A Review of new 2017 ESC guidelines for management of STEMI ..

What is new ?

What do we learn ?

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What is new in 2017 guidelines on STEMI

- Changes in recommendations
- 2017 new recommendations
- New/ revised concepts

What is new in 2017 Guidelines on AMI-STEMI

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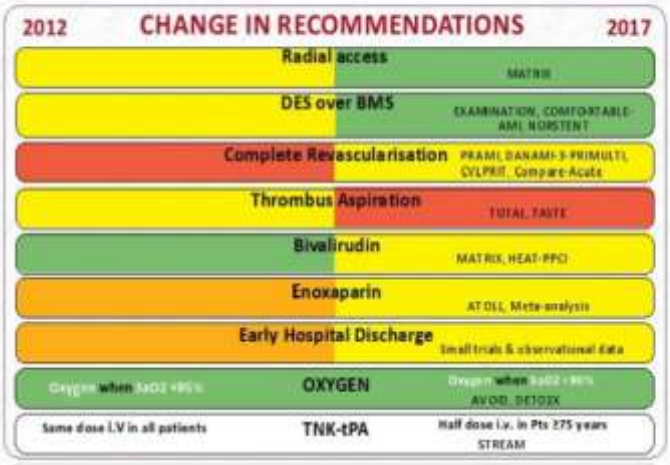

What is new in 2017 Guidelines on AMI-STEMI *(continued)*

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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 $P2Y_{12}$ inhibitors have not been given. ***CHAMPION***
- Switch to potent $P2Y_{12}$ 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)*

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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.

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).

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.

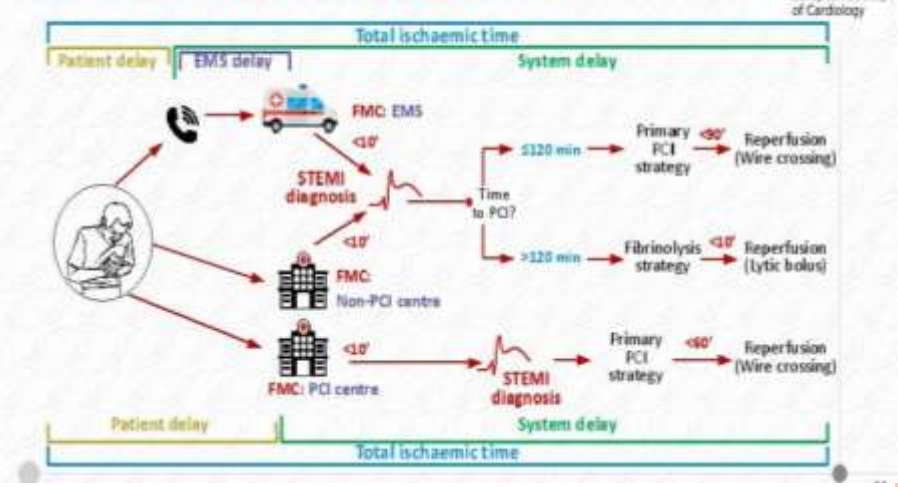
ELECTROCARDIOGRAM AT PRESENTATION:

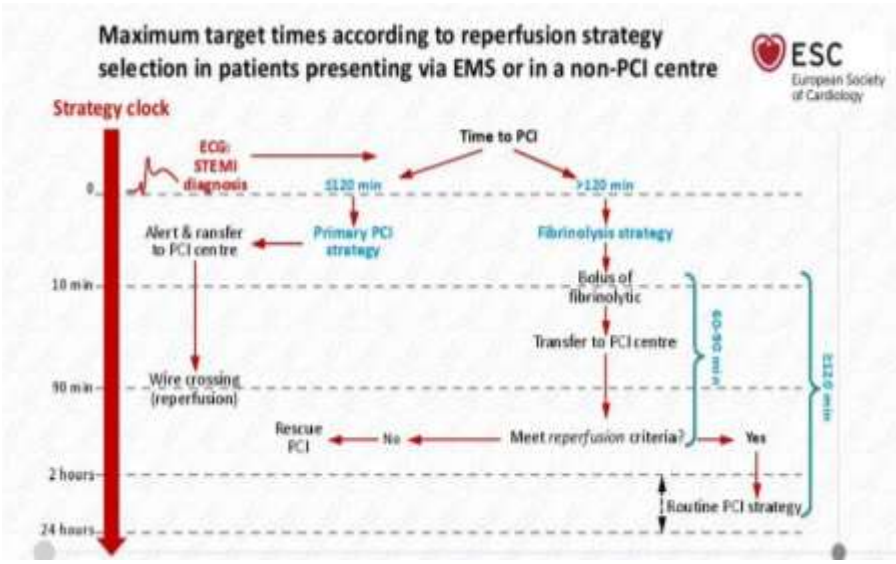
- Left and right bundle branch block considered equal for recommending urgent angiography if ischaemic symptoms.

