Preoperative Assessment of Surgical Patients

Overview

- Introduction.
- Purpose of pre-operative assessment.
- Assessment (History, physical examination).
- Appropriate tests.

Introduction

- The main goal of preoperative assessment is to improve the outcome of surgery and anaesthesia.
- Consultation by an anaesthetist is essential for the medical assessment of a patient prior to anaesthesia for surgery or any other procedure to ensure that the patient is in optimal condition for the procedure.
- Clinical history & examination based assessment has to be carried out initially followed by the appropriate investigations where indicated.

Purpose of pre-operative assessment

This enables the identification of those patients who require:

- Few or no pre op investigations.

- Targeted investigations.

- Further assessment or referral after specific investigations

Objectives of pre -operative assessment

1

1. Identify potential anaesthetic difficulties.

2

2. Identify existing medical conditions.

3

3. Improve safety by assessing and quantifying risk.

4

4. Allowing planning of peri -operative care.

5

5. Provide opportunity for explanation and discussion to allay fear and anxiety

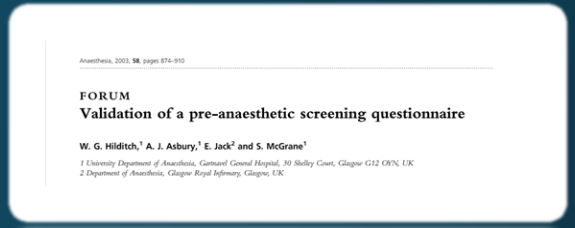
The Goal

- The goal of the evaluation of the **healthy patient** is:
  - To detect unrecognized disease and risk factors that may increase the risk of surgery above baseline
  - To propose strategies to reduce this risk

The anaesthetic pre- op assessment clinic

- Provides the opportunity for anaesthetist to see patients with potential anaesthetic problems early.
- Should preferably involve a consultant anaesthetist/ a senior medical officer in anaesthesia.
- Should have staff and equipment, facilities for X-ray, ECG, and other pre operative testing

1. Do you usually get chest pain or breathlessness when you climb up two flights of stairs at normal speed
2. Do you have kidney disease
3. Has anyone in your family (blood relatives) had a problem following an anaesthetic
4. Have you ever had a heart attack
5. Have you ever been diagnosed with an irregular heartbeat
6. Have you ever had a stroke
7. If you have been put to sleep for an operation were there any anaesthetic problems
8. Do you suffer from epilepsy or seizures
9. Do you have any problems with pain, stiffness or arthritis in your neck or jaw
10. Do you have thyroid disease
11. Do you suffer from angina
12. Do you have liver disease
13. Have you ever been diagnosed with heart failure
14. Do you suffer from asthma
15. Do you have diabetes that requires insulin
16. Do you have diabetes that requires tablets only
17. Do you suffer from bronchitis


Anaesthesia, 2003, 58, pages 874–910

FORUM

Validation of a pre-anaesthetic screening questionnaire

W. G. Hilditch,[1] A. J. Asbury,[1] E. Jack[2] and S. McGrane[1]

1 University Department of Anaesthesia, Gartnavel General Hospital, 30 Shelley Court, Glasgow G12 0YN, UK
2 Department of Anaesthesia, Glasgow Royal Infirmary, Glasgow, UK

Assessment

History

Physical examination

Investigation

History

- A review of patient's present and past medical and surgical history.
- A review of drugs and anaesthetic related problems in the patient and in the immediate family circle

Age

- Much of the risk associated with age is due to increasing numbers of comorbidities (as cognitive or functional impairment, malnutrition, and frailty).

- Age should not be used as the sole criterion to guide preoperative testing or to withhold a surgical procedure.

