

Preoperative preparations and assessments of
patients before surgery

Essay

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In Anesthesia and ICU**

By

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بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

" يرفع الله الذين
آمَنوا منكم والذين
أوتوا العلم درجات
"

صدق الله العظيم

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on the risk of adverse events for patients undergoing (RYGB).

Aim of The Work

The aim of the work is to provide an over view of current & involving concepts in the preoperative and preprocedure medical assessment of patient who are receiving anesthesia to reduce the morbidity of the surgery, increase the quality but decrease the cost of perioperative care,

and return the patient to the desirable functioning as quickly as possible.

A finale goal is to use the operative experience to motivate the patient to more optimal health and improved health outcomes.

INTRODUCTION

Because more than 80% of patients receiving anesthesia are either outpatients or "come-and-stay" patients (i.e., patients admitted to the hospital after surgery), patients cannot be evaluated preoperatively as they were during the 1970s. A new system had to be devised. The resulting set of questions is extensive, consisting of more than 100 items. The usage of a written or automated questionnaire to ask the screening questions, if coupled with a personal interview to pursue positive answers, does not decrease the accuracy or perceived personalization of the care given .

(Dishakjian , et al 2000) .

Therefore, using this combination for inpatients as well , especially for "come-and-stay" patients. Our task is to explore in depth any positive results from the history-taking and to spend the rest of the time discussing issues that the patient is concerned about, as well as educating the patient about postoperative recovery pain and other plans and motivating him or her to adopt medications or lifestyle changes that have been shown to beneficially affect perioperative outcome.

Furthermore, storing the history and physical information electronically and securely allows the anesthesiologist who is providing care to assess the patient's data the day or night before surgery. Most anesthesiologists have developed ways of putting the classic pattern (chart review; history-taking; physical examination; and discussion of risks, alternative anesthetic plans, and postoperative pain therapies) together so that all of these questions are part of a compassionate flow of thought that helps the patient recall information. A rigid, specific order for questioning is usually unnecessary.

The anesthesiologist must remember that older male patients tend to deny symptoms, often seeing disease as a sign of frailty. Some patients believe that their symptoms indicate a life-threatening disease and therefore resist seeking medical help (and answering questions) until help is imperative. Seeing a physician who has adopted beneficial lifestyle changes motivates the patient to do so.

(Roizen , et al 2004).

Despite such obstacles to obtaining pertinent information, seeing the patient before surgery does give the anesthesiologist one strong advantage: patients are usually willing and eager to share information. Surgery is usually a major event for both men and women; no patient really views any surgery as "minor." Thus, the preoperative interview can elicit vital information and is a powerful time to motivate patients to choose healthy options such as adhering to blood pressure normalization therapy, stopping smoking, and initiating a program of regular walking and strength training. The trick is to work with the surgeons to have appointments scheduled far enough in advance to make the lifestyle and drug programs meaningful in perioperative as well as long term outcomes. Some investigators have suggested that anesthesiologists forget the history and just use laboratory tests to screen for disease. A review of the literature strongly suggests otherwise: the history (whether obtained personally, by questionnaire, or by telephone interview by person or computer screening device), and the investigation of positive answers in an in-person interview is many times more effective in screening for disease than the use of laboratory tests alone. Also, the combination of history and personal interview can be a much less expensive process and avoids the medicolegal problems and inefficiency associated with excessive laboratory testing. Furthermore, testing is not a great personal motivator; even using abnormal test results to motivate compliance is only a small fraction as effective as is human-to-human interaction.

(O'Malley, et al 2003).

Some data lead us to believe that the combination of history-taking (from personal interview or questionnaire supplemented by personal interview) and physical examination is the best tool for optimal evaluation of patients and optimal selection of laboratory tests (i.e., selection of only those tests that have a greater chance of benefiting rather than harming the patient).

The primary problem with ordering batteries of laboratory tests for all patients is that laboratory tests are not very good screening devices for disease. In addition, the subsequent "extra" tests that physicians order as a follow-up of supposedly abnormal results are costly. More important is the fact that nonindicated tests often represent additional risk for the patient, increase medicolegal risk for the physician, and render ORs in outpatient centers and hospitals inefficient.

(Hash , et al 2003) .

Chapter (1)

General Preparation

Reducing the patient's anxiety and obtaining informed consent are important values of preoperative preparation. Most data indicate that recovery occurs more quickly when the anesthesiologist allays the patient's concerns, informs the patient about what is to come, and plans postoperative pain therapy with the patient . The next three functions of

preoperative evaluation are closely related: the acquisition of a clear medical history, including information about physical and medical conditions.

(Worwag , et al 1998).

Preoperative consultations may initiate additional risk-modification tactics, such as reducing tachycardia or the stress on plaque,controlling hypertension, perioperative cessation of smoking, nutritional fortification, immunization, reducing inflammation in blood vessels, and stamina/strength training, and in this way may improve perioperative outcome. Preoperative evaluation produces other benefits as well. Patient education about perioperative care expectations can radically reduce the length of stay and, as previously mentioned, substantially improve quality of life.

(Gilbey , et al 2003) .

In addition, preoperative assessment can uncover hidden conditions that could cause problems both during and after surgery. In this way, the anesthesiologist is able to anticipate problems and plan therapy intended to prevent or minimize the effects of such problems.

(Gulati , et al 2003).

Care plans were changed because of information from observation and history: the most common conditions causing changes were gastric reflux, insulin-dependent diabetes mellitus, asthma, and suspected difficult intubation . However, the data did not indicate that these changes improved patient outcome. Nevertheless, practitioners seem to believe that the discovery of these conditions calls for a change in plans, which is

usually implemented in a way that delays operating room (OR) schedules and increases costs. Examples of last-minute changes are administration of an H₂ -blocker 1 to 2 hours before, a β -blocker 1 hour before, and an oral antacid immediately before entry to the OR; the obtaining of equipment to measure blood glucose levels; the obtaining of a history of the patient's diabetic course and treatment from the primary care doctor as well as from the patient; the performance of fiberoptic laryngoscopy; or additional skilled help. Thus, even if preoperative evaluation were not to alter outcome to any great degree, its ability to reduce costs by reducing laboratory tests and delays in obtaining equipment or treatments perceived to be beneficial and medicolegally required) would be substantial and would warrant its use.

Furthermore, a negative history and physical examination can lead to decreased resource utilization for healthy patients and for those with comorbid conditions but without risk factors requiring high intensity care. In addition, preoperative evaluation gives practitioners confidence that they will not be surprised by unexpected patient conditions and gives patients confidence that the health care system is responding to their individual conditions and is focused on their well-being in the perioperative period and beyond.

(Myers ,et al 2002) .

TABLE(1-1) Medical problems discovered on preanesthetic evaluation that could prompt a change in patient management

History Point	Concern/Area to Evaluate	Anesthesia Plans That May Require Extra Time
Airway perceived as difficult to intubate	Head, eyes, ears, nose, throat: airway; prior anesthesia outcomes	Obtain fiberoptic equipment; obtain skilled help
Asthma	Pulmonary disease	Optimize therapy; use bronchodilators; possibly extubate during deep anesthesia
Diabetes, insulin-dependent	Endocrine, metabolic, diabetes	Discuss insulin management with patient and primary care doctor; monitor blood glucose intraoperatively; determine presence of autonomic neuropathy and plan management appropriately, such as administration of metoclopramide and PACU or ICU stay
Drug abuse	Social history	Consider HIV testing; prescribe medications to avoid withdrawal symptoms in perioperative period
Gastroesophageal reflux or hiatal hernia	Gastrointestinal disease: hiatal hernia	Administer H ₂ antagonists or oral antacids and use rapid-sequence induction of anesthesia; or use awake intubation techniques and obtain appropriate equipment
Heart disease: valve disease, risk of subacute bacterial endocarditis	Antibiotic prophylaxis	Arrange for antibiotic administration 1 h prior to surgery
Malignant hyperthermia history, family history, or suspected potential history	Prior anesthetic/surgical history	Obtain clean anesthesia machine; use appropriate technique and precautions; have agents to treat malignant hyperthermia available
Monoamine oxidase inhibitors	CNS: psychiatric/medication	Discontinue therapy preoperatively if patient is not suicidal; plan for perioperative pain therapy
Pacemaker or automatic implantable cardiac defibrillator	Cardiovascular disease: electrocardiogram	Evaluate cause of pacemaker implementation; obtain repolarizing equipment or magnet; use electrocautery with altered position; use bipolar electrocautery
Peripheral motor neuropathy	CNS disease: neurologic deficit	Avoid depolarizing muscle relaxants
Pregnancy or uncertain pregnancy status	Genitourinary: pregnancy	Monitor fetal heart rate; use oral antacids; adjust induction of anesthesia; determine status of pregnancy
Pulmonary tuberculosis	Pulmonary disease: tuberculosis	Use disposable breathing circuit or clean equipment; ensure adequate treatment of
		patient prior to surgery
Renal insufficiency	Genitourinary disease	Monitor fluid status intraoperatively

CNS, central nervous system; HIV, human immunodeficiency virus; ICU, intensive care unit; PACU, postanesthetic care unit.

The database format presented is one maintained at the University of Chicago, but it is modeled after one described by the University of Florida

and is modified from data from Gibby GL, Gravenstein JS, Layon AJ, Jackson KI: How often does the preoperative interview change anesthetic management? [abstract]. Anesthesiology 77:A1134, 1992

The difficulty is that we must obtain a thorough history far enough in advance to allow us to perform selected tests and to implement the necessary therapies and motivational strategies without disrupting surgical schedules and the patient's perioperative care plans. This must also be done far enough in advance to give the patient and his or her significant others time to plan for the options that have been selected.

(Warner , et al 1994).

It is very difficult to make an adequate preoperative evaluation in 5 to 15 minutes, and it is impossible to change any therapy or optimize any care that requires more than 10 minutes without increasing costs and inconveniencing all concerned. Furthermore, the pressure to proceed, even when there may be increased or unknown risk, is much greater when time is short than when such evaluations are done in advance. Frequently, old records are not available. Also, the pressure to proceed quickly probably makes the consent process less informed and the discussion of anxiety relief and preoperative pain therapy plans less thorough. Also, the patient and significant others have little or no time to "digest" information about what to expect regarding the perioperative care plan.

Do we need to change our system? Clearly, a change is needed if preoperative assessment is to be adequate, and more so if

anesthesiology as a specialty is to continue to lead the movement fostering patient safety, optimizing perioperative outcome, and motivating a higher quality of life with fewer health care costs. To perform these assessments efficiently, the anesthesiologist needs to know about the patient, to educate the patient, and to motivate the patient.

Preoperative evaluation is intrinsically valuable, and interacting with the patient in this way is an enjoyable and productive part of the practice of anesthesia and can continue to make anesthesia a specialty integral to and valuable for the health of the nation and of the individual patient. Also, for the practical-minded, inadequate preoperative assessment is now one of the top three causes of lawsuits against anesthesiologists. Nevertheless, in the current atmosphere, there is not enough time to assess the patient preoperatively using traditional methods. Before suggesting solutions to this problem, this chapter will evaluate the importance of preoperative assessment, as well as the conditions that may be sought and determined from such assessment.

(Practice Advisory for Preoperative Evaluation: 2000).

In the past, patients were admitted to the hospital at least a day prior to surgery. Currently, more and more patients are admitted to the hospital on the day of surgery. Older patients are scheduled for more complex procedures, and there is more pressure on the anesthesiologist to reduce the time between cases. The first time the anesthesiologist

performing the anesthetic sees the patient may be just prior to anesthesia and surgery.

The patient has been seen previously by others in a preoperative evaluation clinic. Only a short time exists to engender trust and answer last-minute questions. It is often impossible to alter medical therapy at this juncture immediately preoperatively. However, preoperative screening clinics are becoming more effective and clinical practice guidelines becoming more prevalent. Information technology has helped the anesthesiologist in previewing the upcoming patients that will be anesthetized. Preoperative questionnaires and computer-driven programs have become alternatives to traditional information gathering. Finally, when anesthesiologists are responsible for ordering preoperative laboratory tests, cost saving occurs and cancellations of planned surgical procedures become less likely. In this setting it is important that communication between the preoperative evaluation clinic and the anesthesiologist performing the anesthetic occur through the patient record and in person.

(Tara , et al 2005).

The Anaesthetic Pre-Operative Assessment Clinic

Anaesthetic pre-operative assessment clinics provide the opportunity for anaesthetists to see those patients who have been identified by screening and assessment as presenting potential anaesthetic problems.

The anaesthetic pre-operative assessment clinic must involve consultant anaesthetist presence which is recognised as a fixed commitment within a job plan. The clinic must be fully resourced with

staff and equipment. There should be facilities for interview and examination of patients, phlebotomy and other pre-operative testing such as X-ray and electrocardiography (ECG).

Such clinics are an efficient and convenient method of pre-operative assessment and patients should ideally be seen within two weeks of admission for surgery. Efforts should be made to coordinate this with any other hospital attendance.

In order for the clinic to function efficiently:

- The patient's full hospital record must be available to the anaesthetist.
- The patient should have an opportunity to talk to an anaesthetist, ideally the one who will administer the anaesthetic.
- A surgical or anaesthetic house officer should perform the preliminary clerking and examination
- The patient should have an opportunity to meet other professionals that will be involved in their care, for example members of the pain team or a stoma care nurse or dietician.

The advantages of assessing patients in a pre-operative anaesthetic clinic include:

- Patients identified by screening as requiring further assessment can be seen.
- Patients can be seen in 'office hours'.
- Patients admitted for same day surgery will have had time to have been adequately assessed.
- Risks and side effects can be fully explained and documented as having been discussed.

- Elective postoperative admission to an intensive care or high dependency unit can be organised and explained.

(Roizen ., 2000).

Preanaesthetic assessment of a surgical patient is done differently in various settings. In an inpatient setting the patient on the ward may be referred to the anaesthetist preoperatively for preoperative evaluation and optimization. Although in many institutions the anaesthetists get to see the patient on the day of the procedure in the patient-waiting room, there is evidence that a preanaesthetic assessment well before the procedure play a vital role in avoiding last minute cancellations and delays of surgical procedures.

(Seetharaman Hariharan., 2006).

There is a suggestion that patients should undergo a preanaesthetic evaluation by questionnaire administration which would be scrutinized by staff in the clinic who will then decide if the patient needs to be further evaluated by an anaesthetist.

(Millar .,2005).

The preoperative clinics greatly assist in optimizing patients in relation to the perioperative period. In addition to being cost-beneficial avoiding unnecessary investigations, this also offers the anaesthetist an opportunity of establishing a rapport with the patient, well in advance.

(Lew, et al 2004).

History

Unfortunately, illnesses in systems other than the cardiovascular have an effect on perioperative risk. The following is a list of relatively common conditions we ensure are not present before assuming that the patient is asymptomatic. The evaluation process that follows represents our initial screening procedure for disease. Although the process attempt to be relatively inclusive, it cannot cover all possible conditions that might be encountered when dealing with surgical patient.

(Gibby , et al 1992).

First Area of Concern and The rule of Threes

The rule of threes indicates that three aspects of acute history, three aspects of chronic history, and three aspects of physical examination make a difference to perioperative outcome.

The three aspects of acute history are:

1. Exercise tolerance.
2. History of present illness and treatments.
3. When the patient last visited with her or his primary care physician.

The three aspects of chronic history are:

1. Medications and causes for their use and allergies.
2. Social history including drug, alcohol, and tobacco use and cessation.
3. Family history and history of prior illnesses and operations.

The three aspects of physical examination are:

1. Airway.
2. Cardiovascular.
 3. Lung, plus those aspects specific to the patient's condition or planned procedure, such as a sensory nerve examination if a regional block is planned (more about physical examination later).

Included first in the history are general items, such as whether the patient has received recent medical care, has taken medication, or has allergies. Questions also are asked about prior exposure to anesthetics and subsequent problems:

- When did you last have anesthesia?
- Do you have any problems with anesthesia? Have any of your family members had any problems with anesthesia?
- Do you have allergies?
- What are you allergic to?
- Have you had any blood tests in the last 6 months?
- Have you had a chest x-ray in the last 2 months?
- Have you had an electrocardiogram (ECG) in the last 2 months?
- Has your stool been checked for blood or have you had a colonoscopy, etc., in the last year?

- Have you been a patient in a hospital, an emergency department, or an outpatient surgery center in the last 2 years? If so, why? What part of the hospital (for example, critical care unit)? How long were you there?
- Do you take any medications?
- What medications do you take?
- Do you take any medications not prescribed by your doctor, that you purchase through the internet or from a shelf at a drugstore, health food store, or grocery store?
- Do you take any supplements or vitamins or minerals? (These can interact substantially with perioperative medications.)

(Markowitz , et al 2003).

Also included in this category of questions are items about artificial devices (e.g., hearing aids, false eyes) and use of alcohol:

- Do you wear contact lenses?
- Do you currently use eye drops prescribed by a doctor?
- When did you have an alcoholic drink?
- Have you ever had a drinking problem?

Sensitive subjects include risk factors for use of illegal drugs and for human immunodeficiency virus (HIV) infection. Nevertheless, the personal interview is essential for in-depth questioning.

(Mitchell , et al 1992).

1. Cardiovascular System:

When screening a patient for cardiovascular disease prior to surgery, the anesthesiologist is most interested in recognizing signs and symptoms of uncontrolled hypertension and unstable cardiac disease such as myocardial ischemia, congestive heart failure, valvular heart disease, and significant cardiac dysrhythmias. Symptoms of cardiovascular disease should be carefully determined, especially the characteristics of chest pain, if present. Certain populations of patients, such as the elderly, women, or diabetics, may present with more atypical features. The presence of unstable angina has been associated with a high perioperative risk of myocardial infarction (MI). The perioperative period is associated with a hypercoagulable state and surges in endogenous catecholamines, both of which may exacerbate the underlying process in unstable angina, increasing the risk of acute infarction. The preoperative evaluation can affect both a patient's short- and long-term health by instituting treatment of unstable angina.

Symptoms of clinically important valvular disease should be sought, such as angina, syncope, or congestive heart failure from aortic stenosis that would require further evaluation. A history of other valvular disease such as mitral valve prolapse may simply dictate the need for SBE prophylaxis.

(Shah, et al 1991).

Determination of the patient's cardiovascular reserve is the cornerstone. To do this, you can ask about the maximum amount the patient

can walk or the greatest number of floors she or he can climb without the need to stop, or you can determine an ejection fraction from prior testing or the patient's record during stress testing. The ability to do 4 metabolic equivalents (METs) of exercise, the equivalent of walking 5 city blocks or climbing two flights of stairs at a reasonable rate without having to stop correlates in multiple studies with better perioperative outcome .We try to ensure that the patient does not have the following cardiovascular conditions: congestive heart failure, cardiomyopathies, ischemic heart disease (stable or unstable), valvular or subvalvular heart disease, hypertension (diastolic or systolic), disturbances in cardiac rhythm, pericarditis, arteritis, or other manifestations of atherosclerosis.

(Gulati , et al 2003).

TABLE(1-2) Estimated energy requirements for various activities *

Metabolic Equivalents (METs)	Activity
1 MET	Can you take care of yourself?
	Can you eat, dress, and use the toilet?
	Can you walk indoors around the house?
4 METs	Can you walk a block or two on level ground at 2 to 3 mph (3.2 to 4.8 km/h)?
	Can you climb a flight of stairs or walk up a hill?
	Can you walk on level ground at 4 mph (6.4 km/h)?
	Can you run a short distance?
10 METs	Can you do heavy work around the house such as scrubbing floors or moving heavy furniture?
	Can you participate in moderate recreational activities such as golfing, bowling, dancing, doubles tennis, or throwing a baseball or football?
10 METs	Can you participate in strenuous sports such as swimming, singles tennis,

From Eagle KA, Berger PB, Calkins H, et al: ACC/AHA guideline update for perioperative cardiovascular evaluation for noncardiac surgery—executive summary: A report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines (Committee to Update the 1996 Guidelines on Perioperative Cardiovascular Evaluation for Noncardiac Surgery). J Am Coll Cardiol 39:542, 2002.

****Adapted from the Duke Activity Status Index and the American Heart Association Exercise Standards.***

These conditions require further evaluation to make sure that optimal treatment has been achieved before surgery. In the outcome studies described previously, congestive heart failure incurred the highest risk.

(Duncan, et al 1992).

Exercise tolerance should also be checked—for example, the patient's ability to walk up stairs, play sports, and perform chores (mowing lawns, making beds, vacuuming), without becoming short of breath. Typical questions regarding the cardiovascular system include the following:

- What is the most vigorous activity you've done in the last 3 weeks?
- How far have you walked in the last week without stopping?
- Can you walk a block without stopping? When did you last do so?
- Have you ever awakened and felt short of breath?

- Do you become short of breath after climbing a flight of stairs or after walking a short distance?
 - Are you able to walk up stairs at the same rate as 5 years ago?
- Have you ever had a heart attack, or have you ever been treated for a possible heart attack?
- Do you have heart problems such as skipped heart beats, angina, or chest pain?
- Have you been told that you have a heart murmur or rheumatic fever?
- Have you ever been told that you have mitral valve prolapse?
- Have you ever had heart or lung surgery?
- Do your ankles ever swell?
- Are you ever short of breath? When?
- Do you ever have chest pains, angina, or chest tightness?
- Have you ever been a patient in a critical care unit (cardiac care unit, intensive coronary care unit)?

(Mitchell , et al 1992).

- Do you sleep with more than one pillow at night? (This question is useful only for men and women over age 60, as 50% of younger women sleep with two pillows [Trigg DJ et al, unpublished data].)
- Do you take medication for high blood pressure or medication to prevent high blood pressure?
- Do you currently take anticoagulants or blood-thinning medicine?

- Have you ever been told to take, or have you ever been given, antibiotics before routine dental work?

(Adams , et al 1996).

The initial interview is important because it allows the heart surgeon to obtain the medical history and to establish a patient-doctor relationship. The general inquiry should include the following symptoms of cardiac disease: chest pain, dyspnea, fatigue, hemoptysis, syncope, palpitation, peripheral edema and cyanosis.

Table(1-3) The degree of physical disability that cardiac symptoms causes is expressed by the New York heart association functional classification:

Class I	No symptoms on ordinary physical activities.
Class II	No symptoms at rest; ordinary activities provoke symptoms.
Class III	No symptoms at rest; mild activities provoke symptoms.
Class IV	Symptoms at rest or during any activity.

Perioperative Care in Cardiac Anesthesia and Surgery, edited by Davy C.H. Cheng and Tirone E. David. © 1999 Landes Bioscience 9 Preoperative Assessment 3

The severity of angina pectoris is graded by the Canadian cardiovascular society classification:

Class I—Only very strenuous physical activity causes angina.

Class II—Moderate physical activity causes angina. Examples: walking more than two blocks on the level or climbing more than one flight of stairs at normal pace provoke pain.

Class III—Mild physical activity causes angina. Examples: walking one block on the level or one flight of stairs at normal pace provokes pain.

Class IV—Any physical activity causes pain.

(Davy , et al 1999).