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) inposterior 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 elevationin aVR and/or V_1, suggests left main-, or left main equivalent- coronary obstruction, or severe three vessel ischaemia.

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




Maximum target times according to reperfusion strategy selection in patients presenting via EMS or in a non-PCI centre
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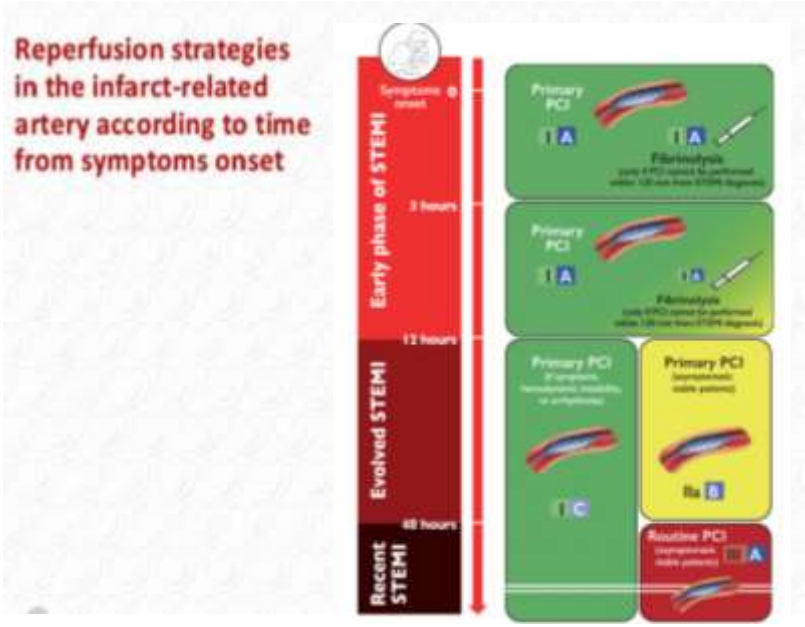
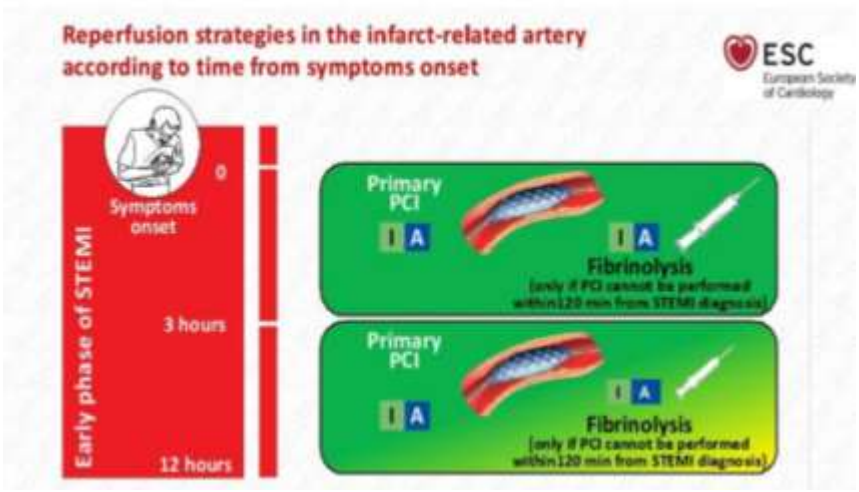
Strategy clock
ECG: STEMI diagnosis
Time to PCI
≤120 min
>120 min
Alert & ransfer to PCI centre
Primary PCI strategy
Fibrinolysis strategy
10 min
Bolus of fibrinolytic
Transfer to PCI centre
60-90 min
90 min
Wire crossing (reperfusion)
≤120 min
Rescue PCI
No
Meet reperfusion criteria?
Yes
2 hours
Routine PCI strategy
24 hours


