2017 ESC Guidelines for the management of acute myocardial infarction in patients presenting with ST-segment elevation
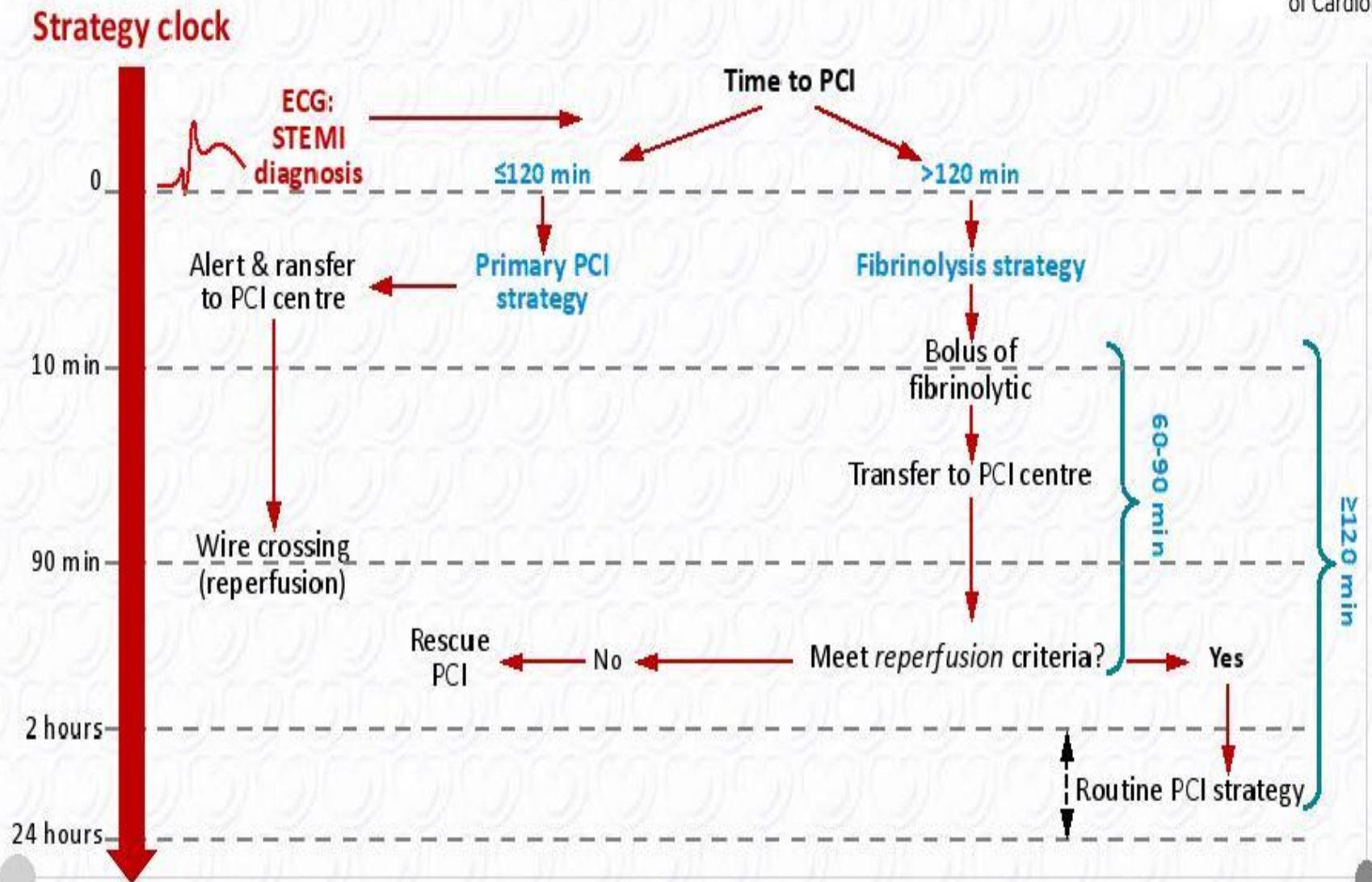
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The Task Force for the management of acute myocardial infarction in patients presenting with ST-segment elevation of the European Society of Cardiology

