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

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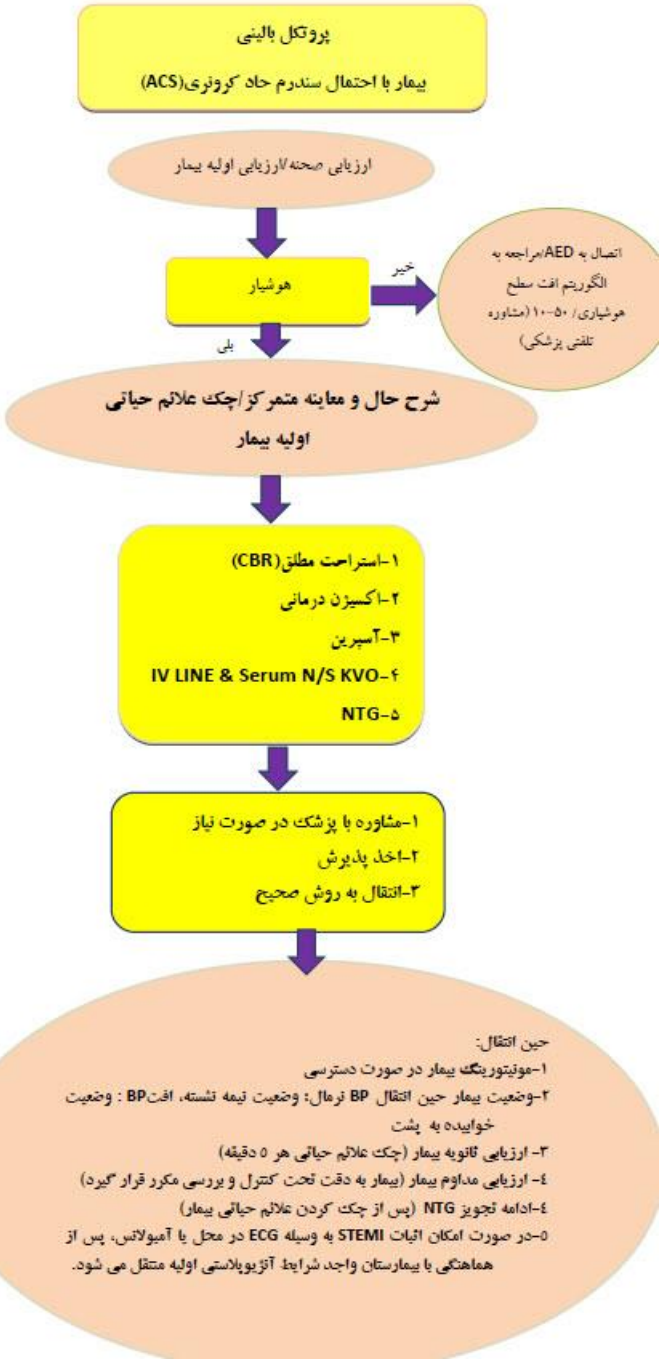
پیوست ۱-الف: پروتکل پیش بیمارستانی برخورد با سندرم حاد کرونری



علایم بیمار با احتمال سندرم حاد کرونری:

+ درد یا احساس ناراحتی در قفسه سینه و یا اپیگاستر، فک تحتانی، گردن، بازوها، شانه ها، پشت قفسه سینه

+درد تیپیک: درد فشارنده، له کننده، خنجری

+علایم همراه: کوتاهی یا تنگی نفس، تعریق، تهوع، استفراغ، ضعف (ممکن است علایم همراه بدون درد وجود داشته باشد)

بررسی وضعیت:

+هوشیاری: بیمار دچار هر گونه افت سطح هوشیاری می بایست از نظر آریتمی های کشنده و سایر علل افت سطح هوشیاری بررسی گردد.

اقدامات:

+استراحت مطلق(CBR): در بیماران مشکوک به ستدرم حاد کرونری، محدودیت کامل فعالیت شامل راه رفتن بایدد انجام پذیرد، کنترل استرس بیمار نیز باید مورد توجه قرار گیرد.

+اکسیژن درمانی:در تمام بیماران بایدد اکسیژن با دوز ۵-۳ لیتر با کانولای بینی تجویز گردد. در صورتی که $SO_2 \leq 94\%$ باشد، از روش های موثرتر مانند ماسک صورت تا رسیدن به $SO_2 \geq 95\%$ استفاده شود.