Reperfusion strategies in the infarct-related artery according to time from symptoms onset
Early phase of STEMI
Evolved STEMI
Recent STEMI
Primary PCI
Fibrinolysis
Primary PCI
Fibrinolysis
Primary PCI
Primary PCI
Routine PCI


Reperfusion strategies in the infarct-related artery according to time from symptoms onset
ESC
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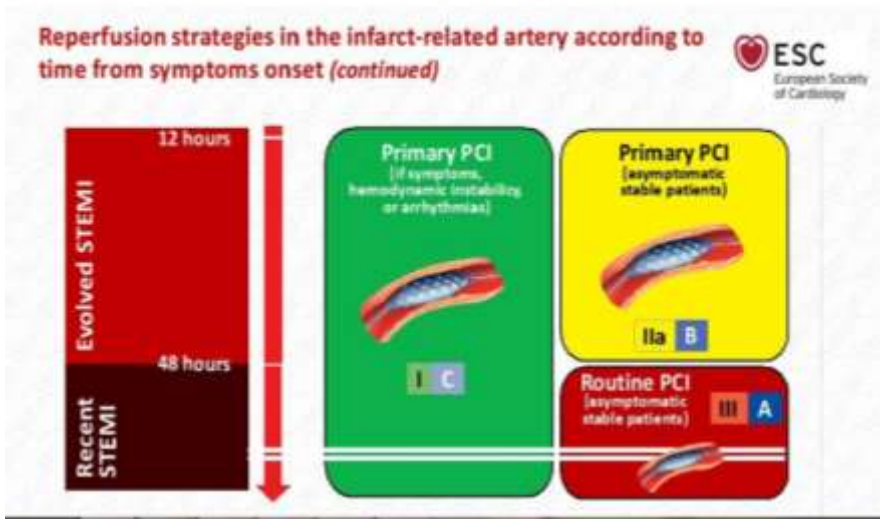
Early phase of STEMI
0
Symptoms onset
3 hours
12 hours
Primary PCI
I A
I A
Fibrinolysis
(only if PCI cannot be performed within 120 min from STEMI diagnosis)
Primary PCI
I A
I A
Fibrinolysis
(only if PCI cannot be performed within 120 min from STEMI diagnosis)


Reperfusion strategies in the infarct-related artery according to time from symptoms onset (continued)
ESC
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Evolved STEMI
12 hours
48 hours
Recent STEMI
Primary PCI
(if symptoms, hemodynamic instability or arrhythmias)
I C
Primary PCI
(asymptomatic stable patients)
IIa B
Routine PCI
(asymptomatic stable patients)
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 *(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

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

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

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

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.	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)*

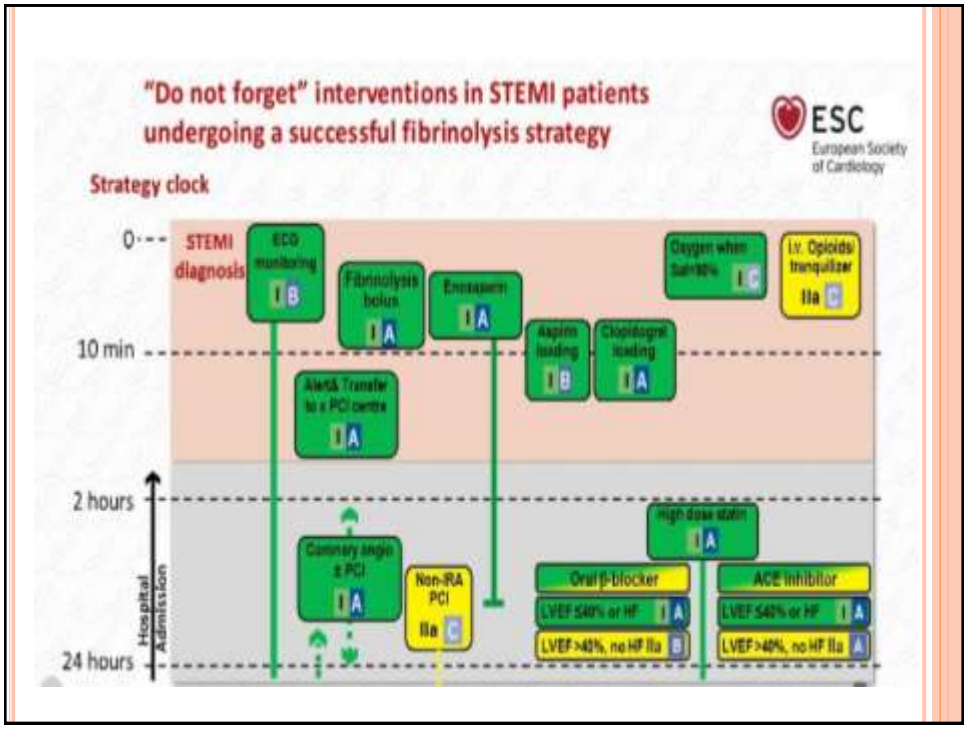
Recommendations	Class	Level
In high ischaemic risk patients who have tolerated DAPT without a bleeding complication, treatment with DAPT in the form of ticagrelor 60 mg twice a day on top of aspirin for longer than 12 months may be considered for up to 3 years.	IIb	B
In low bleeding risk patients who 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 ≤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.	IIa	A


