European guidelines on revascularization

Turin

October 25, 2012

Sebastiano MARRA MD FESC

European guidelines on revascularization

1. STABLE ANGINA (SA)
2. ACUTE CORONARY SYNDROME WITHOUT ST ELEVATION (NSTEMI-UA)
3. ACUTE MYOCARDIAL INFARCTION WITH ST ELEVATION (STEMI)

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European guidelines on revascularization

STABLE ANGINA

European Heart Journal (2010) **31**, 2501–2555
doi:10.1093/eurheartj/ehq277

ESC/EACTS GUIDELINES

Guidelines on myocardial revascularization

The Task Force on Myocardial Revascularization of the European Society of Cardiology (ESC) and the European Association for Cardio-Thoracic Surgery (EACTS)

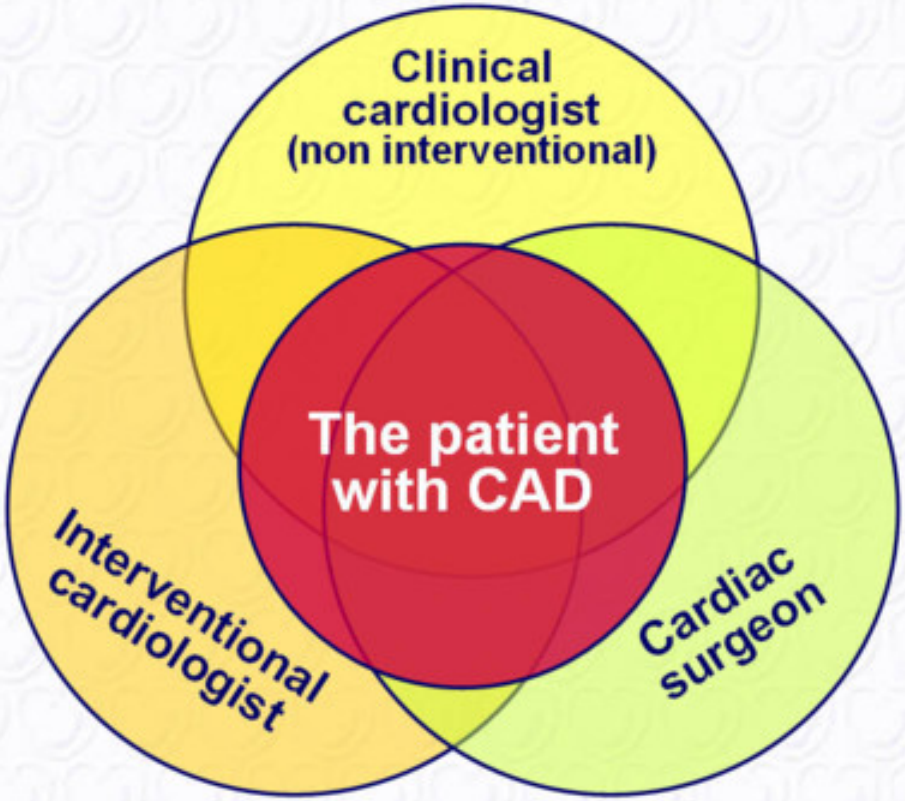
Developed with the special contribution of the European Association for Percutaneous Cardiovascular Interventions (EAPCI)‡

Table 4 Multidisciplinary decision pathways, patient informed consent, and timing of intervention

		ACS			Stable MVD	Stable with indication for *ad hoc* PCI[a]
	Shock	STEMI	NSTE - ACS[b]	Other ACS[c]		
Multidisciplinary decision making	Not mandatory.	Not mandatory.	Not required for culprit lesion but required for non-culprit vessel(s).	Required.	Required.	According to predefined protocols.
Informed consent	Oral witnessed informed consent or family consent if possible without delay.	Oral witnessed informed consent may be sufficient unless written consent is legally required.	Written informed consent[d] (if time permits).	Written informed consent[d]	Written informed consent[d]	Written informed consent[d]
Time to revascularization	Emergency: no delay.	Emergency: no delay.	Urgency: within 24 h if possible and no later than 72 h.	Urgency: time constraints apply.	Elective: no time constraints.	Elective: no time constraints.
Procedure	Proceed with intervention based on best evidence/ availability.	Proceed with intervention based on best evidence/ availability.	Proceed with intervention based on best evidence/ availability. Non-culprit lesions treated according to institutional protocol.	Proceed with intervention based on best evidence/ availability. Non-culprit lesions treated according to institutional protocol.	Plan most appropriate intervention allowing enough time from diagnostic catheterization to intervention.	Proceed with intervention according to institutional protocol defined by local Heart Team.

[a]Potential indications for *ad hoc* PCI are listed in *Table 5*.
[b]See also *Table 12*.
[c]Other ACS refers to unstable angina, with the exception of NSTE-ACS.
[d]This may not apply to countries that legally do not ask for written informed consent. ESC and EACTS strongly advocate documentation of patient consent for all revascularization procedures.
ACS = acute coronary syndrome; MVD = multivessel disease; NSTE-ACS = non-ST-segment elevation acute coronary syndrome; PCI = percutaneous coronary intervention; STEMI = ST-segment elevation myocardial infarction.

The Heart Team



Task Force composition = 8 clinical cardiologists (non interventional) + 9 interventional cardiologists + 8 cardiac surgeons

