

# Preoperative assessment

## A cardiologist's perspective

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**SUMMARY**

The number of patients having elective surgery in Australia is increasing. Many of these people are elderly with multiple comorbidities.

Medical optimisation before surgery is recommended for all patients, and careful clinical assessment is the foundation of preoperative evaluation.

For elective surgery, the patient's clinical characteristics and the nature of the surgery both influence their perioperative cardiac risk.

For emergency surgery, both the severity of underlying medical conditions and the urgency of surgery need to be considered before undertaking preoperative investigations and treatment, or deferring surgery.

**Introduction**

In 2010–11, an estimated 2.4 million hospitalisations in Australia involved surgery. Of these 1.9 million were elective admissions.<sup>1</sup> With an ageing population,<sup>2</sup> an increasing proportion of patients undergoing surgery are elderly with multiple comorbidities.<sup>3</sup> Risk assessment before surgery aims to minimise potential perioperative complications.

A recent observational study found that perioperative cardiovascular complications (including acute myocardial infarction, acute pulmonary oedema and arrhythmia) occurred in around 2–3% of older patients undergoing non-cardiac surgery.<sup>4</sup> Other common complications include acute renal failure (6%) and infection (2–7%). Patients who suffered at least one complication had a 30-day mortality rate of 14%.<sup>4</sup>

**Elective versus non-elective surgery**

For emergency non-elective surgery, preoperative risk assessment uncommonly alters the course or outcome of the operation as the urgency of the surgery takes precedence. However, identifying high-risk conditions such as class IV congestive heart failure, unstable coronary syndromes, or severe valvular heart disease can impact upon perioperative and postoperative management.

In determining the risk for elective procedures, there is an interaction between comorbidity and surgical factors. These include the magnitude and type of operation and its duration, and secondary effects of the surgery on the patient's core body temperature, blood loss and fluid shifts.<sup>5</sup>

As a guide for elective surgery, the 30-day estimated cardiac risk can be classified into low, intermediate or high risk based on the type of procedure being performed (see Box).<sup>6,7</sup>

**Best approach towards preoperative risk assessment**

A preoperative risk assessment can be performed using a preadmission protocol with a clearly defined set of investigations, or a patient-orientated approach, assessing the indication for each investigation in each patient according to the type of surgery. A preadmission protocol ensures relevant clinical details and investigations are obtained consistently for all patients.

There is no single best approach towards preoperative risk assessment. Pending further research, we believe best practice should incorporate elements of both approaches – protocol-driven documentation of important clinical history and risk factors, coupled with standardised investigations relevant to the type of surgery.

The clinical assessment should cover the following:

- history of syncope, chest pain at rest and on exertion
- history of cardiac, pulmonary, renal disease or malignancy
- risk factors for ischaemic heart disease
- pacemaker or defibrillator (to plan perioperative management of the device).

The examination should exclude the presence of heart failure, cardiac murmurs and pulmonary wheezes. Blood pressure should be recorded, and the patients

should be checked for rapid or slow heart rate. For patients with at least moderate risk because of their preoperative condition or because of the nature of the surgery, investigations should include a 12-lead ECG, full blood count and blood biochemistry analyses and a recent chest X-ray. Additional investigations will be dictated by the clinical assessment. This approach allows an individualised risk assessment and an opportunity to provide medical treatment and cardiac or pulmonary interventions if required. It will also guide specific anaesthetic techniques to optimise the patient's perioperative condition.

### Age and comorbidities

It is recommended that all patients over 70 years of age should undergo a full preoperative risk assessment.<sup>4,8</sup> Age alone, however, confers only a modestly increased risk of complications, with greater risks being associated with the urgency of the surgery and significant comorbidities such as cardiac, pulmonary and renal diseases.<sup>4-6,8</sup> Among these, cardiovascular disease (including coronary artery disease, peripheral arterial and cerebrovascular disease, cardiac arrhythmias and valvular heart disease) and its associated risk factors of hypertension and diabetes are the most prevalent in the elderly. It is particularly important that patients with multiple comorbidities, with known cardiac, pulmonary or renal disease, or a history of malignancy, should undergo a full preoperative risk assessment.<sup>9</sup> Patients with comorbidities are likely to be taking multiple medicines. The effect of these drugs on perioperative risks, such as bleeding, needs to be considered.

