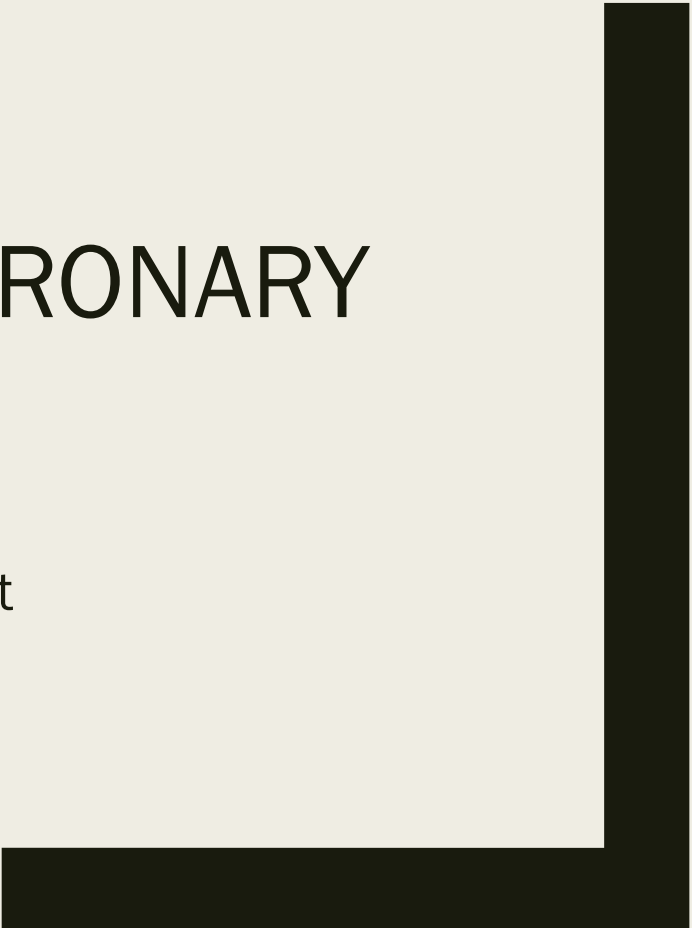
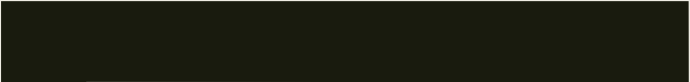




REVASCULARIZATION IN CORONARY ARTERY DISEASE

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Objectives

- To demonstrate an understanding of different revascularization options in Coronary artery disease

Manifestations of Coronary artery disease

■ Stable CAD

- *Angina*
- *SOBOE*
- *Palpitations*
- *Syncope*

■ Acute coronary syndrome

- *NSTEACS*
- *STEMI*

Stable CAD

■ Anatomy

- *Coronary CT*
- *Coronary angiogram*

■ Ischemia

- *Stress echo*
- *Stress nuclear perfusion*
- *Stress CMR*
- *Exercise ECG*

OPTIMAL MEDICAL TREATMENT

Why Revascularize Stable CAD?

■ Symptom

- *PCI*
- *CABG*

■ Prognosis

- *CABG*
- *??PCI*

Revascularization in Stable CAD

Indications for revascularization in patients with stable angina or silent ischaemia

Extent of CAD (anatomical and/or functional)		Class ^a	Level ^b
For prognosis	Left main disease with stenosis >50%. ^{c 68–71}	I	A
	Proximal LAD stenosis >50%. ^{c 62,68,70,72}	I	A
	Two- or three-vessel disease with stenosis >50% with impaired LV function (LVEF ≤35%). ^{c 61,62,68,70,73–83}	I	A
	Large area of ischaemia detected by functional testing (>10% LV) or abnormal invasive FFR. ^{d 24,59,84–90}	I	B
	Single remaining patent coronary artery with stenosis >50%. ^c	I	C
For symptoms	Haemodynamically significant coronary stenosis ^c in the presence of limiting angina or angina equivalent, with insufficient response to optimized medical therapy. ^{e 24,63,91–97}	I	A

How to choose between CABG and PCI?