"Do not forget" interventions in STEMI patients undergoing a successful fibrinolysis strategy
ESC
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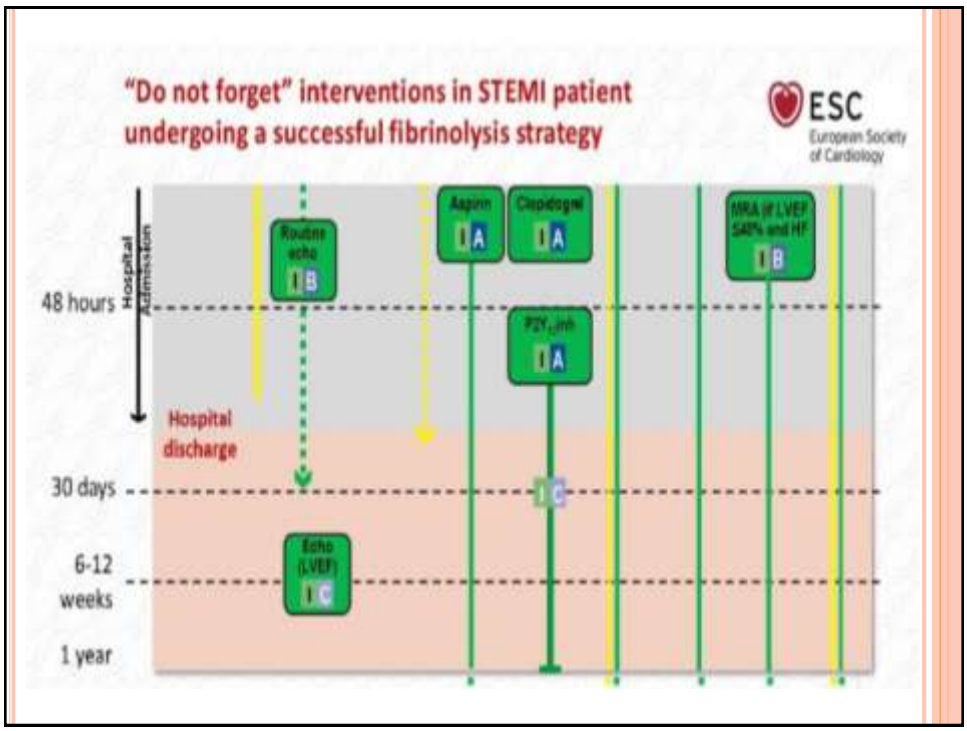
Strategy clock
0
STEMI diagnosis
ECG monitoring
I B
Fibrinolysis bolus
I A
Enoxaparin
I A
Oxygen when Sat<90%
I C
i.v. Opioids/ tranquilizer
IIa C
10 min
Aspirin loading
I B
Clopidogrel loading
I A
Alert& Transfer to a PCI centre
I A
2 hours
High dose statin
I A
Coronary angio ± PCI
I A
Non-IRA PCI
IIa C
Oral β-blocker
LVEF ≤40% or HF
I A
LVEF >40%, no HF
IIa B
ACE inhibitor
LVEF ≤40% or HF
I A
LVEF >40%, no HF
IIa A
Hospital Admission
24 hours


