

Patient Evaluation

The goal of preoperative evaluation is to reduce patient risk and the morbidity of surgery, and is based on the premise that it will modify patient care and improve outcome.

The Joint Commission for the Accreditation of Healthcare Organizations (JCAHO) requires that all patients receive a preoperative anesthetic evaluation and the American Society of Anesthesiologists (ASA) has approved Basic Standards for Preoperative Care which outline the minimum requirements for a preoperative evaluation. Preoperative patient assessment is important in order to develop a safe and appropriate surgical and anesthetic plan.

Obtaining a patient history

The importance of an accurate, detailed history cannot be overemphasized because it provides the framework on which the clinician builds an accurate diagnosis and treatment plan. An inaccurate or incomplete evaluation may lead to a delay in treatment, unnecessary testing, or misdiagnosis.

It is often helpful to review previous medical records. This can provide important information and save time during the interview process. The patient should be asked to describe the history of the present illness (HPI). Information should be gathered regarding onset, intensity, quality, location, duration, radiation, and any exacerbating or relieving factors. Constitutional symptoms that relate to the present illness should also be noted. Examples of pertinent positives and negatives with regard to the chief complaint may include fever, chills, loss of weight, weakness, etc.

The past medical history (PMH) alerts the clinician to any coexisting illnesses that may have an impact on any planned surgeries. A family history (FH) may

reveal risk factors for patients as well as the possibility of inherited illnesses such as hemophilia or malignant hyperthermia.

The social history (SH) of a patient should include information regarding their social support system and also any habits such as tobacco, alcohol, or illicit drug use. These habits may adversely affect healing and also increase a patient's risk for undergoing a planned surgical procedure.

A review of systems (ROS) is a comprehensive method of inquiring about a patient's symptoms on an organ system basis. The review of systems may reveal undiagnosed medical conditions unknown to the patient.

Physical examination

During the physical exam the clinician further reinforces or disproves impressions gained during the history-taking portion. Vital signs are recorded at the beginning of the physical exam. These include blood pressure, pulse rate, respiratory rate, and temperature. The patient's general appearance should be noted.

For a complete description of examination techniques the reader is advised to consult textbooks on physical diagnosis.

Comorbidities/systemic diseases

The clinician needs to assess potential risk factors and understand their effect on treatment. Changes in heart rate, rhythm, blood pressure, preload, afterload, and inotropy may occur during surgery and these can have deleterious effects, especially in patients with comorbidities. The risks for complications are greatest when caring for patients who are

already medically compromised. Many significant untoward events can be prevented by careful preoperative assessment along with attentive intraoperative monitoring and support.

Cardiovascular system

Cardiac disease

Cardiac complications following non-cardiac surgery constitute an enormous burden of perioperative morbidity and mortality. More than one million operations annually are complicated by adverse cardiovascular events, such as perioperative myocardial infarction or death from cardiac causes. Common cardiac risk factors include diabetes, hypertension, family history of heart disease, hypercholesterolemia, and obesity. Certain populations of patients, such as the elderly, diabetics, or women, may present with more atypical features.

Methods for evaluating a patient's cardiac risk preoperatively include a careful history, including exercise tolerance, physical examination, and electrocardiogram (EKG). Based on this information, various risk indices, guidelines, and algorithms can assist the clinician in deciding which patients can undergo surgery without further testing and which patients may benefit from further cardiac evaluation or medical therapy prior to surgery. Risk assessment involves evaluating patients' comorbidities and exercise tolerance, as well as the type of procedure to be performed to determine the overall risk of perioperative cardiac complications. Exercise tolerance is a major determinant of cardiac risk and need for further testing. Beta blockade has shown clear benefits in risk reduction whereas revascularization procedures, such as coronary artery bypass grafting, have not been shown to be useful in reducing non-cardiac surgical risk.

Hypertension

Hypertension is a common disease which can increase perioperative cardiac risk. Hypertension has been associated with an increase in the incidence of silent myocardial ischemia and infarction. The Joint National Committee on Prevention, Detection, Evaluation and Treatment of High Blood Pressure recently revised their definition. Hypertensive patients with left ventricular hypertrophy are at a higher perioperative cardiac risk than non-hypertensive patients.