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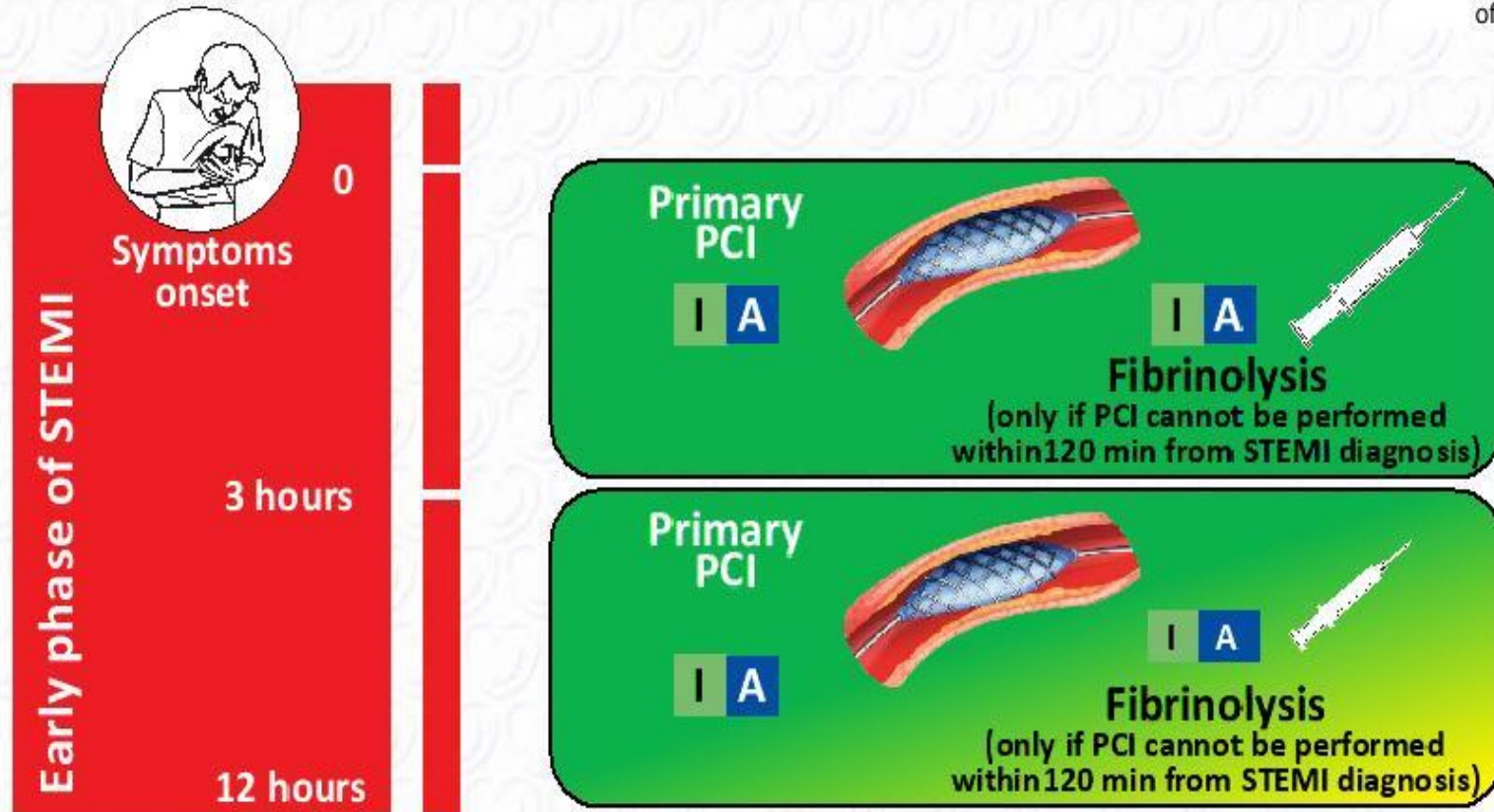
Reperfúzní léčba

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

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Strategy clock

Time to PCI

ECG:
STEMI
diagnosis

0

≤120 min

>120 min

Alert & ransfer
to PCI centre

Primary PCI
strategy

Fibrinolysis strategy

10 min

Bolus of
fibrinolytic

Transfer to PCI centre

60-90 min

≥120 min

90 min

Wire crossing
(reperfusion)

Rescue
PCI

No

Meet *reperfusion* criteria?