"Do not forget" interventions in STEMI patient undergoing a successful fibrinolysis strategy
ESC
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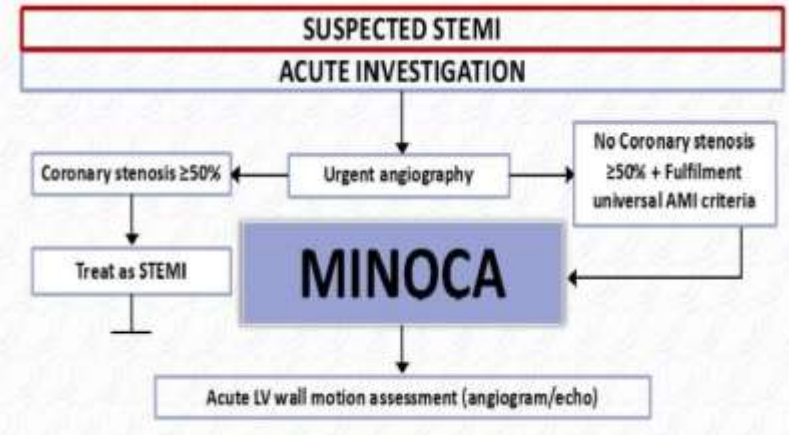
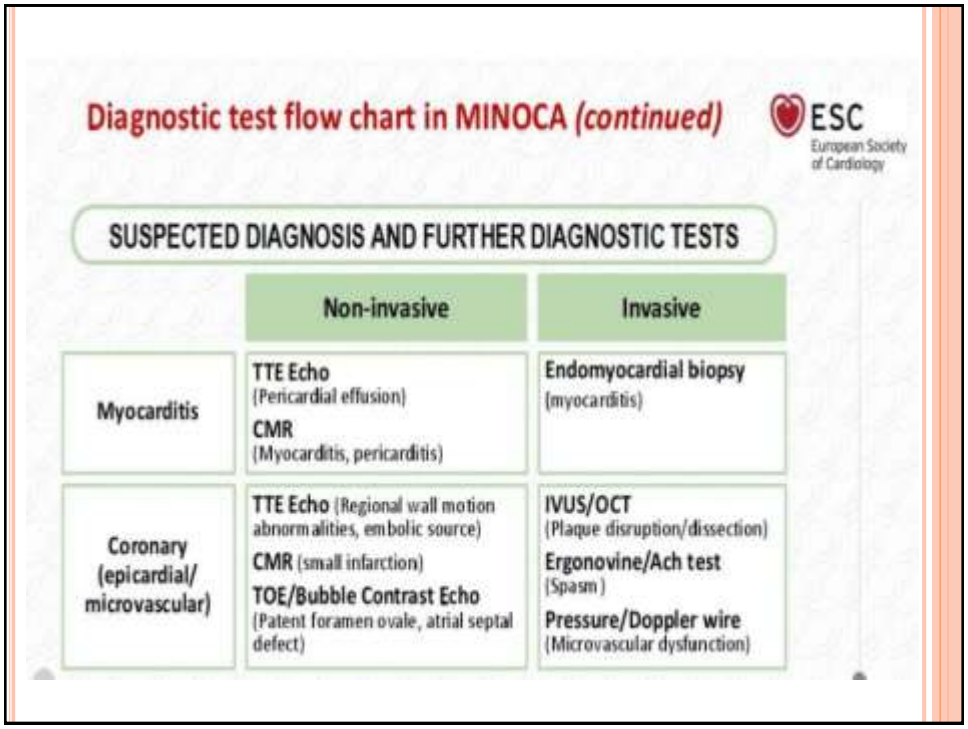
Hospital Admission
48 hours
Routine echo
I B
Aspirin
I A
Clopidogrel
I A
MRA (if LVEF ≤40% and HF
I B
P2Y12 inh
I A
Hospital discharge
30 days
I C
Echo (LVEF)
I C
6-12 weeks
1 year