Recommendations on criteria for the choice between coronary artery bypass grafting and percutaneous coronary intervention

Recommendations	Class ^a	Level ^b
Assessment of surgical risk^c		
It is recommended that the STS score is calculated to assess in-hospital or 30 day mortality, and in-hospital morbidity after CABG. ^{112,114,138}	I	B
Calculation of the EuroSCORE II score may be considered to assess in-hospital mortality after CABG. ¹¹²	IIb	B
Assessment of CAD complexity		
In patients with LM or multivessel disease, it is recommended that the SYNTAX score is calculated to assess the anatomical complexity of CAD and the long-term risk of mortality and morbidity after PCI. ^{117–124}	I	B
When considering the decision between CABG and PCI, completeness of revascularization should be prioritized. ^{131,132,134–136}	IIa	B

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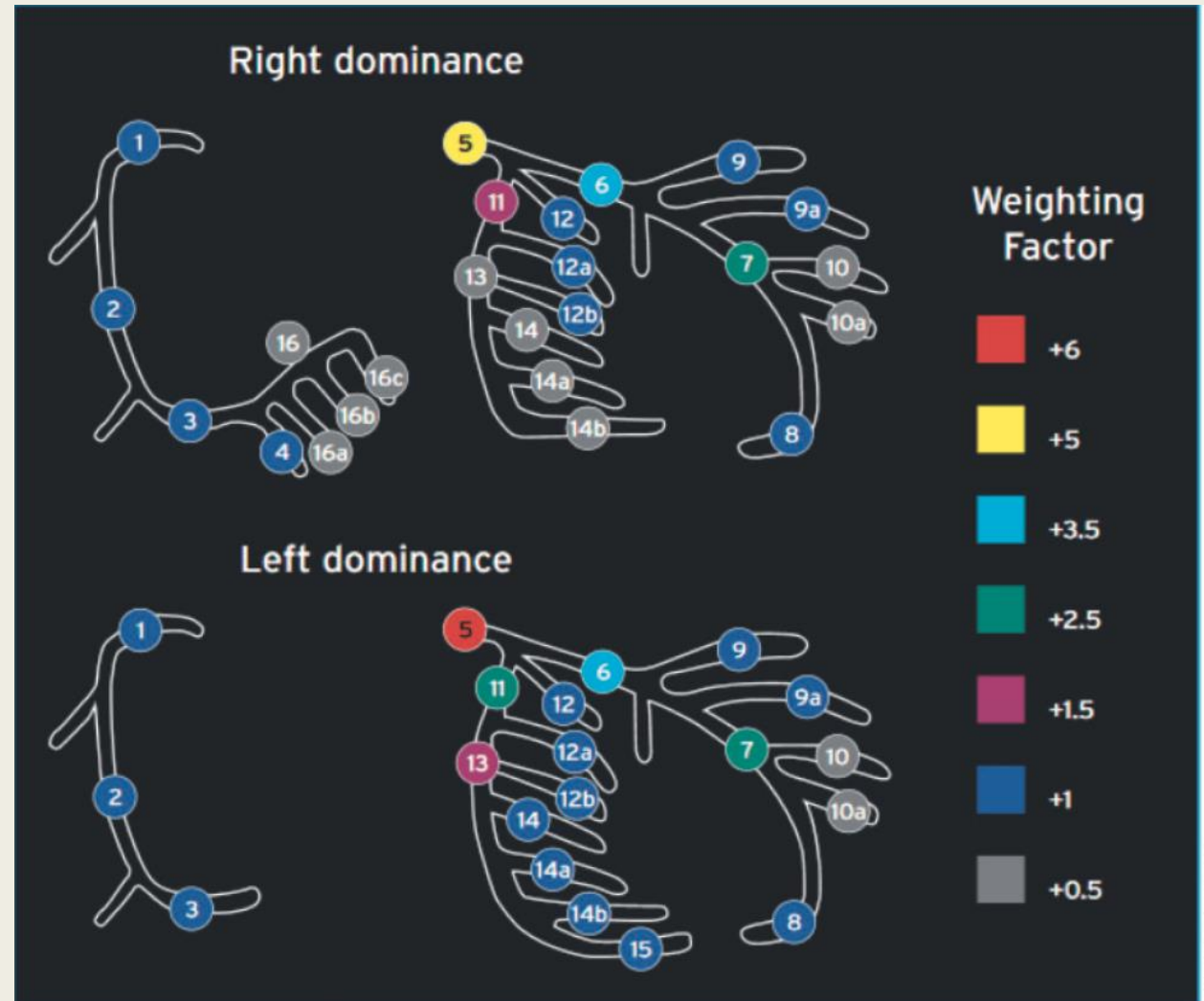
EuroSCORE = European System for Cardiac Operative Risk Evaluation; CABG = coronary artery bypass grafting; CAD = coronary artery disease; LM = left main; PCI = percutaneous coronary intervention; STS = Society of Thoracic Surgeons; SYNTAX = Synergy between Percutaneous Coronary Intervention with TAXUS and Cardiac Surgery.