+آسپرین: در بیماری که جهت مشکل اخیر، آسپرین با دوز مناسب دریافت نکرده است، دو عدد آسپرین ۸۰ یا یک عدد آسپرین ۳۲۵ میلی گرم می بایست به صورت جویدنی تجویز گردد.

- موارد منع مصرف آسپرین: سابقه حساسیت به آسپرین، خونریزی فعال گوارشی (نه سابقه آن) و حمله حاد آسم

+line IV:در صورتی که IV گرفتن تأخیر طولانی مدتی در روند درمان یا انتقال بیمار ایجاد نماید، می بایست قبل از تجویز line.TNG IV از بیمار گرفته شود تا در صورت بروز افت فشارخون، ۲۵۰cc نرمال سالین به صورت تزریقی تجویز شود.

+NTG: ۳ دوز هر ۵ دقیقه زیر زبانی گذاشته شود قبل از هر دوز، فشارخون چک شود. موارد منع مصرف شامل: مصرف تادالافیل در دو روز گذشته یا سیلدنافیل در روز گذشته، فشار سیستولیک ≤ 90 mmHg یا ۳۰ mmHg کمتر از سطح پایه فشارخون بیمار و $HR<50$

+مانیتورینگ: در صورت دسترسی به مانیتور، در اولین فرصت ممکن بیمار مانیتورینگ شود. در صورتی که AED در دسترس باشد، بایدد با کابل مانیتورینگ بیمار را مانیتور کرد و در صورت بروز دیس ریتمی، بدد AED متصل گردد.

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

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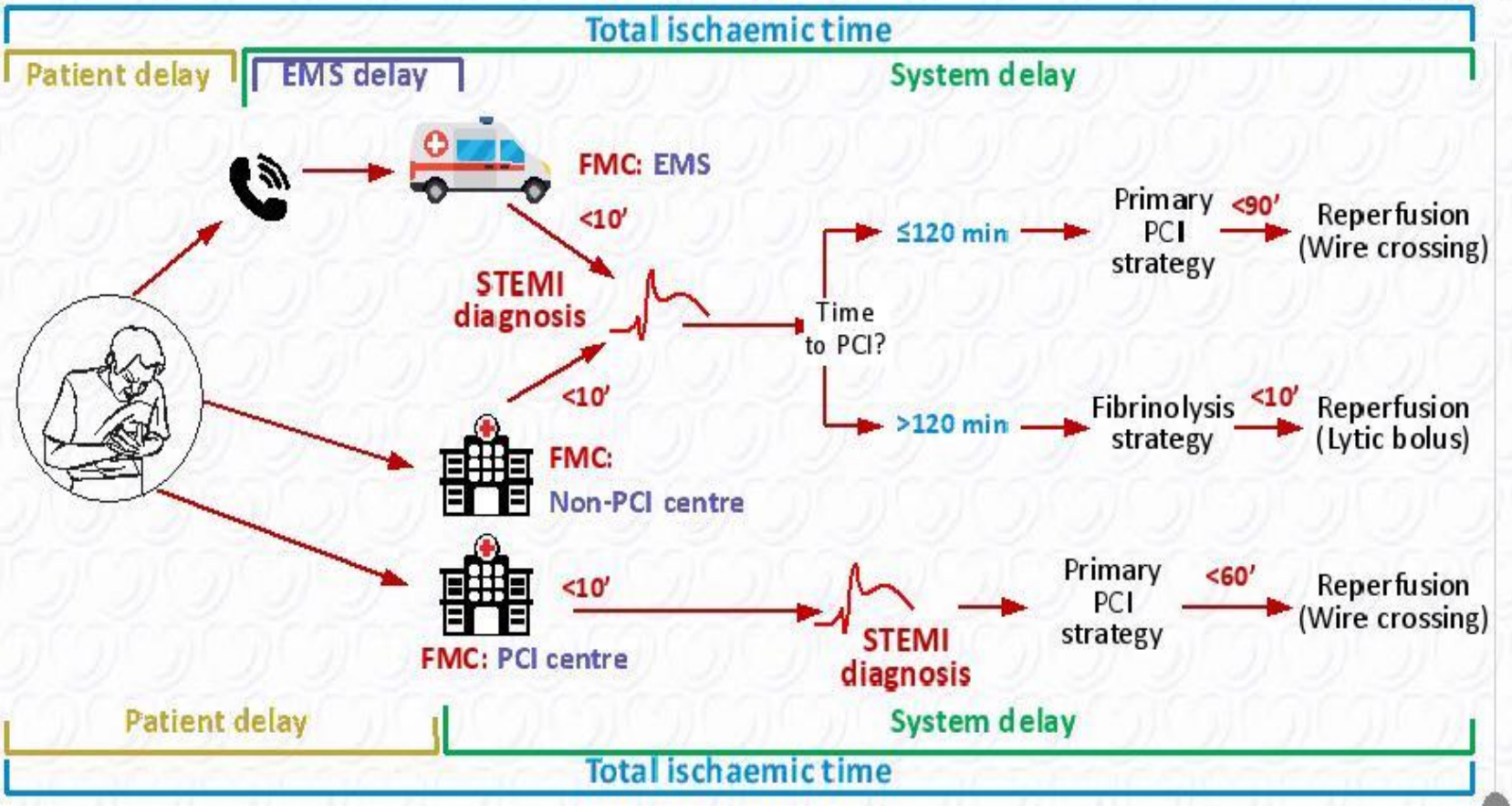