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 ≥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 (continued)
ESC
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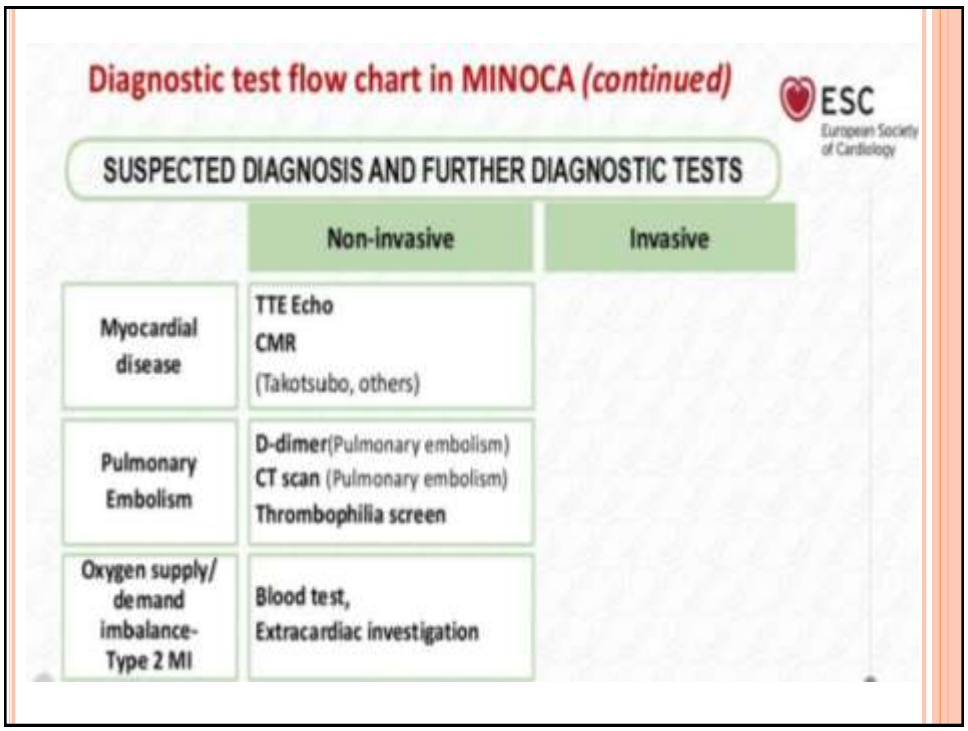
SUSPECTED DIAGNOSIS AND FURTHER DIAGNOSTIC TESTS
Non-invasive
Invasive
Myocarditis
TTE Echo (Pericardial effusion)
CMR (Myocarditis, pericarditis)
Endomyocardial biopsy (myocarditis)
Coronary (epicardial/ microvascular)
TTE Echo (Regional wall motion abnormalities, embolic source)
CMR (small infarction)
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)
ESC
European Society of Cardiology
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

QUALITY INDICATORS

Type of indicator and process	Quality indicator
Structural measures (organization)	1) The centre should be part of a network specifically developed for the rapid and efficient management of STEMI patients with written protocols covering the following points: • *Single emergency telephone number* for patients to contact the emergency services • *Prehospital interpretation of the ECG* for diagnosis and decision for immediate transfer to a PCI centre • Prehospital activation of the catheterization laboratory • Transportation (ambulance-helicopter) equipped with ECG defibrillators 2) Key times to reperfusion are systematically recorded and periodically reviewed for quality assessments by the centre or network participants
Performance measures for reperfusion therapy	1) Proportion of STEMI patients arriving in the first 12 h receiving reperfusion therapy 2) Proportion of patients with timely reperfusion therapy, defined as: • For patients attended to in the pre-hospital setting: • <90 min from STEMI diagnosis to IRA wire crossing for reperfusion with PCI • <10 min from STEMI diagnosis to lytic bolus for reperfusion with fibrinolysis • For patients admitted to PCI centres: • <60 min from STEMI diagnosis to IRA wire crossing for reperfusion with PCI • For transferred patients: • <120 min from STEMI diagnosis to IRA wire crossing for reperfusion with PCI • <30 min door-in-door-out for patients presenting in a non-PCI centre (en route to a PCI centre)
Performance measures for risk assessment in hospital	1) Proportion of patients having LVEF assessed before discharge
Performance measures for antithrombotic treatment in hospital	1) Proportion of patients without a clear and documented contra-indication for aspirin and/or a $P2Y_{12}$ inhibitor, discharged on DAPT

QUALITY INDICATORS (CONTINUED)