^aClass of recommendation.

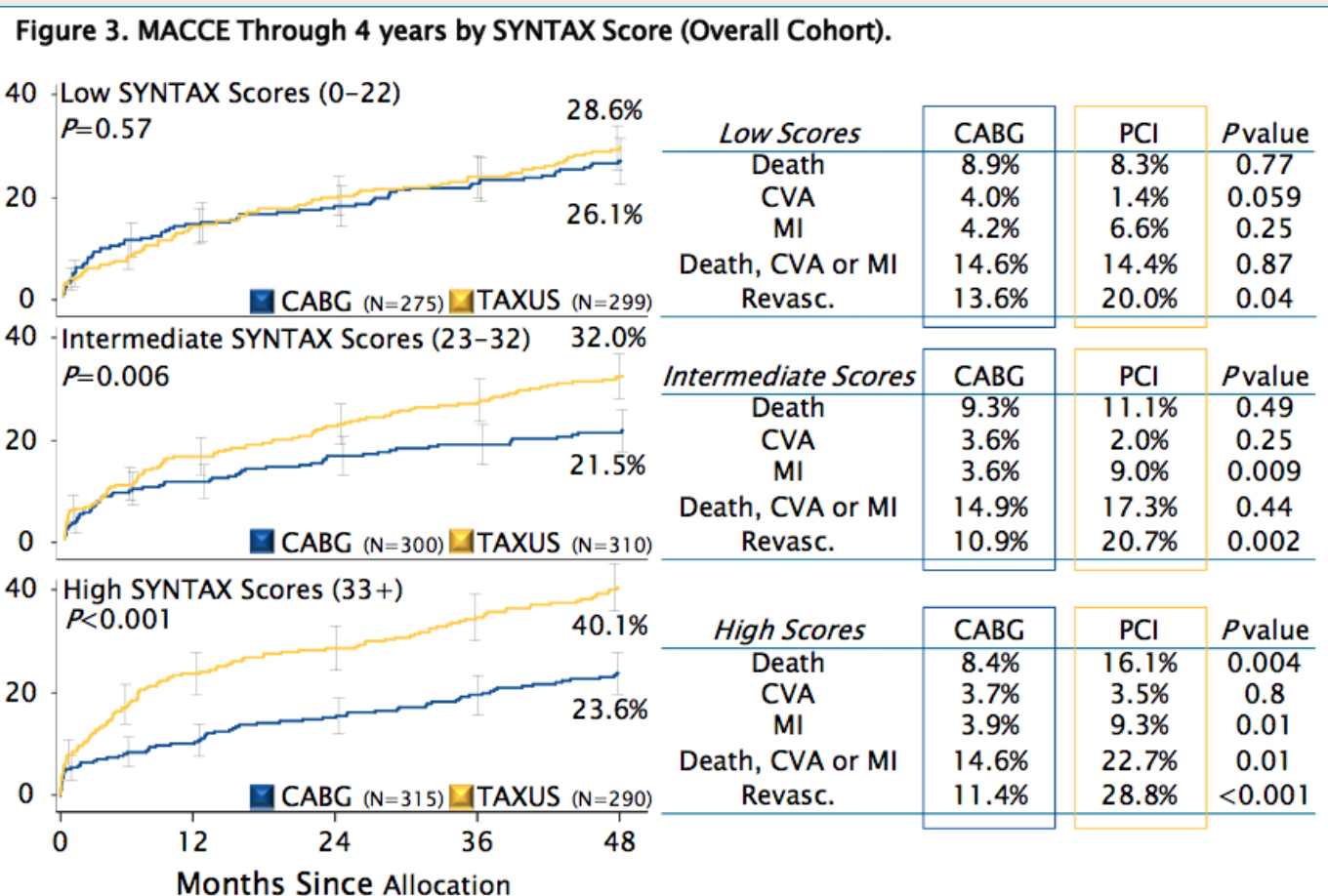
^bLevel of evidence.