### Clinical status

Assessing the functional capacity of a patient before surgery is a simple but essential part of preoperative cardiac risk assessment.<sup>7,10,11</sup> A highly functional asymptomatic patient will very likely have a favourable outcome irrespective of comorbid status, and is unlikely to need further cardiopulmonary testing. If a patient has poor functional capacity, is unable to walk two flights of stairs comfortably, is symptomatic with exertional dyspnoea, chest discomfort, presyncope or syncope, or has unknown functional capacity, then a detailed preoperative

clinical assessment supplemented with appropriate tests is recommended.

From a cardiac perspective, a number of conditions require identification and stabilisation before surgery.<sup>7</sup> These include:

- acute ST-elevation myocardial infarction
- other unstable coronary syndromes (unstable angina pectoris, non-ST-elevation myocardial infarction)
- decompensated congestive cardiac failure (class IV heart failure symptoms and clinical signs of congestive cardiac failure)
- significant arrhythmias (second or third degree heart block, atrial fibrillation or flutter with ventricular response rate more than 100 beats/minute, sustained supraventricular tachycardia, sustained or newly recognised ventricular tachycardia, severe sinus bradycardia – heart rate less than 40 beats/minute) especially with history of pre-syncope or syncope
- valvular heart disease (particularly severe aortic or mitral stenosis).

Patients suspected of having these conditions need further cardiac evaluation or referral as they may need treatment before their elective surgery.

Some patients may have non-correctable life-threatening cardiovascular conditions which preclude surgery. Conditions which carry a significant adverse prognosis include:

- terminal congestive cardiac failure
- severe pulmonary hypertension
- uncontrolled ventricular tachycardia
- severe left main coronary artery stenosis not suitable for revascularisation
- cardiogenic shock.

Patients with these conditions will rarely undergo elective surgery. The decision to proceed or cancel semi-urgent or urgent surgery, such as for a fractured neck of femur, requires a coordinated review and consultation between the admitting doctor and the patient's GP, attending physician, anaesthetist and surgeon.

### Box Estimated cardiac risk with different types of surgery

<b>Low risk (&lt;1%)</b>	endoscopic procedures, superficial procedures such as localised skin excisions, dental, cataract, breast and gynaecological surgery, minor orthopaedic (knee) or urologic surgeries
<b>Intermediate risk (1-5%)</b>	intraabdominal and intrathoracic surgery, carotid endarterectomy, head and neck surgery, neurological/major orthopaedic (hip and spine) surgery, prostate surgery, peripheral arterial angioplasty, endovascular aneurysm repair
<b>High risk (&gt;5%)</b>	aortic and major vascular surgery, peripheral vascular surgery

## Blood tests

Biochemical tests and full blood count are unlikely to affect the outcome of low-risk surgery, but are considered routine before intermediate and high-risk elective surgery. Common blood tests include full blood count (haemoglobin and platelet count), serum electrolytes, urea and creatinine to assess renal function.

Identifying anaemia is important in the elderly patient undergoing non-cardiac surgery as it predicts poorer 30-day postoperative outcomes.<sup>12</sup> A low platelet count ( $<50 \times 10^9/L$ ) requires haematological evaluation. The need for platelet transfusion before or after surgery should be assessed.

Where possible, electrolyte disturbances should be corrected before surgery. An estimated glomerular filtration rate  $<60$  mL/min is associated with an increased incidence of cardiovascular complications,<sup>13</sup> and necessitates fastidious monitoring of fluid status during the perioperative and postoperative periods.

The need for additional investigations such as fasting glucose, liver function tests, coagulation studies, and group and hold for blood products will depend on the patient's demographic, clinical status, medical history (including medicines) and type of surgery. For example, patients with a known history of chronic hepatic disorders (e.g. hepatitis B or C, history of autoimmune hepatic disorder or excessive alcohol use) will require consultation with their specialist, as well as evaluation of liver function and coagulation. Similar issues are relevant to patients with cardiac, endocrine, haematological, respiratory and renal illnesses.