Relief of hypoxaemia and symptoms

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Recommendations	Class	Level
Hypoxia		
Oxygen is indicated in patients with hypoxaemia (SaO2 <90% or PaO2 <60 mmHg).	I	C
Routine oxygen is not recommended in patients with SaO2 ≥90%.	III	B
Symptoms		
Titrated i.v. opioids should be considered to relieve pain.	IIa	C
A mild tranquillizer (usually a benzodiazepine) should be considered in very anxious patients.	IIa	C

Cardiac arrest

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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

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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

Logistics of prehospital care

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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

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

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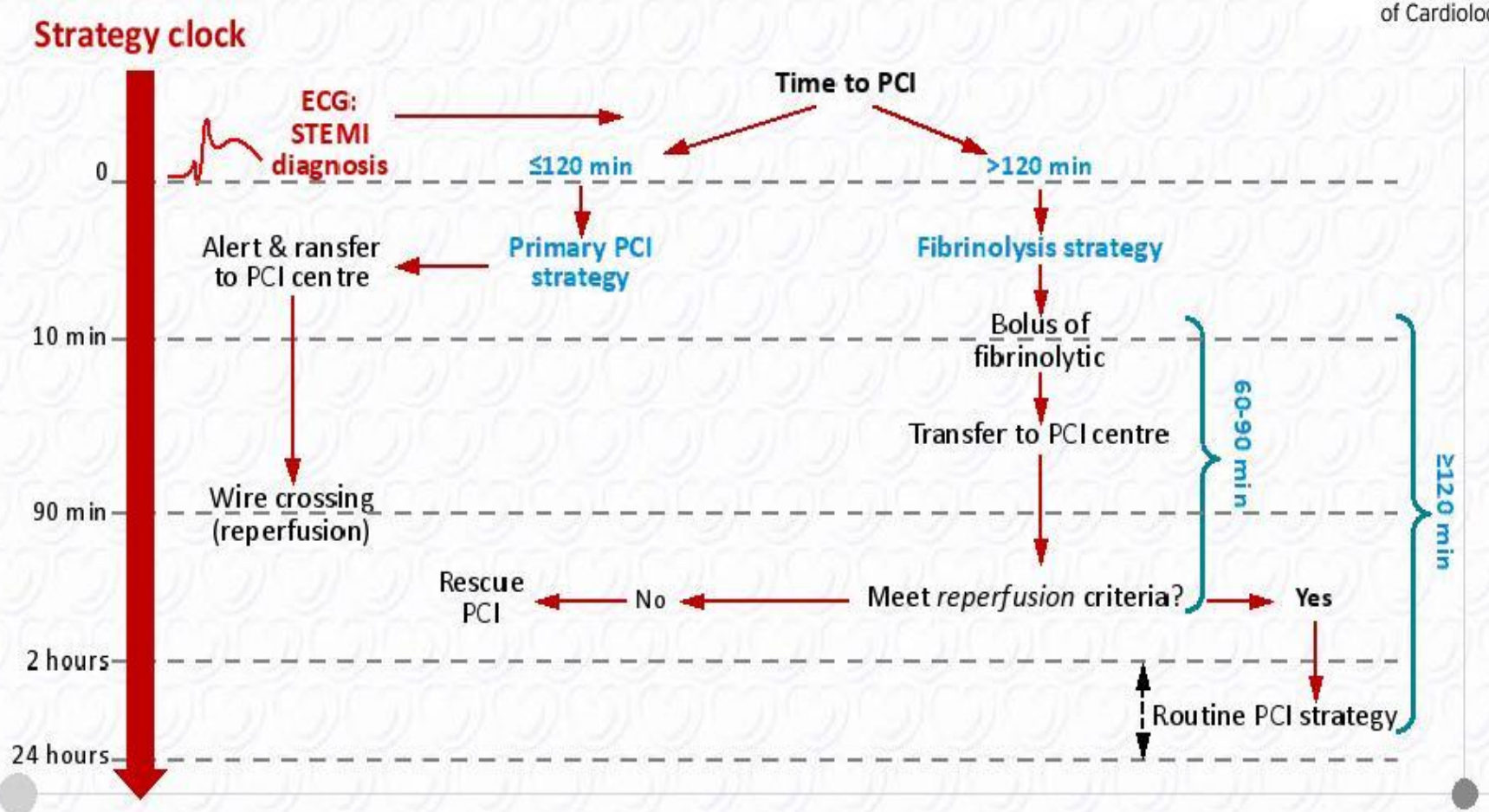
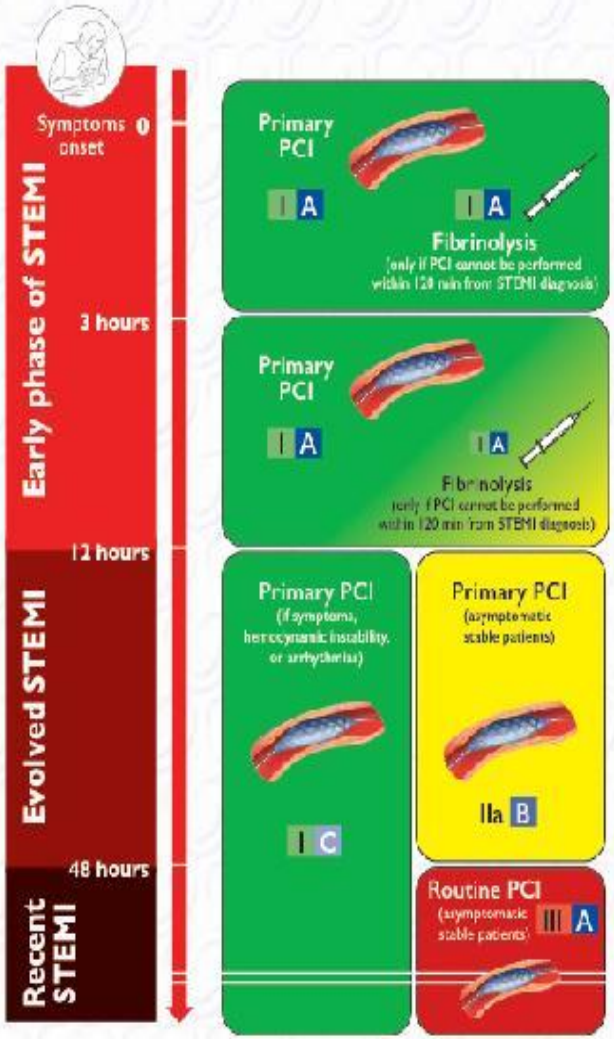


www.escardio.org/guidelines 2017 ESC Guidelines for the Management of AMI-STEMI (European Heart Journal 2017 - doi:10.1093/eurheartj/ehx095)

