Chapter

13 PREOPERATIVE EVALUATION AND MEDICATION

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PREOPERATIVE ASSESSMENT: OVERVIEW

1. What is the purpose of preoperative evaluation?
2. What are the essential components of a complete preoperative evaluation?
3. How does the anesthesiologist classify a patient's physical status?
4. How is the patient's functional status determined?
5. Why is it important to assess the patient's functional status?
6. How much oxygen is consumed when performing one metabolic equivalent of task (MET) of activity?
7. Why is evaluation of the airway important?
8. What are the components of the airway examination?
9. Is "screening" preoperative testing indicated for every patient?
10. When should preoperative tests be ordered?
11. Should all patients of a certain age receive a preoperative electrocardiogram (ECG)?
12. What are the recommendations for obtaining a preoperative ECG?
13. How effective are ECG findings for predicting a major adverse cardiac event (MACE)?
14. Do all females of childbearing years require a β-human chorionic gonadotropin (β-hCG) assay prior to surgery?
15. Why might preoperative tests be useful when evaluating patients with severe comorbid conditions and undergoing intermediate- or high-risk procedures?
16. Which patient comorbid conditions when undergoing intermediate- or high-risk procedures may make preoperative albumin level testing useful?
17. Which patient comorbid conditions when undergoing intermediate- or high-risk procedures may make preoperative complete blood count (CBC) with platelets testing useful?
18. Which patient comorbid conditions when undergoing intermediate- or high-risk procedures may make preoperative creatinine level testing useful?
19. Which patient comorbid conditions when undergoing intermediate- or high-risk procedures may make obtaining a preoperative chest radiograph useful?
20. Which patient comorbid conditions when undergoing intermediate- or high-risk procedures may make obtaining a preoperative ECG useful?
21. Which patient comorbid conditions when undergoing intermediate- or high-risk procedures may make preoperative electrolyte testing useful?
22. Which patient comorbid conditions when undergoing intermediate- or high-risk procedures may make preoperative glucose level testing useful?
23. Which patient comorbid conditions when undergoing intermediate- or high-risk procedures may make preoperative liver function tests (LFTs) useful?
24. Which patient comorbid conditions when undergoing intermediate- or high-risk procedures may make preoperative platelet count testing useful?

25. Which patient comorbid conditions when undergoing intermediate- or high-risk procedures may make preoperative prothrombin time (PT) testing useful?
26. Which patient comorbid conditions when undergoing intermediate- or high-risk procedures may make preoperative partial thromboplastin time (PTT) testing useful?
27. Which patient comorbid conditions when undergoing intermediate- or high-risk procedures may make preoperative thyroid function testing (TFT) useful?
28. Which patient comorbid conditions when undergoing intermediate- or high-risk procedures may make preoperative urinalysis useful?
29. Are any patient-specific baseline tests indicated before anesthesia?
30. What is the purpose of a preoperative consultation?
31. Is a consultation letter stating "cleared for surgery" or "low risk" adequate?