Controversy exists regarding whether to delay a surgical procedure in a patient with untreated or poorly controlled hypertension. Aggressive treatment of high blood pressure does diminish long-term risk. A study often quoted as the basis for delaying surgery for patients with a diastolic blood pressure greater than 110mmHg actually demonstrated no major morbidity in that group of patients. Other authors have found little association between blood pressures less than 180mmHg systolic or 110mmHg diastolic and postoperative outcomes. Patients with

severe hypertension are more prone to perioperative myocardial ischemia, ventricular dysrhythmias, and lability in blood pressure. For patients with blood pressures greater than 180/110mmHg there is no absolute evidence that postponing surgery will decrease the cardiac risk. For patients without end-organ changes, such as renal insufficiency or left ventricular hypertrophy, it may be appropriate to proceed with surgery. However, patients with a markedly elevated blood pressure and new onset of a headache should have surgery delayed for further medical treatment. Patients with hypertension may have a contracted intravascular volume and therefore have an increased susceptibility to vasodilator effects of commonly used sedative and anesthetic agents. For elective surgery it is best to have the patient's blood pressure optimized prior to surgery.

Risk factors for hypertension include smoking, hypercholesterolemia, increasing age, family history of cardiovascular disease, and diabetes. Untreated hypertension commonly causes coronary heart disease, cardiomegaly, congestive heart failure, and end-organ damage. When evaluating a patient with hypertension, it is important to determine the presence of end-organ damage (heart, lung, and cerebrovascular systems). An elevated systolic blood pressure may be a better predictor of postoperative myocardial ischemia than elevated diastolic blood pressure.

Pulmonary system

Pulmonary complications are a major cause of morbidity for patients undergoing a surgical procedure. They occur more frequently than cardiac complications with an incidence of 5–10% in those having major non-cardiac surgeries. Perioperative pulmonary complications include atelectasis, pneumonia, bronchitis, bronchospasm, hypoxemia, and respiratory complications. For patients with an upper respiratory illness, surgery should be delayed if possible for at least 2 weeks after resolution of the illness. Studies have indicated a 10% incidence of severe complications, respiratory as well as cardiac arrest, pneumonia, and prolonged intubation due to increased sputum, when surgery is performed on patients with an active upper respiratory tract infection.

During the presurgical evaluation, the clinician should obtain information about exercise tolerance, chronic cough, or unexplained dyspnea. On physical exam, findings of rhonchi, wheezing, decreased breath sounds, dullness to percussion, and a prolonged expiratory phase are important. Preoperative pulmonary function tests are usually reserved for patients undergoing lung resection or those undergoing major surgery who have unexplained pulmonary signs and symptoms after a history and physical examination.

Obesity

A patient is considered obese when their body weight is 20% or more above ideal weight. Obesity can be

measured by the body mass index (BMI) which is derived by dividing the weight in kilograms by the height in meters squared ($BMI = Wt/ht^2$).

A BMI greater than 30 suggests increased morbidity due to stroke, heart disease and diabetes. At a minimum, these conditions indicate the need for close evaluation of the patient's airway and cardiac and pulmonary status. Even with an adequate airway, ventilation may be difficult because of the patient's size and a tendency toward hypoxemia. There may also be significant cardiovascular changes.

On the other hand, the clinician should not dismiss a low BMI, especially with evidence suggesting an eating disorder. Nutritional deficiency may be present along with significant cardiac changes, fluid and electrolyte imbalances, delayed gastric emptying, and severe endocrine abnormalities.

Imaging

A patient's presentation will dictate which films are required. Radiographs such as plain films, cone beam or fan beam computed tomography (CT), nuclear

scans, and arteriography are helpful in various circumstances. The risks associated with these studies should be weighed against the added benefit from them.

Laboratory studies

Some institutions have preadmission screening test algorithms based on factors such as age of the patient (Table 1.1). Preoperative laboratory tests should be ordered based on defined indications such as positive findings on a history and physical exam. A thorough history and physical examination can be used to identify those medical conditions that might affect perioperative management and direct further laboratory testing. A study by Golub *et al.* reviewed the records of 325 patients who had undergone preadmission testing prior to surgery. Of these 272 (84%) had at least one abnormal screening test, while only 28 surgeries were canceled or delayed. Only three patients potentially benefited from preadmission testing, including a new diagnosis of diabetes in one and non-specific EKG changes in two. Another study

Table 1.1 Sample preadmission screening test algorithm. (EBL, estimated blood loss; HTN, hypertension; IVDA, intravenous drug abuse; LMP, last menstrual period; ABG, arterial blood gases; CBC, complete blood count; PT, prothrombin time; PTT, partial thromboplastin time; LFTs, liver function tests; CXR, chest X-ray; EKG, electrocardiogram; HCG, human chorionic gonadotropin; UA, urinalysis; PFTs, pulmonary function tests; T/S, type and screen.)

