2008 ESC GUIDELINES: Management of acute myocardial infarction in patients presenting with persistent ST-segment elevation (STEMI)

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2008 ESC STEMI GUIDELINES: Task Force

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Key Messages remain unchanged:

- Early diagnosis
- Reperfusion therapy as soon as possible
- Optimal secondary prevention

Main Differences with 2003 Guidelines

- Early pre-hospital diagnosis/triage and networks
- Selection criteria for primary PCI vs. fibrinolytic therapy
- Antithrombotic co-therapies
- Angiography in patients not undergoing primary PCI
- Secondary prevention

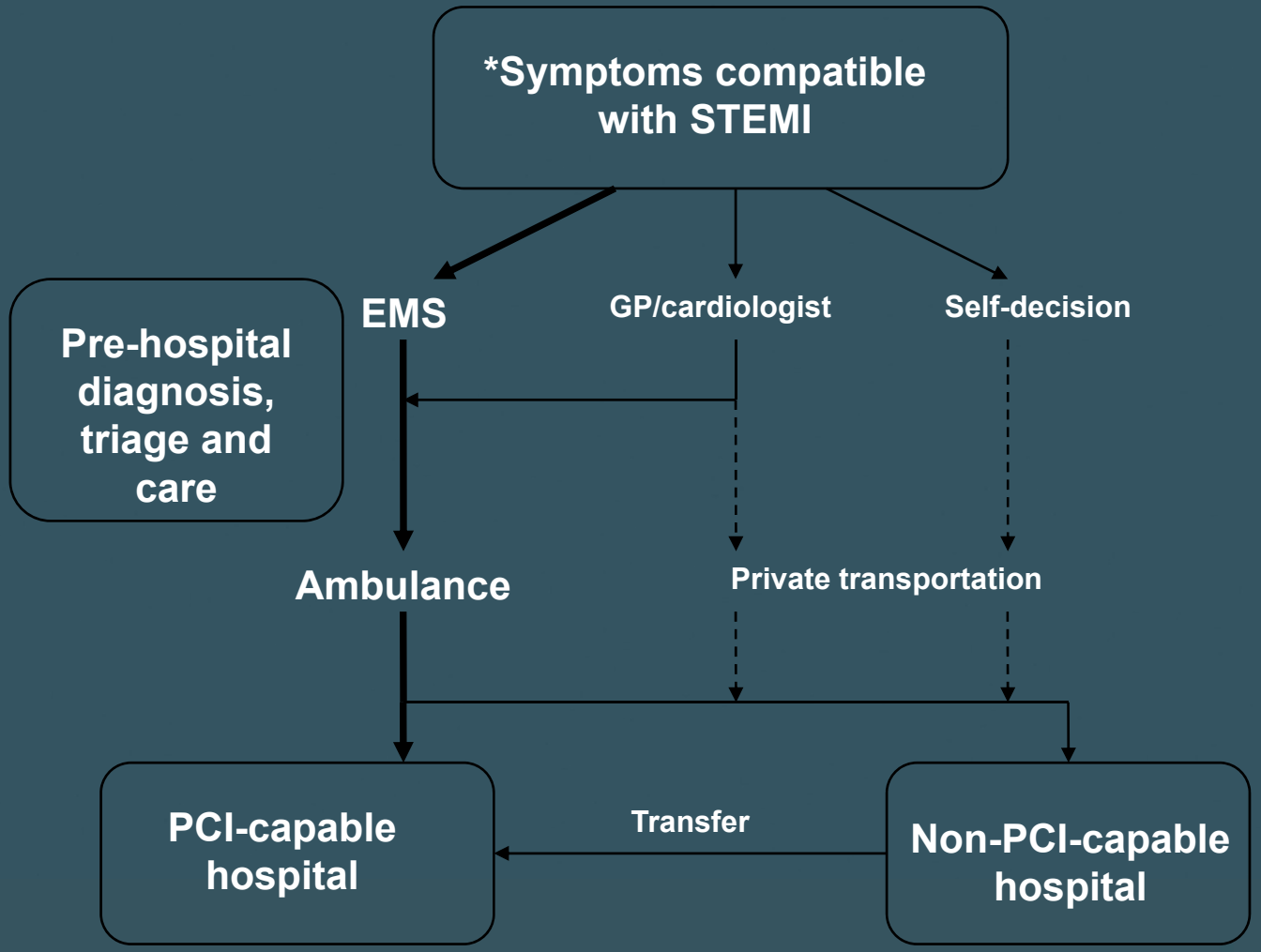
Classes of Recommendations

Classes of Recommendations	Definition
Class I	Evidence and / or general agreement that a given treatment or procedure is beneficial, useful, effective.
Class II	Conflicting evidence and / or a divergence of opinion about the usefulness / efficacy of the given treatment or procedure.
Class IIa	Weight of evidence / opinion is in favour of usefulness / efficacy.
Class IIb	Usefulness / efficacy is less well established by evidence / opinion.
Class III	Evidence or general agreement that the given treatment or procedure is not useful / effective, and in some cases may be harmful.