European Heart Journal (2010) 31, 2501-2555
European Journal of Cardio-thoracic Surgery (2010) 38, S1-S52

www.escardio.org/guidelines

Joint 2010 ESC - EACTS Guidelines on Myocardial Revascularisation

EACTS

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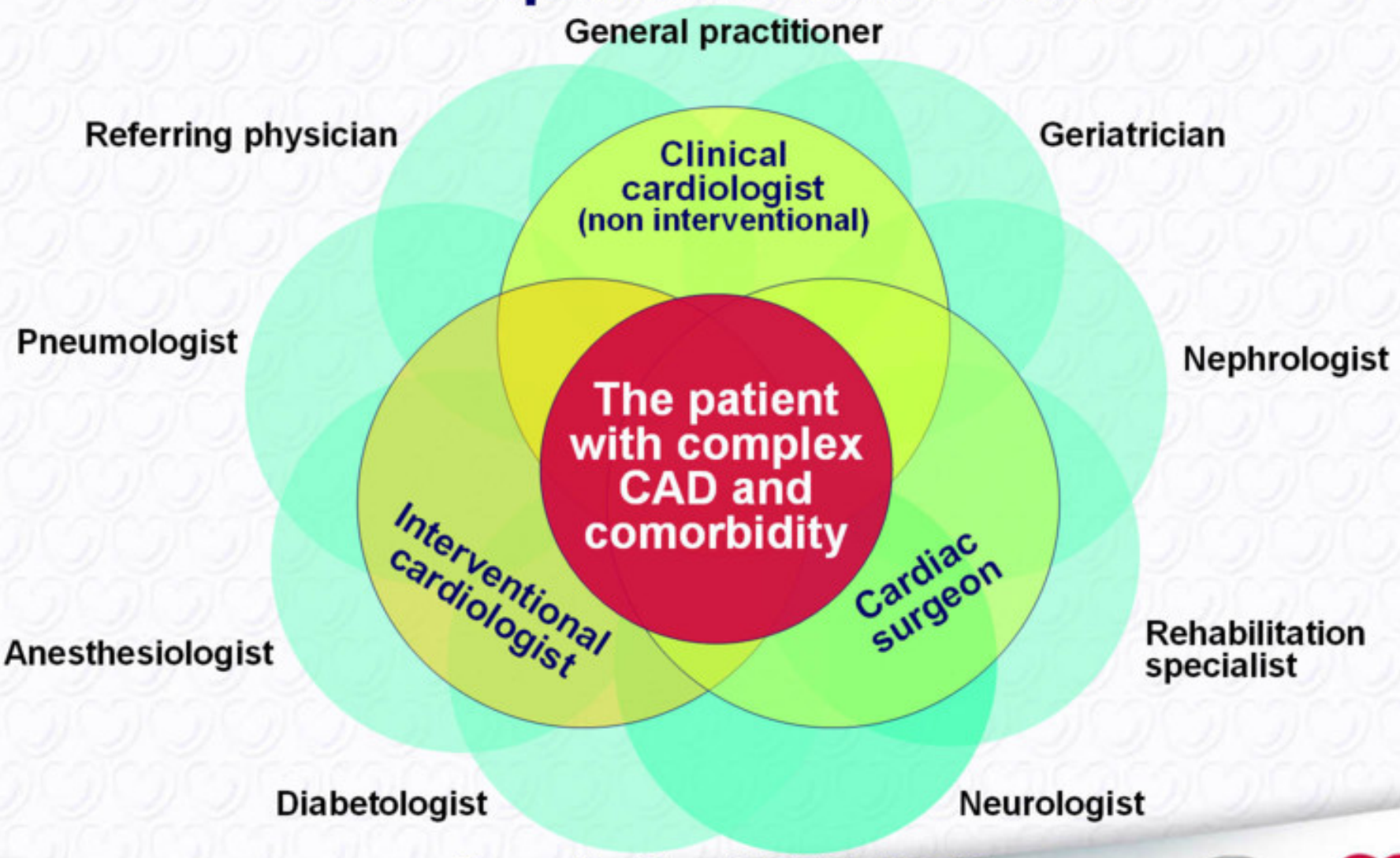
The Expanded Heart Team



European Heart Journal (2010) 31, 2501-2555
European Journal of Cardio-thoracic Surgery (2010) 38, S1-S52

www.escardio.org/guidelines

Joint 2010 ESC - EACTS Guidelines on Myocardial Revascularisation

EACTS

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5. Revascularisation for stable coronary artery disease

- OMT (optimal medical therapy)?
- Coronary Revascularization?
- If revascularization: PCI or CABG?

5. Revascularisation for stable coronary artery disease

- ✓ **The target of revascularization therapy is myocardial ischaemia, not the epicardial coronary disease itself.**
- ✓ **Revascularization procedures performed in patients with documented ischaemia reduce total mortality through reduction of ischaemic burden.**

5. Revascularisation for stable coronary artery disease

- ✓ **Discrepancies between the apparent anatomical severity of a lesion and its functional effects on myocardial blood supply are common, especially in stable CAD.**
- ✓ **Functional assessment, non-invasive or invasive, is essential for intermediate stenoses.**
- ✓ **Revascularization of lesions without functional significance can be deferred.**

5. Revascularisation for stable coronary artery disease

DETECTION OF MYOCARDIAL VIABILITY IN PATIENTS WITH POOR LEFT VENTRICLE (LV) FUNCTION

- ✓ **Patients who have viable but dysfunctional myocardium are at higher risk if not revascularized**
- ✓ **The prognosis of patients without viable myocardium is not improved by revascularization**

Indications for revascularisation in stable angina or silent ischaemia

	Subset of CAD by anatomy	Class	Level
For prognosis	Left main > 50%*	I	A
	Any proximal LAD > 50%*	I	A
	2VD or 3VD with impaired LV function*	I	B
	Proven large area of ischaemia (> 10% LV)	I	B
	Single remaining patent vessel > 50% stenosis*	I	C
	1VD without proximal LAD and without > 10% ischaemia	III	A

* With documented ischaemia or Fractional Flow Reserve (FFR) < 0.80 for angiographic diameter stenosis 50-90%.

	Subset of CAD by anatomy	Class	Level
For symptoms	Any stenosis > 50% with limiting angina or angina equivalent, unresponsive to OMT	I	A
	Dyspnoea/CHF and > 10% LV ischaema/viability supplied by > 50% stenotic artery	IIa	B
	No limit symptoms with OMT	III	C

European Heart Journal (2010) 31, 2501-2555
European Journal of Cardio-thoracic Surgery (2010) 38, S1-S52

Indications for revascularisation in stable angina or silent ischaemia

- The Heart Team agrees on the indication for myocardial revascularisation.
- Which technique to recommend:
  - PCI or CABG?