Famliy History

Malignant Hyperthermia

Pseudo cholinesterase deficiency

Bleeding disorders

Social History

Smoking:

Short term :

Increadesd myocardial oxygen demand and decreased oxygen delivery

Long term:

decreased immune function and decreased clearance

Past medical & surgical Hx

Many diseases have direct effect on general and anesthetic treatment and outcome

Any previous operation or bleeding tendency

Any previous reaction to anaesthetic agent

Drugs and Allergic Hx

interaction with anesthesia (MAOI)

Related with sudden withdrawal(steroids)

Drugs for HTN, IHD to be continued over perioperative period

Anticoagulant drugs (aspirin, warfarin)

HRT

Physical Examnaton

- Includes a full physical examination
- Don't rely on the ex. of others. Surgical signs may change and others may miss imp pathology

  "What mind doesn't know, eyes cant see"
- No step is omitted and added advantage of familiarizing what is normal so that abnormalities can be more recognised

- General Ex. Including vitals.
- Cardiac ex. (JVP, HS)
- Respiratory Ex. (trachea, accessory ms, percussion, auscultation)
- Abdominal Ex.
- CNS
- Musculoskeletal system
- Peripheral vasculature
- Local Ex
- Body orifices

Emergency Physical Examination

- The routine examination must be altered to fit the circumstances.
- A,B,C,D,E
- Secondary survey(head to toe)
- When a number of emergencies present at same time- Triage

Overall risk of surgery

- …is extremely low in healthy individuals

Assessment of risk of surgery

- There are few patients who have no risk for surgery
- It is important to quantify the risks involved so they be discussed with the patients
- Two main prognostic scoring systems which are in current use are

❑ **APACHE SYSTEM**

❑ **ASA SYSTEM**

ASA System

- " American Society of Anaesthesiologist"
- It is very simple and widely accepted
- 50% patients presenting for elective surgery are in ASA Gr I
- Operative mortality rate for these patients is less than 1 in 10,000

ASA Grading and Predictive Mortality

ASA Grade	Definition	Mortality %
I	Normal healthy individual	0.06
II	Mild systemic disease that doesn't limit activity	0.4
III	Severe systemic disease that limits activity	4.5
IV	Severe systemic disease that is constant threat to life	23
V	Moribund, not expected to survive 24hrs with or without surgery	51

Clinical Predictors of increased risk

Major predictors

Acute or recent MI

Unstable or Severe Angina

Strongly positive stress test

Decompensated heart failure

Severe Valvular disease

Significant Arrythmias

Intermediate predictors

Mild angina

Previous MI by history or by Q waves

Compensated heart failure

Diabetes

Renal insufficiency (Cr >2.0)

Minor predictors

Advanced Age

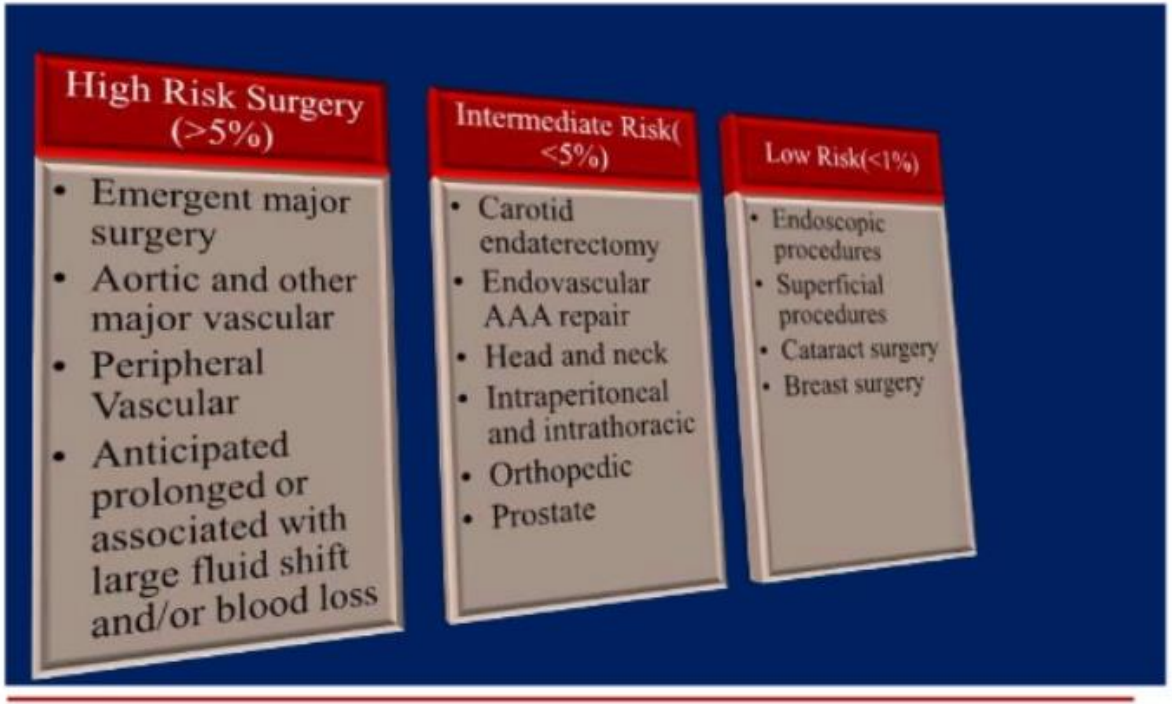
Abnormal ECG(LVH,LBBB,ST changes)

