ESC Guidelines for preoperative cardiac risk assessment and peroperative cardiac management in non-cardiac surgery

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The magnitude of the problem

- **Annually:**
  - **40.000.000 surgical procedures**
    - **400.000 myocardial infarction (1%)**
      - **133.000 cardiovascular deaths (0.3%)**

Rationale for new ESC Guidelines

- **High incidence of perioperative cardiac mortality and morbidity**
- **Impact of vascular disease (e.g. atherosclerosis) on postoperative outcome**
- **Impact of risk reduction strategies**
  - Medications: β-blockers, statins, ACE-inhibitors
  - Coronary revascularization: Stents, Clopidogrel, aspirin
- **Changes of surgical techniques**

† Guidelines for pre-operative cardiac risk assessment and perioperative cardiac management in non-cardiac surgesy

The Task Force for Preoperative Cardiac Risk Assessment and Perioperative Cardiac Management in Non-cardiac Surgery of the European Society of Cardiology (ESC) and endorsed by the European Society of Anaesthesiology (ESA)

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Objectives of these guidelines

- To describe a stepwise approach for preoperative cardiac risk assessment
- To describe cardiac risk factors, risks of surgical procedure and exercise capacity
- To describe how to initiate the therapy
- To address practical issues including decisions algorithms, tables, figures and summaries
- To be easy to use for practitioners

Classes of recommendations

- **Evidence and/or general agreement that a given treatment or procedure *is beneficial, useful and effective***
- **Conflicting evidence and/or divergence of opinion about the usefulness/efficacy of the given treatment or procedure**
  - Weight of opinion/evidence is in favour of usefulness/efficacy
  - Usefulness/efficacy is less well established by evidences/opinion
- **Evidence and/or general agreement that the given treatment or procedure *is not useful/effective and in some cases may be harmful***

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Levels of evidence

- Data derived from *multiple* randomized clinical trials or *meta-analyzes*

A

- Data derived from *a single* randomized clinical trial or large-non randomized studies

B

- Consensus of opinion of the experts and/or small studies, restropective studies, registries

C

A stepwise approach

Step 1: Urgent surgery

Step 2: Active or Unstable cardiac conditions

Step 3: What is the risk of the surgical procedure?

Step 4: What is the functional capacity of the patient?

Step 5: In patients with moderate or low functional capacity consider the risk of surgical procedure

Step 6: Consider cardiac risk factors

Step 7: Consider non invasive tests

Step n°1: Urgent surgery → NO → Step 2

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YES

Patient or surgical specific factors dictate the strategy & do not allow further cardiac testing: the consultant provides recommendations on perioperative management, surveillance for cardiac events & continuation of chronic CV medical treatment

I	C

If applicable, discuss the discontinuation of chronic aspirin (ASA) treatment: Discontinuation of ASA should be considered only in patients with difficult control of haemostasis during surgery

IIa	B

↓

Surgery

ESC recommendations on perioperative ASA use

	Class	LOE
• Continuation of aspirin in patients previously treated with aspirin should be considered in the perioperative period	IIa	B
• *Discontinuation* of ASA in patients previously treated with that drug should be considered *only in patients with difficult haemostasis control during surgery*	IIa	B

Step 2: Active or unstable cardiac condition(s):
Unstable/severe angina- Recent MI (< 30 days +ischemia)
overt heart failure, severe arrhythmias, severe valv. disease

→ **No** → **Step3**

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Yes

- **Postpone the procedure**
- **Treatment options to be discussed in a multi-disciplinary team involving all perioperative care physicians**

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Surgery

Step 3: Risk of surgical produre: 30-day CV death and MI

Low risk < 1%	Intermediate risk < 1-5%	High risk > 5%
• Breast • Dental • Endocrine • Eye • Gynaecology • Reconstructive • Orthopaedic- minor (knee surgery) • Urologic	• Abdominal • Carotid • Peripheral arterial angioplasty • Endovascular aneurysm repair • Head and neck surgey • Neurological • Orthopaedic major (hip & spine) • Pulmonary/renal/ liver transplant • Urologic- major	• Aortic & major vascular surgery • Peripheral vascular surgery

Step 3: Risk of surgical procedure

	Class	LOE
• **Low risk of surgical procedure** Identify risk factors & provide recommendations on life style & medical treatment according to the ESC guidelines for postoperative care	IIa	B

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Surgery

- **Intermediate or High Risk of surgical procedure**

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Step 4

Step 4: Functional capacity of the patient scheduled for intermediate or high-risk surgery

Functional Capacity

1 MET — **Can you…**

- Take care of yourself? Eat, dress, or use the toilet?
- Walk indoors around the house?
- Walk 100 m on level ground at 3 to 5 km per h?