ANESTHETIC IMPLICATIONS OF COMMON COMORBID CONDITIONS

32. For which comorbid conditions are hypertensive patients at risk?
33. Should surgery be delayed because of elevated blood pressure (BP)? What is severe hypertension?
34. Is there a risk in normalizing BP in hypertensive patients?
35. How is a patient with known or risk factors for coronary artery disease evaluated prior to noncardiac surgery?
36. What is the Revised Cardiac Risk Index (RCRI)?
37. What are the six criteria that are incorporated in the RCRI?
38. How long should a patient wait after coronary revascularization before undergoing elective noncardiac surgery?
39. What are the current recommendations for use of perioperative β-blockade and statins for cardiovascular risk reduction?
40. What are the main types of heart failure? What are common causes of each type?
41. Should patients with advanced or decompensated heart failure undergo anesthesia?
42. When is a preoperative echocardiogram indicated in patients with heart failure?
43. Are all cardiac murmurs associated with valvular disease?
44. Which cardiac murmurs are always pathologic?
45. What are some clinical clues that suggest a patient may have valvular disease?
46. When is a preoperative echocardiogram indicated in a patient with a cardiac murmur?
47. Should patients with valvular disease undergo elective surgery?
48. For which patients is prophylaxis for infective endocarditis indicated? For which procedures?
49. What conditions typically prompt placement of a pacemaker or implantable cardioverter-defibrillator (ICD)?
50. What challenges does a cardiac implantable electronic device (CIED) present perioperatively? What are the potential risks to the patient?
51. What is the typical response to a magnet for an ICD? For a pacemaker? For an ICD in a patient who is also pacemaker dependent?
52. Are there any procedures for which electromagnetic interference of a CIED is not a concern?
53. What clinical conditions are predictors of postoperative pulmonary complications (PPCs)?
54. What methods are effective at reducing the rate of PPCs?
55. Are specific tests predictive of PPC risk?
56. What is obstructive sleep apnea (OSA)?
57. Which comorbid conditions are associated with OSA?
58. What components of the patient's history or physical examination can identify those at risk of OSA? Is there a questionnaire that predicts the diagnosis of OSA?

59. What impact does OSA have for anesthesia?
60. Should patients having anesthesia bring their continuous positive airway pressure (CPAP) devices to the hospital?
61. What are the American Society of Anesthesiologists (ASA) published recommendations for perioperative care of patients with OSA?
62. What body mass index (BMI) defines extreme obesity?
63. Which comorbid conditions are associated with obesity?
64. What physiologic effects can chronic hyperglycemia have on the organs?
65. What perioperative complications can result from chronic hyperglycemia?
66. If a diabetic patient has preoperative hyperglycemia, should the surgery be canceled? Is there benefit to acutely lowering the blood glucose?
67. What is the clinical significance of renal disease in the preoperative patient?
68. Is renal insufficiency a risk factor for perioperative complications?
69. When should a patient with end-stage renal disease receive dialysis before surgery?
70. Should surgery be canceled if a dialysis patient has a preoperative potassium level of 5.8 mEq/dL?
71. Does radiocontrast medium worsen renal function in normal patients?
72. Can the risk of renal injury be reduced in patients receiving radiocontrast medium?
73. Does anemia predict perioperative morbidity and mortality risks?
74. Does a patient with anemia require further evaluation to identify its cause before elective surgery?
75. What is the clinical significance of advanced age in the preoperative patient?
76. Are elderly patients at a higher risk for hospital admission after ambulatory surgery?
77. How does a patient's do-not-resuscitate (DNR) status transfer from the hospital ward to the operating room?

FORMULATION OF ANESTHETIC PLAN

78. What are some patient factors, procedural factors, and logistical factors the anesthesiologist considers when choosing an anesthetic technique?
79. What side effects of general anesthesia are commonly disclosed to patients?
80. What side effects of regional anesthesia are commonly disclosed to patients?
81. Why is an accurate assessment of risk important?
82. What risk assessment tools are available?
83. How is informed consent obtained?
84. Should all medications be continued perioperatively?
85. Should β-adrenergic blockers be continued preoperatively?
86. Should statins be continued preoperatively?
87. Should angiotensin-converting enzyme inhibitors (ACEIs) or angiotensin receptor blockers (ARBs) be continued preoperatively?
88. How is aspirin managed perioperatively? Should it always be withheld?
89. How are antiplatelet agents managed for regional or neuraxial anesthesia?
90. How are anticoagulants managed for regional or neuraxial anesthesia?
91. For which patients is bridging anticoagulation indicated?
92. If warfarin is being withheld before surgery, for how many days should it be stopped?
93. When should low-molecular-weight heparin (LMWH) be discontinued before surgery?
94. What should be done if the international normalized ratio (INR) is elevated near the day of surgery?
95. In which patients is LMWH contraindicated?
96. How should insulin dosing for type 1 and type 2 diabetics be managed preoperatively?
97. Should ultra-long-acting insulin such as glargine be continued on the day of surgery?

