroprusside should be considered in patients with heart failure and elevated SBP to control blood pressure and improve symptoms.	Ila	C
Opiates may be considered to relieve dyspnoea and anxiety in patients with pulmonary oedema and severe dyspnoea. Respiration should be monitored.	Ilb	B
Inotropic agents may be considered in patients with severe heart failure with hypotension refractory to standard medical treatment.	Ilb	C

Management of cardiogenic shock in ST-elevation myocardial infarction

Recommendations	Class	Level
Immediate PCI is indicated for patients with cardiogenic shock if coronary anatomy is suitable. If coronary anatomy is not suitable for PCI, or PCI has failed, emergency CABG is recommended.	I	B
Invasive blood pressure monitoring with an arterial line is recommended.	I	C
Immediate Doppler echocardiography is indicated to assess ventricular and valvular functions, loading conditions, and to detect mechanical complications.	I	C
It is indicated that mechanical complications are treated as early as possible after discussion by the Heart Team.	I	C
Oxygen/mechanical respiratory support is indicated according to blood gases.	I	C

Management of cardiogenic shock in ST-elevation myocardial infarction *(continued)*

Recommendations	Class	Level
Fibrinolysis should be considered in patients presenting with cardiogenic shock if a primary PCI strategy is not available within 120 min from STEMI diagnosis and mechanical complications have been ruled out.	Ila	C
Complete revascularization during the index procedure should be considered in patients presenting with cardiogenic shock.	Ila	C
Intra-aortic balloon pumping should be considered in patients with haemodynamic instability/cardiogenic shock due to mechanical complications.	Ila	C
Haemodynamic assessment with pulmonary artery catheter may be considered for confirming diagnosis or guiding therapy.	Ilb	B

Management of cardiogenic shock in ST-elevation myocardial infarction *(continued)*

Recommendations	Class	Level
Ultrafiltration may be considered for patients with refractory congestion, who failed to respond to diuretic-based strategies.	IIb	B
Inotropic/vasopressor agents may be considered for haemodynamic stabilization.	IIb	C
Short-term mechanical support may be considered in patients in refractory shock.	IIb	C
Routine intra-aortic balloon pumping is not indicated.	III	B

The IABP-SHOCK II (Intra-aortic Balloon Pump in Cardiogenic Shock II) trial randomly assigned 600 participants planned for early revascularization of acute MI complicated by cardiogenic shock to either IABP placement or no IABP placement.^[2] The primary end point was 30-day all-cause mortality. At 30 days, all-cause mortality was 40%, with no difference between patients randomized to receive an IABP versus those who were not. There were no differences between treatment groups in secondary outcomes, including bleeding, ischemic complications, stroke, time to hemodynamic stabilization, intensive care unit length of stay, and the dose and duration of catecholamine therapy. A previous intermediate-term report of IABP-SHOCK II trial outcomes demonstrated no difference between treatment groups for all-cause mortality at 12 months.^[3]

Management of atrial fibrillation

Recommendations	Class	Level
Acute rate control of AF		
Intravenous beta-blockers are indicated for rate control if necessary and there are no clinical signs of acute heart failure or hypotension.	I	C
Intravenous amiodarone is indicated for rate control if necessary in the presence of concomitant acute heart failure and no hypotension.	I	C
Intravenous digitalis should be considered for rate control if necessary in the presence of concomitant acute heart failure and hypotension.	IIa	B
Cardioversion		
Immediate electrical cardioversion is indicated when adequate rate control cannot be achieved promptly with pharmacological agents in patients with AF and ongoing ischaemia, severe haemodynamic compromise or heart failure.	I	C

Management of atrial fibrillation (continued)