2.Respiratory System:

A screening evaluation should include questions regarding the history of tobacco use, shortness of breath, cough, wheezing, stridor, and snoring or sleep apnea. The patient should also be questioned regarding the presence or recent history of an upper respiratory tract infection, emphysema and bronchitis. We try to ensure that asthma is not present and that other conditions, such as obesity, have not progressed to the point of limiting respiratory function or causing sleep apnea.

(Mooe , et al 2001).

Of the six cardinal symptoms of respiratory disease (cough, sputum, haemoptysis, dyspnoea, wheeze and chest pain), dyspnoea provides the best indication of functional impairment. Specific questioning is required to elicit the extent to which activity is limited by dyspnoea. Dyspnoea at

rest or on minor exertion clearly indicates severe disease. A cough productive of purulent sputum indicates active infection. Chronic copious sputum production may indicate bronchiectasis. A history of heavy smoking or occupational exposure to dust may suggest pulmonary pathology. A detailed drug history is important. Long-term steroid therapy within 3 months of the date of surgery necessitates augmented cover for the perioperative period and may cause hypokalaemia and hyperglycaemia. Bronchodilators should be continued during the perioperative period. Patients with cor pulmonale may be receiving digoxin and diuretics.

(Skolnick , et al 1998).

Questions that usually elicit information about the general condition of the respiratory system and possible reactions to anesthesia include the following:

- Do you have shortness of breath, wheezing, chest pain,?
- Do you cough regularly or frequently?
- Do you cough up mucus (sputum or phlegm)?
- In the last 4 weeks, have you had a fever, chills, cold, or flu?
- Do you smoke or have you ever smoked? When did you stop?
- Do you use spit or chew tobacco?
- Have you ever smoked half a pack or more of cigarettes?
- Have you ever smoked a pipe or cigars on a regular basis?
- The following questions search for lung disease:
- Have you ever had pneumonia? When?
- Have you ever undergone lung surgery?

(Skolnick , et al 1998).

The airway:

There are specific medical or surgical conditions which are associated with potential airway problems during anaesthesia, such as obesity, the later stages of pregnancy, a large neck, mediastinal tumours and some faciomaxillary deformities. Apart from these, it requires an experienced anaesthetist to collate various physical features which can predict likely difficulty. Several classifications or scoring systems have been designed for this purpose, although none is entirely reliable; they are discussed elsewhere.

Because airway problems cause substantial risk, the most important consideration regarding the respiratory system is securing the airway. Therefore, evidence of airway obstruction and restriction of neck and jaw movement is sought.

Questions that usually elicit information about the general condition of the mouth and airway and possible reactions to anesthesia include the following:

- Do you wear dentures, a crown, a partial, or a bridge?
- Have you ever had anesthesia?
- Can you open your mouth fully?
- Have you ever been treated for a problem of the jaw joint (that is, a temporomandibular joint [TMJ] problem)?
- Have you ever been hoarse for more than 1 month?
- Do you snore, or do others say you snore? (This question proved to be the best predictor of difficult intubation when our computer-based health history was compared with outcome

studies but was not very specific [four of five patients who answered yes to this question did not have a difficult intubation].)

(Poldermans, et al 2003).

3. Neurological System:

A screening of the neurological system in the apparently healthy patient can mostly be accomplished through simple observation. The patient's ability to answer health history questions practically ensures a normal mental status. Questions can be directed to exclude the presence of increased intracranial pressure, cerebrovascular disease, seizure history, preexisting neuromuscular disease, or nerve injuries.

- Have you ever had a seizure, convulsion, fit, stroke, or paralysis?
- Have you ever had nerve injury, multiple sclerosis, or any other disorder of the nervous system?
- Have you taken antidepressant, sedative, tranquilizing, or antiseizure medications in the last year?

(Markowitz , et al 2003).

4. Endocrine System:

Each patient should be screened for endocrine diseases that may affect the perioperative course: diabetes, thyroid disease, parathyroid

disease, endocrine-secreting tumors, and adrenal cortical suppression. Such questions are:

- Do you wake up at night to urinate? How often?
- Have you ever been told that you have diabetes or sugar diabetes?
- Do you perspire (sweat) much more than others or a great deal every now and then?
- Does your face flush or get red every now and then, even when you are not exercising?

The last question attempt to rule out the hazardous perioperative situation of undiscovered pheochromocytoma or carcinoid syndromes. Both conditions can now be well managed if known about in advance . Both, however, incur a mortality rate as high as 10% if undiscovered prior to operation.

The following questions search for symptoms of thyroid and parathyroid disease:

- Have you ever taken medicine (e.g., Synthroid [levothyroxine]) or had radioactive iodine (¹³¹I) for thyroid disease?
- Do you consistently like the room warmer or colder than your spouse does?
- Do you have muscle cramps or spasma in your legs more than three times a year?

(Jeffrey , et al 2006).

5. Renal System:

Pre-anaesthetic history of the patient should be directed to several specific problems which require correction before embarking on anaesthesia. Renal disease has important implications for fluid and electrolyte management, as well as metabolism of drugs. Renal dysfunction has several important implications for anaesthesia, and therefore full assessment is required before even minor surgical procedures are contemplated.

The following questions search for renal disease:

- Have you ever had any kidney problem?
- Have you ever had kidney failure, dialysis, or more than two kidney infections?
- Has your appetite for food changed in the last year? (Voluntary avoidance of foods having a high protein content is a subtle sign of renal disease.)

(O'Leary , et al 2001).

6.Haematological system

Coagulation disorders may influence the choice of regional anesthesia. The anesthesiologist should inquire about bruising, bleeding, and the use of medications that influence platelet function such as aspirin, other nonsteroidal anti-inflammatory drugs, and anticoagulants. The perioperative management of hemoglobinopathies should be discussed.

The following questions search for such abnormalities:

- Have you ever had a blood problem such as anemia or leukemia?
- Have you ever had a problem with blood clotting?
- Have you ever had a serious bleeding problem?

(G. Edward Morgan, et al 2006).

7. Hepatic and Gastrointestinal System

The presence of gastrointestinal or hepatic disease can give clues about possible endocrine, pulmonary, or cardiac disease (e.g., gastritis in the alcoholic patient could indicate alcoholic cardiomyopathy).

Questions that screen for gastrointestinal or hepatic disease include the following:

- Have you ever been diagnosed as having a hiatus hernia?
- Have you ever had hepatitis, yellow jaundice, liver disease, or malaria?
- Are your stools ever bloody or black and tarry?
- Have you seen bright red blood on your stool or on toilet tissue after wiping?

(Pratt , et al 2000).

Examination

The Physical Examination:

Clinical examination may be difficult, although the signs of congestive cardiac failure (added heart sound, pulmonary crepitation, elevated jugular venous pressure, hepatomegally, ascitis, and peripheral edema) have the usual significance, also chronic obstructive pulmonary disease show (diminished air entry, prolonged expiratory time scattered ronchi& if there is infection there will be crepitation.

(Tsueda et al., 2000).

American Society of Anesthesiologists (ASA) Scoring System. The ASA scoring system describes the pre-operative condition of a patient (Sacklad 1941) and is used routinely for every patient in the UK. It makes no allowances for the patient's age, smoking history, any obesity or pregnancy. Anticipated difficulties in intubation are not relevant. Addition of the postscript E indicates emergency surgery. There is some correlation between ASA score and peri-operative mortality.

THE ASA SCORING SYSTEM

(PERI-OPERATIVE MORTALITY GIVEN IN BRACKETS)

The ASA grading system was introduced in the 1960s as a simple description of the physical state of a patient, along with an indication of whether surgery is elective or emergency. Despite its apparent simplicity, it remains one of the few prospective descriptions of the patient that correlates with the risks of anaesthesia and surgery.

However, it does not embrace all aspects of anaesthetic risk, as there is no allowance for inclusion of many criteria such as age or difficulty in intubation. In addition, it does not take into account the severity of either the presenting disease or the surgery proposed, nor does it identify factors which can be improved preoperatively in order to influence outcome. Nevertheless, it is

extremely useful and should be applied to all patients who present for anaesthesia.

Table(1-4) ASA rating for physical status of the patient

Class I	A normally healthy individual
Class II	A patient with mild systemic disease
Class III	A patient with severe systemic disease that is not incapacitating
Class IV	A patient with incapacitating systemic disease that is a constant threat to life
Class V	A moribund patient who is not expected to survive 24 h with or without operation
Class E	Added as a suffix for emergency operation

(Alan , et al 2001).

The physical examination consists of the following processes:

- Determination of arterial blood pressure in both arms, and in at least one arm 2 minutes after the patient assumes the upright position after lying down.
- Examination of the pulses and of the chest for heaves, thrusts, pulsations, murmurs, and gallops (third and fourth heart sounds). (Some believe that obtaining ankle blood pressure is useful in assessing the risk for cardiovascular disease, but this process is not routine.)
- Examination of the carotid and jugular pulses. (I have found that patients expect to be partially undressed for this exam and consider the examiner unprofessional if he or she does not auscultate blood pressure sounds using a bell or diaphragm held to the skin.)
- Examination of the chest and auscultation of the bases of the heart for subtle rales suggestive of congestive heart failure, or for rhonchi, wheezes, and other sounds indicative of lung disease. (Although history-taking may detect these symptoms that point to lung disease as accurately as auscultation, the patient expects a "good" physician to auscultate his or her lungs preoperatively. Thus, this part of the physical examination also helps increase patient confidence.)
- Observation of the patient's walk for signs of neurologic disease and to assess back mobility and general health.
- Examination of the eyes for abnormal movement and, along with the skin, for signs of jaundice, cyanosis, nutritional abnormalities.

- The fingers are checked for clubbing.
- Examination of the airway and mouth for neck mobility, tongue size, oral lesions, and ease of intubation .
- Functional evaluation of cardiovascular risk by observing vigor and stamina in walking. (I frequently take the pulse of the patient and myself prior to and after climbing two flights of stairs with the patient, while we talk about other subjects. My own pulse change acts as a control, alerting me when to be concerned about the patient's exercise capacity: if the patient's pulse rate exceeds an increase of 40 beats per minute after climbing two flights [twice my usual pulse change], I worry that the patient cannot do much more than 4 METs of activity .)
- Examination of the legs for bruising, edema, clubbing, mobility, sensation, and adequacy of hair growth (or skin texture) as signs of circulatory competence.

(Leng , et al 1996).

Bedford and Feinstein reported that the admission blood pressure was the best predictor of response to laryngoscopy. Auscultation of the heart is performed, specifically listening for a murmur radiating to the carotids suggestive of aortic stenosis or abnormal rhythms, or a gallop.

(Bedford , et al 1980) .

Physical exam of the respiratory system should assess the respiratory rate as well as the chest excursion, Auscultation should be used to detect decreased breath sounds, wheezing, stridor, or rales. For

the patient with positive findings, see preoperative evaluation of the pulmonary patient.

(Zollinger , et al 2002).

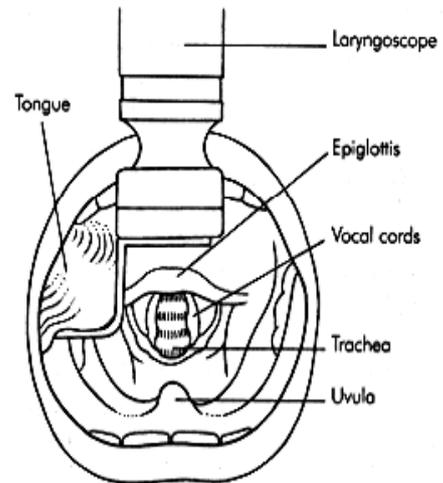
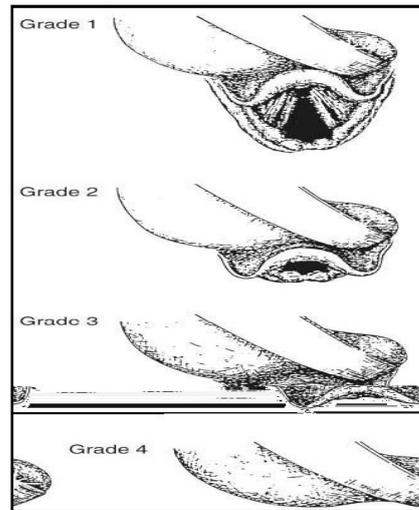
Evaluation of the airway involves determination of the thyromental distance, the ability to flex the base of the neck and extend the head, and examination of the oral cavity including dentition. The Mallampati classification has become the standard for assessing the relationship of the tongue size relative to the oral cavity , although by itself the Mallampati classification has a low positive predictive value in identifying patients who are difficult to intubate.

(Savva ., 1994).

TABLE (1-5) Airway Classification System

CLASS	DIRECT VISUALIZATION, PATIENT SEATED	LARYNGOSCOPIC VIEW
I	Soft palate, fauces, uvula,	Entire glottic
II	Soft palate, fauces, uvula	Posterior commissure
III	Soft palate, uvular base	Tip of epiglottis
IV	Hard palate only	No glottal structures

Modified with permission from Mallampati RS, Gatt SP, Gugino LD et al: A clinical sign to predict difficult tracheal intubation: A prospective study. Can Anaesth Soc J 32:429,1985.



Figure(1-1) Grades of difficulty in laryngoscopy: grade 1, no difficulty; grade 2, only posterior extremity of glottis visible; grade 3, only epiglottis seen; grade 4, no recognizable structures. (*Adapted from Cormack RS, Lehane J: Difficult tracheal intubation in obstetrics. Anaesthesia 9:1105, 1984.*)

The Wilson risk factors may provide additional predictive information on the airway. The Wilson risk factors each score 0-2 points, to give a maximum of 10 points. A score > 2 predicts 75% of difficult intubations, also with a high incidence of false positives. The Wilson risk factors are: 1. Obesity 2. Restricted head and neck movements

3. Restricted jaw movement 4. Receding mandible 5. Buck teeth

(Sawin , et al 1996).

The neurologic examination may be cursory in healthy patients, or extensive in patients with coexisting disease. Testing of strength, reflexes, and sensation may be important in patients if the anesthetic plan or surgical procedure may result in a change in the condition.

(Kandel , et al 2000).

Investigation

Because we now no longer enjoy the luxury of seeing patients leisurely in the hospital the night before surgery, the methods of preoperative evaluation are changing. In response to these changes, the ASA has developed a practice advisory for preanesthetic evaluation.⁵ Most concepts of that document will be discussed here. These changes in patterns also mean that we must ensure that perioperative care is predictable for both patient and surgeon; comprehensive, so that no facet of care is overlooked to create problems later; and efficient and cost-effective, to save resources and time. Tests within one year need not be repeated. Patients of ASA physical status 1 or patients who will undergo a minimally invasive procedure may not need laboratory tests to alter their risk.

(Practice Advisory for Preoperative Evaluation: 2002).

The primary problem with ordering batteries of laboratory tests for all patients is that laboratory tests are not very good screening devices for disease; their results are costly to pursue; and they add new risk for the patient, increase medicolegal risk to the physician, and render ORs inefficient. Many studies have compared the yield from indicated (warranted from history or risk group) vs. unindicated (unwarranted) preoperative and preprocedure testing.

(Schein , et al 2000).

In the state of Maine guidelines, no laboratory tests are required for surgery isolated to one limb where peripheral nerve block or monitored care with hypnotics only is administered. One might question such a guideline in the event

that an anticipated "little anesthetic" turns into a "big general anesthetic." The experience in Maine suggests otherwise: Few anesthetic plans had to be altered because of failed block, inadequate sedations, or change in surgical plans.

(Schein , et al 2000).

There are two important concepts related to the reported benefits and risks of screening tests deserve consideration: lead-time and length-time biases. These two factors can indicate an apparent benefit of testing when there is none. This subject has been reviewed in detail.

(Roizen , 2004).

TABLE(1-6) Types of surgical procedures for which anesthesia may be administered

Type	General Definition	Specific Examples
A	<i>Minimally invasive</i> procedures that have little potential to disrupt normal physiology and are associated with only rare periprocedure morbidity related to the anesthetic; these procedures rarely require blood administration, invasive monitoring, and/or postoperative management in a critical care setting	Cataract extraction, diagnostic arthroscopy, postpartum interval tubal ligation
B	<i>Moderately invasive</i> procedures that have a modest or intermediate potential to disrupt normal physiology; these procedures may require blood administration, invasive monitoring, or postoperative management in a	Carotid endarterectomy, transurethral resection of the prostate , and laparoscopic cholecystectomy

	critical care setting	
C	<i>Highly invasive</i> procedures that typically produce significant disruption of normal physiology; these procedures commonly require blood administration, invasive monitoring, or postoperative management in a critical care setting	Total hip replacement, open aortic valve replacement, and posterior fossa craniotomy for aneurysm

(Gilbey , et al 2003).

A decade ago the answer to these two questions was no. Today, as we indicated above, the answer is yes. Some operations incur such low rates of morbidity and mortality that a test is not indicated unless it is necessary for "routine" preventive care of the patient. Examples would be diagnostic knee arthroscopy and cataract extraction, procedures should be divided into three types. Type A procedures are minimally invasive operations that produce little tissue trauma and minimal blood loss. I believe that *no* laboratory testing is indicated for these operations, based on preoperative status alone (such a division was proposed in the ASA Advisory for Preanesthesia Evaluation discussed earlier). That assumes that the patient is seen and followed by a primary care physician and judged to be in optimal health for daily living by that physician.

Obviously, some laboratory testing may be required for patients undergoing such procedures, in order to provide preventive care or to optimize such patients' medical condition if they are not already in optimal health for daily living (even a haircut can pose a risk for someone in severe congestive heart failure). On the

other hand, type B and C procedures are progressively more risky and invasive. For these procedures, it becomes increasingly important to optimize any adverse conditions (even the less severe ones) that exist preoperatively. Therefore, type B and C procedures often require more preoperative testing. There are insufficient data to be able to state there is a definitive benefit to additional preoperative screening for type B procedures, but in the absence of such data, most physicians err on the side of caution and obtain the same data that are appropriate for type C procedures.

(Gilbey , et al 2003).

Roizen and Cohn have suggested a protocol for screening tests based on the preoperative evaluation using a benefit–risk analysis.

Recommended Laboratory Testing

Blood Count	Coagulation Studies
Neonates	Chemotherapy
Physiologic age \leq 75 yr	Hepatic disease
Class C procedure	Bleeding disorder
Malignancy	Anticoagulants

Renal disease

BUN/Creatinine

Tobacco use

Physiologic age \leq 75 yr

Anticoagulant use

Class C procedure

Electrolytes

Cardiovascular disease

Renal disease

Renal disease

Diabetes

Diabetes

Diuretic, digoxin, use

CNS disease

CNS disease

Diuretic or digoxin use

Blood Glucose

Chest X-Ray

Physiologic age \leq 75 yr

Physiologic age \leq 75 yr

Class C procedure

Cardiovascular disease

Diabetes

Pulmonary disease

Steroid use

Malignancy

CNS disease

Radiation Therapy

Liver Function Tests

Tobacco \leq 20 p-y

Hepatic disease

Albumin

Hepatitis exposure

Physiologic age \leq 75 yr

Malnutrition

Class C procedure

Pregnancy Test

Possible pregnancy

Malnutrition

ECG

T/S

Physiologic age \leq 75 yr

Physiologic age \leq 75 yr

Class C procedure

Class C procedure

Cardiovascular disease

Pulmonary disease

Radiation therapy

Diabetes

Digoxin use

CNS disease

(Roizen , et al 1993).

Cardiovascular Tests:

A. Noninvasive Cardiovascular Testing:

1. Electrocardiogram:

Preoperative 12-lead electrocardiogram can provide important information on the state of the patient's myocardium and coronary circulation. Abnormal Q

waves in high-risk patients are highly suggestive of a past myocardial infarction. The Framingham study showed that long-term prognosis is not improved by lack of symptoms.

(Kannel , et al 1984).

2. Exercise electrocardiogram

The exercise electrocardiogram has been the traditional method in the past for evaluating patients with suspected coronary artery disease. Other investigators have demonstrated the value of ambulatory ECG monitoring, although the negative predictive values have not been as high as reported by some.

(Raby , et al 1995).

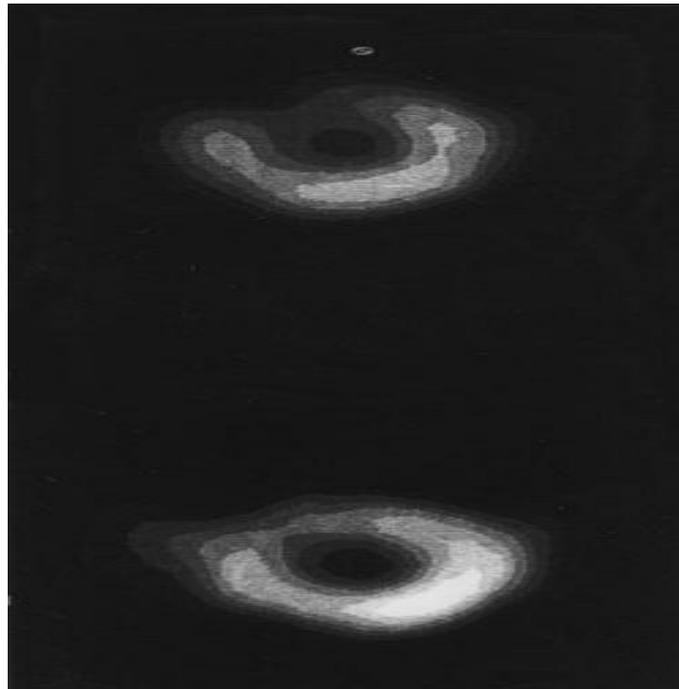
3. Echocardiography

Stress echocardiography is another preoperative test that may be of value in evaluating patients with suspected coronary artery disease. The appearance of either new or more severe regional wall motion abnormalities with exercise is considered a positive test. Either represents areas at risk for myocardial ischemia.

(Shaw , et al 1996).

4. Stress thallium imaging

Pharmacologic stress thallium imaging is useful in those patients who are unable to exercise. Dipyridamole or adenosine is administered as a coronary vasodilator to assess flow heterogeneity.



FIGURE(1-2) *A dipyridamole-thallium SPECT image demonstrating a reversible defect. The top image demonstrates defects consistent with areas of low perfusion or ischemia, which fills in on subsequent imaging (bottom). (See upper left portion of image.)*

(Shaw , et al 1996).

B. Invasive Cardiovascular Testing:

1. Coronary Angiography:

Coronary angiography is currently the best method for defining coronary anatomy. In addition, information regarding ventricular and valvular function can also be assessed. Hemodynamic indices can be determined such as ventricular pressures and pressure gradients across valves.

(Anonymous., 1997).

2. Preoperative Coronary Interventions

The strategies to reduce the perioperative risk of noncardiac surgery have recently been studied. There are several large studies that suggest that in patients who survive CABG, the risk of subsequent noncardiac surgery is low. While there is little data to support the notion of coronary revascularization solely for the purpose of improving perioperative outcome.

(Lee , et al 1999).