4 METs

4 METs — **Can you…**

- Climb two flights of stairs or walk uphill? Run a short distance
- Do heavy work around the house like scrubbing floors or lifting or moving heavy furniture?
- Participate in strenuous sports like swimming, singles tennis, football, basketball, or skiing?

Greater than 10 METs

Step 4: Functional capacity of the patient scheduled for intermediate or high-risk surgery

Class	LOE
IIa	B

- **Good: climb two flight of stairs/run short distance**

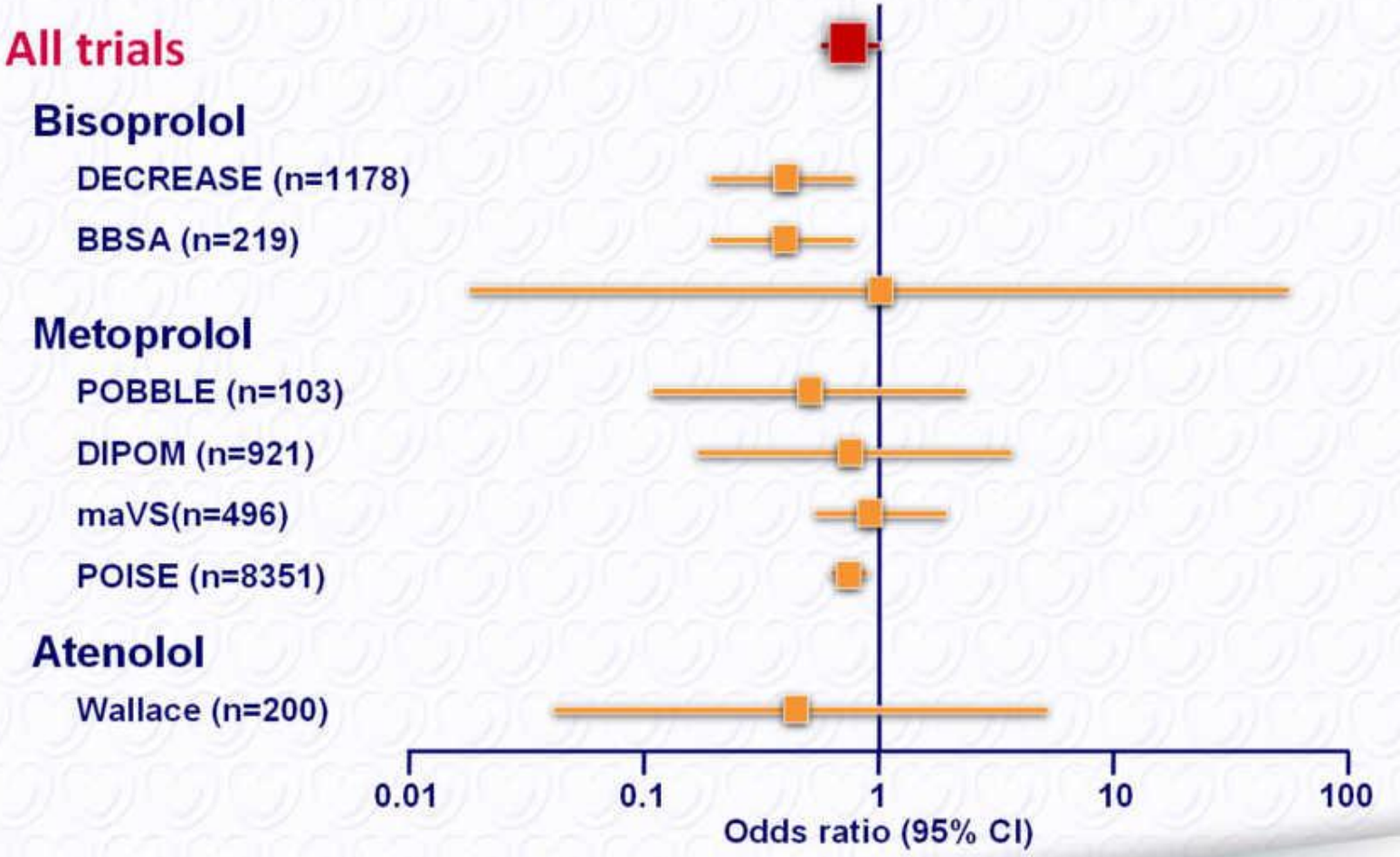
  Coronary artery disease: or risk factor(s)