European Heart Journal (2010) 31, 2501-2555
European Journal of Cardio-thoracic Surgery (2010) 38, S1-S52

EACTS

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5. Revascularisation for stable coronary artery disease

SYNTAX TRIAL

The NEW ENGLAND JOURNAL of MEDICINE

ESTABLISHED IN 1812 MARCH 5, 2009 VOL. 360 NO. 10

Percutaneous Coronary Intervention versus Coronary-Artery Bypass Grafting for Severe Coronary Artery Disease

Patrick W. Serruys, M.D., Ph.D., Marie-Claude Morice, M.D., A. Pieter Kappetein, M.D., Ph.D., Antonio Colombo, M.D., David R. Holmes, M.D., Michael J. Mack, M.D., Elisabeth Ståhle, M.D., Ted E. Feldman, M.D., Marcel van den Brand, M.D., Eric J. Bass, B.A., Nic Van Dyck, R.N., Katrin Leadley, M.D., Keith D. Dawkins, M.D., and Friedrich W. Mohr, M.D., Ph.D., for the SYNTAX Investigators*

Indications for CABG versus PCI in stable patients with lesions suitable for both procedures and low predicted surgical mortality

Subset of CAD by anatomy	Favours CABG	Favours PCI
1VD or 2VD - non-proximal LAD	IIb C	I C
1VD or 2VD - proximal LAD	I A	IIa B
3VD simple lesions, full functional revascularisation achievable with PCI, SYNTAX score ≤ 22	I A	IIa B
3VD complex lesions, incomplete revascularisation achievable with PCI, SYNTAX score > 22	I A	III A
Left main (isolated or 1VD, ostium/shaft)	I A	IIa B
Left main (isolated or 1VD, distal bifurcation)	I A	IIb B
Left main + 2VD or 3VD, SYNTAX score ≤ 32	I A	IIb B
Left main + 2VD or 3VD, SYNTAX score ≥ 33	I A	III B

- In the most severe patterns of CAD, CABG appears to offer a survival advantage as well as a marked reduction in the need for repeat revascularisation.

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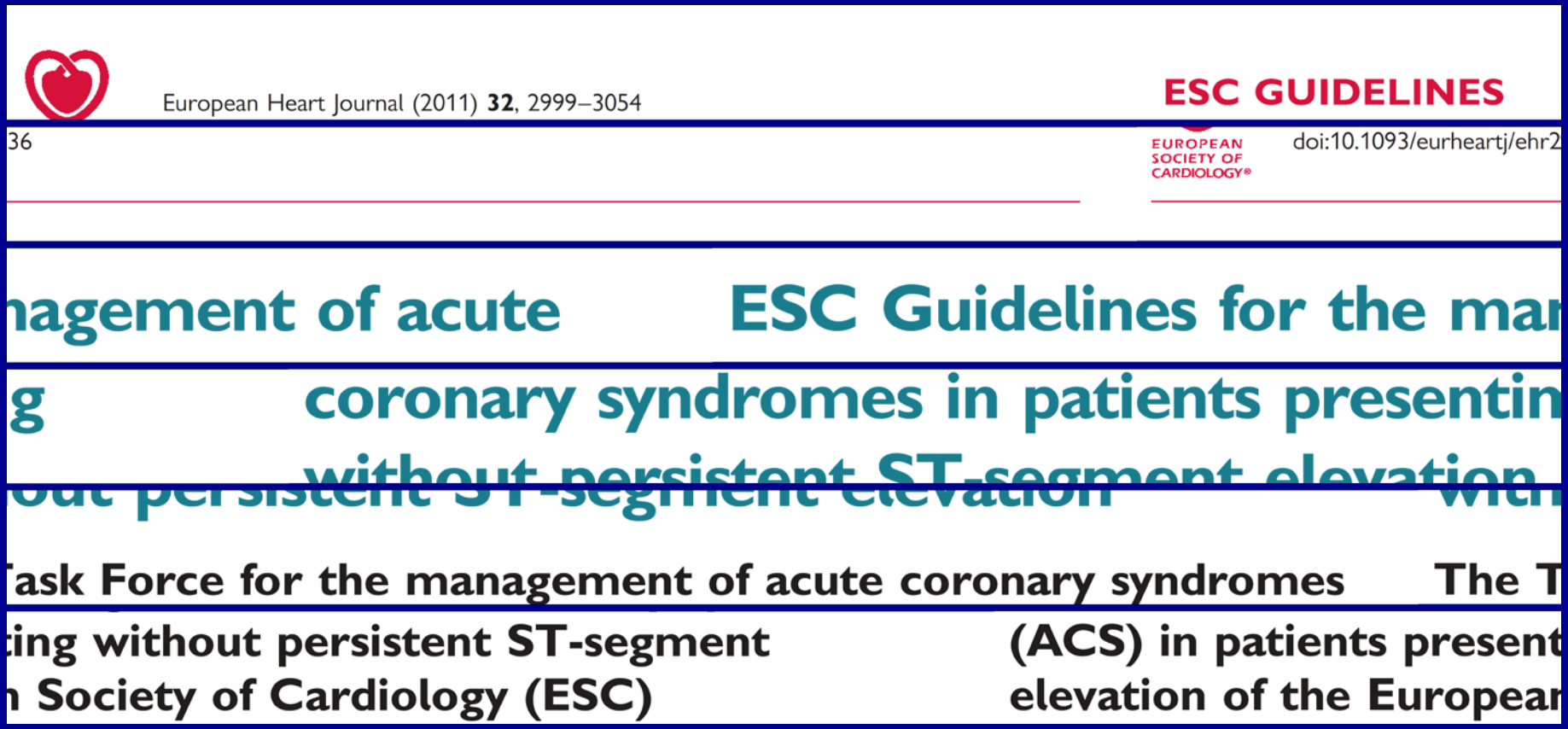

European Heart Journal (2011) **32**, 2999–3054

ESC GUIDELINES

EUROPEAN SOCIETY OF CARDIOLOGY®

36

doi:10.1093/eurheartj/ehr2

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Task Force for the management of acute coronary syndromes The T

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n Society of Cardiology (ESC) elevation of the European

Hamm et al, Eur Heart J 2011

European guidelines on revascularization

NSTE-ACS

- ✓ **Revascularization for NSTE-ACS relieves symptoms, shortens hospital stay, and improves prognosis.**
- ✓ **The indications and timing for myocardial revascularization and choice of preferred approach (PCI or CABG) depend on many factors:**

  - patient's conditions
  - presence of risk features
  - co-morbidities
  - extent and severity of the lesions