Respiratory tests:

1. Chest X-Rays:

Chest x-ray preoperatively can identify abnormalities that may lead to either delay or cancellation of the planned surgical procedure or modification of perioperative care. For example, identification of pneumonia, pulmonary edema, pulmonary nodules, or a mediastinal mass could all lead to modification of care.

(Sox ., 1990).

2. Pulmonary Function Tests:

Pulmonary function tests can be generally divided into two categories, spirometry and an arterial blood gas. Spirometry can provide information on forced vital capacity (FVC), forced expiratory volume in 1 sec (FEV1), ratio of FEV1/FVC, and average forced expiratory flow from 25 to 75%. Although each of these measures has a sound physiologic basis, their practical assessment can vary greatly among healthy persons.

(Fisher , et al 2002).

3. Arterial blood gas:

With the advent of the pulse oximeter, the use of preoperative arterial blood gas sampling has become less important. It may still be indicated, since determining the baseline CO₂ is useful in managing postoperative ventilation settings and resting hypercapnia is associated with increased perioperative risk. Another indication for an arterial blood gas has been determination of oxygen concentration. With the advent and availability of pulse oximetry in the preoperative screening clinic, this is rarely an indication

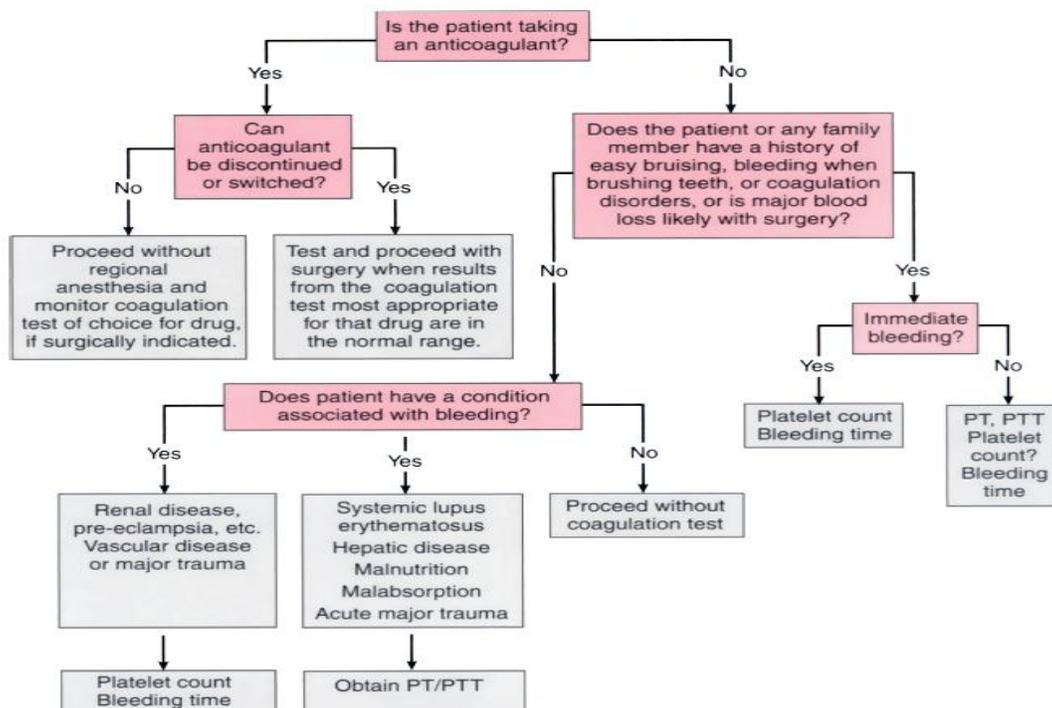
(Hall , et al 1996).

Coagulation Studies:

Coagulation disorders can have significant impact on the surgical procedure and perioperative management. However, abnormal laboratory studies in the absence of clinical abnormalities will rarely lead to perioperative problems. A

prothrombin, partial thromboplastin time analysis is indicated in the presence of previous bleeding disorders such as following injuries; after tooth extraction or surgical procedures; In the absence of a clinical bleeding diathesis, complications are extremely rare. If such a history exists, it may be prudent to avoid regional anesthesia.

(Asaf, et al 2001).



Figure(1-3) Procedure for determining whether coagulation tests are needed. PT, prothrombin time; PTT, partial thromboplastin time. (Redrawn and modified from Roizen MF, Hurd MJ: Preoperative patient evaluation. In Rogers MC (ed): Current Practice in Anesthesiology, 2nd ed. St. Louis, Mosby-Year Book, 1990, p 14.)

Chemistries Of Blood:

What blood chemistries would have to be abnormal, and how abnormal would they have to be, to justify changing one's perioperative management? Abnormal hepatic or renal function might change the choice and dose of anesthetic or adjuvant drugs.

(Khuri , et al 1997).

Complete Blood Count and Hemoglobin Concentration:

The use of a preoperative hemoglobin has been suggested as the only test necessary in many patients prior to elective surgery. The current recommendations of the National Blood Resource Education Committee is that a hemoglobin of 7 g/dL is acceptable in patients without systemic disease. In patients with systemic disease, signs of inadequate systemic oxygen delivery (tachycardia, tachypnea) are an indication for transfusion.

(Pemberton , et al 2002).

Electrolytes:

In the past, patients routinely received a chemistry panel prior to surgery. Because of technology issues, it may be cheaper to obtain a standard battery than to determine one particular test. However, testing rarely leads to any change in perioperative management. There are numerous guidelines regarding the need for preoperative electrolytes(Na, K, Ca, Mg, Ph).

(Wong , et al 1983).

Fasting

Preoperative fasting:

The time of last oral intake of solid and fluid must be established. One of the commonest causes of anaesthetic-related mortality and morbidity is aspiration of gastric contents. Many anaesthetic departments are currently re-evaluating their standing orders on the issue of preoperative fasting for clear fluids in light of clinical studies which have demonstrated the speed of gastric emptying in healthy adults. Several important points need to be emphasized on this topic.

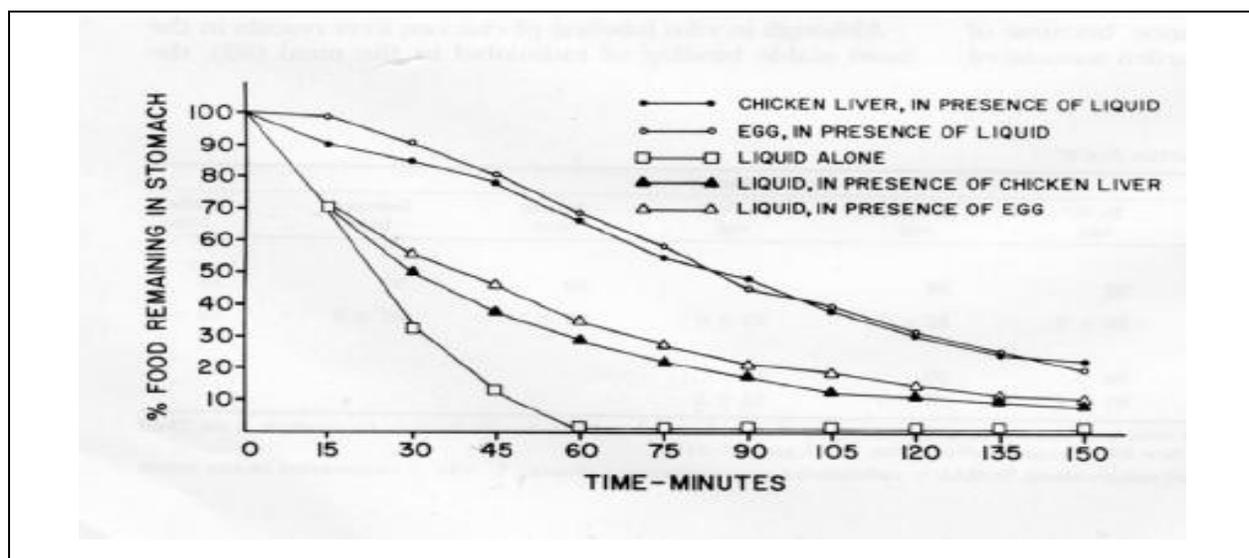
(Cote ., 1990).

Preoperative Fasting Guidelines

The issue of preoperative fasting is quite controversial and was the subject of practice guidelines published in 1999 by the American Society of Anesthesiology . The guidelines indicate that the minimal fasting period for clear liquids is 2 hours, breast milk is 4 hours, non-human milk is 6 hours, infant formula is 6 hours, light meal is 6 hours and solids is 8 hours. Pulmonary aspiration of gastric contents is associated with significant morbidity and mortality. Factors predisposing to regurgitation and pulmonary aspiration include inadequate anaesthesia, pregnancy, obesity, difficult airway, emergency surgery, full stomach, and altered gastrointestinal motility.

Aspiration of 30–40 ml of gastric contents can cause serious pulmonary damage—fasting before anaesthesia aims to reduce the volume of gastric contents.

Figure(1-4) Relation between type of food and time of gastric emptying



(Zeev. , ASA 2006).

Chemical control of gastric acidity and volume:

Antacids can be used to neutralize acid in the stomach thereby reducing the risk of damage should aspiration occur. Particulate antacids are not recommended. Sodium citrate solution administered shortly before induction is the agent of choice in high-risk cases (e.g. pregnancy) but this results in an increase in gastric volume.

- H₂ blockers/proton pump inhibitors decrease secretion of acid in the stomach and should be used for high-risk patients. Ideally, these agents should be

administered on the evening before surgery (or early morning for an afternoon list) and a second dose given 2 h preoperatively. Although these agents are generally very effective, there is a small failure rate and therefore other precautions to prevent aspiration are necessary.

- Gastric motility enhancing agents such as metoclopramide increase gastric emptying in healthy patients, but a clear benefit in trauma patients has not been demonstrated. Metoclopramide is more effective IV than orally.
- Anticholinergic agents do not have a significant effect and are not routinely recommended.
- Pregnant patients should be given ranitidine 150 mg on the evening before elective surgery (or at 0700h for an afternoon list) and again 2 h preoperatively. During labour, high-risk patients should be given oral ranitidine, 150 mg 6-hourly. For emergency cases, ranitidine 50 mg intravenously should be given at the earliest opportunity. In addition, 30 ml of 0.3 M sodium citrate should be given to neutralize any residual gastric acid.

The ASA do not recommend routine use of these agents in healthy, elective patients.

(Zeev ., ASA 2006).

Consent

Informed Consent:

Informed consent is obtained by discussing the potential risks and benefits of a proposed action and any available alternatives and then ascertaining that the patient (or agent) understands and agrees to what is being proposed. There may be some residual debate as to whether there needs to be a separate informed consent for the anesthesia for a planned surgical operation or whether consent to the operation implies consent for the anesthesia. Now, most anesthesiologists obtain a separate informed consent because there are wholly separate identifiable "material risks" associated with the anesthetic independent of the surgery. This has become the expected standard of care. It is inadequate to expect the surgeon to fully discuss the anesthetic and, particularly, any special anesthesia implications of the patient's medical condition. In a discussion, what risks should be disclosed to obtain truly informed consent for anesthesia? There needs to be a balance between giving enough information that would be significant for a "reasonable person" to make a decision and frightening the patient with a long list of potential, very rare, severe complications. "Negligible" risks are not "material" and need not be detailed. Exactly what this means in anesthesia care will be defined over time. Using an analogy to automobile accidents, it is possible to mention death as a remote risk to every patient without scaring them. The significant broadcast and print publicity recently of cases of alleged awareness during general anesthesia could justify some mention of this topic, including of the use of any technology intended to help address this concern. Overall, of course, all patient questions must be answered, specifically using easily understandable terms and language and, if possible, with a witness present. Consent is a state of mind, not a piece of paper. However, documentation of the consent discussion is necessary (including identification of

anybody present in addition to the patient or guardian). A preprinted form alone is inadequate because it can be signed without any understanding of the content. If used, a printed form can help record the necessary separate anesthesiologist's consent documentation. All this will not prevent charges of lack of informed consent in lawsuits, but will significantly aid in the defense against them.

(John , et al ASA 2006).

Restricted consent:

- Some patients may consent to treatment in general, but refuse consent for certain aspects of the treatment, e.g. Jehovah's Witness patients who refuse blood transfusion.
- Restricted consent should be discussed with the patient, in the presence of a witness, so that they are fully aware of the implications of withholding the treatments refused.
- The details of the restriction should be carefully documented on the consent form.
- The patient's wishes must be respected.

Treatment without consent:

- In an emergency, consent is not necessary for life-saving procedures.

- Unconscious patients may be given essential treatment without consent. It is good practice to consult with the next of kin, but they cannot give or refuse consent for adult patients.
- Patients who are 'incompetent' may be given treatment provided it is in their best interest.
- Patients detained under the Mental Health Act 1983 may be treated for the mental disorder without consent but not for physical disorder unless they are 'incompetent'. Electroconvulsive therapy requires the patient's consent or the second opinion of an authorized medical practitioner.

The anaesthetic plan discussed and agreed with the patient should be documented, including a list of the risks which have been explained. Separate written consent is not required for local or regional anaesthesia. The Department of Health recommends that written consent should be obtained for general anaesthesia but the Working Party of the Association of Anaesthetists concluded that this was not necessary.

(John , et al ASA 2006).

Chapter (2)
Premedication

For some patients, the preoperative visit alone is insufficient to allay anxiety and pharmacological methods are required. The nature of the surgical procedure, coexisting pathology or the need for a rapid recovery from anaesthesia may dictate extreme caution before the prescription of sedating premedication . Co-administration of an opioid and a benzodiazepine has a potent respiratory depressant effect.

Preoperative medication:

Management of anesthesia begins with preoperative psychological preparation of the patient and administration of a drug or drugs selected to elicit specific pharmacologic component of anesthetic management is referred to as preoperative medication. Ideally all patients should enter the preoperative period free of anxiety, sedated but easily arouable, and fully cooperative.

Psychological preparation:

Psychological preparation is provided by the anesthesiologist's preoperative visit and interview with the patient and family members. The incidence of anxiety is lower in patients visited by the anesthesiologist preoperatively than in those receiving only pharmacologic premedication and no

visit. Nevertheless, a shortage of time and the fact that some patients' problems do not lend themselves to reassurance may limit the anxiolytic value of the preoperative interview.

Pharmacologic premedication:

Pharmacologic premedication is typically administered orally or intramuscularly 1 to 2 hours before the anticipated induction of anesthesia. For outpatient surgery, premedication may be administered intravenously in the immediate preoperative period. The goals of pharmacologic premedication are multiple and must be individualized to meet each patient's unique requirements. Furthermore, multiple different drugs or combinations of drugs may be selected to achieve the same goals

(Coté ., 1999).

Table(2-1) Primary Goals of Pharmacologic Premedication

- | |
|--|
| <ol style="list-style-type: none">1. Relief of anxiety (anxiolysis). 2. Sedation. 3. Analgesia.4. Amnesia. 5. Antisialagogue effect. 6. Increase in gastric fluid pH7. Decrease in gastric fluid volume8. Attenuation of sympathetic nervous system reflex responses9. Decrease in anesthetic requirements |
|--|

10. Prophylaxis against allergic reactions

Modified from Stoelting RK: Psychological preparation and preoperative medication. In Miller RD (ed): Anesthesia. New York, Churchill Livingstone, 1981.

Secondary Goals of Pharmacologic Premedication

- 1.**Decrease in cardiac vagal activity-better achieved with the intravenous injection of an anticholinergic (atropine) just before the time of anticipated need.
- 2.**Facilitation of induction of anesthesia-not necessary in view of the availability of potent intravenous induction drugs
- 3.**Postoperative analgesia- better achieved with neuraxial opioids or the intravenous injection of an opioid just before the painful surgical stimulus (preemptive analgesia) and /or just before awakening.
- 4.**Prevention of postoperative nausea and vomiting-better achieved with the intravenous injection of an antiemetic just before awakening versus withholding treatment and treating the symptoms if necessary.

The appropriate drug or drugs and doses to be used for pharmacologic premedication can be selected only after the psychological and physiologic condition of the patient has been evaluated . The choice of drug and dose must take into account multiple factors. Certain types of patients should not receive depressant pharmacologic drugs in an attempt to decrease preoperative anxiety and produce sedation . A patient who requests to be "asleep" before being

transported to the operating room must be assured that this is neither a desired nor a safe goal of pharmacologic premedication.

(White ., 1986).

Table(2-2) Determinants of Drug Choice and Dose

Patient age and weight
Physical status
Level of anxiety
Tolerance of depressant drugs.
Previous adverse experience with drugs used for preoperative medication
Allergies
Elective or emergency surgery
Inpatient or outpatient surgery.

(Coté ., 1999).

Drugs Administered for Pharmacologic Premedication

Several classes of drugs are available to facilitate achievement of the desired goals for pharmacologic premedication in each individual patient . These drugs are administered orally if possible as opposed to intramuscularly to improve

patient comfort. The small volume of water (up to 150 mL) used to facilitate oral administration of drugs introduces no hazards related to gastric fluid volume. Ultimately, selection of specific drugs is based on a consideration of the desirable goals to be achieved balanced against any potential undesirable effects of these drugs.

Table(2-3) Drugs and Doses Used for Pharmacologic Premedication before Induction of Anesthesia

Classification	Drug	Typical adult Dose (mg)	Route of Administration
Benzodiazepines	Midazolam	1-2.5	IV
	Diazepam	5-10	Orally, IV
	Lorazepam	0.5-2	Orally IV
Opioids	Morphine	5-15	IV
	Fentanyl	25-100 mg	IV
Antihistamines	Diphenhydramine	12.5-25	Orally, IV
α_2- Agonists	Clonidine	0.1-0.3	Orally, transdermal
Antiemetics	Droperidol	1.25	IV
	Dolasetron	12.5	IV
	Ondansetron	4	IV
Anticholinergics	Atropine	0.3 – 0.6	IV
	Glycopyrrolate	0.1	IV

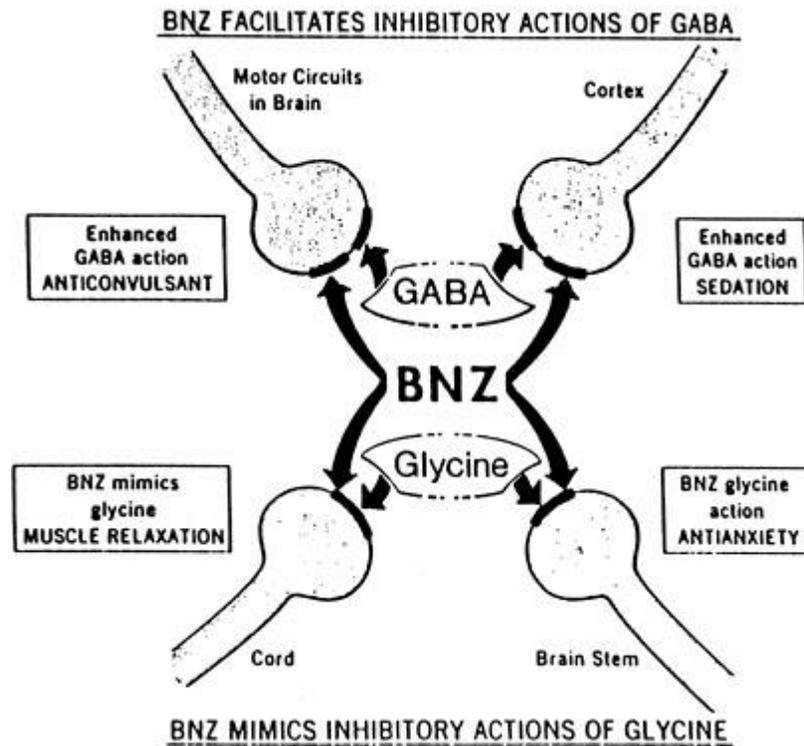
H₂ antagonists	Cimetidine	200-300	Orally
	Rantidine	150	Orally
	Famotidine	20-40	Orally
Antacids	Nonparticulate	15-30 ml	Orally
Proton pump inhibitors	Omeprazole	20	Orally
	Pantoprazole	40	IV
Gastrointestinal stimulants	Metoclopramide	10	Orally, IV

im, intramuscular; iv, intravenous.

Modified from Stoelting RK, Miller RD (eds): Basics of Anesthesia. New York, Churchill Livingstone, 1984.

Benzodiazepines:

Benzodiazepines are the most commonly administered drugs for production of sedation and relief of anxiety before elective surgery. These drugs act on specific brain receptors to produce selective anxiolytic effects at doses that do not produce excessive sedation or cardiopulmonary depression. In addition, these drugs, particularly midazolam and lorazepam, produce suppression of recall of events that occur after their administration (anterograde amnesia).



FIGURE(2-1) Schematic diagram of possible mechanisms for pharmacologic effects of benzodiazepines (BNZs). GABA, γ -aminobutyric acid. (Reprinted from Richter JJ: Current theories about the mechanisms of benzodiazepines and neuroleptic drugs. *Anesthesiology* 54:66, 1981.)

Disadvantages of benzodiazepines as used for pharmacologic premedication include excessive and prolonged sedation in occasional patients. Flumazenil, a specific benzodiazepine antagonist, is effective in reversing undesirable or unacceptably persistent effects of these drugs. Though not widely appreciated, benzodiazepines administered for preoperative medication may interfere with the release of cortisol in response to stress.

Table(2-4) Is Depressant Pharmacologic Premedication Indicated?

No	Yes
Newborn (<1 year of age)	Cardiac surgery
Elderly	Cancer surgery
Decreased level of consciousness	Coexisting pain
Intracranial pathology	Regional anesthesia
Severe pulmonary disease	
Hypovolemia	

(Kay, et al 1994).

Opioids

Advantages of the use of opioids for pharmacologic premedication include the absence of direct myocardial depression and the production of analgesia in patients who are experiencing pain preoperatively or who will require insertion of invasive monitors before induction of anesthesia. Discomfort associated with the institution of a regional anesthetic is another possible indication for use of an opioid as pharmacologic premedication. Administration of an opioid in the preoperative medication (preemptive analgesia) may decrease the need for parenteral analgesics in the early postoperative period.

Morphine and meperidine are the most commonly used opioids for pharmacologic premedication. Morphine is well absorbed after intramuscular injection, with a peak effect in 45 to 90 minutes. After intravenous administration the peak effect of morphine usually occurs within 20 minutes. Inclusion of morphine in the preoperative medication decrease the likelihood that undesirable medication decreases the likelihood that undesirable increases in heart rate will accompany surgical stimulation during the administration of volatile anesthetics.

Pharmacologic premedication with intramuscular administration of opioids may seem reasonable when a nitrous oxide-opioid anesthetic is planned. The opioid, however, may be just as logically given intravenously immediately before the induction of anesthesia. In this regard, fentanyl is often administered intravenously immediately before the induction of anesthesia.

(Kanto , et al 1996).