  Statin therapy - titrated low dose of β-blocker regimen can be initiated before surgery

→ ***Surgery***

- **Moderate or poor** → ***Step 5***

β-Blockers and perioperative cardiac events in randomized trials



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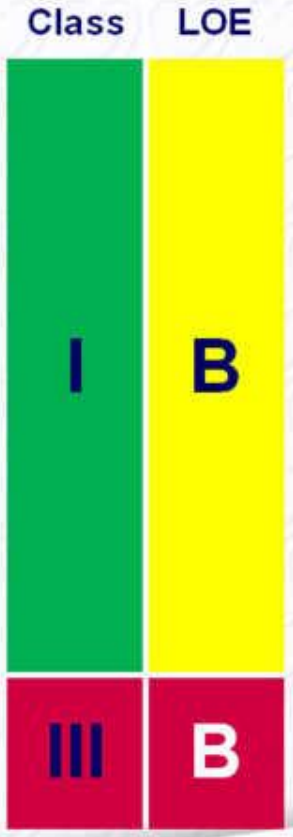
ESC recommendations on perioperative β-blocker use

- **Dose of β-blockers should be titrated, which requires treatment initiation 30 days before (optimal) & at least one week before surgery**

  It is recommended to start with a daily dose of 2.5 mg/d of bisoprolol or 50 mg of metoprolol succinate & to adjust the dose before operation to achieve a resting HR between 60 and 70b/min with SBP >100 mmHg

- **β-blockers are recommended in patients with IHD or myocardial ischaemia according to preoperative stress test**
- **β-blockers *are not recommended* in patients scheduled for low-risk surgery without risk factors**



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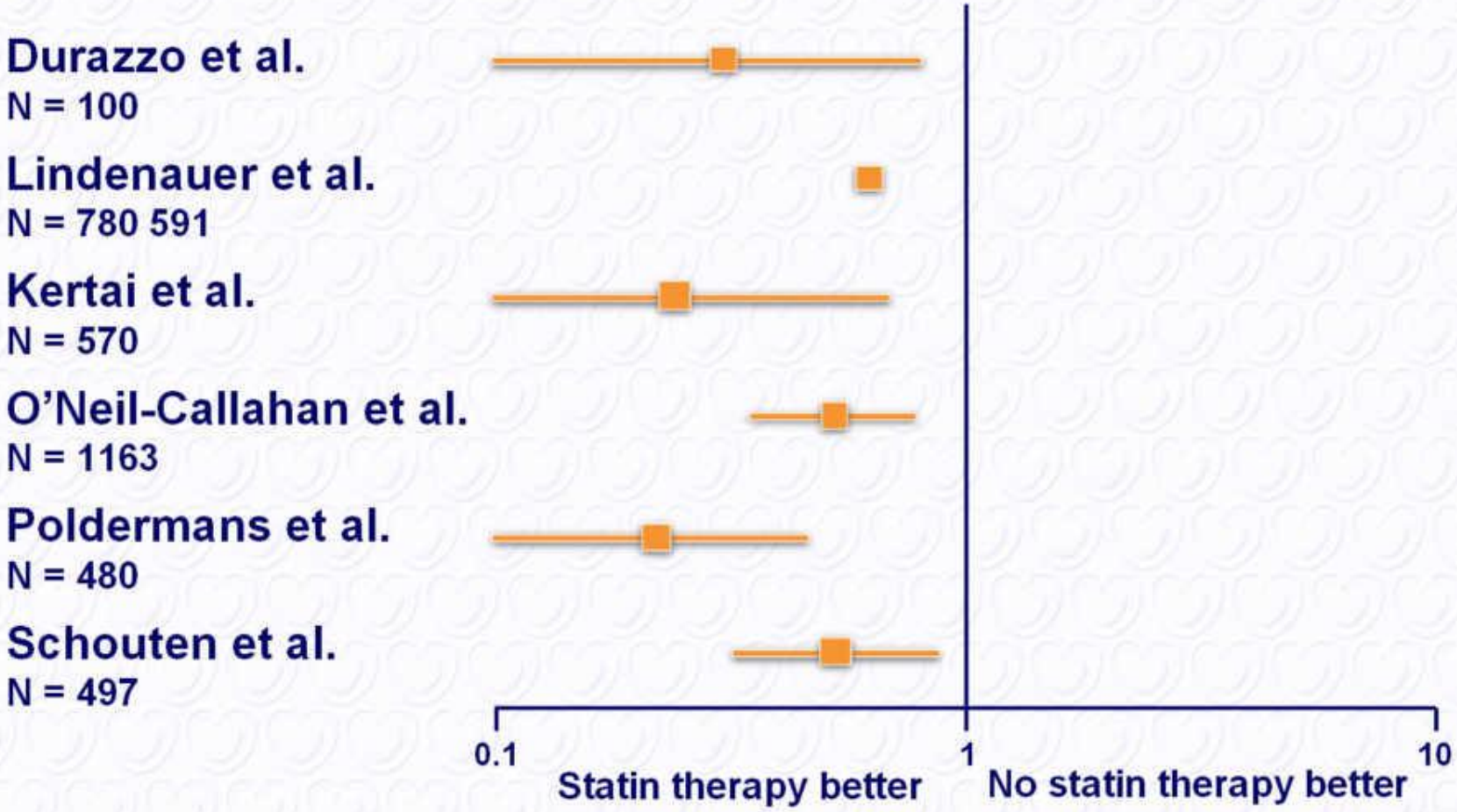
Perioperative statin use