Mortality in hospital and at 6 months according to the GRACE risk score

Risk category (tertile)	GRACE risk score	In-hospital death (%)
Low	≤ 108	< 1
Intermediate	109-140	1-3
High	> 140	> 3
Risk category (tertile)	**GRACE risk score**	**Post- discharge to 6-month death (%)**
Low	≤ 88	< 3
Intermediate	89-118	3-8
High	> 118	> 8

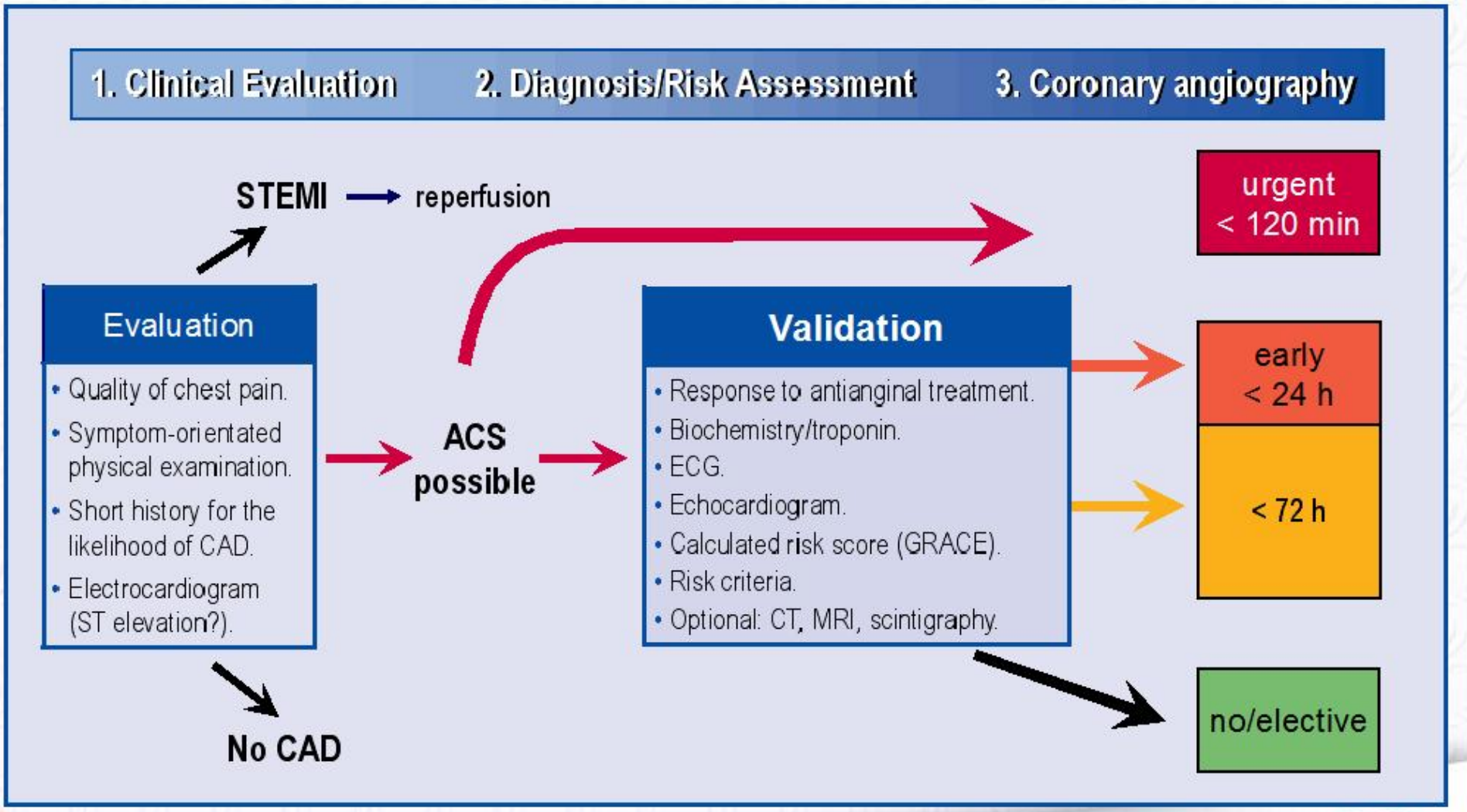
European Heart Journal (2011) 32:2999–3054
doi:10.1093/eurheartj/ehr236

Recommendations for diagnosis and risk stratification (2)

Recommendations	Class	Level
Blood has to be drawn promptly for troponin (cardiac troponin T or I) measurement. The result should be available within 60 min. The test should be repeated 6-9 h after initial assessment if the first measurement is not conclusive. Repeat testing after 12-24 h is advised if the clinical condition is still suggestive of ACS.	I	A
A rapid rule-out protocol (0 and 3 h) is recommended when highly sensitive troponin tests are available.	I	B
An echocardiogram is recommended for all patients to evaluate regional and global LV function and to rule in or rule out differential diagnoses.	I	C
Coronary angiography is indicated in patients in whom the extent of CAD or the culprit lesion has to be determined.	I	C
Coronary CT angiography should be considered as an alternative to invasive angiography to exclude ACS when there is a low to intermediate likelihood of CAD and when troponin and ECG are inconclusive.	IIa	B
In patients without recurrence of pain, normal ECG findings, negative troponins tests, and a low risk score, a non-invasive stress test for inducible ischaemia is recommended before deciding on an invasive strategy.	I	A

European Heart Journal (2011) 32:2999–3054
doi:10.1093/eurheartj/ehr236

Decision-making algorithm in ACS



www.escardio.org/guidelines

European Heart Journal (2011) 32:2999–3054
doi:10.1093/eurheartj/ehr236

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Criteria for high risk with indication for invasive management

Primary
• Relevant rise or fall in troponin. • Dynamic ST- or T-wave changes (symptomatic or silent).
Secondary
• Diabetes mellitus. • Renal insufficiency (eGFR < 60 mL/min/1.73 m^2). • Reduced LV function (ejection fraction < 40%). • Early post infarction angina. • Recent PCI. • Prior CABG. • Intermediate to high GRACE risk score.