Recommendations	Class	Level
Intravenous amiodarone is indicated to promote electrical cardioversion and/or decrease risk for early recurrence of AF after electrical cardioversion in unstable patients with recent onset AF.	I	C
In patients with documented de novo AF during the acute phase of STEMI, long-term oral anticoagulation should be considered depending on CHA ₂ DS ₂ -VASc score and taking concomitant antithrombotic therapy into account.	IIa	C
Digoxin is ineffective in converting recent onset AF to sinus rhythm and is not indicated for rhythm control.	III	A
Calcium channel blockers and beta-blockers including sotalol are ineffective in converting recent onset AF to sinus rhythm.	III	B
Prophylactic treatment with antiarrhythmic drugs to prevent AF is not indicated.	III	B

Management of ventricular arrhythmias and conduction disturbances in the acute phase

Recommendations	Class	Level
Intravenous beta-blocker treatment is indicated for patients with polymorphic VT and/or VF unless contra-indicated.	I	B
Prompt and complete revascularization is recommended to treat myocardial ischaemia that may be present in patients with recurrent VT and/or VF.	I	C
Intravenous amiodarone is recommended for treatment of recurrent polymorphic VT.	I	C
Correction of electrolyte imbalances (especially hypokalaemia and hypomagnesaemia) is recommended in patients with VT and/or VF.	I	C

Management of ventricular arrhythmias and conduction disturbances in the acute phase (continued)

Recommendations	Class	Level
In cases of sinus bradycardia with haemodynamic intolerance or high degree AV block without stable escape rhythm:		
• i.v. positive chronotropic medication (epinephrine, vasopressin and/or atropine) is indicated,	I	C
• temporary pacing is indicated in cases of failure to respond to positive chronotropic medication,	I	C
• urgent angiography with a view to revascularization is indicated if the patient has not received previous reperfusion therapy.	I	C

Management of ventricular arrhythmias and conduction disturbances in the acute phase (continued)

Recommendations	Class	Level
Intravenous amiodarone should be considered for recurrent VT with haemodynamic intolerance despite repetitive electrical cardioversion.	Ila	C
Transvenous catheter pace termination and/or overdrive pacing should be considered if VT cannot be controlled by repetitive electrical cardioversion.	Ila	C
Radiofrequency catheter ablation at a specialized ablation centre followed by ICD implantation should be considered in patients with recurrent VT, VF, or electrical storm despite complete revascularization and optimal medical therapy.	Ila	C

Management of ventricular arrhythmias and conduction disturbances in the acute phase (continued)

Recommendations	Class	Level
Recurrent VT with haemodynamic repercussion despite repetitive electrical cardioversion may be treated with lidocaine if beta-blockers, amiodarone, and overdrive stimulation are not effective/applicable.	IIb	C
Prophylactic treatment with antiarrhythmic drugs is not indicated and may be harmful.	III	B
Asymptomatic and haemodynamically irrelevant ventricular arrhythmias should not be treated with antiarrhythmic drugs.	III	C

Long-term management of ventricular arrhythmias and risk evaluation for sudden death