Levels 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.**

Pre-hospital Management



* 24/7 service

EMS: Emergency Medical System; STEMI: Acute ST-segment Elevation Myocardial Infarction; GP: General Practitioner;
PCI: Percutaneous Coronary Intervention
Thick arrows: preferred patient flow; dotted line: to be avoided

Initial Diagnosis

- History of chest pain / discomfort
- Persistent ST-segment elevation or (presumed) new LBBB. Repeated ECG recordings often needed
- Elevated markers of myocardial necrosis (CK-MB, troponins). One should not wait for the results to initiate reperfusion treatment
- 2-D echocardiography to rule out major acute myocardial ischaemia and other causes of chest pain / discomfort

Relief of Pain, Breathlessness and Anxiety

Recommendations	Class	LOE
i.v. opioids (4 to 8 mg morphine) with additional doses of 2 mg at 5 to 15 min intervals	I	C
O_2 (2–4 L/min) if breathlessness or other signs of heart failure	I	C
Tranquilliser - in very anxious patients	IIa	C

Reperfusion Therapy

Reperfusion Therapy

Recommendations	Class	LOE
■ Indicated in all pts with chest pain/discomfort of < 12 h and with persistent ST-segment elevation or (presumed) new LBBB	I	A
■ Should be considered if there is clinical and/or ECG evidence of ongoing ischaemia if symptoms started > 12 h before	IIa	C
■ Reperfusion (PCI) in stable pts presenting > 12 h to 24 h after symptom onset	IIb	B
■ PCI of totally occluded infarct artery in stable pts > 24 h after symptom onset without signs of ischaemia	III	B