European Heart Journal (2011) 32:2999–3054
doi:10.1093/eurheartj/ehr236

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European Heart Journal (2012) **33**, 2569–2619
doi:10.1093/eurheartj/ehs215

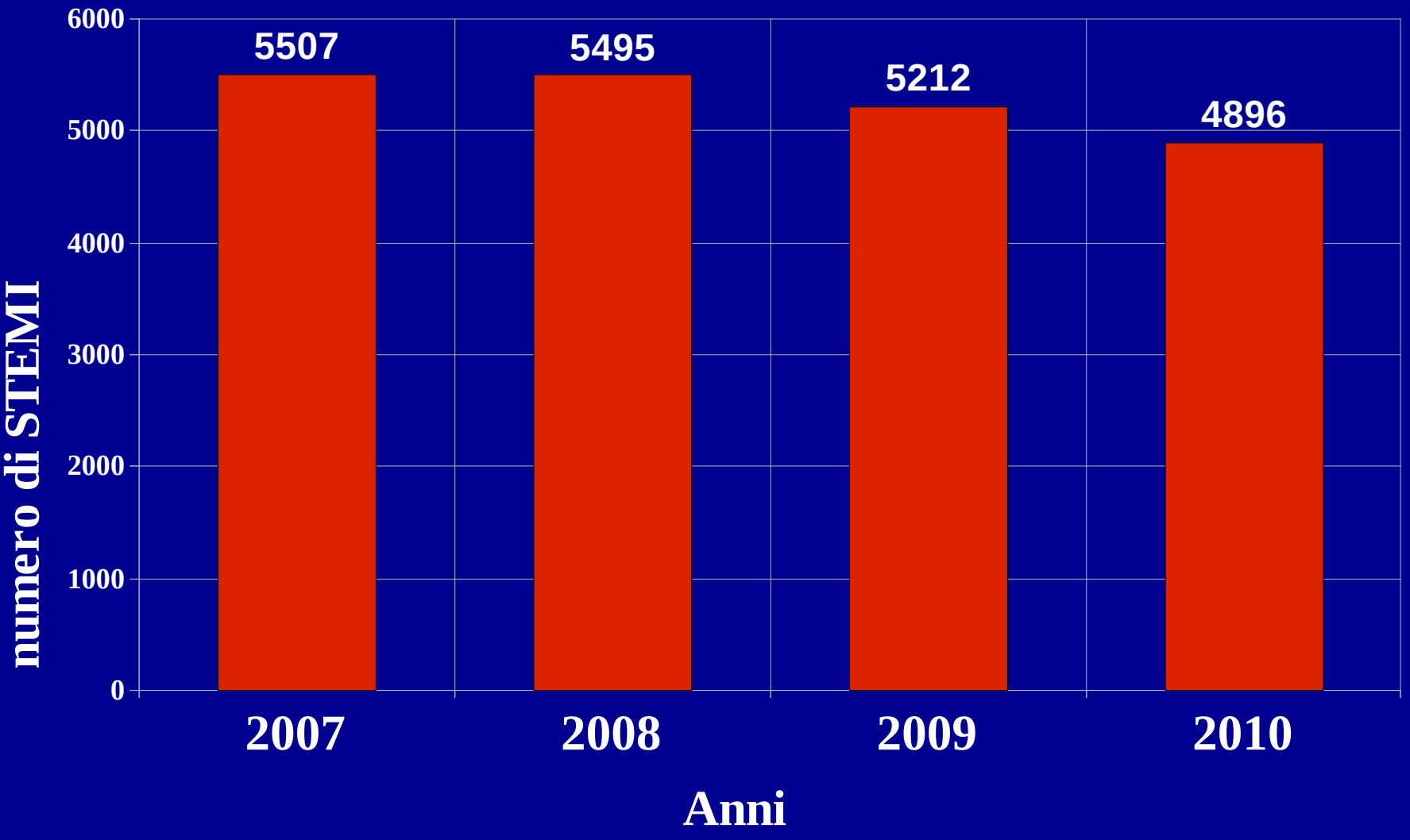
ESC GUIDELINES

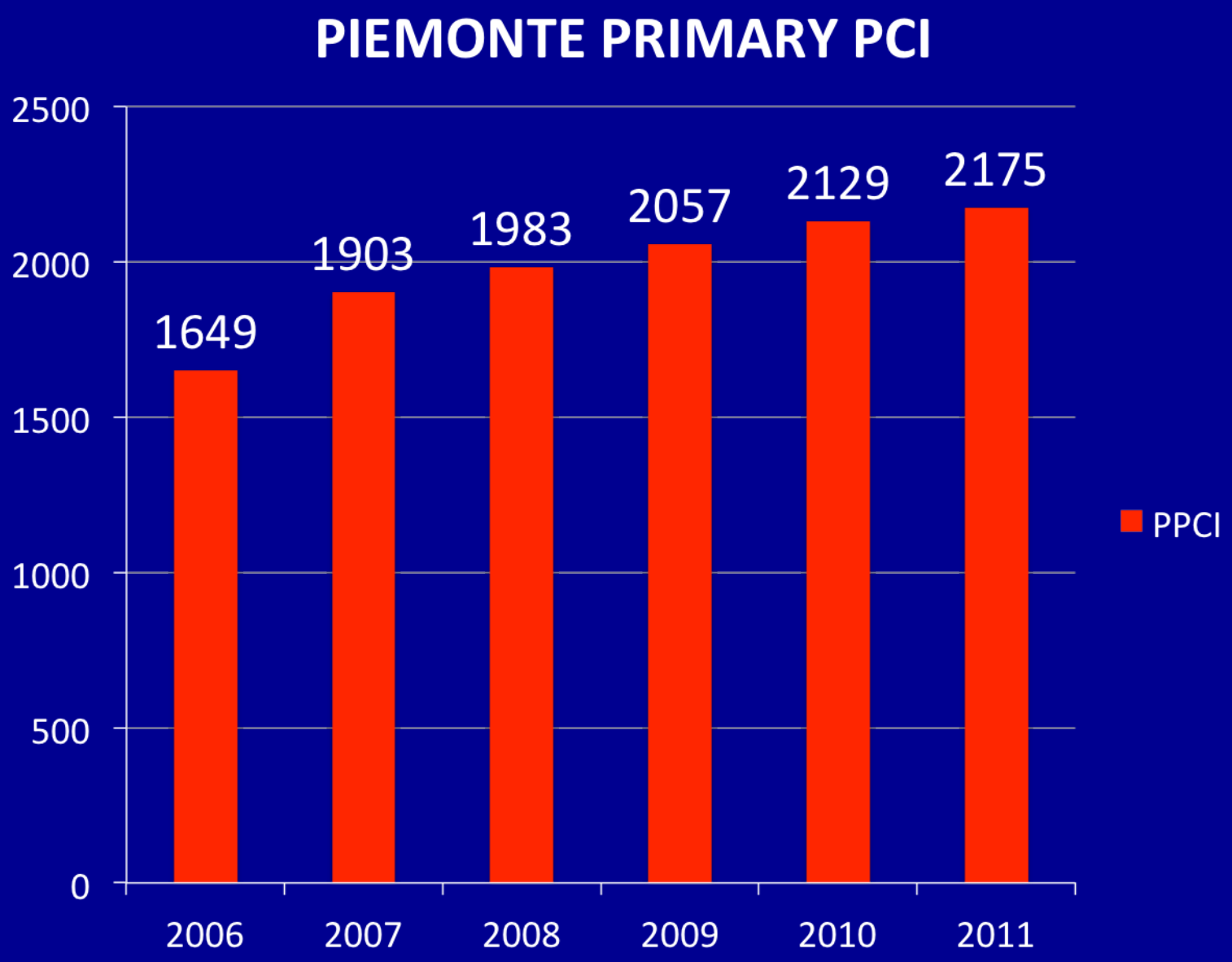
ESC Guidelines for the management of acute myocardial infarction in patients presenting with ST-segment elevation