Low functional capacity

h/o of stroke

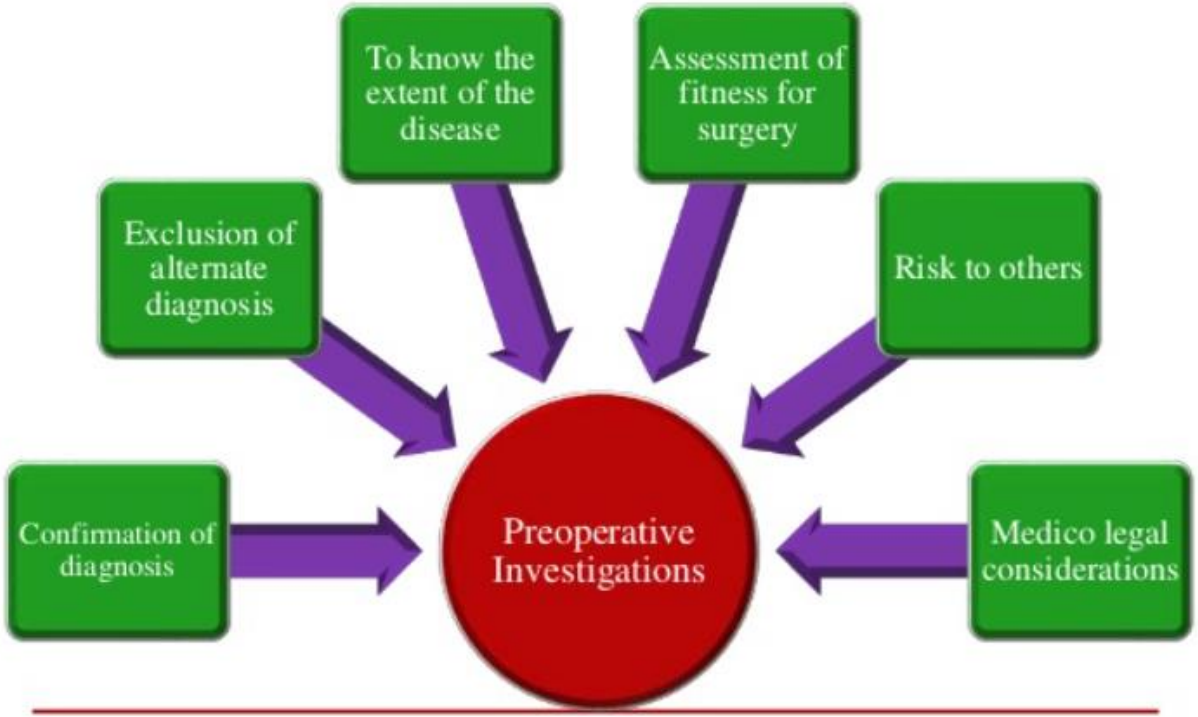
Uncontrolled systemic hypertension

Surgery Related Risk



- Assessment should be completed by classifying the patients according to ASA physical status and grading of surgery so that high risk patients with poor reserves will require consultation with specialists to help optimize the physical status for surgery and anaesthesia.