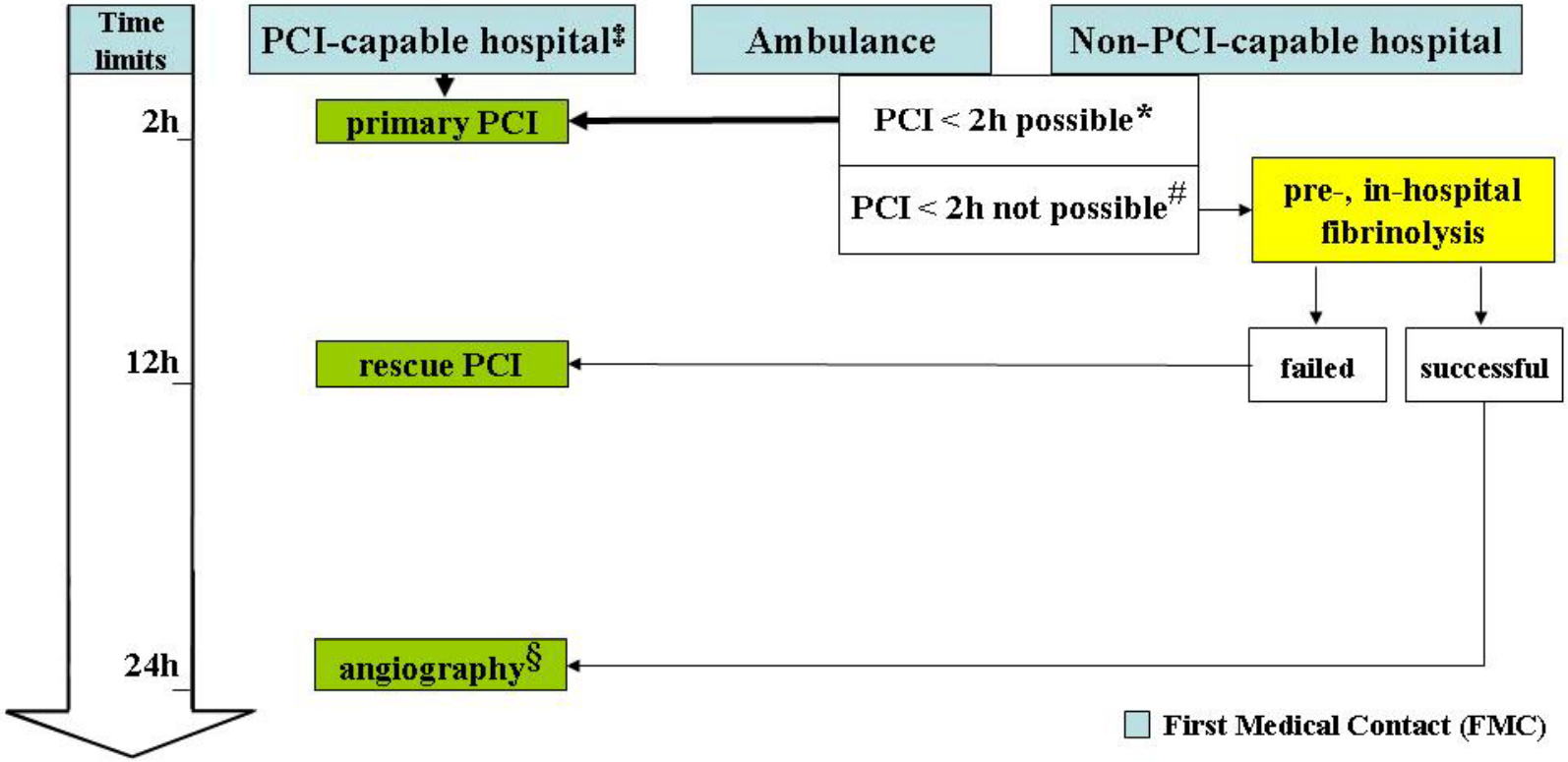
Reperfusion Therapy: Primary PCI

Recommendations	Class	LOE
■ Preferred reperfusion treatment if performed by an experienced team as soon as possible after FMC	I	A
■ Time from FMC to balloon should be < 2 h in any case and < 90 min in pts presenting early (e.g. < 2 h) with large infarct and low bleeding risk	I	B
■ Indicated for patients in shock and those with contraindications to fibrinolytic therapy irrespective of time delay	I	B
<u>Rescue PCI</u> ■ After failed fibrinolysis in patients with large infarcts if performed within 12 h	IIa	A

Reperfusion Therapy: Fibrinolytic Therapy

Recommendations	Class	LOE
■ In the absence of contraindications and if primary PCI cannot be performed within the recommended time	I	A
■ A fibrin-specific agent should be given	I	B
■ Pre-hospital initiation of fibrinolytic therapy	IIa	A

Reperfusion Strategies



* Time FMC to first balloon inflation must be shorter than 90 min in patients presenting early (< 2 h after symptom onset), with large amount of viable myocardium and low risk of bleeding.

If PCI is not possible < 2 h of FMC, start fibrinolytic therapy as soon as possible.

§ Not earlier than 3 h after start fibrinolysis

‡ 24/7 service

Primary PCI: Adjunctive Therapies

Recommendations	Class	LOE
■ Antiplatelet co-therapy		
❑ aspirin	I	B
❑ NSAID and COX-2 selective inhibitors	III	B
❑ clopidogrel loading dose	I	C
❑ GPIIb/IIIa antagonist		
▪ abciximab	IIa	A
▪ tirofiban	IIb	B
▪ eptifibatide	IIb	C
■ Antithrombin co-therapy		
❑ heparin	I	C
❑ bivalirudin	IIa	B
❑ fondaparinux	III	B
■ Adjunctive devices		
❑ thrombus aspiration	IIb	B

Fibrinolytic Therapy: Antithrombotic Co-therapy

Recommendations	Class	LOE
Antiplatelet co-therapy		
if not already on aspirin oral (soluble or chewable / no enteric-coated) or i.v. dose of aspirin plus	I	B
clopidogrel oral loading dose if age ≤ 75 years	I	B
if age > 75 years start with maintenance dose	IIa	B

Fibrinolytic Therapy: Antithrombotic Co-therapy

Recommendations	Class	LOE
Antithrombin co-therapy		
with alteplase, reteplase and tenecteplase:		
enoxaparin i.v. bolus followed 15 min later by first s.c. dose; if age > 75 years no i.v. bolus and start with reduced first s.c. dose	I	A
if enoxaparin is not available: a weight-adjusted bolus of i.v. heparin followed by a weight-adjusted i.v. infusion with first aPTT control after 3 h	I	A

Fibrinolytic therapy: Antithrombotic Co-therapy

Recommendations	Class	LOE
Antithrombin co-therapy		
▫ with streptokinase:		
▪ an i.v. bolus of fondaparinux followed by a s.c. dose 24 h later or	IIa	B
▪ enoxaparin i.v. bolus followed 15 min later by first s.c. dose; if age > 75 years no i.v. bolus and start with reduced s.c. dose	IIa	B
▪ or weight-adjusted dose of i.v. heparin followed by weight-adjusted infusion	IIa	C

Contraindications to Fibrinolytic Therapy (1)

- **Absolute contraindications**
  - Haemorrhagic stroke or stroke of unknown origin at any time
  - Ischaemic stroke in preceding 6 months
  - Central nervous system trauma or neoplasms
  - Recent major trauma/surgery/head injury (within preceding 3 weeks)
  - Gastro-intestinal bleeding within the last month
  - Known bleeding disorder
  - Aortic dissection
  - Non-compressible punctures (e.g. liver biopsy, lumbar puncture)