The Task Force on the management of ST-segment elevation acute myocardial infarction of the European Society of Cardiology (ESC)

Steg et al, Eur Heart J 2012 33,2569-2619

STEMI Regione Piemonte dati S.D.O.




PIEMONTE PRIMARY PCI
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1903
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PPCI

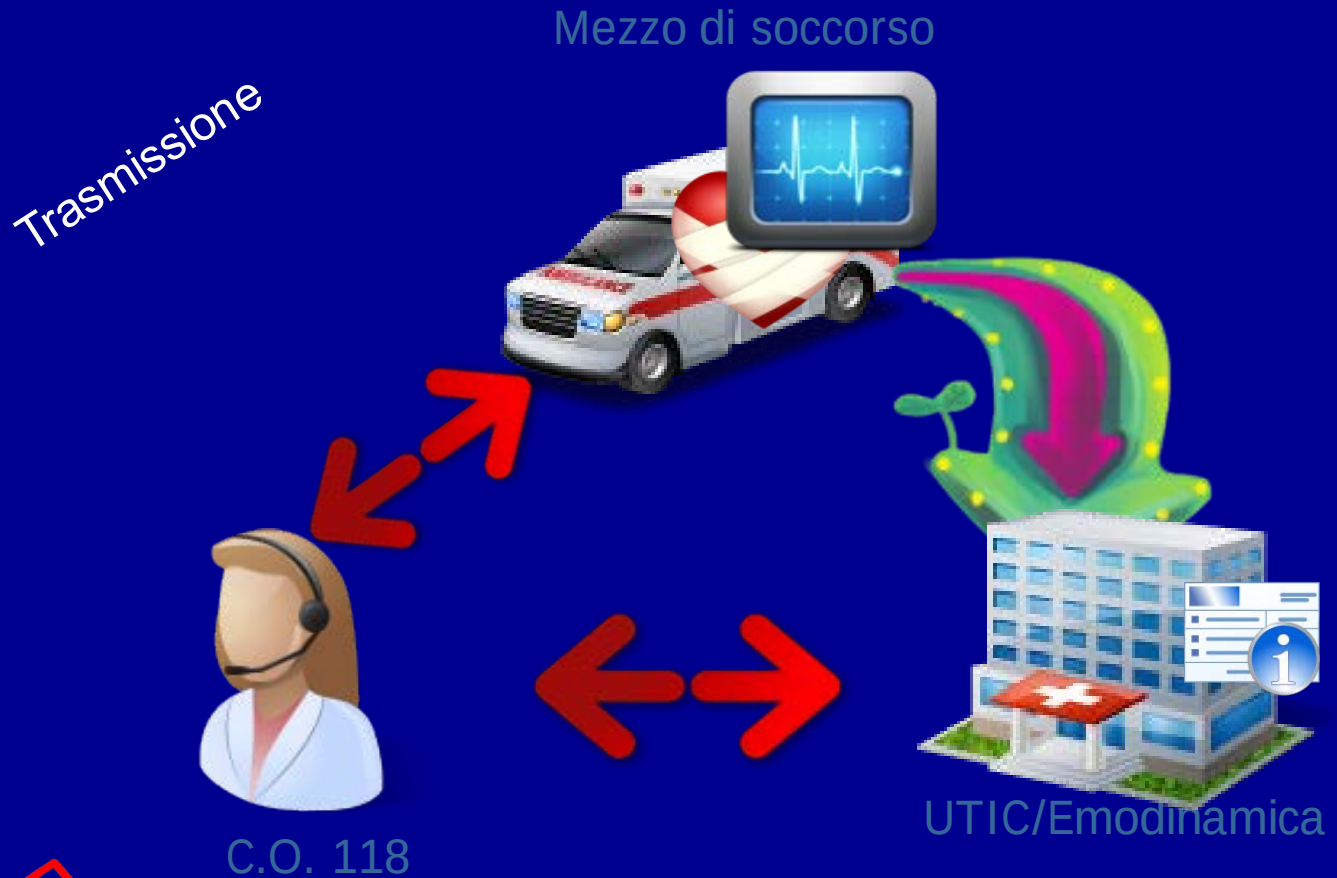
Primary PCI

Recommendations	Class	Level
Indications for primary PCI		
Primary PCI is the recommended reperfusion therapy over fibrinolysis if performed by an experienced team within 120 min of FMC.	I	A
Primary PCI is indicated for patients with severe acute heart failure or cardiogenic shock, unless the expected PCI related delay is excessive and the patient presents early after symptom onset.	I	B

FMC = first medical contacts; PCI = percutaneous coronary intervention.