Preoperative Investigations



Blood tests:

- **Full blood count** (when to perform?)
  - All emergency preoperative cases
  - All elective preoperative cases over 60 years
  - All elective preoperative cases in adult females
  - If surgery is likely to result in significant blood loss
  - Suspicion of blood loss, anemia, sepsis, CKD, coagulation problems

Blood tests

- **Urea and electrolytes** (when to perform?)
  - All preoperative cases over 65 years
  - All patients with cardiopulmonary disease or taking diuretics or steroids
  - All patients with h/o renal/liver disease or abnormal nutritional state
  - All patients with h/o diarrhea, vomiting other metabolic/endocrine disease
  - All patients with IVF for more than 24 hrs.

Blood Tests:

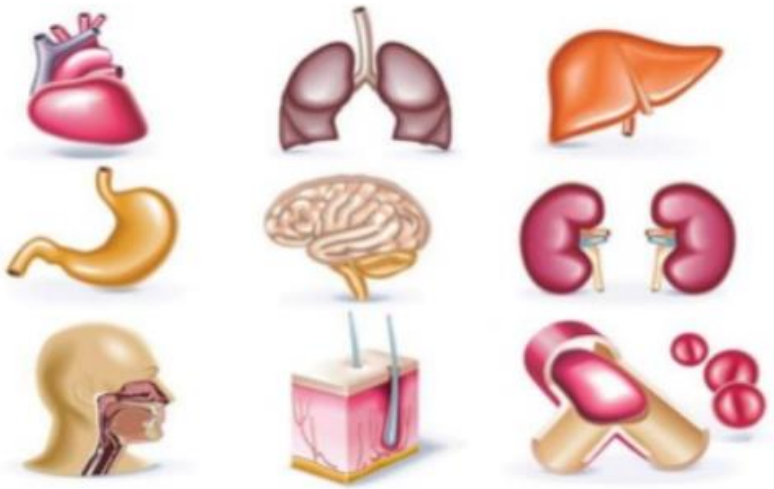
- **Amylase:**
  - Perform in all adult emergency admissions with abdominal pain, prior to consideration of surgery
- **Random Blood Glucose:**
  - Acute abdomen
  - Elective cases with DM, malnutrition, obesity
  - Elective cases over 60

- **Coagulogram studies:**

  - h/o of bleeding disorder, liver disease or excessive alcohol use
  - Patients receiving anticoagulants(PT/INR done on the morning of surgery for patients instructed to discontinue warfarin)
  - Cardiothoracic surgery
  - Vascular surgery
  - Angiographic procedures
  - Craniotomy procedures

- **Liver function tests**
  - All patients with upper abdominal pain, jaundice, hepatic disease
  - Alcoholic
  - Screening for Hepatitis B and Hepatitis C
- **Blood group/ cross match**
  - Emergency preoperative case
  - Suspicion of blood loss, anemia, coagulation defects
  - Procedure on pregnant ladies

- **Chest X-ray:**
  - All elective preoperative cases over 60 years
  - All cases of cervical, thoracic or abdominal trauma
  - Acute respiratory symptoms or signs
  - Previous CRD or no recent CXR
  - Thoracic surgery
  - Malignant disease
  - Viscous perforation
  - Recent h/o TB
  - Thyroid enlargement



SYSTEM WISE APPROACH TO PREOPERATIVE EVALUATION

CARDIOVASCULAR SYSTEM

- The contribution of cardiovascular disease to perioperative mortality in noncardiac surgery is significant
- In US, about 30% of patients undergoing surgery have significant coronary artery disease or other cardiac co morbid condition
- Much of the preoperative risk assessment and patient preparation centers on cardiovascular disease

Cardiac Risk Indices

- Various assessment tools for stratification of the cardiovascular portion of anesthetic risk have been devised:

❑ **Goldman Cardiac Risk Index, 1977**

❑ Detsky Modified Multifactorial Index. 1986

❑ Eagle's Criteria for Cardiac Assess,ent,1989

❑ **Revised Cardiac Risk Index**

Goldman Cardiac Risk Index

•Third heart sound or jugular venous distension	11
•Recent myocardial infarction	10
•Nonsinus rhythm or premature atrial contraction on ECG	7
•>5 premature ventricular contractions	7
•Age >70 yrs	5
•Emergency operations	4
•Poor general medical condition	3
•Intrathoracic, intraperitoneal or aortic surgery	3
•Important valvular aortic stenosis	3