Contraindications to Fibrinolytic Therapy (2)

- **Relative contraindications**
  - Transient ischaemic attack in preceding 6 months
  - Oral anticoagulant therapy
  - Pregnancy or within 1 week post partum
  - Refractory hypertension (SBP > 180 mmHg and/or DBP > 110 mmHg)
  - Advanced liver disease
  - Infective endocarditis
  - Active peptic ulcer
  - Refractory resuscitation

Doses of Fibrinolytic Agents

	Initial treatment	Specific contraindications
Streptokinase (SK)	1.5 million units over 30-60 min i.v.	Prior SK or anistreplase
Alteplase (t-PA)	15 mg i.v. bolus 0.75 mg/kg over 30 min then 0.5 mg/kg over 60 min i.v. Total dosage not to exceed 100 mg	
Reteplase (r-PA)	10 U + 10 U i.v. bolus given 30 min apart	
Tenecteplase (TNK-tPA)	Single i.v. bolus 30 mg if < 60 kg 35 mg if 60 to < 70 kg 40 mg if 70 to < 80 kg 45 mg if 80 to < 90 kg 50 mg if ≥ 90 kg	

Antithrombotic Treatment without Reperfusion Therapy

Recommendations	Class	LOE
Antiplatelet co-therapy		
■ if not already on aspirin oral (soluble or chewable / no enteric-coated) or i.v. dose of aspirin	I	A
■ oral dose of clopidogrel	I	B
Antithrombin co-therapy		
■ i.v. bolus of fondaparinux followed 24 h later by s.c. dose	I	B
■ if fondaparinux is not available: enoxaparin i.v. bolus followed 15 min later by first s.c. dose; if age > 75 years no i.v. bolus and start with reduced first s.c. dose or	I	B
■ i.v. heparin followed by a weight-adjusted i.v. infusion with first aPTT control after 3 h	I	B

Doses of Antiplatelet Co-therapies

With Primary PCI

Aspirin:	**Oral dose of 150-325 mg or i.v. dose of 250 to 500 mg if oral ingestion is not possible**
Clopidogrel:	**Oral loading dose of 300 or 600 mg**
GPIIb/IIIa inhibitors:	**Abciximab: i.v. bolus of 0.25 mg/kg bolus followed by 0.125 µg/kg per min infusion (maximum 10 µg/min for 12 h)**

Doses of Antiplatelet Co-therapies

With Fibrinolytic Treatment

Aspirin:	**Oral dose of 150-325 mg or i.v. dose of 250 mg if oral ingestion is not possible**
Clopidogrel:	**Loading dose of 300 mg if age ≤ 75 years; 75 mg if age > 75 years**

Doses of Antiplatelet Co-therapies

Without Reperfusion Therapy

Aspirin:	**Oral dose of 150-325 mg**
Clopidogrel:	**Oral dose of 75 mg**

Doses of Antithrombin Co-therapies

With Primary PCI

Heparin:	**i.v. bolus at a usual starting dose of 100 U/kg weight (60 U/kg if GPIIb/IIIa antagonists are used). If the procedure is being performed under activated clotting time (ACT) guidance, heparin is given at a dose able to maintain an ACT of 250 to 350 s (200-250 s if GPIIb/IIIa antagonists are used). Infusion should be stopped after sheath removal.**
Bivalirudin:	**i.v. bolus of 0.75 mg/kg followed by an infusion of 1.75 mg/kg/h not titrated to ACT and usually terminated at the end of the procedure.**

Doses of Antithrombin Co-therapies

With Fibrinolytic Treatment

Enoxaparin:	In patients < 75 years and creatinine levels ≤ 2.5 mg/mL or ≤ 221 µmol/L (men) or ≤ 2 mg/ml or 177 µmol/L (women): i.v. bolus of 30 mg followed 15 min later by s.c. dose of 1 mg/kg every 12 h until hospital discharge for a maximum of 8 days. The first two s.c. doses should not exceed 100 mg. In patients > 75 years: no i.v. bolus; start with first s.c. dose of 0.75 mg/kg with a maximum of 75 mg for the first two s.c. doses. In patients with creatinine clearance of < 30 mL/min, regardless of age, the s.c. doses are repeated every 24 h
Heparin:	i.v. bolus of 60 U/kg with a maximum of 4000 U followed by an i.v. infusion of 12 U/kg with a maximum of 1000 U/h for 24 to 48 h. Target aPTT: 50-70 s to be monitored at 3, 6, 12 and 24 h
Fondaparinux:	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 if creatinine ≤ 3 mg/mL or 265 µmol/L