98. Does metformin need to be withheld on the day of surgery? Should surgery be canceled if a patient has taken metformin?
99. Should oral hypoglycemic drugs be withheld on the day of surgery?
100. Which medications should be continued on the day of surgery?
101. Which medications should be discontinued for surgery?
102. Which herbal medication should not be discontinued abruptly before surgery?
103. Is neuraxial anesthesia contraindicated in patients taking herbal medications?
104. Should psychiatric medications be continued preoperatively?
105. Should monoamine oxidase inhibitors (MAOIs) be discontinued before surgery?
106. Should narcotics, anxiolytics, or nicotine replacement be discontinued before surgery?
107. Should patients taking oral steroids take the steroid on the day of surgery?
108. How much cortisol does a patient typically produce a day?
109. Which patients are at risk for adrenal insufficiency?
110. What risks are associated with high-dose steroids?
111. How should perioperative glucocorticoids (e.g., "stress-dose" steroids) be dosed for a patient on chronic steroids?
112. What medications can be offered preoperatively to patients with a history of severe postoperative nausea and vomiting (PONV)?
113. Who is at risk for pulmonary aspiration, and how should these patients be premedicated?
114. What are the guidelines for food and fluid intake for adult patients before elective surgery?

ANSWERS*

PREOPERATIVE ASSESSMENT: OVERVIEW

1. The purpose of preoperative evaluation is to gather information to formulate an anesthetic plan, to assess perioperative risk of complications, to implement risk-reduction strategies to maximize the quality of postoperative recovery, and to order any tests or consultations that may be indicated. (189)
2. The preoperative evaluation includes a medical and anesthetic history, review of medications, and determination of the patient's functional capacity. The physical examination includes evaluation of the airway; vital signs; and cardiovascular, pulmonary and neurologic systems. Previous diagnostic tests, consultations, and laboratory results are reviewed and any further indicated tests are ordered. An anesthetic plan is formulated and discussed with the responsible adult before informed consent is obtained. Medical therapies are optimized, fasting instructions are provided, and preoperative medication recommendations are given. (189)
3. The American Society of Anesthesiologists (ASA) Physical Status Classification ranges from ASA 1 to ASA 6. A patient who is classified as ASA 1 is healthy, without disease (nonsmoking, no or minimal alcohol use). ASA 2 patients have mild systemic disease with no substantive functional limitation (current smoker, social alcohol drinker, pregnancy, obesity [BMI 30-40], well-controlled diabetes mellitus/hypertension, mild lung disease). ASA 3 patients have severe systemic disease causing substantive functional limitations (poorly controlled diabetes mellitus or hypertension, chronic obstructive pulmonary disease, morbid obesity [BMI >40], active hepatitis, alcohol dependence or abuse, implanted pacemaker, moderate reduction in ejection fraction, end-stage renal disease on regular dialysis, history [>3 months] of myocardial infarction, cerebrovascular accident,

*Numbers in parentheses refer to pages, figures, boxes, or tables in Pardo MC, Miller RD, eds. *Basics of Anesthesia*. 7th ed. Philadelphia: Elsevier, 2018.

transient ischemic attack, or coronary artery disease/stents). ASA 4 patients have severe systemic disease that is a constant threat to life and seriously limits daily activities (recent [<3 months] myocardial infarction, cerebrovascular accident, transient ischemic attack, or coronary artery disease/stents, ongoing cardiac ischemia or severe valvular disease, severe reduction in ejection fraction, sepsis, disseminated intravascular coagulation, acute respiratory distress syndrome, or end-stage renal disease not undergoing scheduled dialysis). ASA 5 refers to moribund patients not expected to survive without surgery (ruptured abdominal/thoracic aneurysm, massive trauma, intracranial bleed with mass effect, ischemic bowel in the setting of significant cardiac disease or multiple organ system dysfunction). ASA 6 is reserved for brain-dead patients who are organ donors. The letter E is added to a classification if the surgical procedure is an emergency. (190)