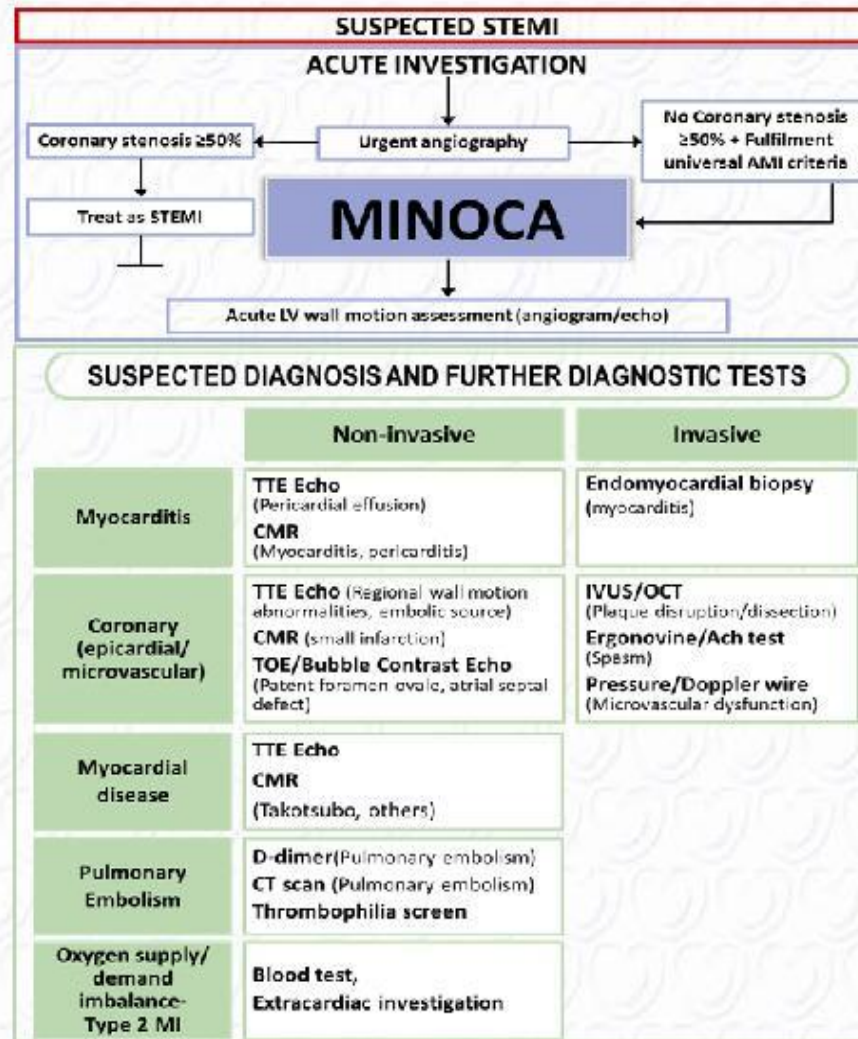
Recommendations	Class	Level
ICD therapy is recommended to reduce sudden cardiac death in patients with symptomatic heart failure (NYHA class II–III) and LVEF $\leq 35\%$ despite optimal medical therapy for >3 months and at least 6 weeks after MI who are expected to survive for at least 1 year with good functional status.	I	A
ICD implantation or temporary use of a wearable cardioverter defibrillator may be considered <40 days after MI in selected patients (incomplete revascularization, pre-existing LVEF dysfunction, occurrence of arrhythmias >48 hours after STEMI onset, polymorphic VT or VF).	IIb	C

Diagnostic criteria for myocardial infarction with non-obstructive coronary arteries