Doses of Antithrombin Co-therapies

Without Reperfusion Therapy

Fondaparinux, enoxaparin, heparin:	**Same dose as with fibrinolytics**

Angiography after Fibrinolytic Therapy

Recommendations	Class	LOE
Evidence of failed fibrinolysis or uncertainty about success: immediate	IIa	B
Recurrent ischaemia, reocclusion after initial successful fibrinolysis: immediate	I	B
Evidence of successful fibrinolysis: within 3 to 24 h after start of fibrinolytic therapy	IIa	A
In unstable patients who did not receive reperfusion therapy: immediate	I	C
In stable patients who did not receive reperfusion therapy: before discharge	IIb	C

Grading of Coronary Flow

TIMI 0	There is no antegrade flow beyond the point of occlusion.
TIMI 1	The contrast material passes beyond the area of obstruction, but "hangs up" and fails to opacify the entire coronary bed distal to the obstruction for duration of the cine run.
TIMI 2	The contrast material passes across the obstruction and opacifies the coronary bed distal to the obstruction. However, the rate of entry of contrast material into the vessel distal to the obstruction or the rate of clearance from the distal bed (or both) are perceptibly slower than entry into or clearance from comparable areas not perfused by the previously occluded vessel, e.g., the opposite coronary artery or the coronary bed proximal to the obstruction.
TIMI 3	Antegrade flow into the bed distal to the obstruction occurs as promptly as antegrade flow into the bed proximal to the obstruction, and clearance of contrast material from the involved bed is as rapid as clearance from an uninvolved bed in the same vessel or the opposite artery.

Grading of Myocardial Blush

MBG 0	No myocardial blush or staining of blush (due to leakage of dye into the extravascular space)
MBG 1	Minimal myocardial blush
MBG 2	Moderate myocardial blush, less than that obtained during angiography of a contralateral or ipsilateral non-infarct-related artery
MBG 3	Normal myocardial blush, comparable with that obtained during angiography of a contralateral or ipsilateral non-infarct-related artery

Recommendations for Prevention and Treatment of No-reflow

Recommendations	Class	LOE
Prevention		
▪ Thrombus aspiration	IIa	B
▪ Abciximab 0.25 mg/kg bolus and 0.125 µg/kg/min infusion for 12-24 h	IIa	B
Treatment		
▪ Adenosine: 70 µg/kg/min i.v. over 3 h i.v. during and after PCI	IIb	B
▪ Adenosine: bolus of 30 to 60 µg i.c. during PCI	IIb	C
▪ Verapamil: bolus 0.5 -1 mg i.c. during PCI	IIb	C

Haemodynamic States

Normal

Normal blood pressure, heart and respiration rates, good peripheral circulation

Hyperdynamic State

Tachycardia, loud heart sounds, good peripheral circulation

Haemodynamic States

Hypotension

Bradycardia:	'warm hypotension', bradycardia, venodilatation, normal jugular venous pressure, decreased tissue perfusion. Usually in inferior infarction, but may be provoked by opiates. Responds to atropine or pacing
RV infarction:	high jugular venous pressure, poor tissue perfusion or shock, bradycardia, hypotension
Hypovolaemia:	venoconstriction, low jugular venous pressure, poor tissue perfusion. Responds to fluid infusion

Haemodynamic States

Pump Failure

Pulmonary congestion:	**tachycardia, tachypnoea, basal rales**
Pulmonary oedema:	**tachycardia, tachypnoea, rales over 50 % of lung fields**
Cardiogenic shock:	**clinical signs of poor tissue perfusion (oliguria, decreased mentation), hypotension, small pulse pressure, tachycardia, pulmonary oedema**

Treatment of Pump Failure and Cardiogenic Shock (I)

Recommendations	Class	LOE
<u>Treatment of mild heart failure (Killip class II)</u>		
■ O_2	I	C
■ Loop diuretics: i.e. furosemide: 20–40 mg i.v. repeated at 1–4 hourly intervals if necessary	I	C
■ nitrates: if no hypotension	I	C
■ ACE-inhibitor in the absence of hypotension, hypovolaemia or renal failure	I	A
■ angiotensin receptor blocker (valsartan) if ACE-inhibitor is not tolerated	I	B

Treatment of Pump Failure and Cardiogenic Shock (II)

Recommendations	Class	LOE
<u>Treatment of severe heart failure (Killip class III)</u>		
▪ O_2	I	C
▪ ventilatory support according to blood gasses	I	C
▪ furosemide: cfr. supra	I	C
▪ nitrates if no hypotension	I	C
▪ inotropic agents: dopamine	IIb	C
and/or dobutamine	IIa	B
▪ haemodynamic assessment with balloon floating catheter	IIb	B
▪ early revascularization	I	C

Treatment of Pump Failure and Cardiogenic Shock (III)