4. The patient's functional status is determined by assessing his or her functional capacity. The functional capacity is measured in metabolic equivalents of task (METs). A patient able to eat, get dressed, and work at a computer has a MET of 1. A patient who can walk one to two blocks has a MET of 3. Climbing one to two flights of stairs equals a MET of 5. A MET of 10 is achieved by running or jogging briskly. A MET of 12 is achieved with running rapidly for long distances. (190)
5. It is important to assess the patient's functional status because it predicts outcome and perioperative complications and guides the need for further evaluation. The ability to achieve a moderate (MET ≥ 4) level of activity predicts a low risk of perioperative complications. (190)
6. One MET of activity is equivalent to the consumption of 3.5 mL O_2/min per kilogram of the patient's body weight. (191)
7. Evaluation of the airway, both on history and physical examination, for factors predicting difficult endotracheal intubation or mask ventilation allows for necessary equipment to be set up and skilled personnel available for airway management. (191)
8. During the airway examination the following are assessed: the condition of the teeth; the ability of the patient to advance or protrude the mandibular incisors; the tongue size; visibility of the uvula, tonsils, soft palate, or hard palate only (Mallampati classification I-IV); the compliance of the mandibular or oral space; the presence of facial hair; the thyromental distance; and the length, thickness, and range of motion of the neck. (191)
9. "Screening" preoperative testing is never indicated. Preoperative "screening" tests ordered without specific clinical indications rarely result in changes in patient management and are not cost-effective. (191)
10. Preoperative tests are indicated to evaluate existing medical conditions or for the diagnosis of disease based on clinical risk factors. Tests should be ordered if the results will impact the decision to proceed with the planned procedure or alter the care plans. Preoperative testing may direct further testing or consultation, inform preoperative medication use, alter anesthetic or surgical technique, change postoperative disposition, or establish a perioperative risk profile. In addition, clinical evaluation of the patient may reveal new or worsening symptoms that warrant testing regardless of whether or not that patient is having an upcoming procedure. (191)
11. Age is not an indication for a preoperative electrocardiogram (ECG). Although ECG abnormalities are common in the elderly, they do not predict adverse events. A simplified algorithm can guide preoperative cardiovascular evaluation of patients having noncardiac surgery. (192)
12. A preoperative ECG may be indicated for assessment of suspected electrolyte abnormalities, arrhythmias, active cardiac conditions (dyspnea, new or worsening chest pain, heart failure), pulmonary hypertension, or use of digoxin. Preoperative resting 12-lead ECG is not indicated for low-risk surgery. Preoperative ECG is reasonable (class IIa recommendation) in patients with

significant coronary disease, peripheral arterial disease, cerebrovascular disease, or major structural heart disease if intermediate- or high-risk surgery is planned. (192)