Adverse effects of opioids used for pharmacologic premedication include depression of the medullary ventilatory center, as evidenced by decreased responsiveness to carbon dioxide, and orthostatic hypotension secondary to relaxation of peripheral vascular smooth muscle. Orthostatic hypotension will be further exaggerated if opioids are administered to patients with decreased intravascular fluid volume. Nausea and vomiting most likely reflect opioid-induced stimulation of the chemoreceptor trigger zone in the medulla. The delayed gastric emptying produced by morphine may alter the rate of absorption of orally administered drugs, increase the risk for pulmonary aspiration, and result in

nausea and vomiting. Recumbency seems to minimize nausea and vomiting after the administration of opioids, thus suggesting that stimulation of the vestibular apparatus may also be important in production of this undesirable affect. Nevertheless, opioids may be avoided for this reasons in patients undergoing outpatient surgery or those having operations (gynecologic and ophthalmologic operations) known to be associated with a high incidence of nausea and vomiting. Opioid-induced smooth muscle constriction may be manifested as choledochoduodenal sphincter spasm, which has caused some anesthesiologists to question the use of opioids in patients with biliary tract disease. The pain associated with opioid-induced biliary tract spasm may be difficult to differentiate from angina pectoris. In this regard, nitroglycerin will relieve any pain associated with both conditions, whereas administration of an opioid antagonist, naloxone, relieves only the pain that is due to opioid-induced biliary tract spasm. An annoying side effect of opioids used as pharmacologic premedication is pruritus. Which may be particularly prominent around the nose.

(Katz , et al 1992).

Antihistamines:

Antihistamines are occasionally used for pharmacologic premedication because of their sedative and antiemetic properties. Promethazine has a new warning from the FDA- associated with apnea in children and deaths.

Prophylaxis against Allergic Reactions:

Diphenhydramine (25 to 50 mg orally) has been recommended as pharmacologic premedication to provide prophylaxis against intraoperative allergic reactions in patients who have a history of chronic atopy or are undergoing procedures (radiographic dye studies) known to be associated with allergic reactions. An H₂ antagonist such as cimetidine (300 mg orally) should be administered with diphenhydramine. This combination of an H₁ antagonist (diphenhydramine) and an H₂ antagonist (cimetidine) acts by occupying peripheral/ receptor sites normally responsive to histamine, thus decreasing manifestations of any subsequent drug- induced release of histamine. Prednisone (50 mg orally or other doses) may also be added to this prophylactic regimen. Even with this prophylactic regimen, however, drug-induced allergic reactions may still occur in highly sensitive patients.

(Coté ., 1999).

α₂- Agonisis

Clonidine is a centrally acting α₂- agonist that as an antihypertensive drug. Administered as preoperative medication (0.1 mg bid or 0.1 mg patch), this drug produces sedation and attenuation of the autonomic nervous system reflex responses (hypertension, tachycardia, catecholamine release) associated with preoperative anxiety and surgical stimulation. Administration of clonidine (titrate to effect) in the preoperative medication may decrease the incidence of preoperative myocardial ischemia in patients with suspected or documented coronary artery disease. Dose requirements for inhaled and inject anesthetics are also decreased in patients receiving clonidine as preoperative medication.

Bradycardia and dry mouth are possible side effects when α_2 - agonists are administered as part of the pharmacologic premedication.

(Quintin , et al 1996).

Antiemetics :

Nausea and vomiting are unpleasant symptoms that rarely harm patients. Nevertheless, prophylactic administration of an antiemetic in the preoperative medication may be recommended with the goal of decreasing the incidence of postoperative nausea and vomiting. In this regard, females undergoing gynecologic operations and patients undergoing ophthalmologic operations are at high risk for this unpleasant symptom.

Drugs used in the preoperative medication for prophylaxis against postoperative nausea and vomiting include serotonin antagonists (ondansetron, tropisetron, granisetron, dolasetron), gastrointestinal prokinetics (metoclopramide), and phenothiazines (perphenazine). The butyrophenone droperidol is a proven effective antiemetic, but its clinical use is tempered by concern this drug may increase the QT interval on the electrocardiogram. Antiemetics are often administered intravenously before the end of surgery. Disadvantages of routine prophylactic administration of antiemetics include :

(1) increased cost, especially if serotonin antagonists are administered. (2) orthostatic hypotension.

(3) the fact that some patients vomit with or without prophylaxis.

(Coté ., 1999).

Anticholinergics:

Routine inclusion of anticholinergics as part of the pharmacologic premedication is not necessary. The most frequent reasons for administering anticholinergics are (1) production of an antisialagogue effect, (2) production of sedative and amnesic effects, and (3) prevention of reflex bradycardia . Anticholinergics have inherent side effects that need to be considered when selecting these drugs as preoperative medication . Furthermore, anticholinergics are not predictably effective in increasing gastric fluid pH or decreasing gastric fluid volume.

Table(2-5) Comparative Effects of Anticholinergics Administered Intramuscularly as Pharmacologic premedication

	Atropine	Scopolamine	Glycopyrrolate
Antisialagogue effect	+	+++	++
Sedative and amnesic effects	+	+++	0
Central nervous system toxicity	+	++	0
Relaxation of lower esophageal sphincter	++	++	++

Mydriasis and cycloplegia	+	+++	0
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0, no effect; +, small effect; ++, moderate effect; +++, large effect.

Adapted from Stoelting RK: Pharmacology and Physiology in Anesthetic Practice. Philadelphia, JB Lippincott, 1991.

Antisialagogue Effect:

The need for including an anticholinergic in the pre-operative medication to produce a antisialagogue effect has been questioned inasmuch as the currently used inhaled and injected anesthetics (ketamine being an exception) do not stimulate excessive upper airway secretions. Nevertheless, a decrease in secretions during general anesthesia, particularly when a tracheal tube is in place, is a desirable effect of an anticholinergic administered preoperatively. An antisialagogue effect is particularly important for intraoral operations, for bronchoscopy, or when topical anesthesia is necessary because excessive secretions may interfere with the surgery or impair production of topical anesthesia by diluting the local anesthetic. Administration of an anticholinergic for an antisialagogue effect is not necessary when regional anesthesia is planned.

Scopolamine is about three times more potent as an antisialagogue than atropine is. For this reason, scopolamine is often selection whe both an antisialagogue effect and sedation are desired results of preoperative medication. Glycopyrrolate may be preferentially selected when an antisialagogue effect, in the absence of sedation, is desired. As an antisialagogue, glycopyrrolate is about twice as potet as a tropine and has a long duration of action. To decrease the

period of discomfort from a dry mouth and throat, an anticholinergic can be administered intramuscularly just before the patient is transported to the operating room or intravenously just before the induction of anesthesia. Nevertheless, anxiety, fluid deprivation before elective surgery, and other drugs used for pharmacologic premedication may produce a dry mouth and throat, even in the absence of an anticholinergic.

Sedative and Amnesic Effects:

Atropine and scopolamine are tertiary amines that can cross lipid barriers, including the blood- brain barrier. The resulting sedative and amnesic effects reflect penetrance of these drugs into the central nervous system. Scopolamine, more than atropine, produces useful sedative effects, particularly in combination with benzodiazepines or opioids as used for pharmacologic premedication. It is estimated that the sedative and amnesic effects of scopolamine are 8 to 10 times greater than those of atropine. Glycopyrrolate, as a quaternary ammonium compound, cannot easily cross the blood-brain barrier and thus does not produce significant sedative or amnesic effects.

Prevention of Reflex Bradycardia :

Use of anticholinergics in the pharmacologic premedication for prevention of reflex bradycardia is a secondary objective because the dose and timing of

intramuscular administration are not appropriate for the period when bradycardia is most likely to occur. The logical approach, particularly in children with increased vagal activity, is to administer atropine or glycopyrrolate intravenously shortly before the anticipated need. Bradycardia has been observed after induction of anesthesia with propofol, thus causing some to recommend prior intravenous injection of atropine when vagal stimulation is likely to occur in association with the use of this intravenous anesthetic.

(Conner , et al 1977).

Undesirable Side Effects ofAnticholinergics:

1. Central nervous system toxicity.
2. Tachycardia.
3. Relaxation of the lower esophageal sphincter.
4. Mydriasis and cycloplegia.
5. Increase in body temperature.
6. Drying of airway secretions.
7. Increased physiologic dead space.

Central Nervous System Toxicity :

The central nervous system toxicity (central anticholinergic syndrome) produced by anticholinergics is manifested as delirium or prolonged somnolence after anesthesia. This undesirable response is more likely to follow the administration of scopolamine than atropine, but the incidence should be low with the doses used for pharmacologic premedication. Nevertheless, elderly patients may be uniquely susceptible to central nervous system toxicity secondary to atropine or scopolamine. Central nervous system toxicity is unlikely after the administration of glycopyrrolate because this drug cannot easily cross the blood-

brain barrier. It must be recognized that the toxicity attributed to the anticholinergic may also represent an uninhibited response to pain as the depressant effects of the anesthetic dissipate.

Central anticholinergic syndrome presumably reflects blockade of muscarinic cholinergic receptors in the central nervous system. Physostigmine (up to 2 mg IV; for life-threatening anticholinergic toxicity administer 1mg/min) is a specific treatment of the central nervous system toxicity caused by scopolamine or atropine in view of the ability of this tertiary amine anticholinesterase to cross the blood-brain barrier. Neostigmine and pyridostigmine are not effective anticholinesterase antidotes because their quaternary ammonium structure prevents these drugs from easily entering the central nervous system.

Tachycardia :

Scopolamine and glycopyrrolate, which have minimal cardioaccelerator effects, may be more logical selections than atropine for pharmacologic premedication when an increased heart rate would be undesirable, as in patients with mitral stenosis and atrial fibrillation. Nevertheless, the most likely cardiac response after the intramuscular administration of atropine, glycopyrrolate, or scopolamine for pharmacologic premedication is slowing of the heart rate, presumably reflecting a weak cholinergic against effect of these drugs.

(McQuay ., 1995).

H₂ Antagonists :

H₂ antagonists counter the ability of histamine to induce secretion of gastric fluid with a high concentration of hydrogen ions. Therefore, these drugs offer a pharmacologic approach for increasing gastric fluid pH before the induction of anesthesia. Routine prophylactic use of an H₂ antagonist in the pharmacologic preparation, though advocated by some, is not recommended .

Table(2-6) Summary of pharmacologic Recommendation to Reduce the Risk for Pulmonary Aspiration

Medication type and Examples	Recommendation
Antiemetics	No routine use
Antacids	No routine use
Anticholinergics	No use
Gastric acid secretion blockers	No routine use
Gastrointestinal stimulants	No routine use
Combinations of the above medications	No routine use

Modification from Warner MA, Caplan RA, Epstein BS, et al. Practice guidelines for preoperative fasting and the use of pharmacologic agents to reduce the risk of pulmonary aspiration: Application to healthy patients undergoing elective procedures. Anesthesiology 1999; 90: 896 – 905.

However, inclusion of an H₂ antagonist in the pharmacologic premedication may be a consideration in patients thought to be at increased risk for pulmonary aspiration (parturients, morbid obesity, symptoms of esophageal reflux, anticipated difficult airway management).

(Warner , et al 1999).

An objection to the routine inclusion of H₂ antagonists in the preoperative medication is the concept that all therapies should be individualized and tailored to fit specific patients, their diseases, and the particular preoperative circumstances. More important, the incidence of pulmonary aspiration and serious morbidity is sufficiently low in patients undergoing elective surgery that the cost of preventing one serious complication of pulmonary aspiration by the routine use of prophylactic medications such as H₂ antagonists would be very high. Furthermore, these drugs are not 100% effective (an inherent failure rate). H₂ antagonists will not alter the pH of gastric fluid that is preset before administration of the drug, nor will they facilitate gastric emptying. Under no circumstances can preoperative medication with H₂ antagonists be substituted for an anesthetic technique that includes placement of a cuffed tracheal tube or maintenance of consciousness to protect the lungs from inhalation of gastric fluid.

(White ., 1986).

Acid suppression:

Antacids administered 15 to 30 minutes before induction of anesthesia are nearly 100% effective in increasing gastric fluid pH to greater than 2.5. The efficiency of antacids may be dependent to some extent on patient movement to facilitate complete mixing with gastric fluid. Nonparticulate antacids, such as sodium citrate, effectively increase gastric fluid pH to greater than 2.5 and do not produce significant pulmonary dysfunction should inhalation of fluid containing antacids occur.

In contrast to H₂ antagonists, administration of antacids is effective in increasing the pH of gastric fluid that is present in the stomach at the time of administration (no lag time). This desirable effect, however, is predictably associated with an increased gastric fluid volume that does not occur with H₂ antagonists. Nevertheless, withholding antacids because of concern for increasing gastric fluid volume is not warranted. As with H₂ antagonists, routine inclusion of antacids in the pharmacologic premedication is not recommended. Rather, antacids are more appropriately administered to selected patients who are judged by the anesthesiologist to be at increased risk for pulmonary aspiration. Intravenous administration of a proton pump inhibitor will achieve acid suppression within hours. Intravenous formulations in the United States include esomeprazole, lansoprazole, and pantoprazole.

(Warner , et al 1999).

Gastrointestinal Prokinetics :

Gastrointestinal prokinetics (metoclopramide, cisapride) may be considered as part of the pharmacologic premedication in selected patients because of the ability of these drugs to stimulate gastric emptying (see Table 13-24). An antiemetic effect of these drugs is not a consistent observation. Of interest, the antibiotic erythromycin promotes gastric emptying and has been advocated as a pharmacologic method to decrease the risk for aspiration before emergency anesthesia and surgery.

(Kopp, et al 1997).

Metoclopramide:

Metoclopramide speeds gastric emptying by selectively increasing the motility of the upper gastrointestinal tract and relaxing the pyloric sphincter. The onset of metoclopramide's effect is 30 to 60 minutes after oral administration and 1 to 3 minutes after intravenous injection. The drug may be useful in pharmacologic preoperative medication intended to decrease gastric fluid volume in at-risk patients (diabetics with gastroparesis, parturients, patients who have recently ingested solids and require emergency surgery for disease unrelated to the gastrointestinal tract, anticipated difficult airway management). Nonetheless, metoclopramide does not guarantee gastric emptying, and its beneficial effects may be offset by the concomitant or prior administration of anticholinergics, opioids, or antacids. The ability of metoclopramide to increase lower esophageal sphincter tone may also be negated by inclusion of atropine in the preoperative medication. Metoclopramide does not predictably alter gastric fluid pH. Side

effects of metoclopramide include abdominal cramping if rapidly administered intravenously and occasional neurologic dysfunction reflecting passage into the central nervous system and production of dopamine receptor blockade. Administration of metoclopramide in the presence of known or suspected gastrointestinal obstruction is not recommended.

(White ., 1986).

Beta-Blockers

For patients with known or suspected coronary artery disease, preoperative beta-blockers may add to safety in the perioperative period. Clinical studies have shown that beta-blockers in this setting have reduced mortality and the incidence of nonfatal myocardial infarction after surgery. Because benefit has been shown with several different beta-blockers, it is probably a drug class effect or hemodynamic effect rather than the result of employing a specific beta-blocker. Contraindications to preoperative beta-blocker therapy include known allergy to beta-blockers, second- or third-degree heart block, congestive heart failure, acute bronchospasm, low systolic blood pressure (less than 100 mm Hg), slow heart rate (less than 60 beats per minute), and other hemodynamic instability.

(Lyons , et al 1975).

Antibiotics :

Antibiotics are often administered immediately before operation for contaminated, potentially contaminated, or dirty surgical wounds. Prophylactic antibiotics may be warranted for “clean” surgical procedures when infection would be catastrophic. Other instances for the use of prophylactic antibiotics include in the immunosuppressed patient, in the aged, or in patients taking steroids. Antibiotics given immediately before surgery are also used for the prevention of endocarditis.

(Dajani , et al 1997).

Steroids :

Steroid administration may be necessary immediately before surgery in the patient treated for hypoadrenocorticism or in the patient with suppression of the pituitary-adrenal axis owing to present or previous administration of corticosteroids. It is impossible to identify the specific duration of therapy or dose of steroids that produces pituitary and adrenal suppression. Marked variability among patients exists. Certainly, more suppression may be expected the higher the dose and the longer the duration of therapy. One regimen is to administer 25 mg of cortisol preoperatively and then give an intravenous infusion of 100 mg of cortisol over the next 12 to 24 hours for adult patients. Another method is to administer 100 mg of hydrocortisone intravenously before, during, and after surgery. This dose is meant to equal the estimated maximum amount of steroid that stress could produce in patients perioperatively.

(Forrest , et al 1997).

Insulin :

Anesthesia and surgery may interrupt the regular meal schedule and insulin administration of diabetics . Perioperative stress may increase serum glucose concentrations. A plan for perioperative insulin and glucose management must be agreed on among the anesthesiologist, the surgeon, and the endocrinologist involved in the diabetic patient's care. There are several methods of doing this, none of which has proved superior to the others. One method is to administer one-fourth to one-half of the usual daily dose of intermediate-acting insulin preoperatively in the morning of surgery and begin an infusion of glucose-containing fluid. A second way is to administer no insulin or no glucose preoperatively and to measure serum glucose levels frequently during anesthesia. Regular insulin or glucose is then administered intraoperatively and postoperatively as needed. A third method is to begin an infusion of insulin and glucose immediately preoperatively and to check serum glucose levels frequently.

(Lazar , et al 2004).

Predmedication for outpatients:

When administering pharmacologic preoperative medication to outpatients, the introduction of persistent drug effects that delay emergence from anesthesia or prevent early discharge (nausea and vomiting) after elective and usually minor surgery must be avoided.

(McQuay ., 1995).

Chapter (3)
Preoperative Preparation For
Special Conditions

1. Cardiovasculare Diseases

Preop Assessment of the Patient with Cardiac Disease:

The past several years have seen a dramatic increase in the number and quality of randomized and prospective studies to define the optimal and most cost-effective approach to the value of preoperative cardiovascular evaluation and management for noncardiac surgery. In 2002, the American College of Cardiology/American Heart Association (ACC/AHA) Task Force on Guidelines published an update on the Guidelines on Perioperative Cardiovascular Evaluation for Noncardiac Surgery. This past year, the Task Force has published a focused update on the use of betablockers, while an update on the complete Guidelines should be published in early 2007.

(Fleisher ,et al 2006).

Perioperative interventions based upon preoperative cardiac evaluation:

- Decision to forego surgery.
- Modification of surgical procedure.
- Delay case for treatment of unstable symptoms.

- Modification of intraoperative monitors.
- Modification of perioperative medical therapy.
- Initiation of beta-blockers, statins, alpha-2 agonists.
- Modification of postoperative monitoring (e.g. Inten. Care Unit).
- Coronary revascularization before noncardiac surgery.
- Modification of location of care.

Clinical Assessment:

Since the original manuscript by Goldman and colleagues in 1977 describing a Cardiac Risk Index, multiple investigators have validated various clinical risk indices for their ability to predict perioperative cardiac complications.

(Goldman , et al 1987).

High risk procedures for which coronary artery bypass grafting reduced the risk of noncardiac surgery compared to medical therapy include major vascular, abdominal, thoracic, and orthopedic surgery. Ambulatory procedures denote low risk. The ACC/AHA Guidelines defined three tiers of surgical stress based upon composite cardiac events rates.

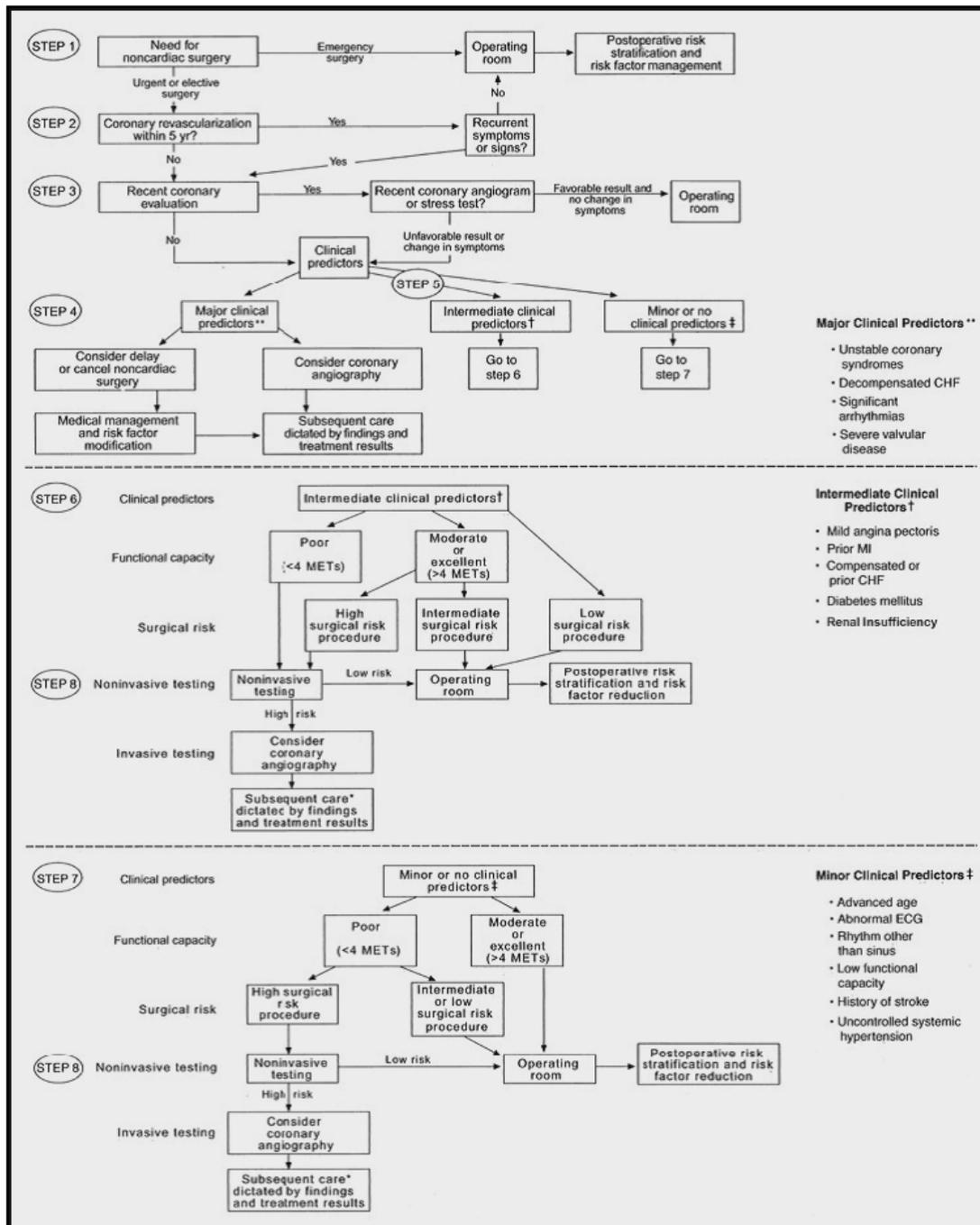
(Reilly, et al 2003).