European Heart Journal (2012) 33, 2569–2619
doi:10.1093/eurheartj/ehs215

L’INFORMAZIONE: il cardine della RETE



Le nuove GL ESC 2012

Recommendations	Class [a]	Level [b]	Ref [c]
Ambulance teams must be trained and equipped to identify STEMI (with use of ECG recorders and telemetry as necessary) and administer initial therapy,including thrombolysis where applicable.	I	B	43
The prehospital management of STEMI patients must be 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	47
Primary PCI-capable centres must deliver a 24/7 service and be able to start primary PCI as soon as possible but always within 60 min from the initial call.	I	B	6, 52, 55
All hospitals and EMSs participating in the care of patients with STEMI must record and monitor delay times and work to achieve and maintain the following quality targets: • first medical contact to first ECG ≤10 min; • first medical contact to reperfusion therapy; • for fibrinolysis ≤30 min; • for primary PCI ≤90 min (≤60 min if the patient presents within 120 min of symptom onset or directly to a PCI-capable hospital).	I	B	56, 57
All EMSs, emergency departments, and coronary care units must have a written updated STEMI management protocol, preferably shared within geographic networks.	I	C	
Patients presenting to a non-PCI-capable hospital and awaiting transportation for primary or rescue PCI must be attended in an appropriately monitored area.	I	C	
Patients transferred to a PCI-capable centre for primary PCI should bypass the emergency department and be transferred directly to the catheterization laboratory.	IIa	B	41, 50, 58

Procedural aspects of primary PCI

Recommendations	Class	Level
Procedural aspects of primary PCI		
Stenting is recommended (over balloon angioplasty alone) for primary PCI.	I	A
Primary PCI should be limited to the culprit vessel with the exception of cardiogenic shock and persistent ischaemia after PCI of the supposed culprit lesion.	IIa	B
If performed by an experienced radial operator, radial access should be preferred over femoral access.	IIa	B
If the patient has no contraindications to prolonged DAPT (indication for oral anticoagulation, or estimated high long-term bleeding risk) and is likely to be compliant, DES should be preferred over BMS.	IIa	A
Routine thrombus aspiration should be considered.	IIa	B
Routine use of distal protection devices is not recommended.	III	C
Routine use of IABP (in patients without shock) is not recommended.	III	A

BMS = bare-metal stent; DAPT = dual antiplatelet therapy; DES = drug-eluting stent; IABP = intra-aortic balloon pump; PCI = percutaneous coronary intervention.

European Heart Journal 2012 - doi:10.1093/eurheartj/ehs215

Revascularization in STEMI -1

- ✓ Approximately 50% of STEMI patients have significant multivessel disease. **Only the infarct-related artery should be treated during the initial intervention**.
- ✓ Multivessel PCI during acute STEMI is justified in patients with **cardiogenic shock** in the presence of multiple, **truly critical** (≥90% diameter) stenoses or **highly unstable** lesions (angiographic signs of possible thrombus or lesion disruption), and if there is persistent ischaemia after PCI of the supposed culprit lesion.
- ✓ In patients with multivessel disease and cardiogenic shock, non-culprit lesions without critical stenoses should not routinely be stented.

Steg et al, Eur Heart J 2012 33,2569-2619

Revascularization in STEMI -2

- ✓ Bleeding is more frequent when PCI is performed during ACS (and STEMI in particular) when compared with bleeding occurring during an elective procedure (use of drugs with a more potent antithrombotic).
- ✓ The radial approach has been shown to reduce the incidence of acute bleeding events, especially in ACS (RIVAL trial; RIFLE-STEACS trial)
- ✓ Interaction between benefit of the radial access route and operator experience, suggesting that **the benefit of radial access over femoral depends upon the radial expertise of operators**.

Steg et al, Eur Heart J 2012 33,2569-2619

Radial versus femoral access for coronary angiography and intervention in patients with acute coronary syndromes (RIVAL): a randomised, parallel group, multicentre trial

*Sanjit S Jolly, Salim Yusuf, John Cairns, Kari Niemelä, Denis Xavier, Petr Widimsky, Andrzej Budaj, Matti Niemelä, Vicent Valentin, Basil S Lewis, Alvaro Avezum, Philippe Gabriel Steg, Sunil V Rao, Peggy Gao, Rizwan Afzal, Campbell D Joyner, Susan Chrolavicius, Shamir R Mehta, for the RIVAL trial group**

Jolly et Al, Lancet 2011;377:1409–1420

	Total	Radial (n/N [%])	Femoral (n/N [%])	HR (95% CI)	Primary outcome p value	Interaction p value
Age (years)						
<75	5986	87/3001 (2·9)	91/2985 (3·0)	0·95 (0·71–1·27)	0·73	0·79
≥75	1035	41/506 (8·1)	48/529 (9·1)	0·89 (0·58–1·34)	0·57	
Sex						
Women	1861	36/908 (4·0)	48/953 (5·0)	0·78 (0·50–1·20)	0·25	0·36
Men	5160	92/2599 (3·5)	91/2561 (3·6)	0·99 (0·74–1·33)	0·97	
BMI (kg/m²)						
<25	2152	44/1067 (4·1)	50/1085 (4·6)	0·89 (0·59–1·33)	0·57	
25–35	4386	73/2205 (3·3)	82/2181 (3·8)	0·88 (0·64–1·20)	0·42	0·83
>35	454	7/219 (3·2)	6/235 (2·6)	1·24 (0·42–3·70)	0·70	
PCI in hospital						
No	2361	49/1196 (4·1)	49/1165 (4·2)	0·97 (0·65–1·44)	0·89	0·72
Yes	4660	79/2311 (3·4)	90/2349 (3·8)	0·89 (0·66–1·20)	0·45	
Radial PCI volume by operator						
≤70	2363	49/1164 (4·2)	46/1199 (3·8)	1·10 (0·74–1·65)	0·63	
71–142	2315	50/1158 (4·3)	57/1157 (4·9)	0·87 (0·60–1·27)	0·48	0·54
>142	2336	29/1182 (2·4)	36/1154 (3·1)	0·79 (0·48–1·28)	0·33	
Radial PCI volume by centre						
Lowest tertile	1920	33/958 (3·4)	40/962 (4·2)	0·83 (0·52–1·31)	0·42	
Middle tertile	2846	77/1420 (5·4)	63/1426 (4·4)	1·23 (0·88–1·72)	0·22	0·021
Highest tertile	2255	18/1129 (1·6)	36/1126 (3·2)	0·49 (0·28–0·87)	0·015	
Clinical diagnosis						
NSTE-ACS	5063	98/2552 (3·8)	87/2511 (3·5)	1·11 (0·83–1·48)	0·49	0·025
STEMI	1958	30/955 (3·1)	52/1003 (5·2)	0·60 (0·38–0·94)	0·026	
Overall	**7021**	**128/3507 (3·7)**	**139/3514 (4·0)**	**0·92 (0·72–1·17)**	**0·50**	