13. Preoperative ECG findings have not been shown to predict major adverse cardiovascular events (MACE) beyond clinical risk factors and are not useful in determining further testing. (192)
14. Pregnancy testing should be offered to women of childbearing age. Some facilities make it mandatory before anesthesia; other facilities allow women to decline testing. The ASA practice advisory for preoperative evaluation states that current literature is not clear as to whether anesthesia causes harmful effects on early pregnancy, so testing should be offered if it will change management. (192)
15. Preoperative tests may be indicated in the assessment of severe disease to establish a diagnosis, predict risk, or guide therapy before intermediate- or high-risk surgery. (192-193)
16. Preoperative albumin level testing may be useful in patients undergoing intermediate- or high-risk procedures if the patient has anasarca, liver disease, malnutrition, or malabsorption. (192-193)
17. Preoperative complete blood count (CBC) with platelets testing may be useful in patients undergoing intermediate- or high-risk procedures if the patient has a history of alcohol abuse, anemia, dyspnea, hepatic or renal disease, malignancy, malnutrition, personal history of bleeding, poor exercise tolerance, or recent chemotherapy or radiation therapy. (192-193)
18. Preoperative creatinine level testing may be useful in patients undergoing intermediate- or high-risk procedures if the patient has renal disease or has risk factors for kidney disease. (192-193)
19. Preoperative chest radiograph analysis may be useful in patients undergoing intermediate- or high-risk procedures if the patient has an active, acute, or chronic pulmonary symptom such as a cough, dyspnea, abnormal unexplained physical findings on chest examination, decompensated heart failure, malignancy within the thorax, or radiation therapy (to chest, breasts, lungs, thorax). (192-193)
20. Preoperative ECG may be useful in patients undergoing intermediate- or high-risk procedures if the patient has a history of alcohol abuse, an active cardiac condition, an arrhythmia, an implantable cardioverter-defibrillator (ICD), obstructive sleep apnea (OSA), pacemaker, pulmonary hypertension, radiation therapy, severe obesity, syncope, or use of amiodarone or digoxin. (192-193)
21. Preoperative electrolyte testing may be useful in patients undergoing intermediate- or high-risk procedures if the patient has a history of alcohol abuse; cardiovascular, hepatic, renal, or thyroid disease; diabetes; malnutrition; or use of digoxin or diuretics. (192-193)
22. Preoperative glucose level testing may be useful in patients undergoing intermediate- or high-risk procedures if the patient has diabetes, is severely obese, or uses steroids. (192-193)
23. Preoperative liver function tests (LFTs) may be useful in patients undergoing intermediate- or high-risk procedures if the patient has a history of alcohol abuse, hepatic disease, recent hepatitis exposure, or an undiagnosed bleeding disorder. (192-193)
24. Preoperative platelet count testing may be useful in patients undergoing intermediate- or high-risk procedures if the patient has a history of alcohol abuse, hepatic disease, bleeding disorder, hematologic malignancy, recent chemotherapy or radiation therapy, or thrombocytopenia. (192-193)
25. Preoperative prothrombin time (PT) testing may be useful in patients undergoing intermediate- or high-risk procedures if the patient has a history of alcohol abuse, hepatic disease, malnutrition, bleeding disorder (personal or familial), or use of anticoagulants. (192-193)

26. Preoperative partial thromboplastin time (PTT) testing may be useful in patients undergoing intermediate- or high-risk procedures if the patient has a bleeding disorder (personal or familial), undiagnosed hypercoagulable state, or use of unfractionated heparin. (192-193)
27. Preoperative thyroid function testing (TFT) may be useful in patients undergoing intermediate- or high-risk procedures if the patient has a goiter, thyroid disease, unexplained dyspnea, fatigue, palpitations, or tachycardia. (192-193)
28. Preoperative urinalysis may be useful in patients undergoing intermediate- or high-risk procedures if a urinary tract infection is suspected. (192-193)
29. Certain patient-specific baseline tests prior to surgery may be indicated. A creatinine level should be checked within 3 months if a patient is to receive an injection of contrast dye. A hemoglobin/hematocrit should be checked if the surgery has the potential for significant blood loss, and a type and screen should be obtained if there is a likelihood of transfusion. On the day of surgery it may be useful to obtain a potassium level in a patient with end-stage renal disease, and a glucose determination in a patient with diabetes, although no absolute level of either potassium or glucose has been determined to preclude surgery and anesthesia. The benefits of the procedure must be balanced against the risk of proceeding in a patient with abnormal results. (192-193)
30. The purpose of a preoperative consultation is to diagnose, evaluate, or improve a new or poorly controlled condition. Consultation for the creation of a clinical risk profile helps guide the patient, anesthesiologist, and surgeon to make management decisions. (192-193)
31. A consultation letter stating "cleared for surgery" or "low risk" is not adequate. A request for consultation seeks specific advice to aid in safe anesthetic planning, not for "preoperative clearance," which is seldom helpful. A thorough consultation should summarize a patient's medical problems, condition, and the results of diagnostic tests and provide therapeutic recommendations to help the anesthesiologist provide a safe anesthetic. (192-193)