Approach to the Patient:

It is important to recognize that this algorithm was last updated in 2002, and may likely be changed in the next update, based upon the new studies. These potential changes are outlined below. First, the clinician must evaluate the

urgency of the surgery and the appropriateness of a formal preoperative assessment. Next, determine if the patient has undergone a previous revascularization procedure or coronary evaluation. Those patients with unstable coronary syndromes should be identified, and appropriate treatment instituted. Finally, the decision to undergo further testing depends upon the interaction of the clinical risk factors, surgery specific risk, and functional capacity. For patients at intermediate clinical risk, both the exercise tolerance and the extent of the surgery are taken into account with regard to the need for further testing.

(Eagle , et al 2002).



FIGURE(3-1) The American Heart Association/American College of Cardiology Task Force on Perioperative Evaluation of Cardiac Patients Undergoing Noncardiac Surgery has proposed an algorithm for decisions regarding the need for further evaluation. This represents one of multiple algorithms proposed in the literature. It is based on expert opinion and incorporates six steps. First, the clinician must evaluate the urgency of the surgery and the appropriateness of a formal preoperative assessment. Next, he or she must determine whether the patient has had a previous revascularization procedure or coronary evaluation. Those patients with unstable coronary syndromes should be identified, and appropriate treatment should be instituted. The decision to have further testing depends on

the interaction of the clinical risk factors, surgery-specific risk, and functional capacity. (Adapted with permission from Eagle K, Brundage B, Chaitman B et al: Guidelines for perioperative cardiovascular evaluation of noncardiac surgery. A report of the American Heart Association/American College of Cardiology Task Force on Assessment of Diagnostic and Therapeutic Cardiovascular Procedures. Circulation 93:1278, 1996.)

Interventions for patients with documented CAD:

Strategies to reduce the perioperative risk of noncardiac surgery have recently been reviewed. Eagle et al studied over 3000 noncardiac surgeries in patients who were originally enrolled in the CASS, and compared the rate of perioperative cardiac morbidity and mortality in those patients in the surgical versus medical treatment arms.

(Eagle , et al 1997).

In those patients who survived coronary artery bypass grafting (CABG), the rate of perioperative MI was lower for intermediate or high-risk surgeries, but not low risk surgeries. McFalls and colleagues reported the results of a multicenter randomized trial in the Veterans Administration Health System in which patients with documented coronary artery disease on coronary angiography, excluding those with left main disease or severely depressed ejection fraction (<20%), were randomized to CABG(59%) or percutaneous transluminal coronary angiography (PTCA)(41%) versus routine medical therapy.

(McFalls,et al 2004).

We have recently demonstrated that perioperative morbidity and mortality remains elevated for approximately 35 days after previous stent placement.

(Vicenzi , et al 2006).

Drug-eluting stents may represent an additional risk over a prolonged period (up to 6 months) based upon case reports. There is now a great deal of evidence to suggest that perioperative medical therapy can be optimized in patients with coronary artery disease as a means of reducing perioperative cardiovascular complications. Multiple studies have demonstrated improved outcome in patients given perioperative betablockers, especially if heart rate is controlled.

(Stevens ,et al 2003).

The current Focused Update to the ACC/AHA Guidelines on perioperative beta-blockade advocates that perioperative beta-blockade is a Class I indication and should be used in patients previously on beta-blockers and those with a positive stress test undergoing major vascular surgery.² The use of these agents in those without active CAD or undergoing less invasive procedures is advocated as a Class IIa recommendation. Based upon these newer studies, beta blockers may not be effective if heart rate is not well controlled, or in lower risk patients. A study of 497 vascular surgery patients randomized to a fixed dose of metoprolol versus placebo demonstrated no difference in perioperative outcome.

(Yang ,et al 2004).

A trial of metoprolol in diabetic patients undergoing a diverse group of surgical procedures was unable to demonstrate any difference in perioperative outcomes.

(Juul .,2004).

Other pharmacologic agents also have been shown to improve perioperative cardiac outcome. Alpha-2 agonists have been shown to improve both perioperative mortality and 6 month event-free survival.

(Wallace , et al 2004) .

Perioperative statins have been shown to improve cardiac outcome. In a case controlled study, Poldermans and colleagues were able to show that statin therapy was associated with reduced mortality after vascular surgery, even in the subset of patients on beta blocker therapy.

(Poldermans , et al 2003).

Durazzo and colleagues published a randomized trial of 200 vascular surgery patients in which statins were started an average of 30 days prior to vascular surgery.

(Durazzo ,et al 2004).

A significant reduction in cardiovascular complications was demonstrated using this protocol. A multi-modal approach to medical management should be taken in high risk patients.

Summary:

Preoperative evaluation should focus on identifying patients with symptomatic and asymptomatic coronary artery disease and the exercise capacity of the patient. The decision to perform further diagnostic evaluation depends upon the interactions of patients and surgery specific factors, as well as exercise capacity, and should be reserved for those at moderate risk undergoing major or intermediate surgery with poor exercise capacity. The indications for coronary interventions are the same in the perioperative period as for the non-operative setting.

(Lee ., 2006).

2. Respiratory Disorders

General Preoperative and Preprocedure Considerations:

There is now an increasing volume of literature regarding the identification of the patient at risk of respiratory complications. Respiratory complications are at least as, and sometimes more common than cardiac complications. However, reaching a consensus on what constitutes a postoperative respiratory complication has proved difficult in recent years and has significantly hindered research in this area. Improvements in the health of the population, advances in

anaesthesia and surgery and reduction in prevalence of smoking amongst the population have all combined to cause problems interpreting the significance of some of the early studies on respiratory risk and complications.

(Lawrence , et al 1995).

Collins and colleagues prospectively examined the benefits of preoperative antibiotics, perioperative chest physiotherapy and therapy with bronchodilating drugs, and routine postoperative analgesia (morphine) on postoperative respiratory complications in patients with COPD. Of these therapies, only preoperative treatment with antibiotics had a beneficial effect. Warner and coworkers collected data retrospectively about smoking history and prospectively (concurrently) about pulmonary complications for 200 patients undergoing CABG surgery. These investigators documented that 8 weeks or more of smoking cessation was associated with a 66% reduction in postoperative pulmonary complications. Smokers who stopped for less than 8 weeks actually had an increase (from 33% for current smokers to 57.1% for recent quitters) in the rate of one or more of the six complications surveyed: purulent sputum with pyrexia; need for respiratory therapy care; bronchospasm requiring therapy; pleural effusion or pneumothorax (or both) necessitating drainage; segmental pulmonary collapse, as confirmed by radiography; or pneumonia necessitating antibiotic therapy. Others have found that both shorter and longer periods of cessation of smoking were needed before achieving cardiovascular and hematologic benefit. Of note, Bluman and associates performed a retrospective chart review of 410 patients undergoing noncardiac surgery at a VA hospital. Current smoking was associated with a nearly sixfold increase in risk for a postoperative pulmonary complication. Reduction in smoking

within 1 month of surgery was not associated with a decreased risk of postoperative pulmonary complications.

(Bluman, et al 1998).

Nakagawa and coauthors also reported higher pulmonary complication rates in patients undergoing pulmonary surgery who quit within 4 weeks of surgery than in current smokers or those who had stopped smoking for more than 4 weeks.

(Nakagawa , et al 2001).

Not all studies demonstrate beneficial effects of pretreatment. In afebrile outpatient ASA I and II children with no lung disease or findings who underwent non-cavitary, nonairway surgery for under 3 hours, neither albuterol nor ipratropium premedication decreased adverse events. Evaluation of dyspnea is especially useful and thus warrants discussion here . Boushy and coworkers found that grades of preoperative dyspnea correlated with postoperative survival.

(Elwood , et al 2003).

TABLE(3-1) Grade of dyspnea caused by respiratory problems (assessed in terms of walking on the level at a normal pace)

Category	Description
0	No dyspnea while walking on the level at a normal pace

I	"I am able to walk as far as I like, provided I take my time."
II	Specific (street) block limitation ("I have to stop for a while after one or two blocks.")
III	Dyspnea on mild exertion ("I have to stop and rest while going from the kitchen to the bathroom.")
IV	Dyspnea at rest

Modified from Boushy SF, Billing DM, North LB, et al: Clinical course related to preoperative pulmonary function in patients with bronchogenic carcinoma. Chest 59:383, 1971.

TABLE(3-2) Classification of risk of pulmonary complications for thoracic and abdominal procedures

Category	Points
I. Expiratory spiogram	
A. Normal (% FVC + % FEV1 /FVC > 150)	0
B. % FVC + % FEV1 /FVC = 100-150	1
C. % FVC + % FEV1 /FVC < 100	2
D. Preoperative FVC < 20 mL/kg	3
E. Postbronchodilator FEV1 /FVC < 50%	3
II. Cardiovascular system	
A. Normal	0
B. Controlled hypertension, myocardial infarction without sequelae for more than 2 yr	0

C. Dyspnea on exertion, orthopnea, paroxysmal nocturnal dyspnea, dependent edema, congestive heart failure, angina	1
III. Nervous system	
A. Normal	0
B. Confusion, obtundation, agitation, spasticity, discoordination, bulbar malfunction	1
C. Significant muscular weakness	1
IV. Arterial blood gases	
A. Acceptable	0
B. PaCO ₂ >50 mm Hg or PaO ₂ <60 mm Hg on room air	1
C. Metabolic pH abnormality >7.50 or <7.30	1
V. Postoperative ambulation	
A. Expected ambulation (minimum, sitting at bedside) within 36 hr	0
B. Expected complete bed confinement for \geq 36 hr	1

From Arozullah AM, Daley J, Henderson WG, et al: Multifactorial risk index for predicting postoperative respiratory failure in men after major noncardiac surgery. The National Veterans Administration Surgical Quality Improvement Program. Ann Surg 232:242–253, 2000, with permission.

Arozullah and associates developed the first validated multifactorial risk index for postoperative respiratory failure, defined as mechanical ventilation for more than 48 hours after surgery or reintubation and mechanical ventilation after postoperative extubation.

(Arozullah , et al 2000).

TABLE(3-3) Postoperative pneumonia risk index

	Preoperative Risk Factor Point Value
Type of surgery	
Abdominal aortic aneurysm repair	15
Thoracic	14
Upper abdominal	10
Neck	8
Neurosurgery	8
Vascular	3
Age	
80 yr	17
70–79 yr	13
60–69 yr	9
50–59 yr	4
Functional status	
Totally dependent	10
Partially dependent	6
Weight loss >10% in past 6 mo	7

History of chronic obstructive pulmonary disease	5
General anesthesia	4
Impaired sensorium	4
History of cerebrovascular accident	4
Blood urea nitrogen level	
<2.86 mmol/L (0.8 mg/dL)	4
7.85–10.7 mmol/L (22–30 mg/dL)	2
≥10.7 mmol/L (≥30 mg/dL)	3
Transfusion >4 U	3
Emergency surgery	3
Steroid use for chronic condition	3
Current smoker within 1 yr	3
Alcohol intake >2 drinks/day in past 2 wk	2

From Arozullah AM, Khuri SF, Henderson WG, et al: Development and validation of a multifactorial risk index for predicting postoperative pneumonia after major noncardiac surgery. Ann Intern Med 135:847–857, 2001, with permission.

Despite the lack of definitive data establishing the efficacy of preoperative pulmonary testing and therapy, we recommend the following approach:

1. Eradicate acute infections and suppress chronic infections by using appropriate diagnostic measures and antibiotic treatment.
2. Relieve bronchospasm by using inhaled corticosteroids and bronchodilating drugs and document such relief with measurements of FEV1 .

3. In patients with bronchial asthma, consider the administration of corticosteroids beginning at least 48 hours before surgery in patients with a significant history of bronchospastic disease to achieve the maximal effect at the time of surgery. No randomized data support such an approach, but studies have not shown an increase in the risk of respiratory infection or wound complications.

(Kabalin , et al 1995).

4. Institute measures to improve sputum clearance and familiarize the patient with respiratory therapy equipment (incentive spirometry) and postural drainage maneuvers. Initiate practice coughing and deep-breathing exercises .

5. Treat uncompensated right ventricular heart failure with digoxin, diuretics, oxygen, and drugs that decrease pulmonary vascular resistance (e.g., hydralazine).

6. The use of low-dose heparin prophylactically to decrease the incidence of venous thrombosis (and pulmonary emboli) has been the standard. More recently, the use of lowmolecular- weight heparin and intermittent compression stockings has become standard for high-risk patients.

(O'Donnell , et al 2003).

7. Identify and treat suspected or diagnosed sleep apnea with CPAP or BiPAP or other measures as indicated earlier (in the section "Obesity").

8. Encourage reduction or cessation of smoking at least 4 weeks and preferably 8 weeks or more before surgery. Although the debate about cessation of smoking includes more than pulmonary risk, cardiovascular, hematologic, and aspiration

risk has also not been shown to be responsive to short-term cessation. Perhaps the benefit of using a major life event, an operation, to promote cessation of smoking is worth the increased short-term risk that encouraging cessation within a day or two of surgery would entail; the latter hypothesis remains to be tested. Even young people who smoke only a half to a pack of cigarettes per day exhibit abnormalities in respiratory function. Avoiding passive smoking also appears beneficial.

(Skolnick , et al 1998).

Chronic obstructive pulmonary disease:

- Patients with chronic obstructive pulmonary disease (COPD) are at increased risk of postoperative respiratory complications, the level of increased risk related to the severity of the lung disease. Hypercapnia is particularly ominous.
- Patients with COPD should be optimised prior to surgery with the usual therapies and those with acute exacerbations should be deferred until treated.

(Smetana . , 1999).

Asthma:

Asthma is one of the most common coexisting diseases that confronts the anesthesiologist. During the patient interview it is important to elicit information regarding inciting factors, severity, reversibility, and current status. Frequent use of bronchodilators, hospitalizations for asthma, and the requirement for systemic steroids are all indicators of the severity of the disease. After an episode of asthma, airway hyperreactivity may persist for several weeks. In addition to bronchodilators, perioperative steroids are worth considering as prophylaxis for

the severe asthmatic; for example, hydrocortisone 100 mg intravenously every 8 hours on the day of surgery. The possibility of adrenal insufficiency is also a concern in those patients who have received more than a “burst and taper” of steroids in the previous 6 months.

(Whyte ,et al 1993).

3. Neurological Disorders

All significant neurologic or mental disease almostly identified by taking history and performing the physical examination. Information gathered from the history that would warrant further investigation includes a previous need for postoperative ventilation in a patient without inordinate lung disease, which would indicate the possibility of metabolic neurologic disorders such as porphyria, alcoholic myopathy, other myopathies, neuropathies, and neuromuscular disorders such as myasthenia gravis.

(Levy , et al 1980).

A primary goal of neurologic evaluation is to determine the site of the lesion in the nervous system. Such localization to one of four levels (supratentorial compartment, posterior fossa, spinal cord, peripheral nervous system) is essential for accurate diagnosis and appropriate management.

(Lowenstein , et al 1997).

(A) Disorders Of Central Nervous System:

(1) Epilepsy:

Preoperative Considerations:

Characterization of the type and the cause of seizure is important in detecting such activity preoperatively. Seizer particularly grand mal seizures are serious complicating factors in surgical patients and should be treated aggressively to prevent musculoskeletal injury, hypoventilation, hypoxemia and aspiration of gastric contents.

(Morgan et al., 2006).

Full blood count, and urea and electrolytes. These are indicated because a number of anticonvulsant drugs have an effect on blood cells and serum.

Table(3-4) Blood abnormalities that may be caused by anticonvulsant drugs
adapted from (Hutton, 2002)

Effect	Drug
Hemoglobin Level reduced	-Phenytoin - Phenobarbitone. - Vigabatrin.
Thrombocytopenia	- Sodium valproate

	- Carbamazepine. - Ethosuximide. - Primidone.
Leucopenia	- Carbamazepine. - Primidone.
Low serum sodium	- Carbamazepine.
Abnormal liver function tests	- Sodium valproate. - Carbamazepine.

Although the electroencephalogram (EEG) is the most important test in evaluation and follow-up, it is unnecessary in the routine preparation for surgery. Continue anticonvulsant medication on the day of surgery to prevent a withdrawal fit. Fits can be induced by extreme nervousness, so a sedative premedication is advisable.

(Hutton., 2002) .

Table(3-5) Agents and other factors that might cause a seizure in the preoperative period **adapted from (Hutton, 2002)**

Patient related	Serum related	Drug related	Technique related
Poor existing	Hypoglycemia	Omission of	Hypoxia

control		anticonvulsant therapy	
Pre-eclamsia	Hyponatraemia	Proconvulsant drugs	Hypercapnia
Pyrexia	Uraemia		Hypocapnia

(2) Cerebrovascular Disease(TIA):

* Preoperative Management:

Preoperative assessment requires careful neurologic and cardiovascular evaluations. The type of stroke, the presence of neurologic deficits, and the extent of residual impairment should be determined. Thrombotic strokes are most common and usually occur in patients with generalized atherosclerosis. Most patients are elderly and have co-morbid conditions such as hypertension, hyperlipidemia, and diabetes. Coexisting coronary artery disease and renal impairment are common. Embolic strokes are most often associated with mitral valve disease or endocarditis or follow valve replacement. Hemorrhagic strokes are typically due to accelerated hypertension, rupture of a cerebral aneurysm, or an arteriovenous malformation. Many patients, following non hemorrhagic strokes, are placed on long-term warfarin or anti platelet therapy. The risk of stopping such therapy preoperatively for a few days appears small. Clotting studies and a bleeding time should be used to confirm reversal of their effect prior to operation. Once surgical hemostasis has been achieved (12- 48 hours), anticoagulants or aspirin may be resumed postoperatively. Hypertension, angina, congestive heart failure. And hyperglycemia should be under good control

preoperatively. With the exception of diuretics and insulin, all patients should receive their usual medications up to the time of surgery.

(Lee et al, 2004).

(B) Neuromuscular Junction Disorders:

Myasthenia Gravis:

Preoperative Considerations for Myasthenia Gravis:

The anesthesiologist should elicit certain symptoms of Myasthenia Gravis (MG) during the preoperative history: aspiration or respiratory failure, degree of fatigability of muscles with use, responses to neostigmine or edrophonium, and general exacerbating or remitting factors.

(Dillon., 2004).

- Preoperative pulmonary function testing may likewise identify persons at particular risk. In one study, those with a forced vital capacity less than 40 ml/kg or 2.9 L total were more likely to require prolonged mechanical ventilatory support.

(Leventhal et al, 1980).

- The dosages of some medications maybe of particular importance to the anesthesioligst. For example, those receiving pyridostigmine in large amounts (greater than 750 mg/d) were more likely to have delayed extubation.

(Leventhal et al, 1980).

- Any preoperative sedation administered at home, or in a preoperative waiting area, especially with opioids or benzodiazepines, is ill-advised because of their essentially unpredictable effects on myasthenic patients.

(Dillon ., 2004).

- The use of metoclopramide and either proton-pump inhibitors or histamine 2 receptor-blocking drugs prior to induction are reasonable precautions. They serve to minimize the risk of pulmonary aspiration of acidic gastric contents .

(Dillon ., 2004).

Drug Interaction Between Anesthetics And commonly Administered Drugs for Myasthenia Gravis:

There is no experimental evidence, clinical or otherwise, to suggest that altering the MG patient's anticholinesterase regimen before anesthesia has any clinically significant effect on either the onset of neuromuscular blockade or the duration of mechanical ventilation following surgery. The theoretical action of the anticholinesterase is such that it would augment the effect of succinylcholine and inhibit the effect of nondepolarizing neuromuscular blocking drugs. In the absence of any evidence suggesting differences in outcome, continuing such medications as pyridostigmine, including an oral dose immediately prior to induction, is recommend .

(Dillon ., 2004).

(C) Muscle Disorders:

(1) Muscular Dystrophy

Types of Muscular Dystrophy

- 1-Duchenne 2-Becker 3-Emery-Dreifuss 4-Limb-girdle
5-Oculopharyngeal 6-Fascioscapulohumeral 7-Congenital
muscular dystrophy

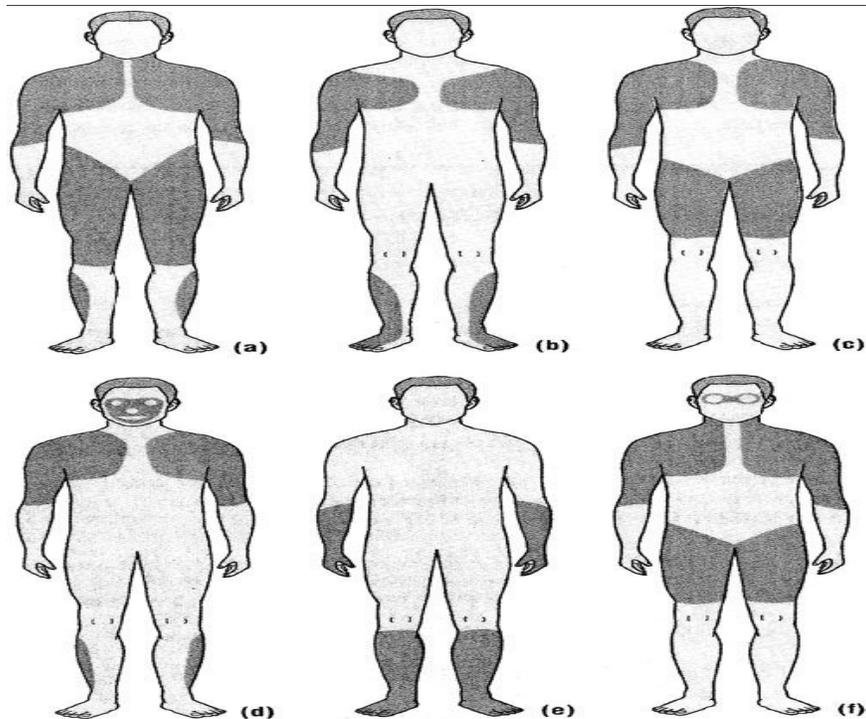
Preoperative Considerations In Duchenne's And Becker's Muscular Dystrophies:

Preparations for anesthesia in the patient affected with Duchenne's muscular dystrophy must take into consideration implications of increased permeability of skeletal muscle membrane and decreased cardiopulmonary reserve.

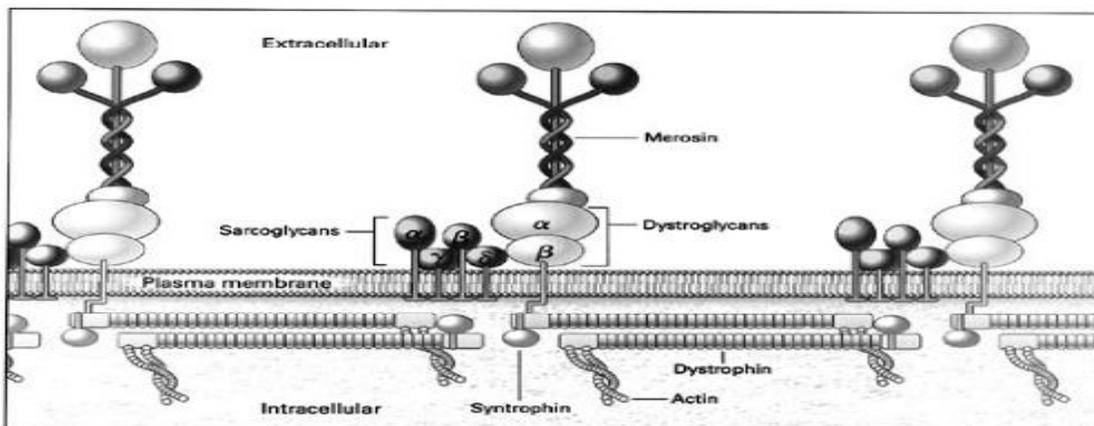
(Smith et al , 1985).