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ESC recommendations on perioperative statin use

- It is recommended that statins should be started in high risk surgery patients, optimally between 30 days and at least one week before surgery
- It is recommended that statins should be continued perioperatively

Class	LOE
I	B
I	C

Step 5: Intermediate or High-risk surgery with a moderate or less, functional capacity

Class	LOE
IIa	B

- **Intermediate: abdominal/carotid**
  - Statin therapy
  - Titrated low dose β-blocker
  - ACE-inhibitors if systolic LV dysfunction
  - ≥ 1 cardiac risk factors → Baseline ECG

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Surgery

- **High risk (aortic/peripheral vascular)**

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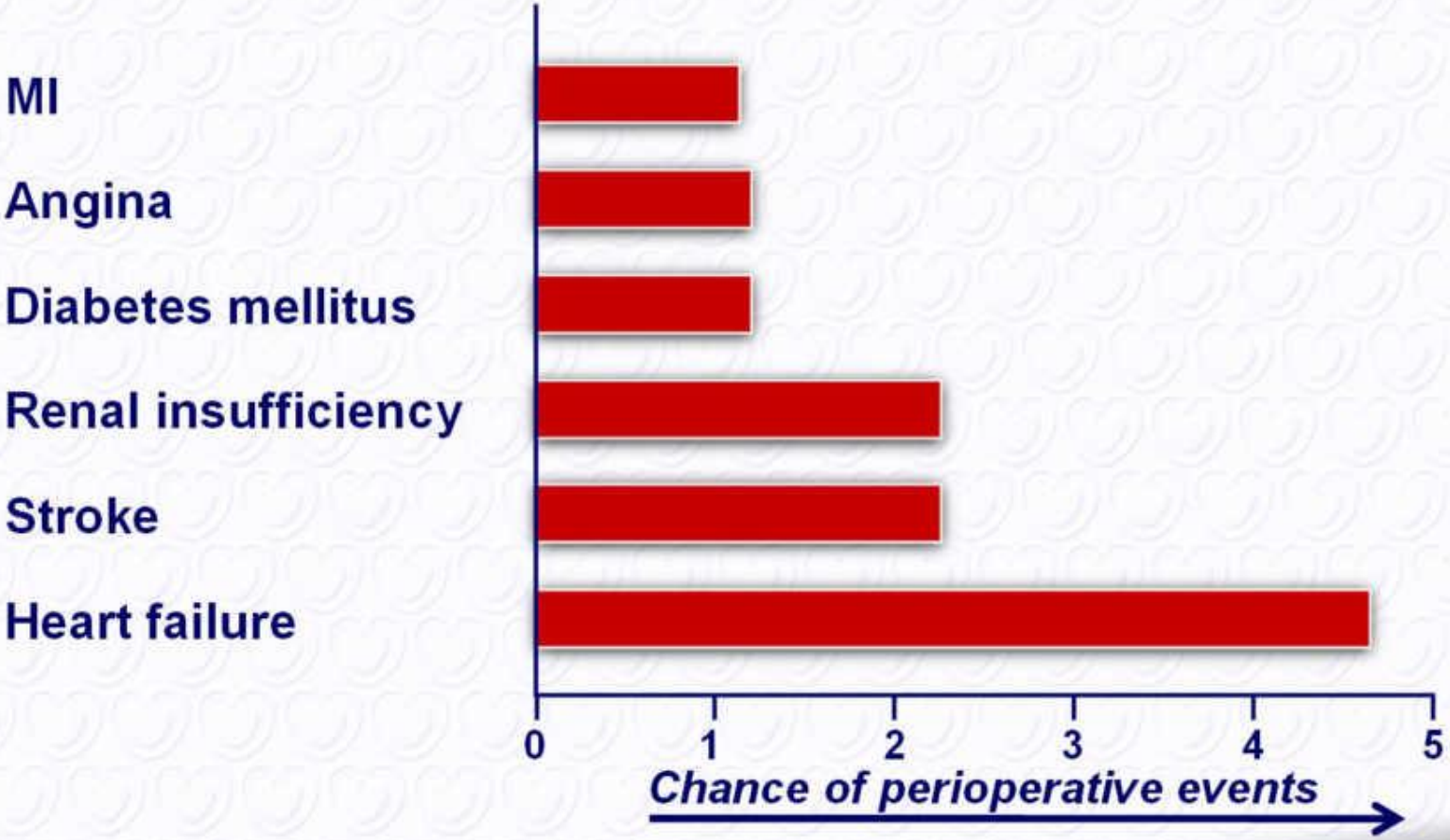
Step 6