ANESTHETIC IMPLICATIONS OF COMMON COMORBID CONDITIONS

32. Hypertensive patients may develop end-organ damage depending on the severity and duration of hypertension. Ischemic heart disease, heart failure, renal insufficiency, and cerebrovascular disease are common in hypertensive patients. (193)
33. In patients with a baseline blood pressure (BP) less than 180/110 mm Hg, there is little evidence that delaying surgery improves outcome. However, severe preinduction hypertension (systolic BP greater than 200 mm Hg or diastolic BP greater than 110 mm Hg) is an independent risk factor for postoperative myocardial infarction (MI). Hypertensive patients are more likely to have arrhythmias, labile intraoperative BP, and myocardial ischemia. Surgery should be delayed for patients with severe hypertension when a true baseline blood pressure is obtained (consecutive measurements, low stress environment). If significant end-organ damage is present or intraoperative hypotensive techniques planned, preoperative optimization of BP over several weeks is recommended. (193)
34. If the BP of hypertensive patients is lowered rapidly and aggressively, a risk of cerebral or coronary ischemia exists. Extreme lowering of BP resulting in intraoperative hypotension is more dangerous than hypertension. It is recommended to maintain intraoperative BP within 20% of the patient's baseline BP for adequate organ perfusion. (194)
35. A guideline by the American College of Cardiology/American Heart Association (ACC/AHA) from 2014 directs preoperative testing and management of preoperative noncardiac surgery patients with coronary artery disease (CAD) based on validated risk stratification tools. A stepwise algorithm for patients with known or risk factors for CAD guides the decision to proceed with surgery. Patients with symptomatic heart failure, valvular heart disease, or significant arrhythmias are managed according to appropriate clinical practice guidelines.

Patients with heart failure or atrial fibrillation have a significantly higher risk of perioperative major adverse cardiovascular events (MACE) than patients with CAD alone. (194)

- Step 1 (emergency surgery): If the surgery is an emergency, the focus is on risk stratification and designing a safe anesthetic, not on delaying for further preoperative testing. Targeting therapies intraoperatively and postoperatively can lower risk of MACE. If the surgery is not emergent, continue to Step 2.
- Step 2 (acute coronary syndrome [ACS]): Patients with an ACS (unstable angina, non–ST-segment elevation myocardial infarction [NSTEMI], ST-segment elevation myocardial infarction [STEMI]) are managed according to appropriate practice management guidelines, and surgery is postponed. If no ACS, continue to Step 3.
- Step 3 (assessment of perioperative risk of MACE): Risk of MACE is calculated using an online risk calculator (http://www.surgicalriskcalculator.com) or using the Revised Cardiac Risk Index (RCRI). If the calculated risk of MACE is <1% or <2 RCRI criteria are present, proceed with surgery without further testing. If risk is elevated, proceed to Step 4.
- Step 4 (functional capacity): If the patient can achieve ≥4 METs of activity (refer to question 4) without symptoms, proceed to surgery without further testing. If not, proceed to Step 5.
- Step 5 (clinical impact of testing): Will further testing change clinical management? If yes, then proceed to Step 6. If no, then proceed to Step 7.
- Step 6 (pharmacologic stress testing): If a dobutamine stress echocardiogram or nuclear stress test is normal, proceed to Step 7. If stress testing is abnormal, coronary angiography or revascularization may be indicated. Revascularization is generally only beneficial if it would otherwise be indicated even if the patient were not having surgery. Coronary artery bypass grafting can lower perioperative risk and have long-term benefits in select patients, typically those with left main or three-vessel CAD. The role of percutaneous coronary intervention (PCI) preoperatively is very limited and can be associated with increased risk of noncardiac surgery. Then proceed to Step 7.
- Step 7 (management options): The most appropriate management option is selected. The patient may proceed with surgery, or alternative strategies may be pursued (noninvasive medical management, less invasive surgery, or palliation).