Cardiac complication rate

0-5 points = 1%

6-12 points = 7%

13-25 points = 14%

>26 points = 78%

Revised Cardiac Risk Index

•Ischemic heart disease	1
•Congestive heart failure	1
•Cerebral vascular disease	1
•High risk surgery	1
•Preoperative insulin treatment of diabetes	1
•Preoperative creatinine level >2 mg/dl	1

Each increment in points increases risk for postoperative myocardial morbidity

- A joint committee of ACC and AHA have developed a stepwise approach to preoperative cardiac assessment for non cardiac surgery

- This methodology takes into account:
  - Previous coronary revascularization
  - Clinical risk assessment: major, intermediate, minor
  - Functional capacity

- Surgeon and the consultants
  - weigh the benefits vs. risk of the procedure
  - whether the perioperative intervention is beneficial

- Perioperative intervention includes:
  - Coronary revascularization (bypass or percutaneous transluminal angioplasty)
  - Modification of choice of anesthetic
  - Invasive intraoperative monitoring

- Patients having PCI with stenting should defer the elective procedure **for 4 – 6 weeks** (or less depending on the type of stent)

- **In case of MI, elective surgery should be postponed for 4-6 weeks**

- Medical therapy with beta blockers have been recommended as per ACC/AHA guidelines:

PULMONARY SYSTEM

- Assessment of pulmonary function should be done in:
  - All lung resection cases
  - Thoracic procedures requiring single lung ventilation
  - Major abdominal and thoracic cases in patients older than 60 years, having underlying medical disease, smoke or have overt pulmonary symptomatology

- Tests which need to be done include:
  - Forced vital capacity in 1 sec.
  - Forced vital capacity
  - Diffusing capacity of carbon monoxide
- Adults with FEV1 less than 0.8 liter/sec or 30% of predicted, have high risk for complications and postoperative pulmonary insufficiency; nonsurgical solutions sought.

RISK GROUP FOR PPC

- General :
  - Age > 70years
  - Cigarette smoking
  - Renal failure
  - Poor nutrition
- Asthma related
  - Recent asthma attack
  - Past h/o endotracheal intubation for asthma management
- Surgery and anaethesia related
  - Emergent surgery
  - Thoracic, vascular and upper abdominal surgery
  - Blood loss > 4 pints of PRBCs (2000ml)
  - Anesthesia time >180 minutes
  - General anesthesia with endotracheal intubation

- **Preoperative interventions**

1. Smoking cessation (within 2 months before planned surgery)
2. Incentive spirometry
3. Encouraging exercise preoperatively. Patient should be encouraged to walk 3 miles in less than an hour several times weekly
4. Bronchodilator therapy
5. Antibiotic therapy for pre existing infection
6. Pretreatment of asthmatic patients with steroids

Assessment of Renal Function

- **History:**
  - ✓ Congenital abnormality, Obstructive uropathy, PCKD, Recurrent UTI
  - ✓ Presence of underlying systemic disease
  - ✓ Known renal sufficiency

- **Physical examination:**
  - ✓ Intravascular volume overload (pulmonary oedema, jugular venous distension, peripheral odema)
  - ✓ Evidence of coagulopsthy(petechie or ecchymosis)
  - ✓ Lethargy or altered mental status
  - ✓ Pericardial and pleural rub

Complication assciated with renal disease

- Fluid and electrolyte homeostasis is altered
  - ✓ Hypertension
  - ✓ Peripheral edema
  - ✓ Salt retention
  - ✓ Electrolyte imbalance(hyponatremia, hyperkalemia, metabolic acidosis)
- Hematological dysfunction
  - ✓ Anemia
  - ✓ Coagulation defects
  - ✓ Altered platelet adhesion and aggregation
  - ✓ Altered calcium and parathyroid hormone metabolism

PREOPERATIVE OPTIMISATION

- Anemia is treated with erythropoietin or darbepoietin
- Manipulation of hyperkalemia
- Replacement of calcium for symptomatic hypocalcaemia
- Use of phosphate binding antacids for hyperphosphatemia
- Correction of metabolic acidosis (sod bicarbonate is given i/v if levels fall below 15meq/l
- Hyponatremia is treated by fluid restriction
- Avoid nephrotoxic drugs

- **Dialysis**
  - Improves many of the uremic symptoms and abnormality and electrolyte abnormalities
  - Preoperative dialysis should be done 24 hrs before elective surgery to minimize the effect of iv heparin and allow the patient to stabilize.