^cLevel of evidence refers to prediction of outcomes.

Syntax score – Anatomical score



Syntax Score



PCI or CABG in stable CAD

Recommendation for the type of revascularization in patients with stable coronary artery disease with suitable coronary anatomy for both procedures and low predicted surgical mortality^d

Recommendations according to extent of CAD	CABG		PCI	
	Class ^a	Level ^b	Class ^a	Level ^b
One-vessel CAD				
Without proximal LAD stenosis.	IIb	C	I	C
With proximal LAD stenosis. ^{68,101,139–144}	I	A	I	A
Two-vessel CAD				
Without proximal LAD stenosis.	IIb	C	I	C
With proximal LAD stenosis. ^{68,70,73}	I	B	I	C
Left main CAD				
Left main disease with low SYNTAX score (0–22). ^{69,121,122,124,145–148}	I	A	I	A
Left main disease with intermediate SYNTAX score (23–32). ^{69,121,122,124,145–148}	I	A	IIa	A
Left main disease with high SYNTAX score (≥33). ^{c 69,121,122,124,146–148}	I	A	III	B
Three-vessel CAD without diabetes mellitus				
Three-vessel disease with low SYNTAX score (0–22). ^{102,105,121,123,124,135,149}	I	A	I	A
Three-vessel disease with intermediate or high SYNTAX score (>22). ^{c 102,105,121,123,124,135,149}	I	A	III	A
Three-vessel CAD with diabetes mellitus				
Three-vessel disease with low SYNTAX score 0–22. ^{102,105,121,123,124,135,150–157}	I	A	IIb	A
Three-vessel disease with intermediate or high SYNTAX score (>22). ^{c 102,105,121,123,124,135,150–157}	I	A	III	A

SYNTAX score calculation information is available at <http://www.syntaxscore.com>.

CABG = coronary artery bypass grafting; CAD = coronary artery disease; LAD = left anterior descending coronary artery; PCI = percutaneous coronary intervention; SYNTAX = Synergy between Percutaneous Coronary Intervention with TAXUS and Cardiac Surgery.

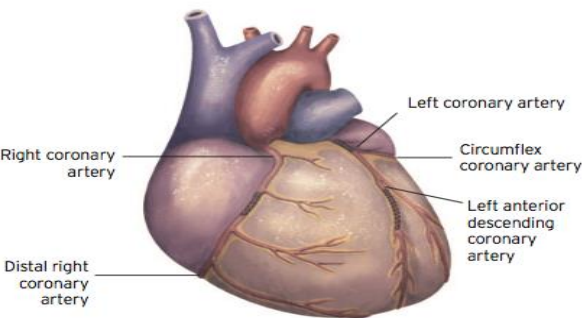
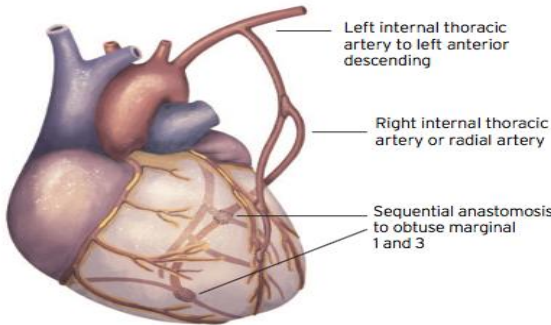
^aClass of recommendation.