Step 6: Cardiac risk factors:
Clinical outcome of 1.2 million procedures



Boersma E. Am J Med 2005;118:1134-41

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Step 6:
Cardiac risk factors in high-risk surgery

1. Angina pectoris
2. MI
3. Heart failure
4. Stroke
5. Diabetes mellitus
6. Renal dysfunction

	Class	LOE
• Number of risk factors ≤ 2 – Statin therapy – Titrated low dose β-blocker – ACE-inhibitors if systolic LV dysfunction	I	B

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Surgery

• **Number of risk factors ≥ 3**

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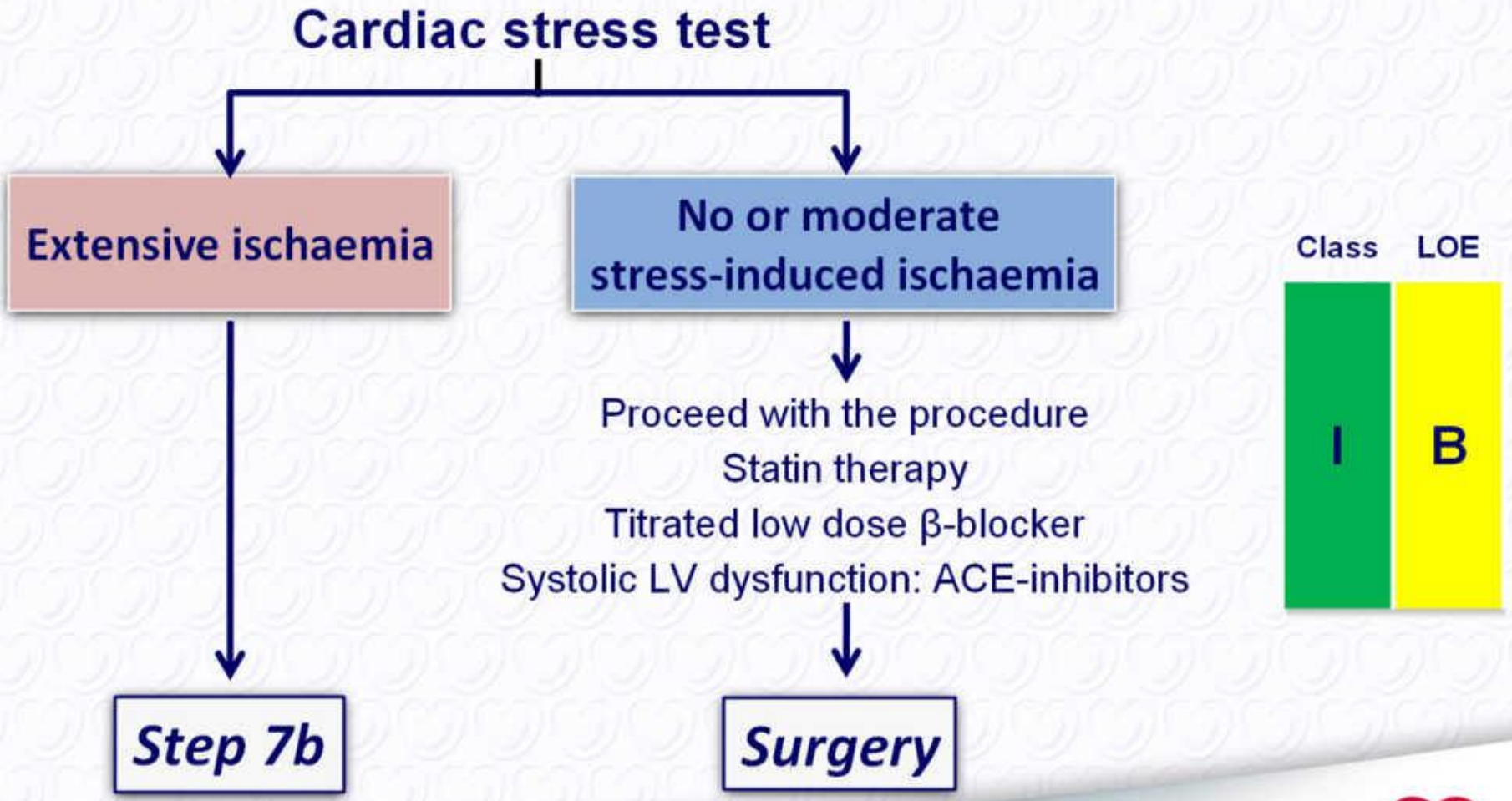
Step 7

Step 7: Preoperative testing

Consider also for patient counselling, surgery, and anaesthesia technique



Pathophysiology of perioperative myocardial infarction

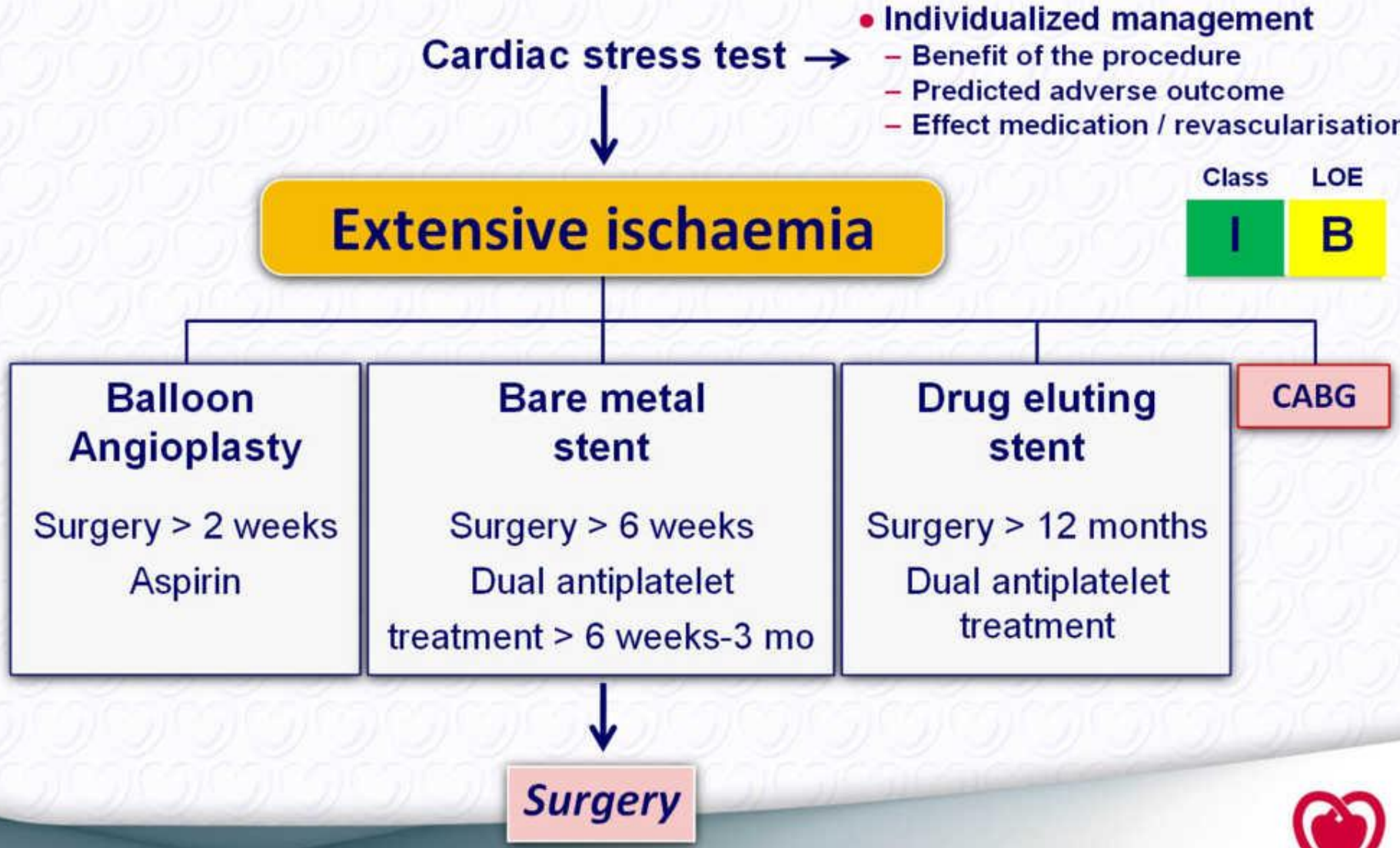
- **Increased risk of plaque rupture and thrombus formation due to the stress surgical response on haemodynamically (in)significant coronary stenosis, haemodynamic stress, vasospasm, fibrinolytic activity, platelet activation, hypercoagulability**
- **Sustained ischaemia**
  - Myocardial oxygen supply / demand mismatch