- Correction of coagulopathy by:
  - Preoperative adequate dialysis
  - Pre and postop FFPs

HEPATOBILIARY SYSTEM

- **ASSESSMENT OF HEPATIC FUNCTION:**

- **HISTORY:**
  - ✓ Prior h/o jaudice, hepatitis, hemolytic anemia, parasitic infection, biliary stone disease, pancreattits, enzyme deficiency, prior malignanacy
  - ✓ h/o drug or alcohol abuse and possible exposure to infectious agents(tattoos, blood transfusion), environmenmtal or other hepatotoxins
  - ✓ h/o prior hepatotoxicity after imhaled anaesthesia

- **PHYSCICAL EXAMINATION:**

  - ✓ Jaundice
  - ✓ Ascitis
  - ✓ Peripheral edema
  - ✓ Muscle wasting
  - ✓ Testicular atrophy
  - ✓ Palmar erythema
  - ✓ Spider angioma
  - ✓ Gynecomastia
  - ✓ Stigmata of portal hypertension(caput medusa, splenomegaly)
  - ✓ Evidence of bleeding disorder
  - ✓ Liver size

LAB INVESTIGATION:

- Liver function tests
- CBC
- Serum electrolytes
- Coagulogram
- Hepatitis serology

CHILD-PUGH SCORING SYSTEM

- Stratification of operative risk in patient with cirrhosis

Parameter	1	2	3
Encephalopathy	None	Stage I or II	Stage III or IV
Ascitis	Absent	Slight (controlled with diuretics)	Moderate despite diuretic treatment
Bilirubin (mg/dl)	<2	2-3	>3
Albumin(g/l)	>3.5	2.8-3.5	<2.8
INR	<1.7	1.7-2.3	>2.3

- **Class A** :- 5-6 points Mortality : 10%
- **Class B** :- 7-9 points Mortality : 31%
- **Class C** :- 10-15points Mortality : 76%

Endocrine System

- **Diabetes mellitus:**
- History and examination:
  - To assess adequacy of glycemic control
  - To access evidence of diabetic complication

- Investigation :
  - Fasting and postprandial blood glucose
  - HbA1c
  - Serum electolytes
  - BUN
  - Serum creatnine

  } to identify metabolic disturbances and renal involvement

  - Urine analysis
  - ECG

- **`Preoperative optimization:**

  - ✓ Morning dose of OHA should be omitted
  - ✓ Patient should be started on variable rate intravenous insulin infusion(VRIII)
  - ✓ VRIII should be adjusted to maintain blood sugars b/w 140-180 mg/dl
  - ✓ If possible patient should be posted first in the list
  - ✓ If the blood sugars are not controlled the elective surgery should be deferred till glycemic control is achieved

- **Hyperthyroidism**:
  - ✓ Elective surgery deferred until euthyroid state achieved
  - ✓ Preop ECG and serum electrolytes done
  - ✓ Anithyroid drugs and beta blockers/digoxin continued on the day of surgery
  - ✓ In case of emergency surgery in thyrotoxic patient at risk of thyroid storm, a combination of beta blocker and glucocorticoids used

- **Hypothyroidism:**
  - ✓ Severe hypothyroidism can cause MI, coagulation defects and electrolyte imbalance
  - ✓ Elective surgery to be deferred until euthyroid state achieved

- **Patients with h/o steroid use/ Suppression of HPAA:**

  - ✓ Patients who have taken > 5mg of prednisolone or equivalent for > 3 weeks are at risk when undertgoing major surgery

  - ✓ Minor procedures: no additional steroid required
  - ✓ Moderate operation: 50-75 mg/day of hydrocotisone (or eq) for 1 -2 days
  - ✓ Major operation: 100-150 mg/day hydrocortisone (or eq) for 2-3 days