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

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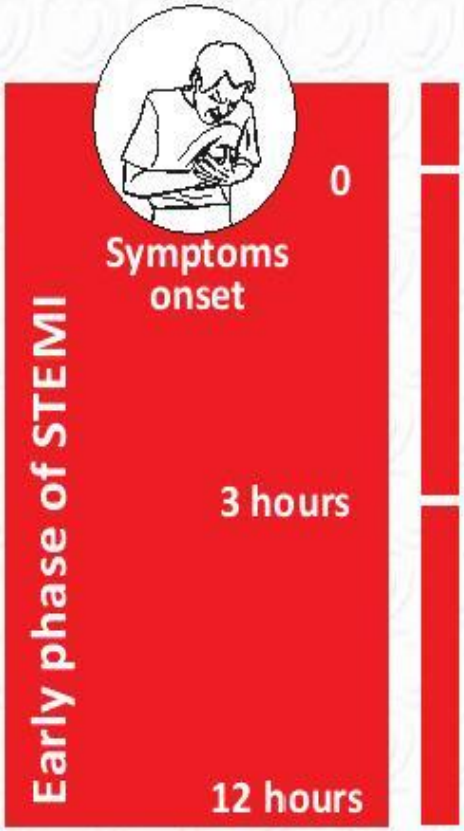

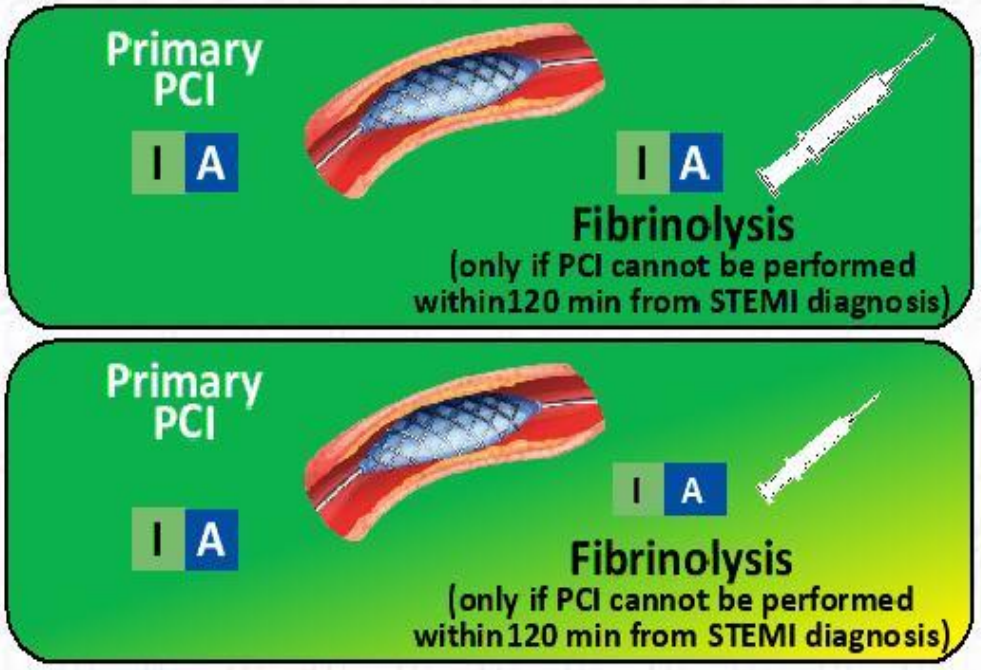

Reperfusion strategies in the infarct-related artery according to time from symptoms onset *(continued)*