Yes

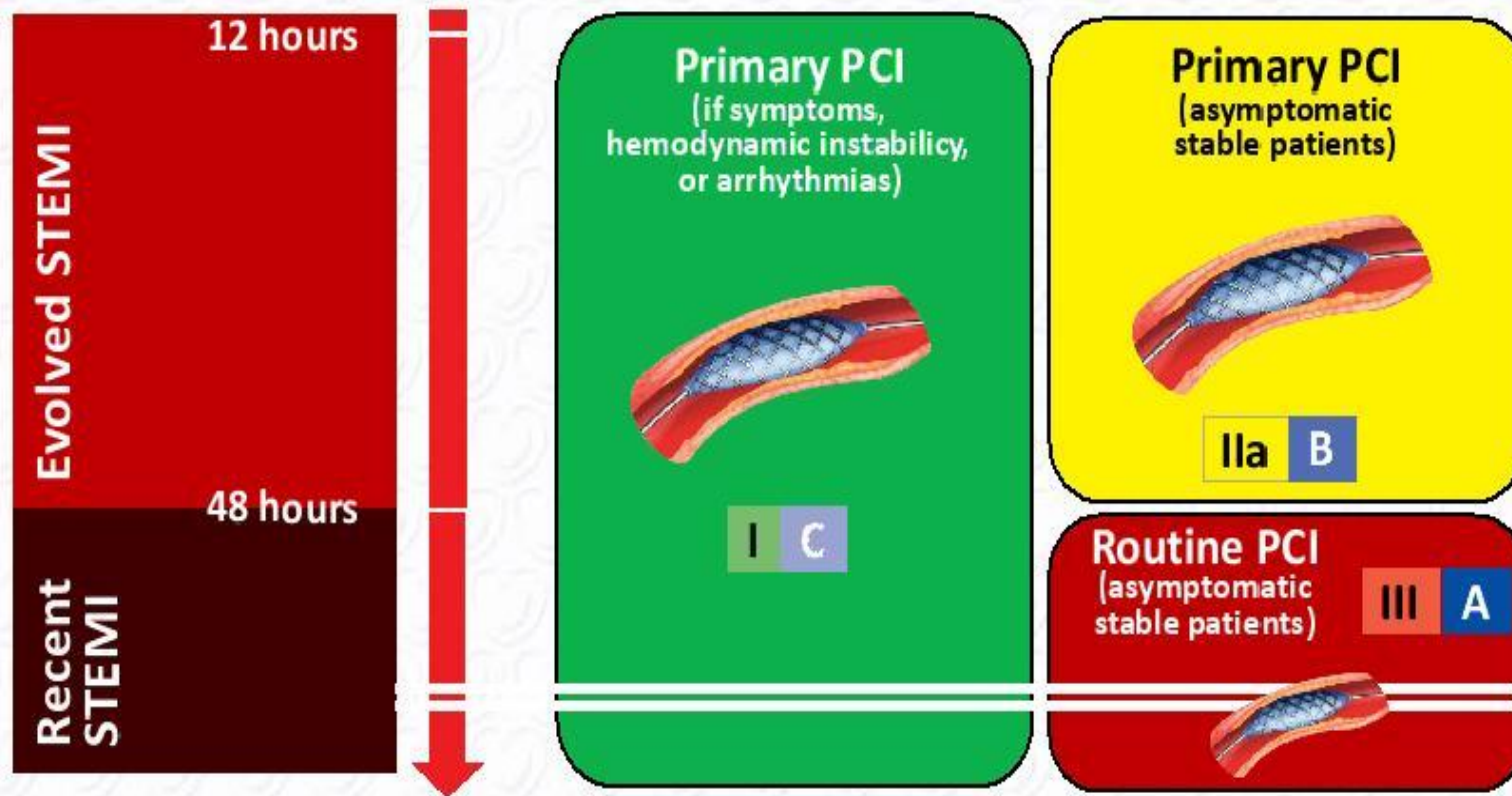2 hours

Routine PCI strategy

24 hours

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.
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.

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

Early phase of STEMI

Symptoms onset — 0
3 hours
12 hours

Primary PCI — I A

Fibrinolysis
(only if PCI cannot be performed within 120 min from STEMI diagnosis) — I A

Primary PCI — I A

Fibrinolysis
(only if PCI cannot be performed within 120 min from STEMI diagnosis) — I A

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 *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)*

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

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 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

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 *(continued)*		
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