Dantrolene should be available, as there is an increased incidence of malignant hyperthermia in these patients. Malignant hyperthermia has been observed after only a brief period of administration of halothane alone, although most cases have been triggered by succinylcholine or with prolonged inhalation of halothane .

(Rosenberg et al , 1983).



FIGURE(3-2) Distribution of predominant muscle weakness in different types of muscular dystrophy. A. Duchenne-type and Becker-type. B. Emery-Dreifuss. C. Limb-girdle. D. Fascioscapulohumeral. E. Distal. F. Oculopharyngeal. (Reproduced with permission from the BMJ Publishing Group Emery AEH: BMJ 317:991, 1998.)



FIGURE(3-3) Muscle cell cytoskeleton. (Reprinted with permission from Duggan DJ, Gorospe JR, Fanin M et al: Mutations in the sarcoglycan genes in patients with myopathy. N Engl J Med 336:618, 1997.)

(2) Myotonia

Preoperative Considerations & Management For Myotonia:

Myotonia congenital and Schwartz-Jampel-syndrome are associated with malignant hyperpyrexia (MH), although it is difficult to determine the extent of the association.

(Brownell, 1988).

Patients with hyperkalaemic periodic paralysis develop weakness in association with changes in serum potassium concentrations and independently of myotonia. Concerning anesthesia for these patients, recommended preoperative potassium depletion with frusemide is beneficial. Thiazide diuretics, while they may treat the weakness, may worsen the myotonia. Potassium-containing fluids and drugs which release potassium from cells should be avoided and the ECG should be monitored continuously. Calcium gluconate is suggested for the emergency treatment of hyperkalaemia induced weakness. Intravenous (IV) glucose should be given to avoid carbohydrate depletion during fasting.

(Ashwood et al, 1992).

4. Endocrinal Disorders:

Update on the preoperative Management of Endocrine Problems

We will include the recent information on: perioperative strategies to modify cardiovascular risk in patients with diabetes mellitus, diagnostic and localization studies for pheochromocytoma, preop management of hypertension in patients with pheochromocytoma, cellular mechanisms of action of T3, direct effects of T3 on the cardiovascular system, diagnostic tests for thyroid disease, preop prep of patients with thyroid dysfunction, incidence of adrenal insufficiency in critically ill patients, diagnostic tests for adrenal insufficiency, and perioperative steroid supplementation.

(Surks , et al 1995).

(1)Diabetes Mellitus:

Diabetes mellitus is common and the prevalence is predicted to increase approximately 200%. in the next several decades. A thorough preoperative evaluation is necessary for all diabetic patients to detect the effects of chronic hyperglycemia which include CAD, HTN, CHF, PVD, CVD, and renal dysfunction. The effects of acute hyperglycemia are also dangerous leading to dehydration, impaired wound healing, infection via decreased WBC and chemotactic function, hyperviscosity to thrombogenesis, and worsened CNS/spinal cord injury with ischemia.

Both acute and chronic hyperglycemia appear to increase the risk of myocardial ischemic injury by decreasing coronary collateral blood flow, vasodilator reserve and microcirculation, and contributing to endothelial dysfunction.

(Daniel ., 2005).

Beta antagonists can be used safely in diabetics and should be used to decrease cardiovascular morbidity and mortality perioperatively. The preoperative management of hyperglycemia includes the oral hypoglycemics: the sulfonylureas (glyburide, glipizide) which increase insulin receptor function and insulin release, and the biguanides (metformin) which enhances the insulin effect at the receptor.

(Genuth, et al 2003).

All type 1 diabetics require insulin and many type 2 diabetics take insulin. The HbA1c levels reflect the average blood glucose level during the preceding 2-3 months and < 7% signifies excellent glycemic control. Lispro (humalog) and aspart (novolog) are short acting insulin analogues with onset times of 10-15 minutes, peak effects at 1-2 hrs. and durations of action of 3-6 hrs. Glargine (lantus) is a peakless intermediate acting insulin with an onset time of 1-2 hrs. and a duration of action of approximately 24 hrs. Glargine may replace NPH insulin in the future.

(Magee , et al 2001).

The use of novel antidiabetic drugs: thiazolidinediones (increase glucose uptake and decrease gluconeogenesis) and the alpha glucosidase inhibitors (decrease GI digestion and absorption of disaccharides) are in the future. Aggressive glycemic control intraoperatively and postoperatively appears important and requires the teamwork of an internist, endocrinologist, surgeon, nursing staff, and anesthesiologist. Continuous intravenous insulin instead of

sliding scales are more effective to maintain reasonable glucose levels (100-180 mg/dl). Insulin infusions (50U regular insulin in 500cc NS or 100U regular insulin in 200 cc NS) are commonly initiated at 0.02 U/kg/hr.

(Van den Berghe, et al 2001).

Patients with severe infection, steroid dependence, on vasopressors, receiving hyperalimentation, or undergoing CABG surgery require significantly higher infusion rates. 1 unit of regular insulin lowers blood glucose 25-30 mg/dl. D5 ½ NS with 20 meq KCl at 100-150 cc/hr is needed to protect against hypoglycemia and ketone production, and monitoring of blood glucose should occur every 30-60 minutes. 1cc of D50 raises the glucose 2mg/dl.

Common Insulin Preparations (subcutaneous administration, large variation within and between patients)

	Onset	Peak	Duration
Short acting			
Regular	30-60 min	2-3 hr	8-10 hr
Lispro/Aspart	5-15 min	30-90 min	4-6 hr
Intermediate acting			
NPH/Lente	2-4 hr	4-10 hr	12-20 hr
Glargine	2-4 hr	none	20-24 hr

Long acting

Ultralente	6-10 hr	10-16 hr	24-48 hr
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Various strategies for preoperative management of insulin have been described for fasting preoperative patients. No single method has been shown to be superior. In general, the dose of insulin is reduced by approximately one half and subsequent insulin or dextrose therapy guided by plasma glucose determination immediately preoperatively. Implanted insulin pumps may be discontinued or placed on a constant infusion and supplemental insulin and/or dextrose administered according to serial glucose determinations.

(Furnary, et al 2003).

Glucose levels > 200 mg/dl in the perioperative period are likely to be detrimental. Intensive insulin therapy (maintaining glucose at 80-110mg/dl) vs. conventional therapy (maintaining glucose at 180-200mg/dl) has demonstrated a significantly greater ICU and in-hospital mortality rate and morbidity rate with conventional treatment. Tighter glucose control appears to improve macrophage and neutrophil function, create beneficial trophic changes on mucosa/skin barriers, enhance erythropoiesis, increase respiratory muscle function and decrease cholestasis and axonal degeneration/dysfunction. Aggressive perioperative control with continuous insulin infusions to maintain blood glucose concentrations of < 150 mg/dl may be in the future.

(Furnary, et al 2003).

(2)Pheochromocytoma:

Pheochromocytomas (pheos) are catecholamine secreting tumors that arise from chromaffin cells of the sympathoadrenal system. Most pheos secrete norepinephrine either alone or more commonly in combination with a smaller amount of epinephrine in a ratio of 85/15, the inverse of the ratio secreted by the normal adrenal gland. About 15% of tumors secrete predominantly epinephrine.

(Kinney, et al 2002).

Since most pheos secrete predominantly norepinephrine medical therapy emphasizes alpha blockade to lower blood pressure, increase intravascular volume, prevent paroxysmal hypertensive episodes, resensitize adrenergic receptors, and decrease myocardial dysfunction. Phenoxybenzamine, an alpha 1, 2 blocker, or prazosin, an alpha 1 blocker, is most commonly prescribed . The optimal duration of treatment is undetermined and may range from 3 days to 2 weeks or longer. Newer

alpha 1 blocking agents include terazosin and doxazosin but experience with these drugs is limited.

Tachycardia, which commonly occurs with phenoxybenzamine, is usually managed with propranolol. A nonselective beta blocker like propranolol should never be administered prior to alpha blockade in pheo patients since a hypertensive crisis may occur. Beta blockers must be used cautiously since some

patients will have an underlying cardiomyopathy. Alpha methylparatyrosine inhibits catecholamine synthesis by 40-80%, and aids in the preoperative and intraoperative control of hypertension. Calcium channel blockers and ACE inhibitors are also effective. Echocardiography should be performed preoperatively to examine for myocardial dysfunction.

(Geoghegan , et al 1998).

Elective surgery is recommended whenever possible. Optimal preparation with alpha blockade + beta blockade + alpha methylparatyrosine and correction of possible hypovolemia are necessary.

In addition, fear, stress, pain, shivering, hypoxia, and hypercarbia which stimulate catechol release must be minimized or avoided in the perioperative period.

Most patients exhibit significant increases in systolic arterial pressure intraoperatively irrespective of preoperative alpha blockade. Sodium nitroprusside is the antihypertensive of choice because of its potency, immediate onset of action, and short duration of action. Phentolamine, nitroglycerin, esmolol, diltiazem, nifedipine, nicardipine, magnesium sulfate, and increasing anesthetic depth are also effective. Mixtures of antihypertensive drugs are recommended for refractory hypertension. Dysrhythmias are usually ventricular in origin and managed with either lidocaine or beta blockers.

(Ulchaker , et al 1999).

(3)Hyperthyroidism/Thyroid Storm:

The majority of cases (99%) of hyperthyroidism result from one of three pathological processes: Graves disease, toxic multinodular goiter, or a toxic adenoma. The signs and symptoms of hyperthyroidism are those of a hypermetabolic state. The cardiovascular system demonstrates increased cardiac work with tachycardia, arrhythmias and palpitations, a hyperdynamic circulation, increased myocardial contractility and cardiac output, and cardiomegaly.

(Langley , et al 2003).

Preparation of the hyperthyroid patient

For elective surgery all patients should be made euthyroid with a 6-8 week course of an antithyroid drug. Potassium iodide may be given for 7-14 days prior to surgery. Surgery need not be delayed to add iodine preoperatively in well controlled hyperthyroid patients. The beneficial effect of iodine on the vascularity and friability of the gland is debatable. Beta adrenergic blockers may be added to control heart rate. Optimal patient response should dictate the time of surgery. For emergency surgery a beta adrenergic blocker is necessary. Intravenous propranolol 0.2 - 1.0 mg boluses followed by an infusion or esmolol 0.25 - 0.5 mg/kg bolus followed by a 50-100 ug/kg/min infusion is titrated to maintain a heart rate <90. Although parenteral NaI has been withdrawn from the U.S. market, oral iodide (iopanoate) is comparable in efficacy.

Antithyroid drugs have a limited effect unless the patient has been receiving them for at least two weeks. Since no intravenous preparation of an antithyroid drug is available, the oral preparation may be administered through a nasogastric tube or the drug may be administered rectally. Glucocorticoids (dexamethasone 2

mg IV q 6 hrs) should be administered to decrease thyroid hormone release and reduce the serum conversion of T4 to T3.

(Langley , et al 2003).

Thyroid storm is a life threatening exacerbation of hyperthyroidism precipitated by injury, infection, or surgery. It most often occurs in the postoperative period in untreated or inadequately treated patients for emergency surgery. Patients present with extreme anxiety, fever, tachycardia, cardiovascular instability, and altered consciousness. Treatment includes rapid alleviation of thyrotoxicosis and general supportive care. Dehydration is managed with intravenous glucose containing crystalloid solutions, and cooling measures are used to counter the fever. Propranolol, labetalol or esmolol is titrated to decrease heart rate to < 90 beats/min. Dexamethasone or hydrocortisone (100-200 mg q 8 hrs) improve survival.

Antithyroid drugs and iodide are administered orally or through a nasogastric tube. If circulatory shock is present a direct vasopressor (phenylephrine) is indicated. Serum thyroid hormone levels generally return to normal within 24-48 hours and recovery occurs within one week. Unfortunately the mortality rate for thyroid storm remains surprisingly high at approximately 20%.

(Langley , et al 2003).

(4)Hypothyroidism / Myxedema Coma:

Hypothyroidism has a slow, insidious progressive course. Physiologically, cardiac output is decreased secondary to reductions in stroke volume and heart rate. Peripheral vascular resistance is increased and blood volume is reduced. In advanced cases the heart becomes enlarged and dilated and a pericardial effusion is common. Baroreceptor function is impaired. Hyponatremia and impairment of free water excretion is common. Maximum breathing capacity and diffusion capacity are decreased and ventilatory responsiveness to hypoxia and hypercarbia are depressed. Gastrointestinal function is slow and an adynamic ileus may occur.

(Farling ., 2000).

Patients with subclinical hypothyroidism usually present no anesthetic problems and elective surgery can proceed without special preparation. Patients with mild to moderate disease should probably receive daily L-thyroxine 100-200 ug/day in the preoperative period. If they do not receive preoperative thyroid supplementation it is debatable as to whether they are at increased risk or not. Patients with overt disease are definitely at increased risk. Elective surgery is contraindicated until these patients are euthyroid which usually requires 3-6 months of L-thyroxine therapy. If emergency surgery is necessary the potential for severe cardiovascular instability intraoperatively and myxedema coma in the postoperative period is high. Intravenous triiodothyronine 25-50 ug bolus plus infusion is effective in 6 hrs with a peak BMR in 36-72 hrs. Steroid coverage is necessary. Amrinone, an ino vasodilator, may improve myocardial contractility since its mechanism of action does not depend on beta receptors, whose number and sensitivity may be reduced with hypothyroidism.

(Stathatos , et al 2003).

(5)Adrenal Insufficiency:

There are 2 types of adrenal insufficiency: primary and secondary.

In primary adrenal insufficiency (Addison's disease) the adrenal glands are unable to elaborate sufficient quantities of glucocorticoid, mineralocorticoid, and androgen hormones.

(Rivers, et al 2001).

Corticosteroid replacement may include dexamethasone 4 mg, methylprednisolone 50 mg, or hydrocortisone 100 mg given intravenously over 10-20 minutes. Hydrocortisone is most commonly prescribed in doses of 100 mg q 6 hrs. When the patient's condition stabilizes the steroid dose is reduced with eventual conversion to an oral preparation. For 1o disease, the mineralocorticoid fludrocortisone is not immediately necessary because isotonic saline replaces sodium loss, and in the case of hydrocortisone in high doses mineralocorticoid properties exist. With tapering of steroids a mineralocorticoid may be necessary in managing 1o disease. Volume deficits may be substantial (2-3 liters) and D5 NS is the fluid of choice. Hemodynamic support with vasopressors (dopamine) may be necessary. Metabolic acidosis and hyperkalemia usually resolve with fluids and steroids. Fortunately only a few cases of adrenal crisis have been reported in the operating room. Acute adrenal insufficiency should be considered in the

differential diagnosis of hemodynamic instability only after more common etiologies have been treated or eliminated such as hypovolemia, anesthetic overdose, cardiopulmonary disorders, or surgical mechanical problems. Patients in circulatory shock and unresponsive to the usual therapeutic interventions (volume, vasopressors, inotropes) may have adrenal insufficiency and require immediate glucocorticoids.

(Axelrod., 2003).

5. Renal Disorders

A patient with renal insufficiency whose own kidneys are still functioning is distinct not only from a patient with end-stage renal disease whose renal functions are provided by dialysis but also from a patient who has a transplanted kidney. These three groups of patients require very different preoperative preparation. In addition, acute changes in renal function present quite a different problem than do chronic alterations in function. Certain renal diseases require different preoperative preparation than others, but generally, renal disease of any origin presents the same preoperative problems .

(Better , et al 1990).

A CLINICAL ALGORITHM FOR PERIOPERATIVE OLIGURIA

1. Define oliguria – i.e. urinary flow rate ≤ 0.5 mL/kg/hr (but it may be $< 1-2$ mL/kg/hr in a patient who has received mannitol).
2. Assume that oliguria is prerenal until otherwise proven. Check for low urine sodium, hemodynamics and urine response to a fluid challenge.
3. Do not give a diuretic to “make urine” in the face of intravascular hypovolemia or hypotension. Do give one if there are signs of fluid overload, oliguria persists despite fluid challenges and stabilized hemodynamics, or there is pigment nephropathy (intravascular hemolysis, rhabdomyolysis).
4. If no improvement, institute invasive hemodynamic monitoring (CVP, TEE, PA catheter).
5. Maximize RBF by enhancing cardiac function: normalize rhythm and rate, optimize preload, inotropic support and afterload reduction with vasodilator or inodilator agents.
6. Maintain renal perfusion pressure in situations of compromised autoregulation (sepsis, ARF).
7. Prophylactic pharmacologic agents (mannitol, dopamine, fenoldopam, N-acetyl cysteine) can be used when renal risk is high (aortic cross clamp, CPB, transplantation, pigment nephropathy, radiocontrast dye studies) but there is little evidence that they maintain GFR better than aggressive volume loading.
8. Diuretic resistance may be due to (1) acute tolerance (braking phenomenon) induced by hypovolemia; (2) chronic tolerance (compensatory hypertrophy of the distal tubule), or (3) refractory states (renal insufficiency, CHF, cirrhosis).

9. Strategies to overcome diuretic resistance include (1) restoration of normal hemodynamics; (2) higher doses of diuretic agent; (3) concomitant administration of human albumin in hypoalbuminemia; (4) continuous diuretic infusion (e.g. furosemide 1-10 mg/hr) and (5) dual segment nephron blockade with a loop diuretic + thiazide (e.g. bumetanide 2.5 mg IV + chlorothiazide 250 mg IV).

(Robert ., 2006).

As with uremic patients, preoperative optimization of volume status is paramount in patients with kidney stones. Seventy-five percent of all kidney stones are composed of calcium oxalate. Patients with these stones often take diuretic drugs, avoid calcium-rich foods, or restrict salt intake. Prevention of dehydration by institution of intravenous fluid therapy along with restricted oral intake of protein may be as important for these patients as it is for patients with struvite or uric acid stones. Struvite stones often result from urinary infection. Uric acid stones can be prevented by treatment with allopurinol, by preoperative hydration, or by alkalization of urine. Again, optimal intravascular volume status is important in preventing stones and preserving renal function.

(Coe , et al 1992).

To preserve normal renal function, infusion of saline, mannitol, furosemide, or low-dose dopamine has been recommended. However, these therapies should be initiated with caution because saline infusions and mannitol can lead to fluid overload and myocardial damage; in addition, diuretic drugs given

intraoperatively can produce postoperative hypovolemia, which worsens renal function.

Because a patient undergoing dialysis has already lost natural renal functioning, the emphasis in preoperative assessment shifts toward protecting other organ systems and optimally maintaining vascular access sites for cannulation. Usually, this does not require invasive monitoring. Emphasis is placed on intravascular fluid volume and electrolyte status, which can be ascertained by knowing when the patient last underwent dialysis, how much weight was normally gained or lost with dialysis, whether the fluid loss was peritoneal or intravascular, and what electrolyte composition the blood was dialyzed against.

(Polson , et al 1987).

Although preoperative dialysis may benefit patients who have hyperkalemia, hypercalcemia, acidosis, neuropathy, and fluid overload, the resulting disequilibrium between fluid and electrolytes can cause problems. Because hypovolemia induced by dialysis can lead to intraoperative hypotension, we try to avoid weight and fluid reduction in patients undergoing preoperative dialysis. In addition, hypopnea has been found to occur during and after dialysis when the dialysate contained acetate. Avoiding an acetate bathing solution may prevent this cause of hypoventilation.

(Dolan , et al 1981).

6. Haematological Disorders:

The perfect anesthetic considerations and management of a case of coagulopathy depends on sure diagnosis of coagulopathy state and this can be clearly outlined by history, physical examinations and laboratory investigations after we reach to a definitive diagnosis of coagulopathy state we can manage every type of coagulopathies in the peri-operative periods and the corner stone in a perfect management depends on laboratory investigations (coagulation screening).

(Friendman .,2000).

Table(3-6) Thromboembolic Risk Stratification for Surgery Patients

Low risk	Uncomplicated surgery in patients < 40 years of age with minimal immobility postoperatively and no risk factors
Moderate risk	Any surgery in patients aged 40-60 years major surgery in patients >40 years of age and no other risk factors Minor surgery in patients with 1 or more risk factors
High risk	Durgery in patients aged > 60 years major surgery in patients aged 40-60 years with one or more risk factors.
Very high risk	Major surgery in patients >40 years of age with previous venous thromboembolism, cancer, or known

	hypercoagulable state, major orthopedic surgery, elective neurosurgery, multiple trauma, or acute spinal cord injury.
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Adapted from Gutt CN, Oniu T, Wolkener F, et al. Prophylaxis and treatment of deep vein thrombosis in general surgery, Am J Surg 2005: 189: 14-33.

Pre-operative Management

Preoperative management includes the following points:

- A. Preoperative patient assessment.
- B. General lines of preparation and treatment.
- C. Premedication.

A. Preoperative patient assessment:

1. History and examination:

Patients with hemophilia may have joint bleeding, skeletal muscles hemorrhages, easy bruising and prolonged bleeding after trauma or surgery.

(Hoyer ., 1994).

Careful history of preoperative drug intake such as:

1. Heparin:

Heparin is a naturally occurring anti-coagulant that facilitates the action of antithrombin III so a patient on heparin therapy is liable to bleed more intraoperatively.

(Warkentin ., 1996).

2. Oral anticoagulants:

Dicumarol and warfarin inhibit the action of vitamin K which is necessary for synthesis of factors **(II, VII, IX, X, protein C, protein S)**. So patient on oral anticoagulants have greater risk for intraoperative bleeding.

(Warkentin ., 1996).

3. Aspirin:

Aspirin induces platelet dysfunction that persists for the life of the platelets (several days) after discontinuation of aspirin.

(Hoyer ., 1994).

2. Investigations:

Many laboratory investigations should be done to diagnose any abnormalities in the coagulation in the preoperative period including **PT, PTT, INR**, clotting time, bleeding time, and platelet count and function.

(Rodgers ., 1990).

Laboratory investigation to detect the cause coagulopathy (coagulation screening).

The main indications of coagulation screening are presence of coagulation disorders, previous administration of anticoagulants, presence of severe liver disease or renal dysfunction and in extra-corporeal circuits and liver transplantation.

- (A) Tests of primary hemostasis include platelet count (PC), bleeding time (BT), platelet aggregation test, capillary fragility test, anti-platelet antibodies, peripheral blood smear and bone marrow examinations.
- (B) Tests of coagulation include prothrombin time (PT) activated partial thromboplastin time (aPTT), thrombin time (TT), fibrinogen concentration, reptilase time, activated clotting time (ACT), urea clot lysis test, determination of free hemoglobin in blood, mixing test and specific factor assay.
- (C) Tests of total coagulation include thromboclastography (TEG) and sonoclot (Paul et al., 2001).
- (D) Tests of fibrinolysis include fibrin degradation products (EDPs), euglobulin lysis time and presence of soluble fibrin monomers.