Recommendations	Class	LOE
<u>Treatment of shock (Killip class IV)</u>		
▪ O_2	I	C
▪ mechanical ventilatory support according to blood gases	I	C
▪ haemodynamic assessment with balloon floating catheter	IIb	C
▪ inotropic agents: dopamine	IIb	B
and dobutamine	IIa	C
▪ intra-aortic balloon pump	I	C
▪ LV assist devices	IIa	C
▪ early revascularization	I	B

Management of Arrhythmias and Conduction Disturbances in the Acute Phase

Recommendations	Class	LOE
<u>Haemodynamically unstable VT and VF:</u>		
▪ DC cardioversion	I	C
<u>Haemodynamically unstable, sustained monomorphic VT refractory to DC cardioversion:</u>		
▪ i.v. amiodarone	IIa	B
▪ or lidocaine or sotalol*	IIa	C
▪ transvenous catheter pace termination if refractory to cardioversion or frequently recurrent despite antiarrhythmic medication	IIa	C

*i.v. sotalol or other β-blockers should not be given if EF is low, DC: direct current, LV: left ventricular, AV: atrio-ventricular, i.v.: intravenous, VT: ventricular tachycardia, LMWH: low-molecular-weight heparin.

Management of Arrhythmias and Conduction Disturbances in the Acute Phase

Recommendations	Class	LOE
<u>Repetitive symptomatic salvoes of non-sustained monomorphic VT</u>		
▪ i.v. amiodarone, sotalol* or other β-blockers*	IIa	C
<u>Polymorphic VT</u>		
❑ If baseline QT is normal		
▪ i.v. sotalol* or other β-blockers*, amiodarone or lidocaine	I	C
❑ If baseline QT is prolonged		
▪ correct electrolytes, consider magnesium, overdrive pacing, isoproterenol, or lidocaine	I	C
▪ urgent angiography should be considered	I	C

*i.v. sotalol or other β-blockers should not be given if EF is low. DC: direct current, AV: atrio-ventricular, VT: ventricular tachycardia, LMWH: low-molecular-weight heparin.

Management of Arrhythmias and Conduction Disturbances in the Acute Phase

Recommendations	Class	LOE
<u>Rate control of atrial fibrillation</u>		
▪ i.v. beta blockers or non-dihydropyridine calcium antagonists (e.g. diltiazem, verapamil)**. If no clinical signs of heart failure, bronchospasm (only for beta blockers), or AV block	I	C
▪ i.v. amiodarone to slow a rapid ventricular response and improve LV function	I	C
▪ i.v. digitalis if severe LV dysfunction and/or heart failure	IIb	C
▪ Electrical cardioversion if severe haemodynamic compromise or intractable ischaemia, or when adequate rate control cannot be achieved with pharmacological agents.	I	C

** These calcium antagonists should be used cautiously or avoided in patients with heart failure because of their negative inotropic effects.

DC: direct current, AV: atrio-ventricular,VT: ventricular tachycardia, LMWH: low-molecular-weight heparin.

Management of Arrhythmias and Conduction Disturbances in the Acute Phase

Recommendations	Class	LOE
Anticoagulation for atrial fibrillation		
▪ i.v. administration of a therapeutic dose of heparin or a LMWH	I	C
Sinus bradycardia associated with hypotension		
▪ i.v. atropine	I	C
▪ temporary pacing if failed response to atropine	I	C
AV block II (Mobitz 2) or AV block III		
with bradycardia that causes hypotension or heart failure		
▪ i.v. atropine	I	C
▪ temporary pacing if atropine fails	I	C

DC: direct current, AV: atrio-ventricular, VT: ventricular tachycardia, LMWH: low-molecular-weight heparin.

Intravenous Doses of Recommended Antiarrhythmic Medications

Drug	Bolus	Maintenance infusion
Amiodarone:	150 mg over 10 min. Supplemental boluses of 150 mg may be given over 10 to 30 min for recurrent arrhythmias, but limited to 6-8 supplemental boluses in any 24-h period	1 mg/min for 6 h and then 0.5 mg/min may be necessary after initial bolus dose
Esmolol: Metoprolol: Atenolol: Propranolol:	500 µg/kg over 1 min, followed by 50 µg/kg/min over 4 min. 2.5 - 5 mg over 2 min; up to 3 doses 5 - 10 mg (1 mg/min) 0.15 mg/kg	60 to 200 µg/kg/min - - - -
Digoxin:	0.25 mg each 2 h, up to 1.5 mg	-
Lidocaine:	0.5 - 0.75 mg/kg	-
Sotalol:	20 - 120 mg over 10 min (0.5 - 1.5 mg/kg). May be repeated after 6 h (maximum 640 mg/24 h).	-
Verapamil:	0.075 - 0.15 mg/kg over 2 min	-
Diltiazem:	0.25 mg/kg over 2 min	-