^bLevel of evidence.

^cPCI should be considered if the Heart Team is concerned about the surgical risk or if the patient refuses CABG after adequate counselling by the Heart Team.

^dFor example, absence of previous cardiac surgery, severe morbidities, frailty, or immobility precluding CABG (also see Table 5).

CABG vs PCI in stable CAD

PCI	CABG
	
FAVOURS PCI Clinical characteristics - Presence of severe co-morbidity (not adequately reflected by scores) - Advanced age/frailty/reduced life expectancy - Restricted mobility and conditions that affect the rehabilitation process Anatomical and technical aspects - MVD with SYNTAX score 0-22 - Anatomy likely resulting in incomplete revascularization with CABG due to poor quality or missing conduits - Severe chest deformation or scoliosis - Sequelae of chest radiation - Porcelain aorta*	FAVOURS CABG Clinical characteristics - Diabetes - Reduced LV function (EF $\leq$ 35%) - Contraindication to DAPT - Recurrent diffuse in-stent restenosis Anatomical and technical aspects - MVD with SYNTAX score $\geq$ 23 - Anatomy likely resulting in incomplete revascularization with PCI - Severely calcified coronary artery lesions limiting lesion expansion Need for concomitant interventions - Ascending aortic pathology with indication for surgery - Concomitant cardiac surgery

CABG = coronary artery bypass grafting; Cx = circumflex; DAPT = dual antiplatelet therapy; EF = ejection fraction; LAD = left anterior descending coronary artery; LIMA = left internal mammary artery; LV = left ventricular; MVD = multivessel coronary artery disease; PCI = percutaneous coronary intervention; PDA = posterior descending artery; RA = radial artery; RIMA = right internal mammary artery; SYNTAX = Synergy between Percutaneous Coronary Intervention with TAXUS and Cardiac Surgery.

*Consider no-touch off-pump CABG in case of porcelain aorta.

Who makes the decision?