Table(3-7) Showing coagulation profiles (Bakerman and Young, 2002).

Pre-operative coagulation	Tests
Abnormal bleeding	PT, PTT, PC, BT, TT, fibrinogen, tourniquet test, specific factor assay.

Esay Bruisability	PT, PTT, PC, BT, tourniquet test, plat. Function test (adhesion, aggregation) peripheral smear for megathrombocytes.
Fibrinolysis	Euglibulin lysis, fbrin split products, TT, protamine sulphate corrected.
Disseminated intravascular coagulation "DIC"	PT, PTT, PC, TT, fibrinogen, FDPs, Euglobulin lysis time, peripheral smear.
Von-willebrand's	PTT , factor VIII assay, factor VIII related antigen, BT, PC, plat. Aggregation, Ristocetin
Thrombotic tendency	PTT, antithrombin III, Lupus anticoagulants, protein C, protein S.
Qualitative platelet disorders	PC, Plat. Factor 3, BT, Tourniquet test plat. Function test (adhesion, aggregation, clot retraction time).
PT= Prothrombin time , parial thromboplastin, PC= platelet count., BT=Bleeding time, TT = Thrombin time, plat = platelet.	

Table(3-8) Showing Function and hemostatic tests (Bakerman and young, 2002)

Function	Tests
Vascular integrity	Bleeding time Tourniquet test

Platelets	Platelet count, bleeding time, clot retraction, tourniquet test, platelet agregometry.
Thrombosis	Activated partial thromboplastin time Prothrombin time, fibrinogen, Antithrombin III whole blood clot lysis, protein C, protein S, Lupus anticoagulants.
Fibrinolytic studies	Euglobulin lysis, fibrin split products, thrombin time

B. General line of preparation and treatment (Transfusion therapy):

Components of Transfusion Therapy:

(1) The Whole Blood:

- a. Give oxygen carrying capacity of blood and volume expansion which depends on the intra-vascular volume loss and volume of blood exchange.
- b. In an adult, 1 unit of whole blood will increase hemoglobin about 1g /dl.
- c. Storage blood contains low level of factors V and VIII and loses viable platelets and granulocytes.
- d. One unit of whole blood contains approximately 450 ml of blood plus 63 ml of anti- coagulant preservatives.

- e. In emergency situation if you know the type of blood give the same type but if the type is unknown give O-RH negative (universal donor) and the chance of reaction with this transfusion is about 1: 300. Rhesus negative blood should whenever possible give to Rh-negative patients.
- f. The indications of the whole blood transfusion:
- (i) Acute blood loss in hemorrhagic shock (slower rate of hemorrhage are managed with packed RBCs).
 - (ii) In surgical procedures with an expected blood loss > 20% of blood volume in adult and 10% in children.
 - (iii) Hb < 8 gm /dl (Hct < 26%).
 - (iv) Hb < 11 gm/ dl and clinically symptomatic (clinical picture of anemia as tachycardia, angina, ECG changes or hemoglobinopathy) or high risk e.g. coronary artery diseases, chronic obstructive pulmonary diseases, cerebro-vascular stroke, congenital or acquired anemia.

(Boldt et al , 2000).

(2) Packed RBCs:

It is plasma- reduced cells or RBCs concentration. One unit = 250-310 ml. it should be the most commonly used blood transfusion because it allows optimal utilization of blood bank resources. It is indicated in patients requiring RBCs but not volume replacement e.g. anemic patient in compensated congestive heart failure. Add normal saline to the packed RBCs and avoid lactated ringer's injection because its calcium content may reverse the anticoagulant effects of citrate preservative and avoid 5% glucose because it is hypotonic solution with subsequent RBCs hemolysis.

(Tsakiris et al , 2005). (3) Fresh

Frozen Plasma:

a- It is stored frozen, once thawed in must be transfused within 24hour, one unit = 200ml. it contains all contains all plasma proteins and lipids including all clotting factors. Each unit of FFP generally increases the level of each clotting factors by 2-3% in adults. ABO compatible units should generally be given but are not mandatory. Some patient may become sensitized to plasma proteins. It can be as infectious as whole blood. The dose initially 10-15 ml/kg. FFP at that does achieves a minimum of 30% of clotting factor concentration, because blood usually coagulates appropriately when coagulation factors concentration are at least 20-30% of the normal level and when fibrinogen levels > 75 mg/dl although laboratory values such as (PT) and (PTT) may be prolonged.

(Levi et al ., 2001).

b-The indications of FFP transfusion (i) treatment of abnormal coagulation tests (PT) > 15 seconds or (PTT) > 45seconds and isolated factor deficiency either prophylactic before surgery or with bleeding. (ii) reversal of warfarin therapy and liver disease. (iii) in patients with massive blood transfusion and continuous bleeding after platelet transfusion. (iv) antithrombin III deficiency in patients who must be on anti-coagulant with heparin and in thrombotic thrombocytopenic purpura (TTP). (v) open heart surgery if transfusion > 6 RBCs units/ causes and in presence of abnormal bleeding from vein puncture and generalized oozing.

(Roizen et al , 2000).

(4) Platelets Transfusion:

- a. One unit = 50 – 70 ml. they are stored at 20-24°C for 5 days (shelf life). Platelet transfusion may contain proliferating bacteria because they are stored at room temperature. Each unit increases the platelet count by 5000-10000/ ml and a lesser increase is expected in patients with history of prior platelet transfusion due to rapidly developing platelet antibodies in 70% of patients. ABO- Compatible units are desired but not mandatory. Platelets may cause Rh sensitization due to presence of a few RBCs in Rh +ve platelet units, so administration of Rh immunoglobulins to Rh-ve patients can protect against Rh sensitization after Rh +ve platelet transfusion. Transfused platelets survive for only 1-7 days after transfusion.

(McCullough, 2000).

- b. The standard dose is 4 units /square meter of body surface given twice on the day of surgery, then half the first dose at least 1 h preoperatively, then twice daily on the first and succeeding post operative days according to patient's progress and the usual therapeutic dose is one unit platelet concentrate / 10 kg body weight within 24 hours period.

(Rapaport et al, 2000).

- c. It is indicated in (i) thrombocytopenia (in presence of bleeding or bleeding time > 10 minutes), prophylactic when platelet count < 20.000/ ml to decrease risk of spontaneous hemorrhage, in open heart surgery if blood

transfusion given is > 6 RBCs units / case, in DIC and massive blood transfusion causing coagulopathy if platelet count < 40,000/ml. (ii) idiopathic thrombocytopenic purpura (ITP) with platelet count < 10,000 /ml. (iii) prophylactic preoperative use when platelet count < 100,000/ml before major surgery and 50,000 /ml before minor surgery. (iv) thrombocytopenia, even if the platelet count > 100,000/ ml in presence of bleeding and for preoperative prophylaxis especially for patient on non-steroidal anti-inflammatory drugs, uremia or after cardio-pulmonary bypass.

(Birnbach et al., 2000).

(5) Cryoprecipitate:

It contains high concentrations of factor I, VIII (C and VW factor) IX and XIII. Its dose is one unit of cryoprecipitate /10 kg body weight, it increases plasma fibrinogen concentrations about 50 mg/dl in absence of continued consumption or massive bleeding. It is indicated in (a) prophylaxis and treatment of congenital fibrinogen deficiency. (b) Von Willebrand diseases and hemophilia. (c) massive blood transfusion causing a decrease in fibrinogen concentration < 80-100 mg % (d) Open heart surgery, if transfusion > 6 RBCs units/case. (e) DIC.

(Dill et al., 2005).

Preoperative Considerations and management of inherited disorders of hemostasis:

Hemophilia A: Pre-operative therapy:

- a. **Factor VIII replacement therapy:** Reaching 100% of factor VIII is the ideal although > 30 % is adequate, given 1-2 hour before surgery. The dose can be calculated as one unit of factor VIII activity/kg body weight increase factor VIII level about 2%. One unit of factor VIII activity is defined as the amount of factor VIII in one of fresh pooled plasma. It is given every 12 hours as the half life of factor VIII is 10-12 hours. The route of administration are i.v bolus dose which is not preferred and i.v infusion which is preferred because this eliminates the high peak concentration observed after bolus injection and it avoids inhibition which develops 1-2 hours after administration.

(Bern et al., 2005).

- b. **Desmopressin- D-arginine vasopressin (DDAVP or Desmopressin):** it is a synthetic analogue of ADH which causes release of factor VIII concentrate from endothelial cells storage site. The usual dose of desmopressin is 0.3mg/Kg body weight, 30 minutes before surgery and cannot be repeated because such stores are depleted as factor VIII concentrate half life is only 12 hours and it also release tissue plasminogen activators (t-PA), so epsilon amino caproic acid or tranexamic acid is recommended with it.

(Chan et al , 2004).

- c. **Management of resistant cases:** Resistance occurs in 8-10% of hemophilic patients which have antibody inhibitors in the form of high (IgG) titer and Bethesda unit of inhibition which is amount of inhibitory antibody activity that decrease one to 0.5 units. These patients are managed by massive factor VIII concentrate, plasmapheresis is done first then given

factor IX concentrate to hemophilic A patients which apparently contains an amount of activated factor VIII which enters coagulation cascade distal to the level of factor VIII and so bypass the effect of inhibitors but thrombosis can occur and the final measure of management is by giving porcine factor VIII which is effective if Bethesda unit < 50 , so give 100-150 IU/kg.

(Stoelting et al , 2002).

Hemophilia B: Pre-operative Therapy:

a- Factor IX replacement therapy:

Maintain a plasma concentration of this procoagulant > 30% of normal during peri-operative period, given every 24 hours because its half life is 18-24 hours. To manage major surgical procedures you must correct the level by 80-100% of normal by a loading dose of 80-100 mg/kg, followed by 40-50mg/kg every 18-24 hours, in general each unit of infused factor IX/ kg body weight gives 1% increase in plasma IX level.

(Nilesen ., 2005).

Side effects include allergic reactions e.g. urticaria or fever in very mild form but anaphylaxis is rare, infectious disease transmission and inhibitor antibodies in 10% of patients and treated by porcine concentrates and recombinant factor VIIa but recent plasmapheresis is the ideal treatment.

b- Cryoprecipitate:

Not used because it does not contain factor IX and porcine concentrate which is used in association with factor IX.

(Bloom et al , 1991).

Von willebrand's disease: Pre-operative Therapy:

a- DDAVP (Desmopressin):

It is the drug of choice in major types of the disease, it stimulate release of VWF from endothelial cells, can be given intranasally (stimulate) and intravenously in a dose of 0.3 mg/kg over 30 minutes in 50 ml saline, it stimulate rapid 3-5 folds increase in factor VIII and VWF but it is complicated by water retention and hyponatremia.

b- Factor VIII concentrate:

Can be used as starting dose of 50 mg/kg.

c- Cryoprecipitate:

Which is indicated in resistant patients to desmopressin and in patient with no endogenous stores.

d- Epsilon Amino Caproic Acid:

In mild to moderate forms of the disease.

(Mannuci., 2001).

Preoperative considerations and management of acquired disorders of hemostasis

Vitamin- K deficiency: Pre-operative Therapy:

- a. In mild deficiency give vitamin K analogue (phytonadione) intravenously in a dose of 10-15 mg every 6-24 hours for 3 days preoperatively, but in severe deficiency fresh frozen plasma is the drug of choice (3units) which provides temporary correction of vitamin K dependent clotting factors.
- b. In emergency cases and cases needing prolonged period give fresh frozen plasma, infusion of concentrate containing vitamin K dependent clotting factors and factor VII but its side effects are intra-vascular coagulation and hepatitis which is dangerous in these patients.
- c. General pre-operative hydration is advised to guard against postoperative renal failure and mannitol to decrease high bilirubin.

(Mammen ., 2000).

Drugs-induced hemorrhage: Pre-operative Therapy:

- a. In minimal bleeding stoppage of heparin therapy is curative but in severe bleeding or when emergency correction is needed protamine sulphate is the drug of choice (i) dose 1 mg/ 100 units of heparin every 8-18 hours in cases of heparin rebound and are modulated according to heparin level. (ii)

side effects include hypotension, anaphylactoid reactions with rapid infusion, anaphylaxis, non-cardiogenic pulmonary edema and pulmonary spasm.

- b. For warfarin, stop the drug 2-3 days before surgery (half life 15-48 hours), vitamin K administration or fresh frozen plasma for rapid correction.
- c. For aspirin and anti-platelets, if elective surgery stop the drugs 7-10 days before surgery but in emergency surgery give platelet transfusion i.e each unit of platelet increase platelet count by 5000-10000 cells/ mm^3 .

(Goyal, et al 2005).

Idiopathic thrombocytopenic purpura (ITP): Pre-operative Therapy:

a- For emergency surgery:

- i. Give platelet concentration transfusion at induction of anesthesia and ligation of splenic pedicle in a dose of 6 units but may stimulate antiplatelet antibodies formation which can be decreased by the use of corticosteroid therapy as prednisone in a dose of 60mg/day.
- ii. IgG infusion in a dose of 0.4 mg/kg/day.

b- For elective surgery:

(i) Acute Type:

Reassurance and just observation if platelet count $> 50,000$ /ml, asymptomatic case or minor manifestations and no risk factor as hypertension and peptic ulcer. Curative treatment is indicated in severe form of the disease and life threatening hemorrhage in the form of IgG infusion in a dose of 0.4 mg/kg/day for 7-12 days followed by gradual weaning for the same period,

platelet concentration infusion for recurrent cases and finally splenectomy if the above measures fails.

(ii)Chronic type:

Corticosteroid Therapy:

It is the first line of treatment giving 10% patient cure, the duration of treatment up to 6 weeks in a dose of 60 mg prednisone /day gradually reduce the dose in 3 weeks and it acts by inhibition of macrophages attacking and decrease anti-platelet antibodies so increase platelet survival time.

Immunosuppressant drugs:

IgG infusion and anti-D i.v. for 1-3 weeks, they have a rapid onset and give good results after one week.

Splenectomy:

Indicated in cases of relapse with decrease the dose of corticosteroid therapy and if no response with the above measures. It gives 70% cure and 15% failure rate. The level of platelet count before surgery must be about 80,000 /ml and you must give polyvalent pneumococcal vaccine 2-3 months before surgery to guard against post-splenectomy infections.

Alternative immunosuppressant drug:

Indicated in 25% of patients not responding to the above measure. It includes azathioprine, Cyclosporine, vincristine, cyclophosphamide, anti-D , interferon and synthetic hormones e.g. danazol.

(Mederos et al , 2000).

Disseminated intravascular coagulation(DIC):

Pre-operative period:

- a- The basic line of treatment is directed to correct the events responsible for initiation of the generalized activation of coagulation system e.g. improvement of COP, restoration of intravascular volume, emptying the uterus and treatment of sepsis.
- b- Supportive measures which enhance organs perfusion, treatment of ischemia and necrosis can overcome DIC.

- c- Transfusion therapy e.g. (i) Fresh blood transfusion that contain clotting factors, II, V and VIII. (ii) platelet transfusion indicated in
- d- Drugs Therapy e.g. (i) heparin is controversial as may be beneficial in patient with thrombo-embolic diseases and amniotic fluid embolism but it is contra-indicated when DIC is the cause of cerebral hemorrhage. It is given in bolus dose of 100 u/ kg then 500 u/1 hours. (ii) anti-thrombin III which is more effective with low risks than heparin and reverse DIC in advanced septic shock. (iii) anti-fibrinolytic therapy which is used when fibrinolysis is the cause of DIC and the most commonly used drug is epsilon aminocaproic acid (initial i.v dose of 4-5gm over one hour then 1g/8 hours and can be given as 100-150 mg/kg i.v initial dose and then constant infusion one-tenth the initial dose /hour), note that the antifibrinolytic in a dose of 4-6 gm i.v given if no fresh frozen plasma but may worsen coagulation process and causes hepatitis B.
- e- Others e.g. protein C concentrate in pediatric patient and prostacyclin which cause platelets activation .

(Norig et al,2000).

C. Premedications:

Intramuscular injections should be avoided in patients with coagulation disorders. If a sedative hypnotic or anti-cholinergic drug would be necessary before the induction of anesthesia, intravenous route should be used.

(Sampson ,et al 1989).

7. Hepatologic Disorders:

Preoperative preparation and assessment of hepatic patient

What are the risks of giving anesthesia to patients with acute liver disease who require emergency surgery? What are the risks of giving anesthesia to patients with chronic impairment of liver function? What can be done to minimize these risks? Although one might think that the experiences gained from providing anesthesia for liver transplantation would answer many of these questions, there is a substantial difference between optimizing cardiovascular function to meet the needs of a new liver (e.g., supply of nutrients) and maintaining liver function in a diseased liver, we will mention only that the liver performs many functions: it synthesizes substances (e.g., proteins, clotting factors), detoxifies the body of both drugs and the products of normal human metabolism, excretes waste products, and stores and supplies energy.

(Lentschener , et al 2003).

In our preliminary study, *every* patient with abnormal liver function tests has been symptomatic preoperatively. Therefore, the risk may be less than described . All anesthetics tested (general, narcotic-nitrous oxide, and regional) have caused transient abnormalities in liver function test results. These abnormalities were magnified by upper intraabdominal surgery and occurred regardless of preexisting liver disease.

(Lentschener , et al 2003).

Patients whose preoperative liver function tests are abnormal will obviously have a higher incidence of abnormal results on postoperative liver function tests. Lacking in the literature are investigations that studied patients with compromised hepatic function to determine how to decrease the risk of surgery and anesthesia. Also lacking are comparisons of outcome after various perioperative strategies for managing different causes of hepatic dysfunction (i.e., viral [or even one virus versus another virus], toxic, or drug induced). In addition to preexisting hepatic disease and the operative site, hypokalemia, hypotension, sepsis, and the need for blood transfusion all contribute to postoperative hepatic dysfunction. Thus, anesthesia and surgery probably exacerbate hepatic disease and thereby clearly increase morbidity and mortality.

(Zinn , et al 1985).

Liver disease severe enough to affect hepatic synthesis can impair the detoxification of many drugs, including muscle relaxants, and can disturb coagulation but may or may not affect anesthetic requirements greatly. Administration of fresh frozen plasma may be needed to correct coagulation disorders.

(Swerdlow , et al 1990).

8. Preoperative preparation for pregnant patient:

Anesthesia for the Pregnant Patient Undergoing Surgery:

Discovering that our “routine” surgical patient also happens to be pregnant heightens anxiety for most of us. Yet about 2% of parturients *will* have surgery during their pregnancy, estimated to be over 80,000 anesthetics per year. This number is increasing, many as laparoscopic procedures. Most surgeries treat conditions common to this age group: traumatic injuries, ovarian cysts, appendicitis, cholelithiasis, breast biopsy, and cervical incompetence.

However major procedures such as craniotomy, cardiopulmonary bypass, and liver transplantation may also be necessary during pregnancy, and usually result in good outcomes for mother and fetus. Despite favorable results overall, both medically trained and non-medical individuals have a strong aversion to drugs being used or procedures being performed during pregnancy. For example, during Congressional testimony in 1995 on late-term abortions, the erroneous statement was made that “The fetus usually dies from the anesthesia administered to the mother before the procedure begins.” Naturally, with the availability of such misinformation, a pregnant patient requiring surgery is likely to present with extreme anxiety. When women exposed to *non-teratogenic drugs* discovered they were pregnant, they estimated they had a 25% risk of major congenital malformations due to that exposure! How do we counsel a pregnant patient having surgery and anesthesia? What can you tell her about the risks to her pregnancy associated with anesthesia?

(Joy .,2006).

Preoperative assessment

pregnancy testing if pregnancy status is unknown or if the patient requests testing, possibly delaying until the second trimester or postpartum period, counseling the patient on anesthetic risks (or lack thereof) to the fetus and pregnancy, and educating her about symptoms of preterm labor and the need for left uterine displacement at all times after 24 weeks gestation. Mandatory pregnancy testing is controversial, raising both medical and ethical issues. Any female patient between the ages of 12 and 50 should have the date of her last menstrual period documented on the anesthetic record.

Pregnancy testing should be offered if more than 3 weeks has elapsed. If surgery can be delayed until the second trimester, the risks of teratogenicity and spontaneous miscarriage are less. Preterm labor is not as common during the second as in the third trimester.

Administration of preoperative medications to allay anxiety or pain is appropriate, since elevated maternal catecholamines may decrease uterine blood flow. Whether you choose to use benzodiazepines such as midazolam is more of a medicolegal than medical issue. Consider aspiration prophylaxis with some combination of an antacid, metoclopramide, and/or H₂-receptor antagonist. Discuss perioperative tocolysis with the patient's obstetrician.

Indomethacin (oral or suppository) and magnesium sulfate (by infusion) are the most commonly used perioperative tocolytics. Indomethacin has few anesthetic implications, but magnesium potentiates nondepolarizing muscle relaxants and attenuates vascular responsiveness, making hypotension difficult to treat during acute blood loss or volume shifts.

(Kerr , et al 2003).

SPECIAL SITUATIONS:

Cervical cerclage may be the most common surgical procedure performed during pregnancy. However, a recent study showed that it might not be beneficial. 253 women with a short cervix by ultrasound were randomized to cerclage or expectant management.

(Chestnut , et al 2004).

Further study may provide more patient-specific indications.

Trauma is a leading cause of maternal death. Fetal loss in these situations is due to maternal death or placental abruption. The mother should receive *all* needed diagnostic tests to optimize her management, with shielding for the fetus when possible. Exposure to less than 5 rad (e.g., head CT is < 1 rad) does not increase risk to the fetus.

(Scott , et al 2004).

Neurosurgical procedures such as aneurysm clipping or arteriovenous malformation (AVM) resection may be required in this age group. Endovascular treatment of acutely ruptured intracranial aneurysms has been done successfully during pregnancy, thus avoiding craniotomy.

(Norris , et al 2001).

Cardiac surgery requiring bypass has also been successfully performed during pregnancy. During pregnancy the physiologic increase in blood volume and cardiac output is maximal at 28-30 weeks, and this is a common time for cardiac decompensation in parturients with stenotic valvular lesions or pulmonary hypertension.

(Haram , et al 1997).

EXIT procedures (EX utero Intrapartum Treatment) are done for oropharyngeal or neck masses or other problems that could compromise the airway in the newborn. At cesarean delivery under general anesthesia, the fetal head is delivered but placental circulation is kept intact until the airway is secured by intubation or surgical means. With excellent prenatal diagnosis available using ultrasound and MRI, the EXIT procedure will likely become more common in labor and delivery suites.

In contrast, fetal surgery is only being performed at a few centers and for limited indications (eg., closure of a myelomeningocele). There are major problems to overcome including postoperative preterm labor and maternal morbidity due to pulmonary edema. Patients often receive perioperative indomethacin or magnesium sulfate for tocolysis. High concentrations of an inhalation agent are used for maternal and fetal anesthesia and for uterine relaxation.