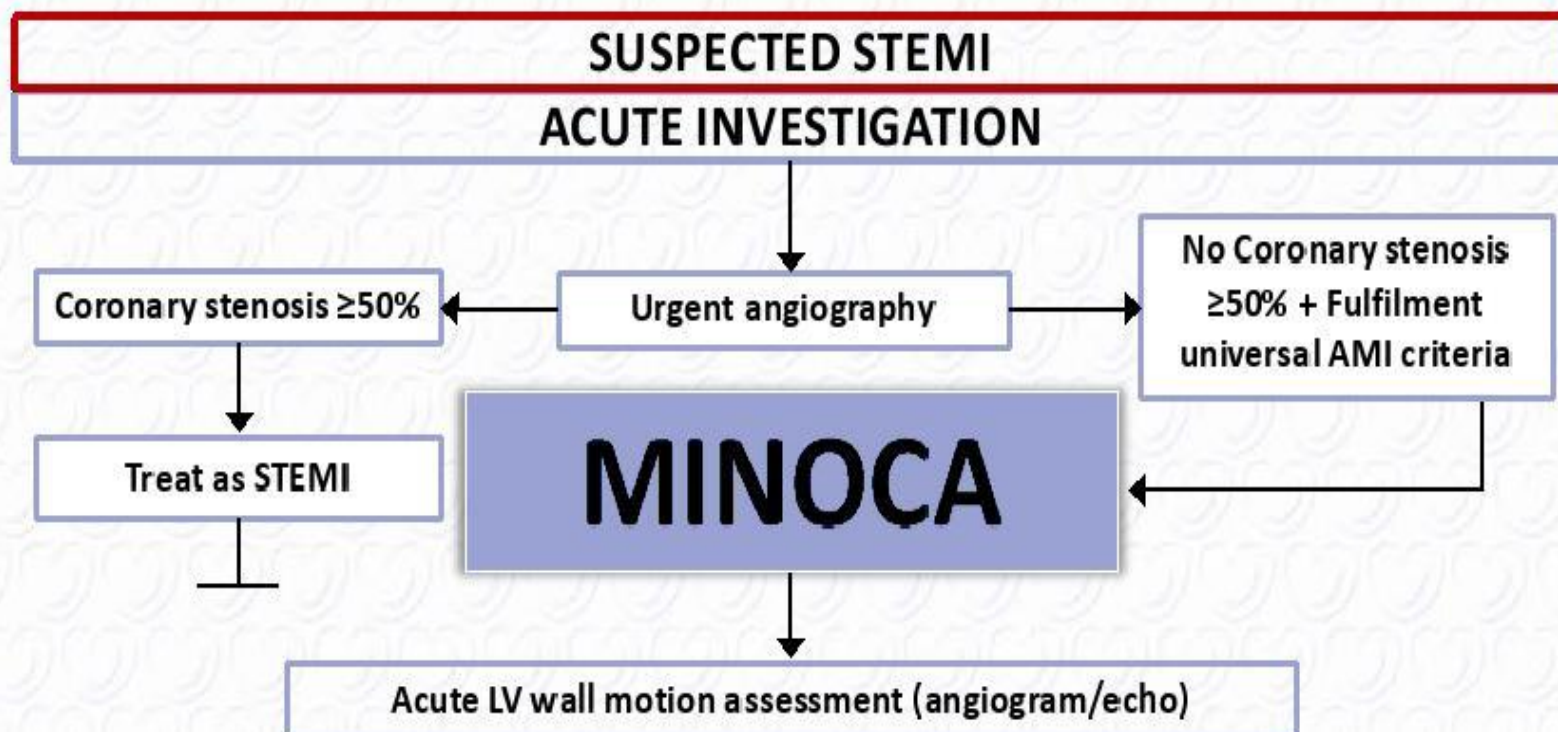
The diagnosis of MINOCA is made immediately upon coronary angiography in a patient presenting with features consistent with an AMI, as detailed by the following criteria:

- (1) Universal AMI criteria.
- (2) Non-obstructive coronary arteries on angiography, defined as no coronary artery stenosis $\geq 50\%$ in any potential IRA.
- (3) No clinically overt specific cause for the acute presentation.

Diagnostic test flow chart in MINOCA



Diagnostic test flow chart in MINOCA



Diagnostic test flow chart in MINOCA (*continued*)

SUSPECTED DIAGNOSIS AND FURTHER DIAGNOSTIC TESTS

	Non-invasive	Invasive
Myocarditis	TTE Echo (Pericardial effusion) CMR (Myocarditis, pericarditis)	Endomyocardial biopsy (myocarditis)
Coronary (epicardial/ microvascular)	TTE Echo (Regional wall motion abnormalities, embolic source) CMR (small infarction) TOE/Bubble Contrast Echo (Patent foramen ovale, atrial septal defect)	IVUS/OCT (Plaque disruption/dissection) Ergonovine/Ach test (Spasm) Pressure/Doppler wire (Microvascular dysfunction)

Diagnostic test flow chart in MINOCA (*continued*)

SUSPECTED DIAGNOSIS AND FURTHER DIAGNOSTIC TESTS

	Non-invasive	Invasive
Myocardial disease	TTE Echo CMR (Takotsubo, others)	
Pulmonary Embolism	D-dimer(Pulmonary embolism) CT scan (Pulmonary embolism) Thrombophilia screen	
Oxygen supply/ demand imbalance- Type 2 MI	Blood test, Extracardiac investigation	