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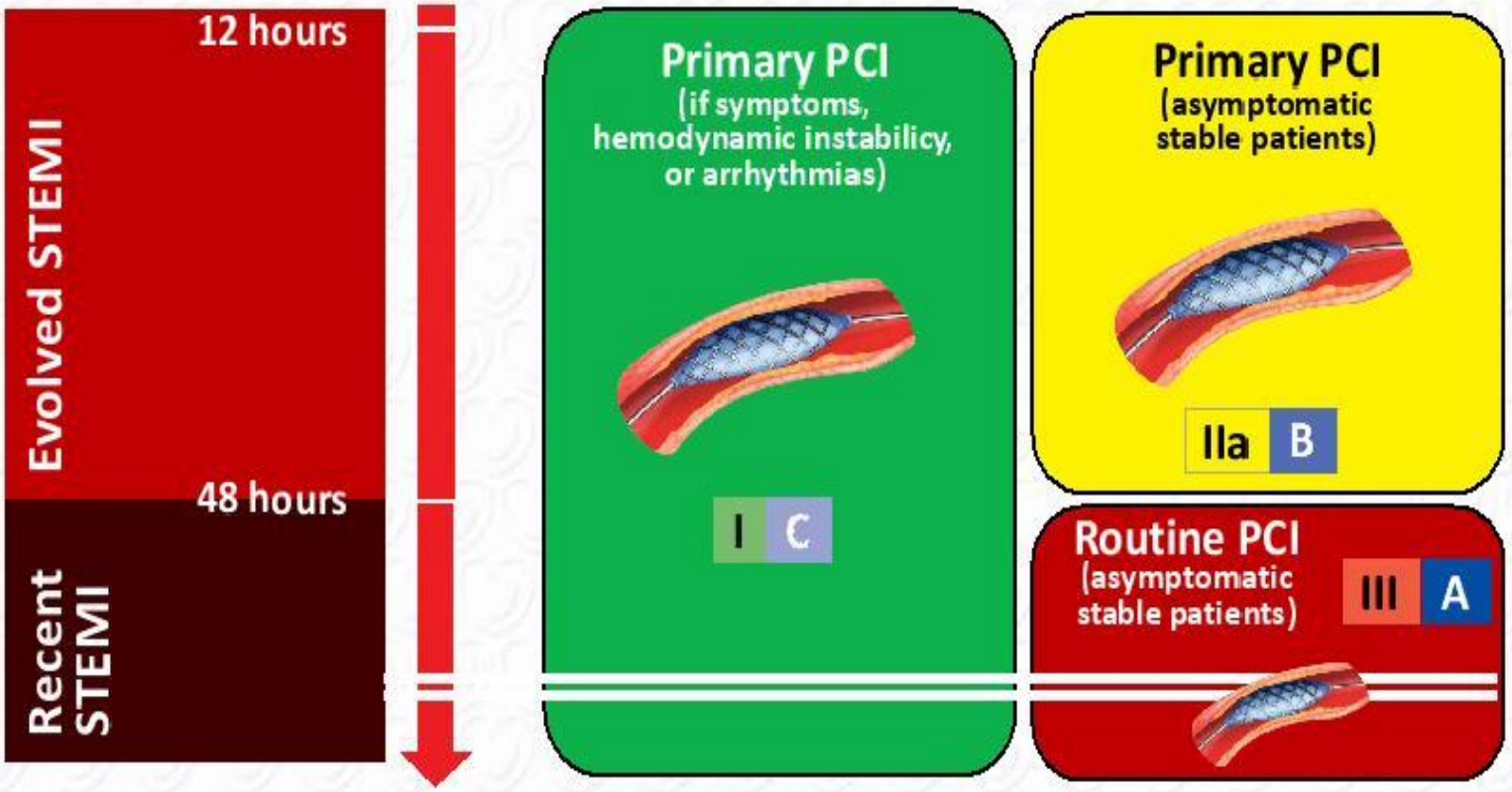

Reperfusion therapy

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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 *primary PCI strategy* 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)*

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Recommendations	Class	Level
In the absence of ST-segment elevation, a *primary PCI strategy* 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)*

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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 *primary PCI strategy* is indicated in the presence of ongoing symptoms suggestive of ischaemia, haemodynamic instability, or life-threatening arrhythmias.	I	C
A routine *primary PCI strategy* 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

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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)*

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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

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

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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

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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

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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 of75 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.

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

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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.

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

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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

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Doses of antiplatelet and parenteral anticoagulant therapies inpatients 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

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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)*

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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)*

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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 between2 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

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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.	

Contra-indications to fibrinolytic therapy

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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

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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.

Behavioural aspects after ST-elevation myocardial infarction

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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

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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)*

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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.	IIa	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).	IIa	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.	IIa	C
In patients with LV thrombus, anticoagulation should be administered for up to 6 months guided by repeated imaging.	IIa	C

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

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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

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Recommendations	Class	Level
Beta-blockers		
Oral treatment with beta-blockers is indicated in patients with heart failure or LVEF ≤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)*

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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.	IIa	A

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

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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 ≤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

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

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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 ≤40% and/or heart failure to reduce the risk of hospitalization and death.	I	A
Beta-blocker therapy is recommended in patients with LVEF ≤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 ≤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)*

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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 SaO2 <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, SaO2 <90%) without hypotension.	IIa	B

Management of ventricular arrhythmias and conduction disturbances in the acute phase

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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 hypomagnesemia) is recommended in patients with VT and/or VF.	I	C

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

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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


THANK YOU
FOR YOUR
ATTENTION