CIRCLE APPROPRIATE LABS TO ORDER												
Preoperative condition	ABGs	CBC	PT/PTT	Lytes	BUN/Creat	Blood/Glucose or Accucheck	LFT	CXR	EKG	Hcg preg/UA	PFTs	T/S
Possible EBL >500 ml		X										X
Neonates		X										
Age: >40 yr									X			
Age: >75 yr		X				X			X			
Cardiovascular disease/chronic HTN		X			X			X	X			
Use of diuretics, digoxin				X*	X				X			
Severe pulmonary disease/prethoracotomy	X	X						X	X		X	
Malignancy/radiation/chemotherapy		X, plt		X	X							
Hepatic disease		X, plt					X					
Chronic alcoholism		X, plt		X	X		X		X			
Renal disease (dialysis)		X		X*	X*			-/+	-/+			
Bleeding disorder/anticoagulant therapy		X, plt*	X*									
Diabetes				-/+	X	X*				>30 yr		
Possible pregnancy/gyn surgery											X*	

Note: Not all diseases are included. Therefore, the physician should use own judgment regarding patients having diseases that are not listed.

In patients with stable medical conditions, labs and EKGs within the last 3 months, and CXR within the last year, will be acceptable. X Items should be done within 72 hours of surgery.

*Urine pregnancy test if LMP >21 days with possibility of pregnancy or menstruating females <18 years of age, all women undergoing tubal ligation and all women having a hysterectomy who are in their reproductive years or who are experiencing the first year of menopause.

Table 1.2 American Society of Anesthesiologists physical status classification.

Status	Disease state
ASA class 1	No organic, physiologic, biochemical, or psychiatric disturbance
ASA class 2	Mild to moderate systemic disturbance that may not be related to the reason for surgery
ASA class 3	Severe systemic disturbance that may or may not be related to the reason for surgery
ASA class 4	Severe systemic disturbance that is life threatening with or without surgery
ASA class 5	Moribund patient who has little chance of survival but is submitted to surgery as a last resort (resuscitative effort)
Emergency operation (E)	Any patient in whom an emergency operation is required

by Narr *et al.* demonstrated minimal benefits from routine testing and proposed that routine laboratory screening tests were not required in healthy patients.

Assessing anesthetic/surgical risk

Once the clinician has gathered information by interviewing and examining the patient, they can classify them according to the American Society of Anesthesiologists (ASA) Classification of Physical Status (Table 1.2). Patients with a lower ASA classification represent a lower surgical risk than do patients with severe systemic disease. This system is commonly used and is helpful in identifying risk factors so that modifications in the treatment plan can be undertaken. The surgical procedure influences the scope of preoperative evaluation required by determining the potential range of physiologic flux during the perioperative period.

Office vs inpatient

Once the clinician has gathered pertinent information during the preoperative work-up, they must decide where best to perform the surgical procedure.

Safety continues to be the guiding factor in deciding where various types of procedures should be performed. Options available include office surgery, ambulatory surgery centers, and traditional hospital-

based locations. Many variables are considered when deciding on whether to perform a surgery in the office or perform the surgery elsewhere, including the size and severity of the surgery.

Patient factors should also be an important part of the decision on where to perform the procedure. Patients with poorly controlled medical conditions such as morbid obesity or poorly controlled hypertension should be carefully evaluated, and appropriate preoperative testing should be performed to determine their surgical risk. Patient factors such as increased age, an operating time longer than 120 minutes, cardiac diagnoses, peripheral vascular disease, cerebrovascular disease, malignancy, and immunodeficiency can place patients at higher risk for immediate hospital admission.

Advantages of performing surgery in a hospital setting include the addition of another health care provider to administer anesthetic during the surgical procedure. Imaging techniques such as ultrasonography, CT, and chest radiographs are readily available, as are blood chemistries to rapidly diagnose and treat complications. Also, procedures such as interventional radiology, for such things as embolization, are available. Ultimately the decision on where to perform a surgery depends on both the surgeon and informed patient considering the type and length of the procedure, patient health factors, and safety.

Summary

The process of preoperative evaluation is essential in assessing the medical condition of patients, evaluating their overall health status, determining risk factors, and educating them. The goal of preoperative evaluation is to reduce patient risk and the morbidity of surgery.

Recommended reading

- Golub R, Cantu R, Sorrento JJ, *et al.* (1992). Efficacy of preadmission testing in ambulatory surgical patients. *The American Journal of Surgery*, **163**, 565.
- Herford AS, Tanaka WK. (2010) Patient evaluation. In: *Oral and Maxillofacial Surgery* (eds, Andersson L, Kahnberg K-E, Pogrel MA). Oxford, Wiley-Blackwell.
- Narr BJ, Hansen TR, Warner MA. (1991) Preoperative laboratory screening in healthy Mayo patients: cost-effective elimination of tests and unchanged outcomes. *Mayo Clinic Proceedings*, **66**, 155.