Performance measures for discharge medication and counselling	1) Proportion of patients without contra-indications with a statin (high-intensity) prescribed at discharge 2) Proportion of patients with LVEF ≤40% or clinical evidence of heart failure and without contra-indications with a beta-blocker prescribed at discharge 3) Proportion of patients with LVEF ≤40% or clinical evidence of heart failure without contra-indications with an ACE inhibitor (or ARB if not tolerated) prescribed at discharge 4) Proportion of patients with smoking cessation advice/counselling at discharge 5) Proportion of patients without contra-indications enrolled in a secondary prevention/cardiac rehabilitation programme at discharge
Patient-reported outcomes	• Availability of a programme to obtain feedback regarding the patient's experience and quality of information received, including the following points: • Angina control. • Explanations provided by doctors and nurses (about the disease, benefit/risk of discharge treatments, and medical follow-up) • Discharge information regarding what to do in case of recurrence of symptoms and recommendation to attend a rehabilitation programme (including smoking cession and diet counselling)
Outcome measures	1) 30-day adjusted mortality (e.g. GRACE risk score-adjusted) 2) 30-day adjusted readmission rates
Opportunity-based composite quality indicators	• Proportion of patients with LVEF >40% and no evidence of heart failure receiving at discharge low-dose aspirin and a $P2Y_{12}$ inhibitor and high-intensity statins • Proportion of patients with LVEF ≤40% and/or heart failure receiving at discharge low-dose aspirin, a $P2Y_{12}$ inhibitor, high-intensity statins, an ACE inhibitor (or ARB), and a beta-blocker