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

Postprocedural antithrombotic regimen in pts on anticoagulant therapy
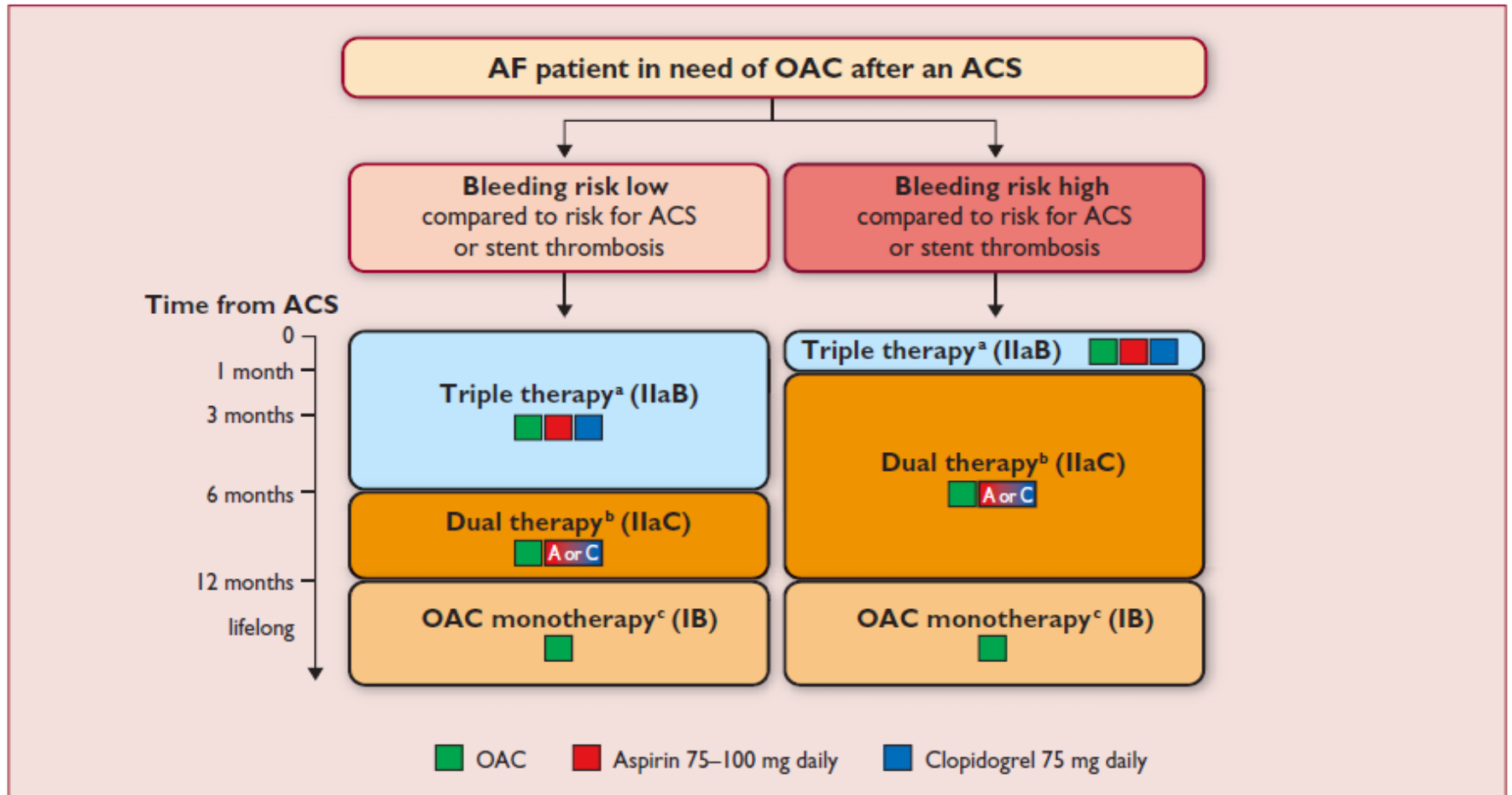
ACS = acute coronary syndrome; AF = atrial fibrillation; OAC = oral anticoagulation (using vitamin K antagonists or non-vitamin K antagonist oral anticoagulants);
PCI = percutaneous coronary intervention.
[a] Dual therapy with OAC and aspirin or clopidogrel may be considered in selected patients, especially those not receiving a stent or patients at a longer time from the index event.
[b] OAC plus single antiplatelet.
[c] Dual therapy with OAC and an antiplatelet agent (aspirin or clopidogrel) may be considered in patients at high risk of coronary events.

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
Urgent angiography (and PCI) should be considered in patients resuscitated with cardiac arrest without diagnostic ST segment elevations but with high suspition of ongoing myocardial ischemia	IIa	C

Management of cardiogenic shock in ST-elevation myocardial infarction

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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.	IIa	C
Complete revascularization during the index procedure should be considered in patients presenting with cardiogenic shock.	IIa	C
Intra-aortic balloon pumping should be considered in patients with haemodynamic instability/cardiogenic shock due to mechanical complications.	IIa	C
Haemodynamic assessment with pulmonary artery catheter may be considered for confirming diagnosis or guiding therapy.	IIb	B

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

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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