(Dwyer ,et al 2002).

Laparoscopic techniques avoid unnecessary laparotomy when abdominal pain presents a diagnostic challenge during pregnancy, and may also allow management of some surgical procedures such as cholecystectomy.

(Hawkins , et al 2004).

CONCLUSIONS:

Surgery may be necessary during pregnancy. Anesthesiologists should reassure the mother that anesthetic drugs and techniques by themselves will not put her fetus or the pregnancy at risk. Prevention of preterm labor is the greatest concern and may require perioperative monitoring and tocolysis. Effective postoperative pain management without sedation will aid in early diagnosis and treatment of preterm labor and assist with early mobilization to prevent thrombotic complications.

Principles for anesthetic management of the parturient < 24 weeks gestation (pre-viable).

- Postpone surgery until second trimester or postpartum, if possible.
- Request preoperative assessment by an obstetrician.
- Counsel the patient preoperatively (see text).
- Use (at least) a non-particulate antacid as aspiration prophylaxis.

- Document fetal heart tones before and after the procedure.

Principles for anesthetic management of the parturient > 24 weeks gestation.

- Postpone surgery until postpartum if possible.
- Obtain consultation and discuss use of perioperative tocolytic agents with the obstetrician.
- Counsel the patient preoperatively (see text).
- Use aspiration prophylaxis of choice.
- Maintain left uterine displacement perioperatively.

(Hawkins , et al 1998).

9. Obesity

To have a successful outcome for an obese patient undergoing surgery, all stage of the patient's care must be well planned, including a thorough preoperative evaluation and optimization of medical co-morbidities. The goal of the preoperative evaluation is to identify risk factors that may modify the perioperative course.

The first step is a detailed history and physical examination that should include all systems with particular attention to cardiac and respiratory systems.

Laboratory screening should include a complete blood cell count to exclude polycythemia, chemistry panel, liver function tests, coagulation profile, and urine analysis. A chest radiograph should also be done.

(Abir ,et al 2004).

Preoperative evaluation of the airway:

This must include:

- 1- Assessment of head neck flexion, extension and lateral rotation.
- 2- Assessment of jaw mobility and mouth opening.
- 3- Inspection of oropharynx and dentition.
- 4- Checking the patency of the nostrils.
- 5- Inspection of previous anesthetic charts and questioning the patient about previous difficulties especially any episodes of upper airway obstruction associated with anesthesia or surgery (one should always bear in mind that previous records of uneventful anesthetics may no longer be relevant and new changes, such as further weight gain, pregnancy, head and neck radiotherapy or development of signs and symptoms of upper airway obstruction, must be thought).
- 6- A systemic enquiry into features suggestive of obstructive sleep syndrome, such as excessive snoring with or without episodes of apnea and daytime hypersomnolence. These imply potential airway obstruction once the patient has been rendered unconscious.

(Buckely, 1992).

Further imaging of the airway with soft tissue X-ray and CT scans along with consultation with an otolaryngologist for direct or indirect laryngoscopy may provide useful information about the airway if time is available preoperatively. If difficult intubation is envisaged, an awake fiberoptic intubation should be considered .

(Lee, et al 2000).

Preoperative risk assessment for obese patients:

Patients with clinically severe obesity, are placed in low (1 or less risk factors), intermediate (2-3 risk factors), or high (> 3 risk factors) risk groups for having a perioperative cardiovascular event based on the number of comorbidities, electrocardiogram findings and cardiac history. Low risk patients should receive perioperative blood code only with no further noninvasive testing. On the other hand, intermediate- and high-risk patients should undergo non invasive cardiac testing before proceeding with any major operative procedure.

(Kakisis , et al 2003).

Risk indices:

Pulmonary risk index/cardiopulmonary risk index:

A combined cardiopulmonary risk index is proposed for risk stratification of pulmonary complications. Pulmonary risk factors have been added to the

goldman cardiac risk index; patients with a combined score of greater than 4 points (out of a total of 10) are 17 times more likely to develop complications. Obese patients with BMI > 27kg/m² considered as the most important pulmonary risk factors. Other pulmonary risk factors include cigarette smoking within weeks of surgery, productive cough within 5 days of surgery, diffuse wheezing within 5 days of surgery and FEV1-to-FVC ratio less than 70% and Paco₂ within 45 mmHg.

Lawrence risk index:

The test to determine this index is based on clinical information such as abnormal findings from the physical examination or chest radiography. This index needs further validation in prospective studies.

(Mitchell ., 2000).

Risk factors predicting complications:

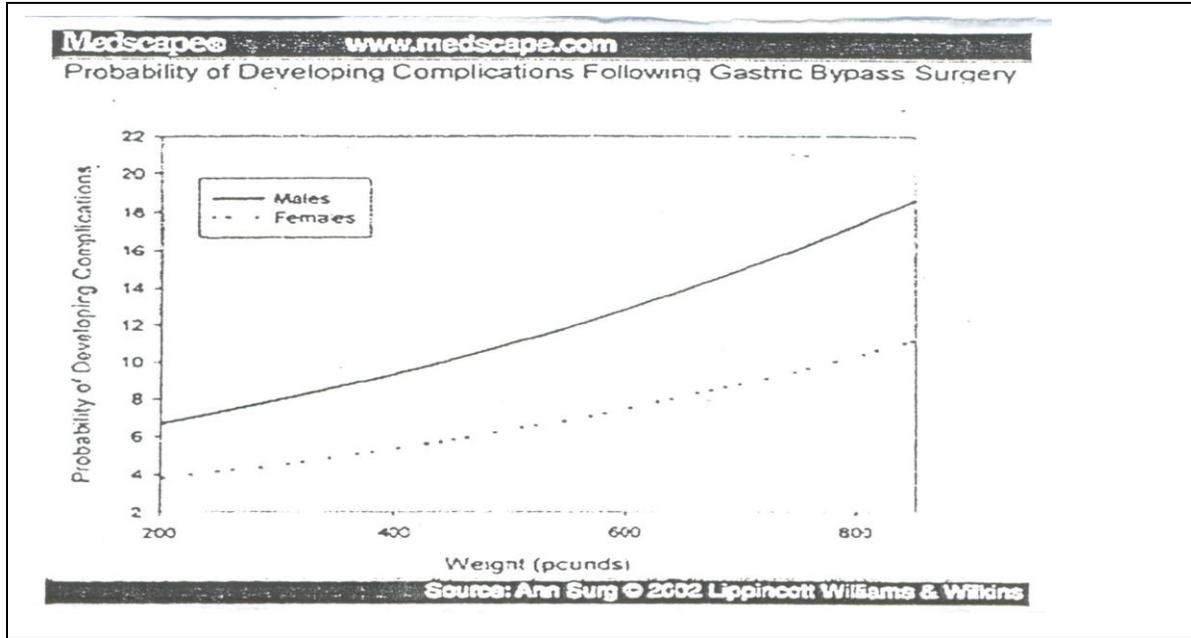
In a recent study, analysis of the preoperative risk factors was done and revealed that only weight and male gender were predictive for the development of severe life-threatening complication (table 3). Neither age nor BMI was associated with a greater number of sever life-threatening complications. Smoking history, hypertension, osteoarthritis, diabetes, sleep apnea, use of CPAP, and revision cases also did not correlate with the development of complications. Logistic regression revealed an equation predictive of complications.

Table(3-9)Risk factors predicting complications of obesity during surgery

	Non complications (n = 1,005)	Complications (n = 62)
Age	42.2 ± 0.3	43.8 ± 1.1
Weight	332 ± 2	356 ± 11.1
BMI	53.6 ± 0.3	55.0 ± 1.5
P < 0.05, t test		

(Livingston ., 2002).

Being one of the most important surgical procedures, sensitivity analysis of the effect of gender and weight on the risk of adverse events for patients undergoing Roux-en-Y gastric bypass surgery (figure 4) was done. The probability of adverse events is represented on the ordinate and weight on the axis of the graph. For a 200-lb women, the risk of developing complications is slightly less than 4% and rises to 12% at 900 lb. the complication risk is higher for men at each weight and rises more steeply for men compared to women as weight increases. A 200-lb man has a 6.5% risk of complications that increases to 20% at 900 lb.



Figure(3-4) Sensitivity analysis of the effect of gender and weight on the risk of adverse events for patients undergoing (RYGB) (Living, 2002)

Preoperative medication:

Preoperative drugs may be administered to facilitate induction and to decrease induction complications. Anxiolysis and analgesia should be addressed during premedication but given only in an environment where patient can be monitored and should also given orally.

(Bready, et al 2000).

Morbidly obese patients are more likely to be immobile postoperatively and are at increased risk of deep vein thrombosis. Heparin, 5000 IU subcutaneous, administered before surgery and repeated every 12h until the

patient is fully mobile, reduces the risk of DVT. Recently, low molecular weight heparins (LMWH) have gained popularity in thromboembolism prophylaxis because of their bioavailability when injected subcutaneously.

(Pineo, et al 1998).

Other preoperative considerations:

A family history of anesthetic problems may suggest a familial problem such as malignant hyperthermia. We should not forget the possibility of an underlying anxiety neurosis, because this may influence the choice of premedication.

If awake intubation is anticipated, it should be fully explained in a sympathetic manner. Meanwhile, anticholinergics should be given as preoperative medication. Glycopyrolate in a dose 0.2-0.4mg given intravenously prior to anesthesia. It suppresses gastric secretion better than atropine with less side effects (tachycardia and dysrhythmias) and also longer lasting drying action. Specific risks should be explained to the patient including possible postoperative ventilation and even tracheostomy.

We look at the patient and decide whether the standard operating table will be adequate or whether special arrangements have to be made. Patients weighing over 350 lbs may require special operating room table. We also take the opportunity to look at the condition of the skin over pressure areas, that may require extra padding to avoid neurological injuries.

(Bready, et al 2000).

Complete medication history including any herbal therapeutics, should be elicited from every patient. This is because of the potential for drug interactions with anesthesia. History of serotonin and norepinephrine uptake inhibitor or sibutramide, used as pharmacologic treatment of obesity, may be associated with modest hypertension and rarely the serotonin syndrome.

(Barash, et al 2005).

Example of herbal medications used for weight loss is ephedra which has ephedrine-like sympathetic stimulation with increased heart rate and blood pressure any may cause dysrhythmias, myocardial infarction or stroke, so it must be discontinued at least 24 hours prior to surgery. Patients scheduled for repeat bariatric surgery may confront the anesthesiologist days, months, or years after the initial surgery, so, the possible metabolic changes in these patients should be considered. Common long-term nutritional abnormalities include vitamin B₁₂, iron, calcium and folate deficiencies. However, vitamin deficiency is uncommon in patients compliant with daily vitamin supplements.

(Morgan ., 2002).

10. Pediatric Preoperative Preparation

Preoperative assessment:

A- Pre-procedure interview:

The pre-procedure visit and preparation of the child are more important than the choice of premedication .

(Cote ., 1997).

During this time, the anesthesiologist evaluates the medical condition of the child, the needs of the planned procedure, and the psychologic makeup of the patient and family. The anesthesiologist also formulates the approach to induction of anesthesia explains the possibilities regarding induction, and helps to soothe family concerns. Because anxiety felt by the parents may be transferred to the child, any practice that reduces anxiety of the parents may also reduce anxiety of the child. Therefore, the anesthesiologist should explain in great detail what the child and family can expect and what will be done to ensure the utmost safety. The more information the parents and child have, the more easily they will deal with the stress of procedure and hospitalization.

(Kain ,et al 1996).

B- RED FLAGS” for sedation:

There are certain medical conditions that invariably act as red flags to herald potential complications.

These red flags are:

- 1- Apnea, or abnormal airway.
- 2- Less than 1 month of age unless admitted or formerly premature infants less than 34 weeks gestation.
- 3- Respiratory compromised patients.
- 4- Uncontrolled gastroesophageal reflux.
- 5- Raised intra-cranial pressure.
- 6- Poor oral muscle development (Neuro-muscular disease).
- 7- Allergies to Phenobarbital or other sedatives to be used.
- 8- New-onset illness, respiratory distress, neuralgic changes and seizure disorders.
- 9- Children with cardiac disease or repaired heart disease.
- 10- Metabolic disease.
- 11- Bowel obstruction .

(Kanal, et al 1990).

This “Red Flag” list is meant to alert the practitioner to patients who should be referred to pre-op clinic for an anesthetic evaluation. If the child falls within the “Red Flag” guidelines, has required anesthesia in the past, or has a medical condition that warrants further evaluation by an anesthesiologist, the child is then referred to an anesthesia preoperative clinic. When a child has a complicated medical history. Often the referring physician directly makes the referral to the anesthesia preoperative clinic.

(Kanal, et al 1990).

Preoperative Fasting Hours

In conclusion, there is no evidence that the traditional period of abstinence from solids of 6 hours should be change. However there is overwhelming evidence that pediatric patients undergoing elective day case procedure can ingest clear fluids (up to 10ml/kg) safely up to 2-3 hours preoperatively. There is some evidence that this policy may actually reduce gastric volume, reducing the risk of regurgitation of gastric contents and pulmonary aspiration, as well as reducing preoperative stress in the child. As parents or guardians are to supervise the fasting period they must be given clear oral and written instructions detailing what can and cannot be consumed in the preoperative period and how long the child must be starved. Milk is cleared more slowly from the stomach. Breast feed should be permitted up to 4 hours preoperatively.

(Keneally ., 1999).

Premedication:

The response of the infant and child (and particularly the neonate) to medication is modified by many factors: body composition, protein binding, body temperature, distribution of cardiac output, maturation of the blood-brain barrier, and relative size (as well as functional maturity) of the liver and kidneys.

(Van den Anker, 1996).

Drugs which can be used as premedication include:

I- EMLA (eutectic mixture of local anesthetics):

Cream supplies effective topical analgesia to intact skin if placed at least 1 hour prior to venipuncture and covered with an occlusive dressing. Parents (or older patients) can apply the EMLA cream. EMLA is **contraindicated** in children with methemoglobinemia and should not be used in combination with drugs that induce methemoglobinemia. It is not recommended on mucous membranes and in children less than 1 month of age.

(Gajraj, et al 1994).

II- Anticholinergics:

Current inhalation anesthetics do not stimulate salivary or tracheobronchial secretions. Therefore, premedication with anticheobronchial secretions. There, premedication with anticholinergic drugs is not routinely indicated and may cause fevere, confusion, flushing, or an extremely dry mouth. Anticholinergics may be given during the procedure for their antisialagogue effect (e.g., airway manipulation), or vagolysis e.g., preceding succinglycholine administration). Atropine is a better vagolytic agent than scopolamine; however scopolamine produces amnesia and a better drying effect. Glycopyrrolate is the only agent that does not cross the blood-brain barrier, so it does not cause confusion. When compared to atropine, it is less effective in attenuating bradycardia during induction. Preoperative administration of oral atropine or oral glycopyrrolate does not alter the incidence or degree of hypotension during induction of anesthesia .

Table(3-10) Anticholinergics as premedication in pediatrics.

Drug	Dose	
Atropine	0.02 mg/kg IM,	PO - - 0.01mg/kg IV
Scopolamine	0.02 mg/kg IM	PO - - 0.01 mg/kg Iv
Glycopyrrolate	0.01 mg/kg IV, IM	

(Cartabuke ,et al 1991).

III- H₂ antagonists/ gastric motility stimulants:

Table(3-11) Antiacids & Antiemetics as premedication in pediatric.

H₂ antagonists	Dose
cimetidine	7.5mg/kg, PO, IV
Ranitidine	2 mg/kg PO 0.5 to 1mg/kg IV
Gastric stimulants:	Dose
Metoclopramide	0.1 mg/kg PO, IV

(Morgan ., 2006).

Although preoperative administration of H₂ antagonists reduces gastric fluid acidity and volume, and metoclopramide reduces gastric volume, their use is unnecessary in children undergoing day cases surgery.

(Morgan ., 2006).

Intravenous access:

Cannulation of tiny pediatric veins can be a challenge. This is particularly true for infants who have spent weeks in a neonatal intensive care unit and have few veins left unscarred. Even healthy one year old children can prove a challenge because of extensive subcutaneous fat. The saphenous vein has a constant location at the ankle and, with experience;

the practitioner can usually cannulate it even if it is not visible or palpable. Twenty-four-gauge over-the-needle catheters are adequate in neonates and infants when blood transfusion is not anticipated. All air bubbles should be removed from the intravenous line, since a high incidence of patent foramen ovale increases the risk of paradoxical air embolism. In emergency situations where intravenous access is impossible, fluids can be effectively infused through an 18-gauge needle inserted into the medullary sinusoids within the tibial bone. This interosseous infusion can be used for all medications normally given intravenously with virtually as rapid results .

(American Academy of Pediatrics, 1999).

Difficult airway management in the radiology suite:

There are two potential scenarios in the radiology suite: (1) the child who present with a known difficult airway; and (2) the child who has a unrecognized difficult airway. The preference is that if a child with a difficult airway (mask ventilation or intubation) requires an intubation in order to complete the scheduled procedure, then the intubation is performed in the operating room prior to the procedure. Following the intubation, the child is then transported to the radiology suite. Regardless of an anesthesiologist's comfort level and familiarity with the radiology environment, the back-up personnel are not always available in an off-site location. In the radiology suite, fiberoptic intubations are not routine, and the radiology nurses are,

understandably, not able to give assistance with facility. It is easier to perform a fiberoptic intubation, or to have the fiberoptic equipment readily available, in the operating room. There, both the nursing and anesthesia support staff (technicians and other anesthesiologists) are readily available and prepared to provide assistance. After completing a fiber optic of difficult intubation in the operating room, the patient can then be transported to the radiology suite (fully monitored and with an Ambu and oxygen).

(Haxby-Libatu ., 1995).

The next scenario, and one which anesthesiologists prefer to avoid, is the unrecognized difficult airway. For this reason, it is important to have laryngeal mask airways (LMAs) stocked in all off-site anesthesia carts. In the event that the child cannot be intubated or mask ventilated, often LMAs can provide a successful alternative.

(Hansen, et al 1995).

ENGLISH SUMMARY

Preanaesthetic assessment of a surgical patient is done differently in various settings. In an outpatient setting this may be done by administering a questionnaire by the nursing or medical staff, or assessing the patient in a dedicated preanaesthetic outpatient clinic. In an inpatient setting the patient on the ward may be referred to the anaesthetist preoperatively for preoperative evaluation and optimization. Although in many institutions the anaesthetists get to see the patient on the day of the procedure in the patient-waiting room, there is evidence that a preanaesthetic assessment well before the procedure play a vital role in avoiding last minute cancellations and delays of surgical procedures.

There is a suggestion that patients should undergo a preanaesthetic evaluation by questionnaire administration which would be scrutinized by staff in the clinic who will then decide if the patient needs to be further evaluated by an anaesthetist.

The preoperative clinics greatly assist in optimizing patients in relation to the perioperative period. In addition to being cost-beneficial avoiding unnecessary investigations, this also offers the anaesthetist an opportunity of establishing a rapport with the patient, well in advance.

The first step in preoperative preparation is a detailed history and physical examination that should include all systems with particular attention to cardiac and respiratory systems. Laboratory screening should include a complete blood cell count to exclude polycythemia, chemical panel, liver function tests, coagulation profile, urine analysis. A chest radiography should be done.

Traditionally clinicians have seen admission to hospital as an opportunity to screen for biochemical, hematological and radiological abnormalities. However, there is no benefit in this, and a test should only be ordered if it will change patient management. Recently, in an attempt to bring consistency to this area, the National Institute for Clinical Excellence (NICE) in the UK has introduced guidelines for preoperative investigations based upon consensus and best evidence.

Attitude to preoperative fasting have altered recently. The aim of preoperative fasting is to reduce the volume of the gastric contents, and thus the likelihood of gastric regurgitation and pulmonary aspiration, the recommendation for fasting before surgery have been modified specifically, clear liquids(water, pulp free juices, carbonated beverages, clear tea, black coffee) are taken safely 2 hours at least before induction, breast milk should be 4 hours before, infant formula, non

human milk and light meal (typically consists of toast and clear liquids; meals that include fried or fatty foods or meat may prolong the gastric emptying time) should be 6 hours before induction.

Preoperative drugs may be administered to facilitate induction and to decrease induction complications. Anxiolysis and analgesia should be addressed during premedication but given only in an environment where patient can be monitored and should be titrated to patient requirements to avoid respiratory depression, presented as suppression of CO₂ response curve .

Discussion of anaesthesia risk and obtaining informed consent is another important purpose of the preoperative clinic evaluation. Patients may desire to hear very little information or may want detailed information about the risks specific to anaesthesia. Some institutions have recently created a consent form for anaesthesia. Its advantages include the fact that it is a reproducible document and provides a reasonable standard of information about important risks.

الملخص العربى

- إن التحضيرات المسبقة للعمليات الجراحية تمثل دورا هاما في تجنب إلغاء العمليات الجراحية. فهي تتم في نطاقين, إما في عيادات خارجية متخصصة أو عن طريق زيارة طبيب التخدير للمريض المحجوز بالمستشفى قبل إجراء العملية .
- لطبيب التخدير دورا أساسيا حيث يقوم بتقييم حالة المريض الصحية وتقرير صلاحية المريض لإجراء تلك العمليات الجراحية .
- إن أولى الخطوات لتحضير المريض وتجهيزه لإجراء الجراحة تتمثل فى الحصول على التاريخ المرضى الخاص بالمريض وأيضا الفحص الطبي الشامل ولاسيما التحاليل الطبية .
- تمثل العيادات المتخصصة لتقييم المريض قبل إجراء العمليات الجراحية دورا مهما, فمن خلالها يتم وضع خطة التحضير للمريض من حيث التحاليل المطلوبة و الأدوية المسموح تناولها, كما أنها تقيم علاقة الألفة بين المريض وطبيب التخدير .
- لمقابلة المريض لطبيب التخدير قبل العملية أهمية كبيرة, حيث يتم إعطاء بعض التعليمات في الساعات السابقة للعملية ومنها عدد ساعات الصيام حسب نوعية الطعام وبعض الأدوية التي قد يتعاطاها المريض في تلك المدة .
- لتقدم العلم في ابتكار العديد من العقاقير الطبية بالغ الأثر في تمكين طبيب التخدير من تحضير المريض بطريقة مناسبة تضمن تخديرا آمنا للمريض .

- إن إدراك المريض لمخاطر العملية سواء كانت مرتبطة بالجراحة أو بالتخدير و الحصول على إقرار معتمد منه بإجراء العملية يعد عنصرا هاما ولاسيما إذا كان المريض يعاني من بعض الأمراض التي قد تؤثر على صحته أثناء وبعد إجراء الجراحة .
- هناك بعض المرضى يعانون من بعض الأمراض والتي قد تؤثر على صحة المريض قبل و أثناء وبعد العملية فهي حينئذ تستوجب اتباع أساليب خاصة في تحضيرهم قبل إجراء العمليات الجراحية .

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تقييم و تحضير المريض قبل العمليات الجراحية

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