Accordingly:
Choose between local or systemic treatment

ESC recommendations on prophylactic coronary revascularization in stable cardiac patients

	Class	LOE
• Prophylactic myocardial revascularization prior to high-risk surgery *may be considered* in patients with overt ischaemic heart disease	IIb	B
• Prophylactic myocardial revascularization prior to intermediate-risk surgery in patients with proven ischaemic heart disease *is not recommended*	III	B
• Prophylactic myocardial revascularization prior to low-risk surgery in patients with proven ischaemic heart disease *is not recommended*	III	C

Step 7b: Extensive stress induced ischaemia



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Summary of preoperative cardiac risk evaluation & peroperative management

Step	Urgency	Cardiac condition	Type of surgery	Functiona capacity	Number of clinical risk factors	LV echo	ECG	Stress Testing	β-blockers	ACE-inhibitors	Aspirin	Statins	Coronary Revascula risation
1	Urgent surgery					III C	IIa C	III C	I C	I C	I C	I C	III C
2	Elective surgery	Unstable				I C	I C	III C					I C
3	Elective surgery	Stable	Low risk (< 1%)		None	III B	III B	III C	III B	IIa C	IIb C	IIa B	III C
					≥ 1	III B	IIa B	III C	IIb B (titration) III A (no titration)	IIa C	IIb C	IIa B	III C
4				Excellent or good		III B	IIa B	III C	IIb B (titration) III A (no titration)	IIa C	IIb C	IIa B	III C
5	Elective surgery		Intermediate risk (1 - 5%)	Moderate or poor	None	IIIB	IIb B	IIb C	IIa B (titration) III A (no titration)	I C	IIb C	IIa B	III B
					≥ 1	IIIB	I B	IIb C	IIa B (titration) III A (no titration)	I C	IIb C	IIa B	III B
6	Elective surgery		High risk (> 5%)	Moderate or poor	≤ 2	IIa C	I B	IIb B	I B (titration) III A (no titration)	I C	IIb C	I B	IIb B
					≥ 3	IIa C	I B	I C	I B (titration) III A (no titration)	I C	IIb C	I B	IIb B

What is new in these Guidelines?