Acute Coronary Syndromes

■ STEMI

- *Primary PCI*
- *?? CABG*

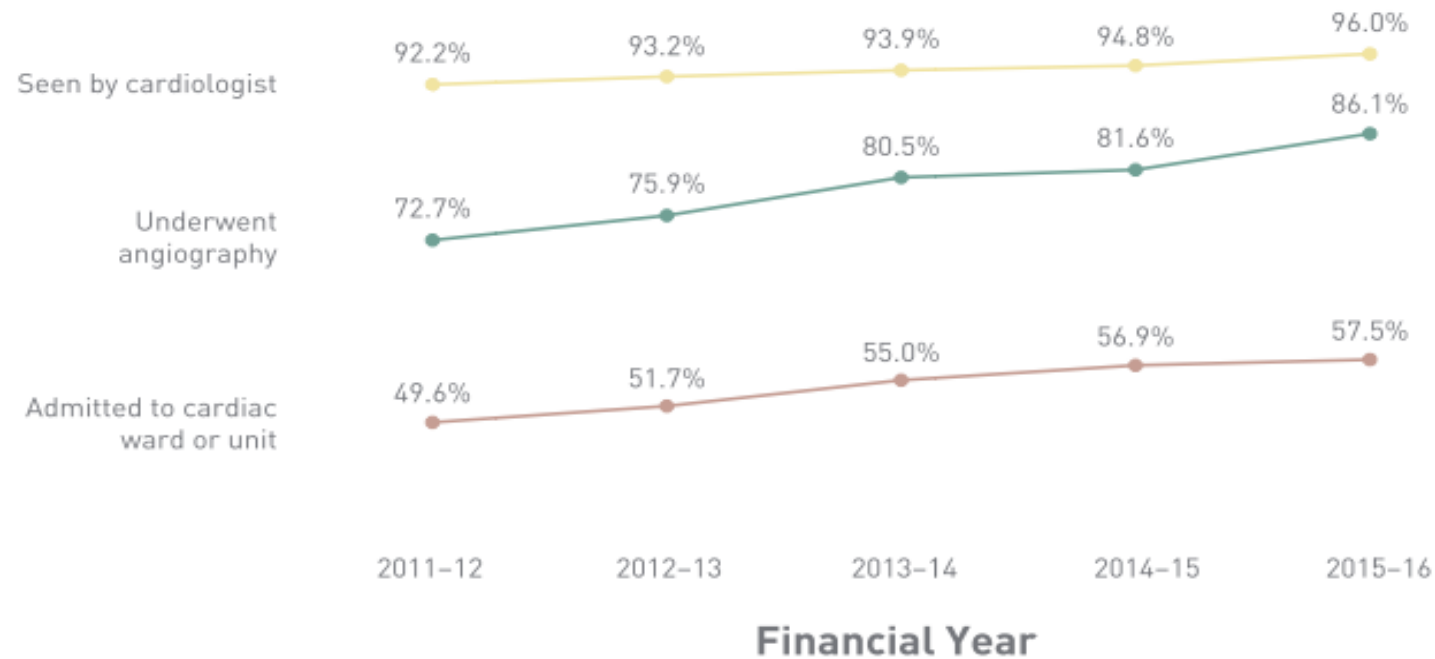
■ NSTEMI/ACS

- *PCI*
- *CABG*

MEDICAL TREATMENT

NSTEACS – Cath or not to Cath

Figure 23: Care of nSTEMI patients 2011-2016



Whom to Cath and when?