Hematologic System

- Hematologic assessment leads to identification of disorders such as anemia, neutropenia , coagulopathy or hypercoagulable state

- **ANAEMIA:**

  - ✓ Often asymptomatic but history an examination may reveal complaints of energy loss, dyspnea , palpitations, or pallor.
  - ✓ Evaluated for lymphadenectmoy, hepatomegaly, splenomegaly, pelvic and rectal examinations done
  - ✓ CBC, reticulocyte count, serum iron, TIBC, ferritin, Vit B12 and folate levels obtained for investigation of cause

- Healthy individuals with minimal anticipated blood loss during surgery- 6-7 g/dl
- Cardiac or pulmonary disease- 10g/dl

- In case of elective surgery:
  - Correctable cause of anemia- delay surgery
  - Uncorrectable cause – blood trasfusion

- Blood transfusion are also required during emergency surgeries

Patients on anticoagulants

- Require preoperative reversal of anticoagulant effect
- Warfarin should be witheld for 5 scheduled doses preoperatively to reduce the INR to 1.5 or less
- Patients at risk of thromboembolic event are recommended to have full bridging while off anticoagulation
- For those on LMWH last dose should be given 20 -24 hours prior to surgery and restarted approx. 12-24 hours postoperatively.

Indication for Chronic Anticoagulation	Patient Characteristics	Perioperative Management
Prosthetic heart valves	**High risk** Recent (<1 mo) stroke or TIA Any mitral valve Caged ball or tilting disc aortic valve **Moderate risk-** Bileaflet aortic valve with two or more risk factors for stroke **Low risk-** bileaflet aortic valve with fewer than two risk factors for stoke	Strongly recommend bridging Consider bridging Bridging optional
Chronic atrial fibrillation	**High risk** Recent stroke or TIA Rheumatic mitral valve disease **Moderate risk-** chronic atrial fibrillation with 2 or more risk factors for stroke **Low risk**- chronic atrial fibrillation with < 2 risk factors	Strongly recommend bridging Consider bridging Bridging optional
Venous thromboembolism	**High risk** Recent(< 3 wk) VTE Active (< 6 mo or palliative) cancer Antiphospholipid antibody Major comorbid disease(cardiac/pulmonary) **Moderate risk** VTE in last 6 mo VTE with interruption of anticoagulant **Low risk-** none of above	Strongly recommend bridging Consider bridging Bridging optional

Coagulopathy

- Coagulopathy may arise from
  - inherited or acquired platelet or factor disorder
  - organ dysfunction
  - Medications
- Personal and family history of bleeding asked
- H/o easy bruising or petechie
- Risk factors for post-op bleeding- liver disease, mal absorption, malnutrition, chronic a/b use

- **Investigation :**
  - Complete haemogram
  - Coagulogram
  - Finrinogen leves
  - D-dimer

- In Vit K deficiency or mild liver disease- PT is prolonged while aPPT may be normal
- Severe liver disease- both PT, aPPT tend to prolong
- Haemophilia – aPPT is prolonged but PT is normal
- In DIC all test are abnormal and fibrin split products and d-dimer are increased

- **Management:**
  - In case of severe factor deficiency, 4-6 units of FFP and cryoprecipitate should be given rapidly
  - Conditions associated with low platelet count or abnormal platelets:--- platelet transfusion
  - One unit of platelet concentrate increases platelet count by 5000-10000

- In patients on heparin:
  - Elective procedure- discontinue heparin 6 hrs before surgery
  - Emergency operation- 10 mg of protamine sulphate in 50 ml of NS iv over 10 min f/b 20 mg in 50 ml NS over 30 min

Nutritional assesment

- Malnutrition increases increases risk of
  - morbidity, wound infection, sepsis, pneumonia, delayed wound healing, anasmotic complication.
- Assesment include careful history and examination.
- Usual weight, recent wt loss, loss of muscle bulk, change in bowel habit.
- IBS,DM,bulmia and anorexia nervosa.
- **Nutritional risk assesement (15.19x sr albumin g/dl+41.7x present wt/usaual weight**.
- NRI < 83% indicates increased mortality.

Thank you