## Chest X-ray

A routine chest X-ray is rarely indicated before most elective surgery. However, it is helpful to exclude significant pulmonary pathology and congestive heart failure in patients with unexplained cough or dyspnoea, or for patients with an increased risk of postoperative pulmonary complications.<sup>14</sup>

## ECG

An ECG is recommended in patients with a history of cardiovascular disease, those with cardiac risk factors (hypertension, renal insufficiency and diabetes), and in all patients undergoing intermediate-risk or high-risk surgery.

A resting 12-lead ECG contains important prognostic information. The presence of Q-waves, strain pattern or left bundle branch block have all been associated with decreased life expectancy,<sup>15</sup> and predict perioperative cardiac events.<sup>16</sup> In addition, unrecognised cardiac arrhythmias are sometimes diagnosed at this point,<sup>17</sup> some of which should trigger

further cardiac evaluation or referral as they may need treatment before their elective surgery.

## Cardiac functional assessment

Resting left ventricular function assessment by echocardiography is not a consistent predictor of perioperative ischaemic events and it is not routinely recommended.<sup>7</sup> It is reasonable to test patients with dyspnoea of unknown origin, in patients with current or previous heart failure and worsening dyspnoea, or in those with suspected significant valvular heart disease. Although the evidence that echocardiography improves outcomes is limited, accurate diagnosis of congestive heart failure and poor left ventricular function, for example, should prompt preoperative stabilisation which would then confer prognostic advantage.

Preoperative non-invasive cardiac stress testing (stress ECG, stress echocardiography or cardiac sestamibi scan) provides an objective assessment of a patient's functional capacity, haemodynamic response and the presence of cardiac ischaemia and arrhythmias. It is an estimation of perioperative cardiac risk. Stress testing is not indicated in patients without risk factors undergoing low-risk non-cardiac elective surgery and is unlikely to be helpful in intermediate risk surgery in patients with no risk factors.<sup>7,10</sup> Patients at risk of cardiovascular disease or with known cardiac conditions are advised to undergo further cardiac evaluation that may include stress testing.

## Spirometry and pulmonary function tests

These tests allow objective pulmonary function assessment in patients with chronic obstructive pulmonary disease or asthma, sleep disordered breathing syndromes or neuromuscular disorders.<sup>18</sup> They may help to establish the severity of a patient's pulmonary disorder and allow treatment optimisation before elective surgery. However, clinical data suggest these tests do not consistently predict postoperative pulmonary complications, and so are currently recommended only for patients with suspected chronic lung disease.<sup>14</sup>

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## Conclusion

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The physician should exercise clinical judgement in order to correctly assess perioperative surgical risks and the need for further evaluation. A protocol-driven approach ensures essential clinical details are collected and investigations are targeted. Effective communication with the patient's doctors before an elective operation will avoid unnecessary delay and potentially reduce perioperative complications. ◀

*Conflict of interest: none declared*

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The full list of references is published with the online version of this article at [www.australianprescriber.com/magazine/37/6/188/91](http://www.australianprescriber.com/magazine/37/6/188/91)

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## Medicines Australia Code of Conduct: breaches

The Medicines Australia Code of Conduct guides the promotion of prescription products by pharmaceutical companies.<sup>1</sup> Each year Medicines Australia publishes a report, from its Code of Conduct Committee, which details all the complaints that have been received about advertising and other promotional activities.

The Table shows the complaints where at least one breach was identified, and more details can be found in the full report.<sup>2</sup>

**Key words**

Medicines Australia, breaches

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**Table Breaches of the Code of Conduct July 2013 – June 2014**

Company	Brand (generic) name	Material or activity	Sanction
AstraZeneca	Brilinta (ticagrelor)	Promotional material	\$10 000 fine
Boehringer Ingelheim	Micardis, Twynsta (telmisartan, telmisartan with amlodipine)	Misleading promotional materials	\$50 000 fine
Eli Lilly Australia	Axiron (testosterone)	Promotion to the public	\$250 000 fine Corrective letter
FIT BioCeuticals	D50K (unregistered drug)	Promotion to the public on a website	\$150 000 fine reduced on appeal to \$25 000 Changes to website Compliance audit of all promotional activities
Novartis	Lucentis (ranibizumab)	Email to ophthalmologists	\$250 000 fine Materials not to be used again Corrective letter
Roche	Actemra (tocilizumab)	Unapproved products and indications	\$15 000 fine Materials not to be used again

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