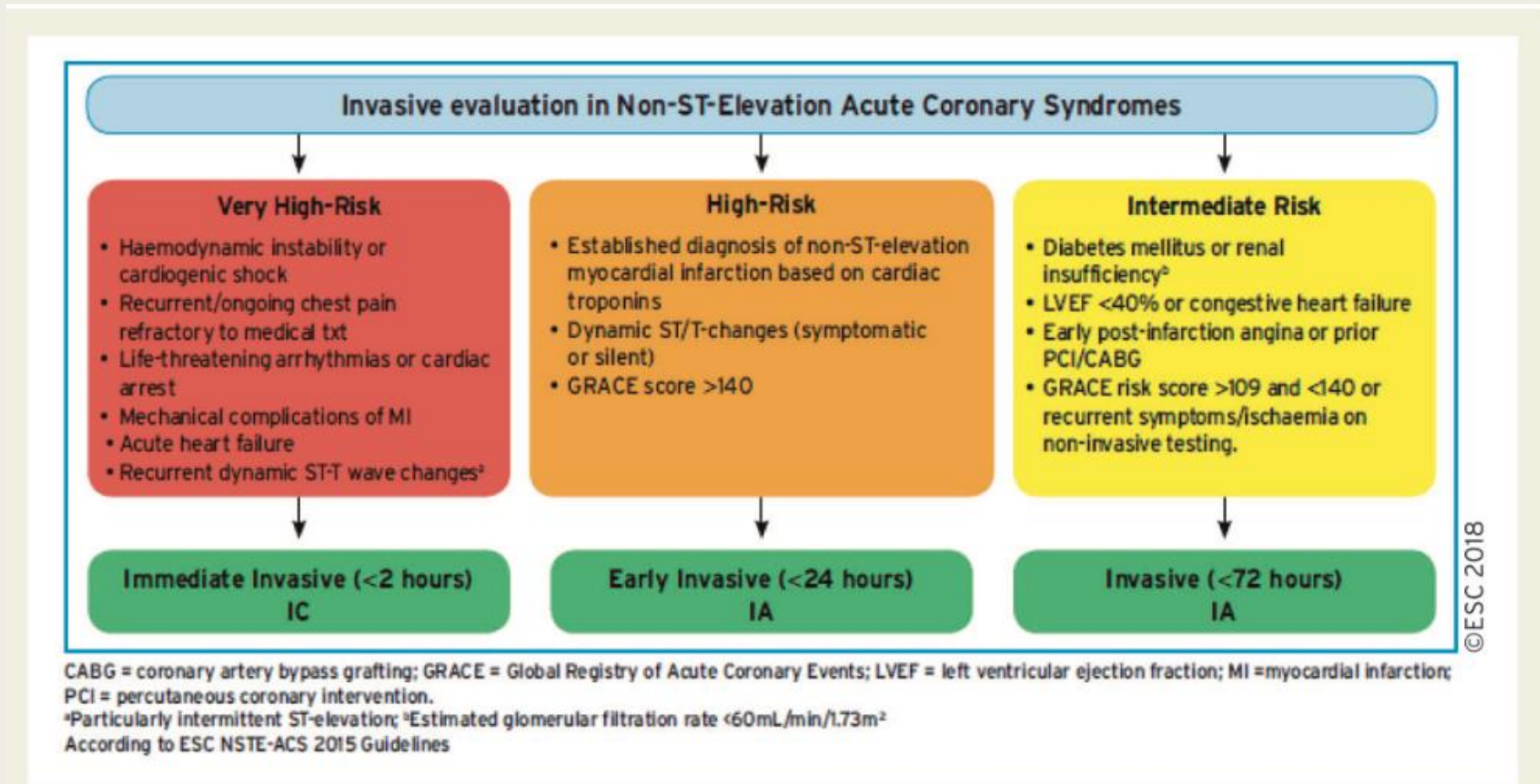


Figure 4 Selection of non-ST-elevation acute coronary syndrome treatment strategy and timing according to initial risk stratification.