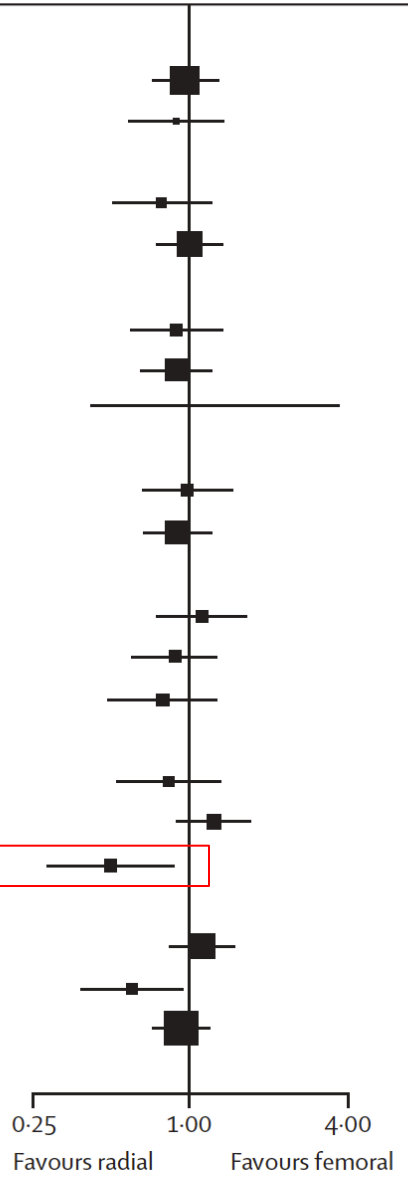


***Figure 3*: Forest plot of prespecified subgroup analyses of the composite primary outcome**

HR=hazard ratio. BMI=body-mass index. PCI=percutaneous coronary intervention. NSTE-ACS=non-ST-segment elevation myocardial infarction. STEMI=ST-segment elevation myocardial infarction.

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Radial Versus Femoral Randomized Investigation in ST-Segment Elevation Acute Coronary Syndrome

The RIFLE-STEACS (Radial Versus Femoral Randomized Investigation in ST-Elevation Acute Coronary Syndrome) Study

Enrico Romagnoli, MD, PHD,* Giuseppe Biondi-Zoccai, MD,† Alessandro Sciahbasi, MD,* Luigi Politi, MD,‡ Stefano Rigattieri, MD,§ Gianluca Pendenza, MD,* Francesco Summaria, MD,* Roberto Patrizi, MD,* Ambra Borghi, MD,‡ Cristian Di Russo, MD,§ Claudio Moretti, MD,‖ Pierfrancesco Agostoni, MD, PHD,¶ Paolo Loschiavo, MD,§ Ernesto Lioy, MD,* Imad Sheiban, MD,‖ Giuseppe Sangiorgi, MD#

Rome, Ospedaletti, and Turin, Italy; and Utrecht, the Netherlands

RIFLE STEACS: Results

- Greater reduction in overall NACE rate at 30 days in the femoral-access group than in the radial-access group: 21.0% vs 13.6%, respectively (p=0.003)
- MACCE rate—a composite of cardiac death, MI, target lesion revascularization, and stroke—was also significantly reduced: 11.4% in the femoral-access group and 7.2% in the radial-access group (p=0.029)

    Largely driven by a significant reduction in cardiac death (5.2% in the radial-access group and 9.2% in the femoral-access group; p=0.20)

Bleeding:

- Bleeding rates also significantly reduced in the radial-access group vs femoral-access: 7.8% vs 12.2%, respectively (p=0.026)

    The reduction in bleeding complications was driven almost entirely by a 47% reduction in access-site bleeds

Revascularization in STEMI -3

- ✓ In primary PCI, drug-eluting stents (DES) reduce the risk of repeated target vessel revascularization, compared with bare metal stents (BMS).
- ✓ An issue with the routine use of DES in this setting is that it is often difficult to determine reliably the ability of patients to comply with or tolerate the protracted use of dual antiplatelet therapy (DAPT).
- ✓ Whether newer generations of DES provide improved clinical outcomes—compared with older generation DES or BM —following primary PCI is currently being tested.

Steg et al, Eur Heart J 2012 33,2569-2619

Revascularization in STEMI -4

- **TAPAS** trial (one single-centre randomized trial), showed **improvement in indices of myocardial reperfusion** (ST-segment resolution and myocardial blush) from routine use of manual thrombus aspiration before a balloon or a stent is introduced into the coronary artery. **One-year** followup from that trial found a **reduction in mortality** with thrombus aspiration as a secondary endpoint.

- In **INFUSE-AMI** randomized trial *Intracoronary abciximab inFUsion and aSpiration thrombEctomy in patients undergoing percutaneous coronary intervention for Anterior ST segment elevation Myocardial Infarction*, thrombus aspiration did not affect infarct size.

Steg et al, Eur Heart J 2012 33,2569-2619

TAKE HOME MESSAGES

STABLE A.: -Revascularization based on the Heart Team.
-No urgent procedure, but elective treatment.
-Aim :improve prognosis ,improving perfusion

NSTE-ACS:-Clinical stratification is the critical point for the selection of the optimal timing and of the management of revascularization strategy

STEMI: -Regional networks between hospitals with different levels of facilities are the key of the treatment.
-An efficient ambulance service able to record, to read and to transmit EKG to the 24 cath-lab is crucial for the procedural success.

THANKS FOR YOUR ATTENTION