# Fourth Stage

# General Surgery

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## Lecture 3

# Perioperative management of the high-risk surgical patient

## INTRODUCTION

In modern day medicine, the majority of patients enjoy a safe and uneventful recovery following surgery. There remains, however, a subgroup at higher risk of morbidity and mortality after surgery. Operative mortality is more meaningfully expressed in terms of deaths occurring during surgery and up to 28–30 days after surgery.

The overall 30-day mortality risk for operative procedures in Western Europe is 0.7–1.85 %, but this figure includes the high-risk patient population.

70% of all elective procedures have a mortality risk of less than 1 percent, the high risk group has a mortality risk in excess of 5 percent and when the risk exceeds 20 per cent, patients are said to be at 'extremely high risk' .

It is estimated that the high risk group accounts for about 12.5 % of all surgical procedures and more than 80 % of deaths.

### *What causes these patients to be at a high risk of death and complications after surgery?*

After surgery tissue destruction, blood loss, fluid shifts, changes in temperature, pain and anxiety result in increased demands for oxygen delivery to the tissues.

This demand increases from an average of 110 mL/m2 per minute at rest to 170 mL/m2 per minute in the postoperative period. Most patients meet this increase in demand by increasing their cardiac output and tissue oxygen extraction.

Failure to meet these demands as a result of a limited cardiorespiratory reserve, can lead to myocardial ischaemia and multiorgan failure.

These account for the majority of predictable surgical morbidity and mortality. Cardiac and respiratory problems contribute equally to this.

### Factors that predispose patients to a high risk of morbidity and mortality

**Patient factors:**

1- History of severe cardiac disease (ischaemic heart disease (IHD), myocardial infarction (MI), cardiac failure.

2- Severe respiratory disease (chronic obstructive pulmonary disease (COPD),

( respiratory failure).

3- Aged >70 years with limited physiological reserve in one or more vital organs.

**4- Metabolic disease (renal failure, poorly controlled diabetes).**

**5- Morbid obesity.**

**6- Late-stage vascular disease.**

**7- Poor nutrition.**

**Surgical factors :**

**1- Prolonged duration of surgery (>1.5 hours).**

**2- Extensive surgery (e.g. oesophagectomy, gastrectomy).**

**3- Type of surgery (thoracic, abdominal, vascular).**

**4- Emergency surgery (e.g. perforated viscus, gangrenous bowel, gastrointestinal bleeding).**

**5- Acute massive blood loss (>2.5 litres) .**

**6- Septicaemia (positive blood cultures or septic focus).**

**7- Severe multiple trauma e.g. >3 organs or >2 systems or 2 body cavities open**

**Optimize medical management of coexisting diseases and intraoperative considerations:**

**Ischemic heart disease Perioperative myocardial infarction (MI) is associated with a high mortality (15–25 per cent).**

**Ischaemia and ultimately MI occur when the supply of oxygen to the myocardium is exceeded by its demand. This situation can be precipitated by hypotension, tachycardia and pro coagulant states (of which the inflammatory response to surgery is an example). Preparation of these patients for surgery should be aimed at optimizing their myocardial oxygen supply and demand ratio and so minimize the risk of myocardial ischemia developing.**

**This work may involve further investigations or even the decision to postpone non-cardiac surgery for three to six months after an MI.**

**Minimizing myocardial ischemia :**

**1- Anesthesia should avoid tachycardia, hypertension and hypotension.**

**2- Pain control is important.**

**3- Oxygen supplementation is advisable for 3–4 days postoperatively.**

**4- Perioperative b-blockade should be considered .**

**5- Elective postoperative critical care admission should be Considered Respiratory failure Surgery, particularly open abdominal procedures under general anesthesia result in changes to respiratory physiology.**

**The functional residual capacity of the lungs is reduced. This combined with respiratory depressant effects of residual anesthetic agents, the patient's limited mobility, and pain from surgery causes atelectasis (failure of gas exchange due to alveolar collapse) and predisposes patients to postoperative respiratory infection.**

**Together with other complications, including bronchospasm, pneumothorax and acute respiratory distress syndrome (ARDS), these contribute as much to morbidity and length of hospital stay as cardiac complications.**

**Respiratory failure occurs when there is inability to extubate a patient 48 hours after surgery and is associated with a mortality of 27–40 %.**

**Optimizing perioperative respiratory function:**

**1- Preoperative pulmonary function needs testing to assess functional status .**

**2- Consider bronchodilator ± steroid therapy.**

**3- Arrange pre- and postoperative chest physiotherapy and breathing exercises .**

**4- Consider regional anesthesia.**

**5- Give good quality pain relief.**

**6- Use non-invasive ventilation strategies.**

**SPECIFIC Strategies:**

**1- Initiation of perioperative b-blockade remains controversial for patients at high risk of perioperative myocardial ischemia. b-blockers in the 'at risk' group undergoing non-cardiac surgery. They found that perioperative b-blockers lead to reduced deaths and MIs combined.**

**2- Patients already taking b-blockers must continue their medication.**

**3- Less invasive modalities of Cardiac Output measurement have largely superseded the pulmonary artery catheter (PAC) such as oesophageal Doppler, lithium dilution and pulse contour analysis equipment. The oesophageal Doppler device measures blood velocity in the aorta and then calculates the CO.**

**4- Fluids guided by goal-directed therapy (GDT) can reduce complications from surgery, the aim of GDT is to manipulate a patient's physiology to achieve targets that are associated with an improved outcome .**