PCI vs CABG in NSTEMACS

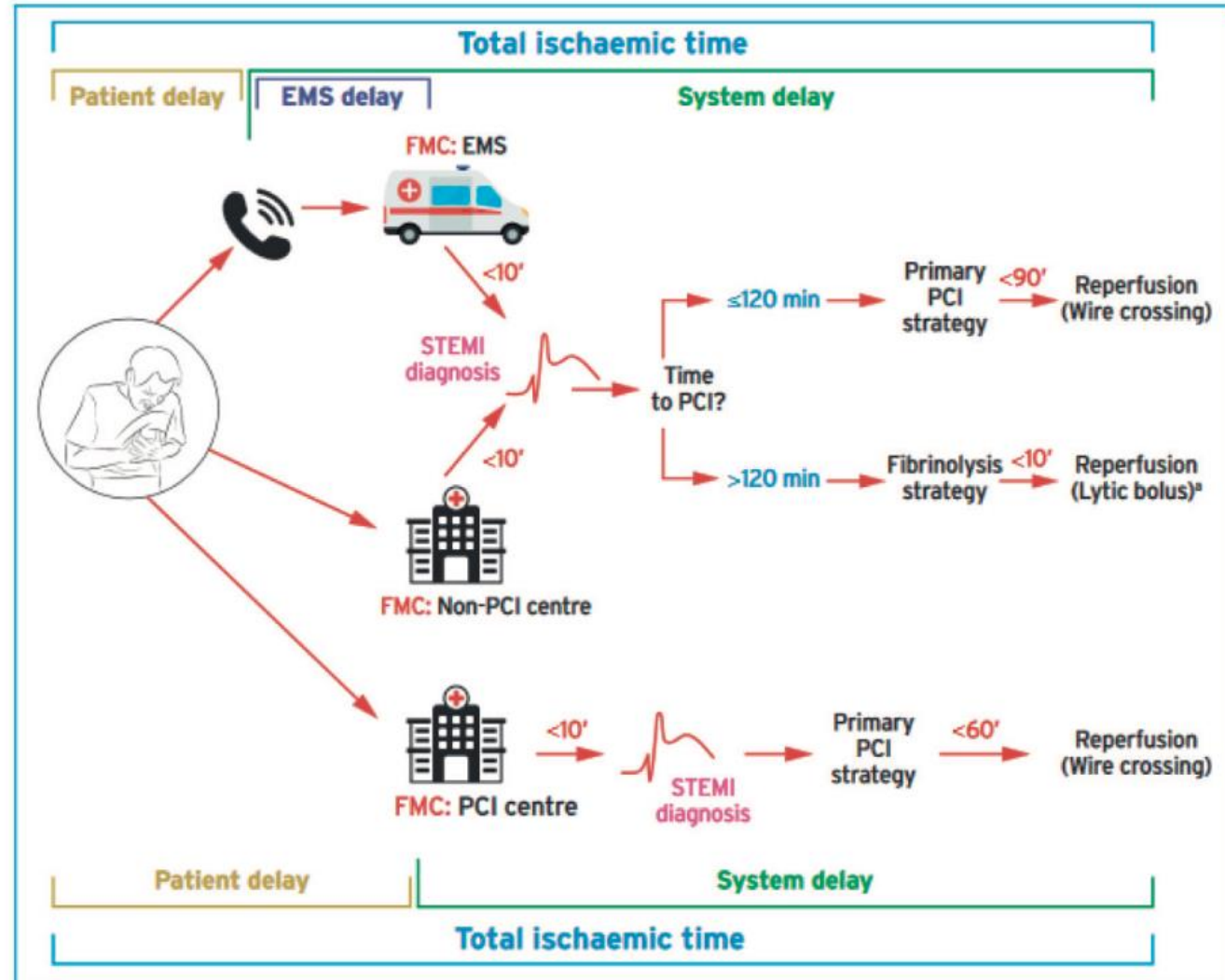
- Settle on medical Treatment

- *PCI*
- *CABG*

- Ongoing chest pain or unstable

- *PCI*
- *?CABG*

STEMI



STEMI

Primary percutaneous coronary intervention for myocardial reperfusion in ST-elevation myocardial infarction: indications and logistics

Recommendations	Class ^a	Level ^b
Indication		
Reperfusion therapy is indicated in all patients with time from symptom onset <12 h duration and persistent ST-segment elevation. ^{200,201,236}	I	A
In the absence of ST-segment elevation, a primary PCI strategy is indicated in patients with suspected ongoing ischaemic symptoms suggestive of MI 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 MI ● acute heart failure ● recurrent dynamic ST-segment or T-wave changes, particularly with intermittent ST-segment elevation.	I	C
A primary PCI strategy is recommended over fibrinolysis within the indicated time frames. ^{200,201,237,238}	I	A
In patients with time from symptom onset >12 h, a primary PCI strategy is indicated in the presence of ongoing symptoms or signs 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 h) after symptom onset. ^{233,234,239}	IIa	B

Case 1.

- 50 year old man. HT, smoker. Exertional angina. On 2 antianginals, Aspirin and Statin. Exercise stress echo – 6 mins on bruce protocol, inferior wall motion abnormality on stress. Normal bloods.
- Coronary angiogram shows severe mid RCA disease. No significant abnormality in Left coronary artery.

Case 2

- 60 female. 2DM, admitted with NSTEMI. Anterolateral ECG changes. Echo shows anterolateral hypokinesia with mild LV dysfunction. Smoker. CKD with eGFR of 40. Troponin elevated. FBC/U&E normal. Painfree since admission for 48 hours
- Coronary angiogram: Severe proximal LAD disease with slow flow, Severe Cx and Right coronary disease

Case 3

- 50 male. NSTEMI. Inferior ECG changes. HT, high Cholesterol. No DM. Smoker. TTE shows inferobasal wall motion abnormality. Troponins elevated. Other bloods normal
- Coronary angiogram: Severe proximal LAD disease. Severe mid RCA disease. Normal Cx.

Objectives

- To demonstrate an understanding of different revascularization options in Coronary artery disease

Suggested Reading



ESC

European Society
of Cardiology

European Heart Journal (2018) 00, 1–96

doi:10.1093/eurheartj/ehy394

ESC/EACTS GUIDELINES

2018 ESC/EACTS Guidelines on myocardial revascularization

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

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