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

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
Levels of evidence

- Data derived from *multiple* randomized clinical trials or meta-analyses
- Data derived from *a single* randomized clinical trial or large-non randomized studies
- Consensus of opinion of the experts and/or small studies, retrospective studies, registries
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

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.

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.

Surgery
ESC recommendations on perioperative ASA use

- Continuation of aspirin in patients previously treated with aspirin should be considered in the perioperative period

- Discontinuation of ASA in patients previously treated with that drug should be considered only in patients with difficult haemostasis control during surgery
Step 2: Active or unstable cardiac condition(s):
Unstable/severe angina- Recent MI (< 30 days +ischemia) → No → Step 3
overt heart failure, severe arrhythmias, severe valv. disease

Yes

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

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

<table>
<thead>
<tr>
<th>Low risk &lt; 1%</th>
<th>Intermediate risk &lt; 1-5%</th>
<th>High risk &gt; 5%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Breast</td>
<td>Abdominal</td>
<td>Aortic &amp; major vascular surgery</td>
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<tr>
<td>Dental</td>
<td>Carotid</td>
<td>Peripheral vascular surgery</td>
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<tr>
<td>Endocrine</td>
<td>Peripheral arterial angioplasty</td>
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<td>Eye</td>
<td>Endovascular aneurysm repair</td>
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<tr>
<td>Gynaecology</td>
<td>Head and neck surgery</td>
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<tr>
<td>Reconstructive</td>
<td>Neurological</td>
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<tr>
<td>Orthopaedic- minor (knee surgery)</td>
<td>Orthopaedic major (hip &amp; spine)</td>
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<tr>
<td>Urologic</td>
<td>Pulmonary/renal/liver transplant</td>
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<tr>
<td></td>
<td>Urologic- major</td>
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</tbody>
</table>
Step 3: Risk of surgical procedure

- Low risk of surgical procedure
  Identify risk factors & provide recommendations on lifestyle & medical treatment according to the ESC guidelines for postoperative care

- Intermediate or High Risk of surgical procedure

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**
  - 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

- **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

![Class IIa B LOE](image)

![Surgery](image)

- **Moderate or poor**

![Step 5](image)
β-Blockers and perioperative cardiac events in randomized trials

All trials

Bisoprolol
  DECREASE (n=1178)
  BBSA (n=219)

Metoprolol
  POBBLE (n=103)
  DIPOM (n=921)
  maVS (n=496)
  POISE (n=8351)

Atenolol
  Wallace (n=200)
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
Perioperative statin use

Durazzo et al.
N = 100

Lindenauer et al.
N = 780,591

Kertai et al.
N = 570

O’Neil-Callahan et al.
N = 1163

Poldermans et al.
N = 480

Schouten et al.
N = 497

Statin therapy better
No statin therapy better
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.
Step 5: Intermediate or High-risk surgery with a moderate or less, functional capacity

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

\[ \downarrow \quad \text{Surgery} \]

- High risk (aortic/peripheral vascular)

\[ \downarrow \quad \text{Step 6} \]
Step 6: Cardiac risk factors: Clinical outcome of 1.2 million procedures

- MI
- Angina
- Diabetes mellitus
- Renal insufficiency
- Stroke
- Heart failure

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

- **Number of risk factors ≤ 2**
  - Statin therapy
  - Titrated low dose β-blocker
  - ACE-inhibitors if systolic LV dysfunction

- **Number of risk factors ≥ 3**

**Surgery**

**Step 7**
Step 7: Preoperative testing

Consider also for patient counselling, surgery, and anaesthesia technique

Cardiac stress test

- Extensive ischaemia
  - Step 7b

- No or moderate stress-induced ischaemia
  - Proceed with the procedure
    - Statin therapy
    - Titrated low dose β-blocker
    - Systolic LV dysfunction: ACE-inhibitors
  - Surgery

Class LOE

[Diagram showing Class I and LOE B]
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

- Prophylactic myocardial revascularization prior to high-risk surgery *may be considered* in patients with overt ischaemic heart disease

- Prophylactic myocardial revascularization prior to intermediate-risk surgery in patients with proven ischaemic heart disease *is not recommended*

- Prophylactic myocardial revascularization prior to low-risk surgery in patients with proven ischaemic heart disease *is not recommended*
Step 7b: Extensive stress induced ischaemia

Cardiac stress test → Extensive ischaemia

- Individualized management
  - Benefit of the procedure
  - Predicted adverse outcome
  - Effect medication / revascularisation

Balloon Angioplasty
Surgery > 2 weeks
Aspirin

Bare metal stent
Surgery > 6 weeks
Dual antiplatelet treatment > 6 weeks-3 mo

Drug eluting stent
Surgery > 12 months
Dual antiplatelet treatment

Surgery

Class I LOE B

CABG
<table>
<thead>
<tr>
<th>Step</th>
<th>Urgency</th>
<th>Cardiac condition</th>
<th>Type of surgery</th>
<th>Functiona capacity</th>
<th>Number of clinical risk factors</th>
<th>LV echo</th>
<th>ECG</th>
<th>Stress Testing</th>
<th>β-blockers</th>
<th>ACE-inhibitors</th>
<th>Aspirin</th>
<th>Statins</th>
<th>Coronary Revascularisation</th>
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<td>III C</td>
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<td>III C</td>
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<td>2</td>
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<td>III B</td>
<td>III C</td>
<td>III B</td>
<td>Ila C</td>
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<td>IIa C</td>
<td>IIb C</td>
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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
ESC POCKET GUIDELINES
Committee for Practice Guidelines
To improve the quality of clinical practice and patient care in Europe

PERIOPERATIVE CARDIAC CARE
GUIDELINES FOR PREOPERATIVE CARDIAC RISK ASSESSMENT AND PERIOPERATIVE CARDIAC MANAGEMENT IN NON-CARDIAC SURGERY

For more information
www.escardio.org/guidelines