Intravenous Doses of Recommended Anti-bradycardia Medications

Drug	Bolus	Maintenance infusion
Atropine:	rapid bolus of at least 0.5 mg, repeated up to a total dose of 1.5 – 2.0 mg (0.04 mg/kg)	-
Isoproterenol:	0.05 – 0.1 µg/kg/min, up to 2 µg/kg/min. Dosage adjusted to heart rate and rhythm	-

Routine Prophylactic Therapies in the Acute Phase

Recommendations	Class	LOE
▪ Aspirin: maintenance dose of 75-100 mg	I	A
▪ Clopidogrel: maintenance dose of 75 mg	I	A
▪ Nonselective and selective COX-2 agents	III	C
▪ i.v. beta-blocker	IIb	A
▪ Oral beta-blocker	I	A
▪ ACE inhibitor: oral formulation on first day		
❑ for all patients in whom it is not contraindicated	IIa	A
❑ for high-risk patients	I	A
▪ Nitrates	IIb	A
▪ Calcium antagonists	III	B
▪ Magnesium	III	A
▪ Lidocaine	III	B
▪ Glucose-insulin-potassium infusion	III	B

Dosages of Inhibitors of the Renin-angiotensin-aldosterone System in Trials after Myocardial Infarction

	Initial dosage	Target dosage
GISSI-3 lisinopril	5 mg initially	up to 10 mg daily
ISIS-4 captopril	6.25 mg initially, 12.5 mg in 2 h, 25 mg at 10–12 h	up to 50 mg b.i.d.
CHINESE captopril	6.25 mg initially, 12.5 mg 2 h later if tolerated	up to 12.5 mg t.i.d.
SMILE zofenopril	7.5 mg initially, repeated after 12 h and repeatedly doubled if tolerated	up to 30 mg b.i.d.
AIRE ramipril	2.5 mg b.i.d. increased to 5 mg b.i.d. if tolerated	up to 5 mg b.i.d.
SAVE captopril	test of 6.25 mg, increased if tolerated to 25 mg t.i.d.	up to 50 mg t.i.d.
TRACE trandolapril	test of 0.5 mg	up to 4 mg daily
VALIANT valsartan	20 mg initially uptitrated in 4 steps	up to 160 mg b.i.d.
OPTIMAAL losartan	12.5 mg	up to 50 mg daily
EPHESUS eplerone	25 mg initially	up to 50 mg daily

Imaging Modalities: Timing and Usefulness

	At presentation	Within 48 h	Before and after discharge
Echo at rest	if required for diagnosis	for LV function and presence of thrombus	for LV function, heart failure, shock or new murmur
Stress ECG			for ischaemia
Stress perfusion SPECT			for viability and ischaemia, infarct size
Stress echo			for viability and ischaemia
PET (rest)			for viability
MRI (rest, stress, contrast-enhanced)			for LV function, infarct size, viability and ischaemia

Echo: transthoracic echocardiography or transoesophageal if required, MRI: magnetic resonance imaging, PET: positron emission tomography, SPECT: single photon emission computed tomography;

Long-Term Medical Treatment

Recommendations	Class	LOE
<u>Antiplatelets</u>		
▪ Aspirin for ever (75 to 100 mg daily) in all patients without allergy	I	A
▪ Clopidogrel (75 mg daily) for 12 months in all patients irrespective of the acute treatment	IIa	C
▪ Clopidogrel (75 mg daily) in all patients with contraindication to aspirin	I	B

Long-Term Medical Treatment

Recommendations	Class	LOE
Anticoagulants		
■ Oral anticoagulant at INR 2-3 in patients who do not tolerate aspirin or clopidogrel	IIa	B
■ Oral anticoagulant at recommended INR when clinically indicated (e.g. atrial fibrillation, LV thrombus, mechanical valve)	I	A
■ Oral anticoagulant (at INR 2-3) in addition to low-dose aspirin (75-100 mg) in patients at high risk of thromboembolic events	IIa	B
■ Oral anticoagulant in addition to aspirin and clopidogrel (recent stent placement plus indication for oral anticoagulation)*	IIb	C
■ Oral anticoagulant in addition to clopidogrel or aspirin (recent stent placement plus indication for oral anticoagulation and increased risk of bleeding)	IIb	C

*If long-term oral anticoagulation is required use of a bare metal stent rather than a drug-eluting stent will expose the patient to a shorter duration of triple therapy and hence a lower bleeding risk