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

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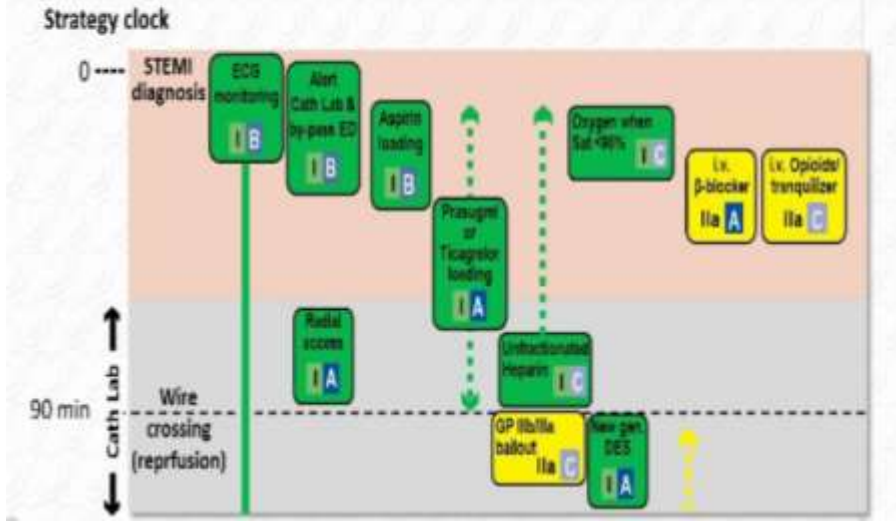
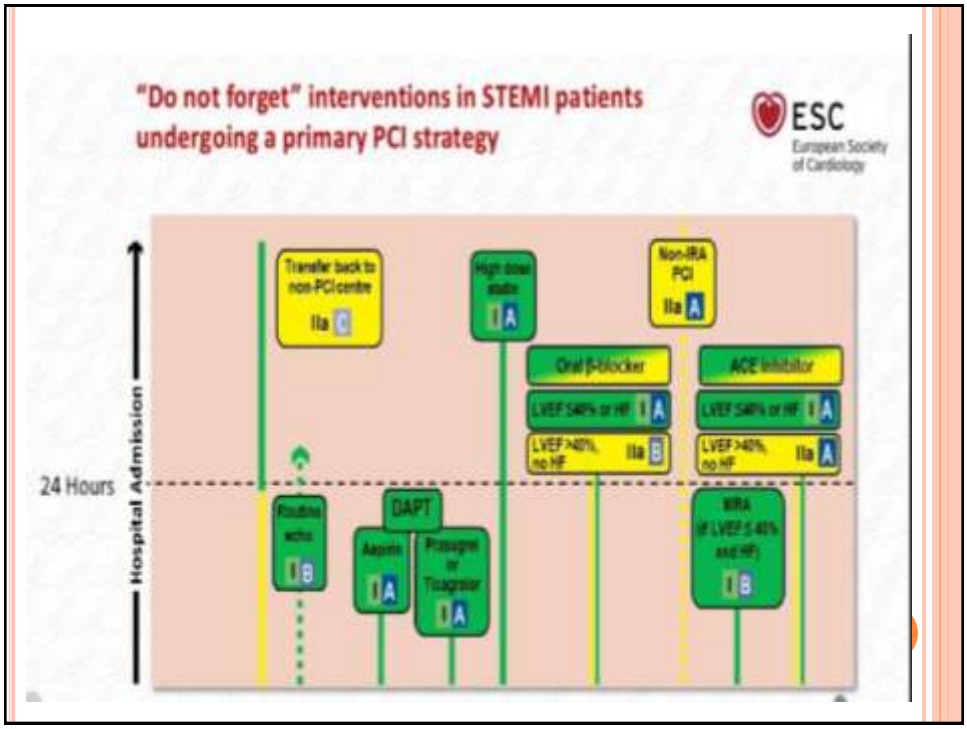
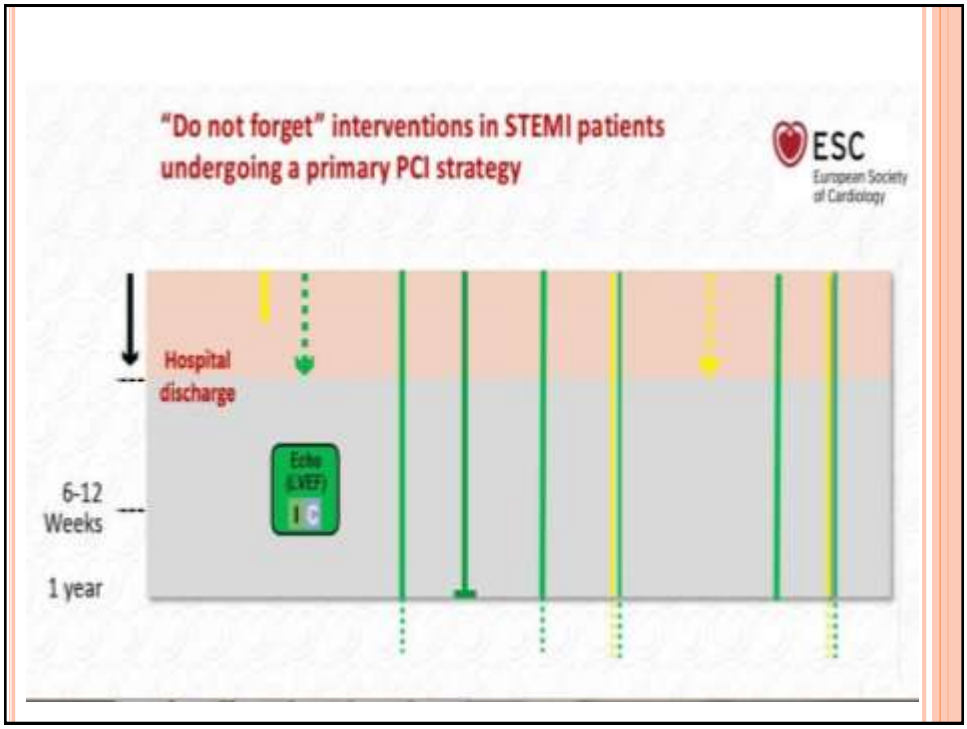



"Do not forget" interventions in STEMI patients undergoing a primary PCI strategy
ESC
European Society of Cardiology
Hospital Admission
24 Hours
Transfer back to non-PCI centre
IIa C
High dose statin
I A
Non-IRA PCI
IIa A
Oral β-blocker
LVEF ≤40% or HF I A
LVEF >40%, no HF IIa B
ACE Inhibitor
LVEF ≤40% or HF I A
LVEF >40%, no HF IIa A
Routine echo
I B
DAPT
Aspirin
I A
Prasugrel or Ticagrelor
I A
MRA
I B


"Do not forget" interventions in STEMI patients undergoing a primary PCI strategy
ESC
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Hospital discharge
Echo (LVEF)
I C
6-12 Weeks
1 year