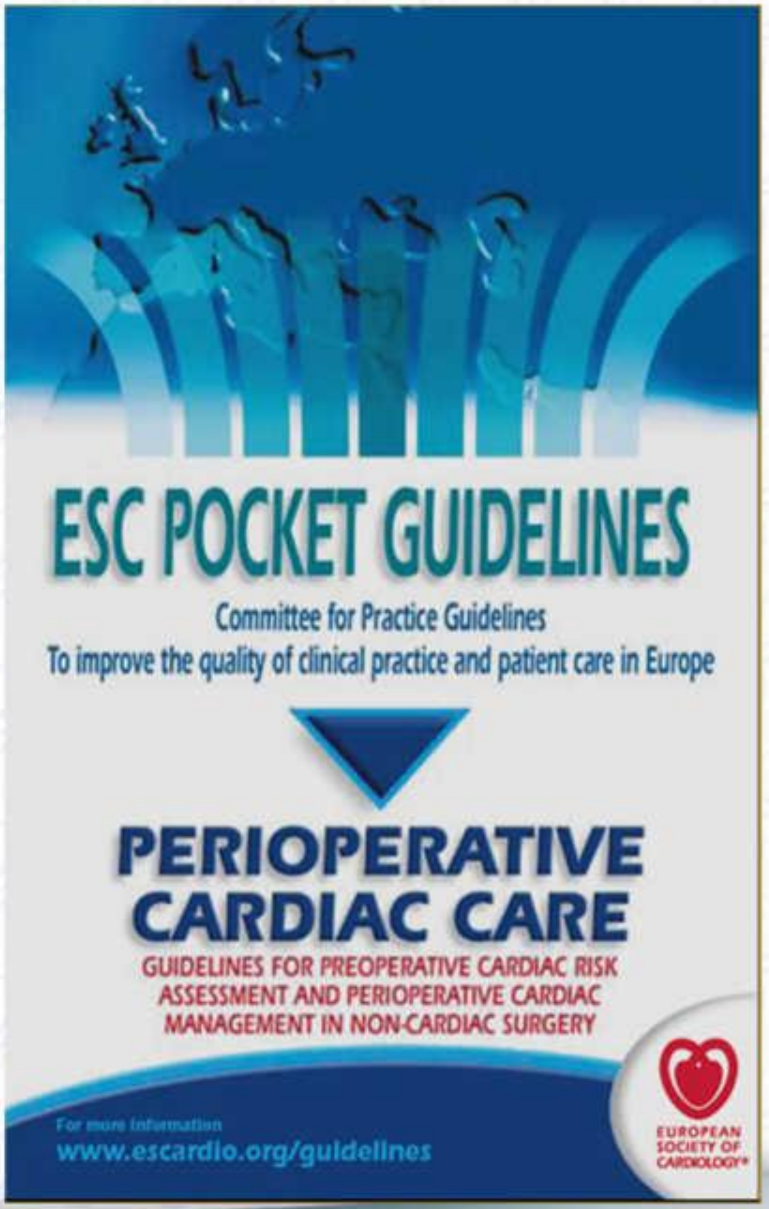
- Integration of cardiac risk factors, exercise capacity, and risk of surgical procedure.
- Stratification of patients in: low (< 1%), intermediate (1-5%), and high (> 5%) risk of postoperative cardiac events.
- Additional cardiac stress testing is only recommended in patients with ≥ 3 risk factors scheduled for high risk surgery.
- Medication for secondary prevention of cardiovascular disease is initiated prior to surgery as it improves both postoperative and late outcome.
- Recommendations on perioperative antiplatelet therapy and titration of beta-blockers.

Which decisions were difficult?

- Assessment of perioperative cardiac events in Europe, as few national databases were available.
- The prognostic value of different levels of exercise capacity.
- The use of perioperative aspirin, should therapy be started in patients at risk?
- The initiation of ACE-inhibitors in patients with left ventricular dysfunction.
- How long should surgery be postponed after coronary stent placement?
- The use of alternative medical therapy for beta-blockers for perioperative heart rate control.

Anticipated benefits of new Guidelines

- **Efficient preoperative work up**
  - emphasis on medical therapy
  - reduction of preoperative cardiac testing
  - reduction on prophylactic coronary artery revascularisation
- **Recommendations on medical therapy**
  - beta-blockers, statins, aspirin, clopidogrel
  - angiotensin converting enzyme inhibitors
- ***Initiation of secondary prevention prior to surgery***



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