Long-term Medical Treatment

Recommendations	Class	LOE
Beta-blockers		
▪ Oral beta-blockers in all patients who tolerate these medications and without contraindications, regardless of blood pressure or LV function	I	A
ACE-I and ARB		
▪ ACE-I should be considered in all patients without contraindications, regardless of blood pressure or LV function	IIa	A
▪ ARB in all patients without contraindications who do not tolerate ACE-inhibitors, regardless of blood pressure or LV function	IIa	C
Statins		
▪ Statins in all patients, in the absence of contraindications, irrespective of cholesterol levels, initiated as soon as possible to achieve LDLc < 100 mg/dL (2.5 mmol/L)	I	A
Influenza immunization		
▪ In all patients	I	B

Long-term Management of Specific Coronary Risk Factors

Recommendations	Class	LOE
Smoking cessation		
▪ Assess smoking status and advise to quit and to avoid passive smoking at each visit	I	B
▪ Bupropione and nicotine treatment in patients who keep smoking at follow-up	I	B
▪ Antidepressants	IIa	C
Physical activity		
▪ Exercise test-guided moderate intensity aerobic exercise at least 5 times per week	I	B
▪ Medically supervised rehabilitation programmes for high-risk patients	I	B
Diabetes management		
▪ Lifestyle changes and pharmacotherapy to achieve HbA1C < 6.5 %	I	B
▪ Intensive modification of other risk factors (hypertension, obesity, dyslipidaemia)	I	B
▪ Coordination with a physician specialized in diabetes	I	C

Long-term Management of Specific Coronary Risk Factors

Recommendations	Class	LOE
Diet and weight reduction		
▪ Weight reduction is recommended when BMI is ≥ 30 kg/m^2 or more, and when waist circumference is more than 102/88 cm (men/women)	I	B
▪ Diet based on low intake of salt and saturated fats and regular intake of fruit, vegetables and fish	I	B
▪ Increased consumption of omega-3 fatty acids (oily fish)	IIb	B
▪ Supplementation with 1 g of fish oil in patients with a low intake of oily fish	IIa	B
▪ Moderate alcohol consumption should not be discouraged	I	B
Blood pressure control		
▪ Lifestyle changes and pharmacotherapy to achieve BP < 130/80 mmHg	I	A

Long-term Management of Specific Coronary Risk Factors

Recommendations	Class	LOE
<u>Lipid management</u>		
▪ Statins in all patients, in the absence of contraindications, irrespective of cholesterol levels, initiated as soon as possible to achieve LDLc < 100 mg/dl (2.5 mmol/L)	I	A
▪ Further reduction of LDLc < 80 mg/dL (2 mmol/L) should be considered in high risk patients	IIa	A
▪ Lifestyle change emphasized if TG > 150 mg/dL (1.7 mmol/L) and/or HDLc < 40 mg/dL (1.0 mmol/L)	I	B
▪ Fibrates and omega-3 supplements should be considered in patients who do not tolerate statins, especially if TG > 150 mg/dL (1.7 mmol/L) and/or HDLc < 40 mg/dL (1.0 mmol/L)	IIa	B

Long-term Management of Heart Failure or LV Dysfunction

Recommendations	Class	LOE
■ Oral beta-blockers in all patients without contraindications	I	A
■ ACE-inhibitors in all patients without contraindications	I	A
■ ARB (valsartan) in all patients without contraindications who do not tolerate ACE-inhibitors	I	B
■ Aldosterone antagonists if EF ≤ 40% and signs of heart failure or diabetes if creatinine is < 2.5 mg/dL (221 µmol/L) in men and < 2.0 mg/dL (177 µmol/L) in women and potassium < 5.0 mmol/L	I	B

Long-term Management of Heart Failure or LV Dysfunction

Recommendations	Class	LOE
▪ CRT in patients with EF ≤ 35% and QRS duration of ≥ 120 msec who remain in NYHA class III-VI in spite of optimal medical therapy if stunning can be excluded	I	A
▪ ICD if EF ≤ 30 % to 40 % and NYHA ≥ II or III at least 40 days after STEMI	I	A
▪ ICD if EF ≤ 30 % to 35 % and NYHA I at least 40 days after STEMI	IIa	B

Recommended Logistics

- **Pre-hospital triage / care:**
  - **EMS**
    - **unique telephone number**
    - **tele-consultation**
  - **Ambulance**
    - **12-ECG recorder / defibrillator**
    - **staff able to provide basic and advanced life support**
- **Networks:**
  - **implementation of a network of hospitals with different levels of technology connected by an efficient ambulance service using the same protocol**
- **Targets:**
  - **< 10 min ECG transmission**
  - **< 5 min tele-consultation**
  - **< 120 min to first balloon inflation**
  - **< 30 min start fibrinolytic therapy**

2008 ESC STEMI GUIDELINES: Task Force Meeting / Approval Dates

- **Face-to-face meetings:**
  - **March 16, 2007**
  - **January 8, 2008**

- **Approval: August 19, 2008**

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