36. The RCRI is a tool for assessing the risk of MACE. (194)
37. The RCRI assesses the risk of MACE by the following six criteria: (1) presence of ischemic heart disease, (2) history of heart failure, (3) history of cerebrovascular disease, (4) diabetes mellitus treated with insulin, (5) creatinine ≥2 mg/dL, and (6) intrathoracic, intra-abdominal, or suprainguinal vascular procedures. The presence of 0, 1, 2, or ≥3 of these factors is associated with 0.5%, 1.3%, 4%, and 9% risk of MACE, respectively. (194)
38. The length of time a patient should wait after revascularization to undergo elective noncardiac surgery depends on the type of revascularization and the associated period of dual antiplatelet therapy (DAPT) to prevent thrombosis or restenosis. The recommendations for DAPT were updated by the ACC/AHA in 2016. After bare metal stent (BMS) placement, 1 month of DAPT is required. If a drug-eluting stent (DES) is placed for stable CAD, 6 months of DAPT is required; if DES is placed for an ACS or there are other high-risk features, 12 months is required. High-risk features include long, overlapping, or small stents or recent in-stent thrombosis. Early discontinuation of DAPT increases risk. For more urgent surgery 3-6 months after placement of a DES, the risk of discontinuation of DAPT is weighed against the risk of delayed surgery. If a patient with a stent requires a procedure that mandates the discontinuation of antiplatelet therapy, aspirin should be continued perioperatively and the second antiplatelet drug restarted as soon as possible. Evidence supports the continuation of low-dose aspirin (75-100 mg) in high-risk patients (secondary prevention or after coronary stenting) for most procedures despite the slightly increased risk of bleeding. During the preanesthetic visit,

the type of stent (DES or BMS) is identified and managed perioperatively with a cardiologist familiar with these stents, especially to prevent premature withdrawal of antiplatelet drugs. The patient should be made aware of the risks associated with premature discontinuation of the drugs, including stent thrombosis, MI, and death. If stent thrombosis does occur, it is best treated in the immediate postoperative period by percutaneous coronary intervention. During the high-risk period patients should only have surgery in facilities with immediate access to interventional cardiac care. (196)

39. Recommendations from the ACC/AHA advise that β-blockade be continued in patients who are on β-blockers chronically and should not be initiated on the day of surgery strictly to lower the risk of MACE. However, it may be reasonable to begin perioperative β-blockade in advance of surgery in high-risk patients (three or more RCRI criteria, intermediate- or high-risk myocardial ischemia on preoperative testing). β-Blockade therapy should always be guided by the clinical condition of the patient. Statins should be continued perioperatively, and it is reasonable to initiate statin therapy in patients having vascular surgery. In patients with clinical indications for statin use, perioperative initiation is considered. (196)
40. The two categories of heart failure are systolic dysfunction (decreased ejection fraction from decreased contractility) and diastolic dysfunction (increased filling pressures with abnormal relaxation but preserved contractility and ejection fraction). Patients may also have a combination of systolic and diastolic dysfunction. Systolic dysfunction is most commonly caused by ischemic heart disease; diastolic dysfunction is associated with hypertension and advanced age. (196)
41. Decompensated heart failure is a high-risk cardiac condition, and elective surgery should be postponed until it is controlled. Patients with class IV heart failure may undergo anesthesia, but the risks and benefits of proceeding should be discussed with a cardiologist and the lowest risk anesthetic technique planned. Patients with heart failure have an approximately 10% risk of MACE compared to approximately 3% risk of MACE in patients with CAD. (196)
42. For patients with heart failure, routine preoperative evaluation of left ventricular function with an echocardiogram is not recommended. If patients have new or worsening symptoms, a change in clinical condition within the past year, or have dyspnea of unknown origin, an echocardiogram is a reasonable investigation before surgery. Symptoms of recent weight gain, complaints of shortness of breath, fatigue, orthopnea, paroxysmal nocturnal dyspnea, nocturnal cough, peripheral edema, recent hospitalizations, or changes in medical management prompt echocardiographic evaluation. (196)
43. Not all cardiac murmurs are pathologic. Functional murmurs arise from turbulent flow across the aortic or pulmonary outflow tracts in high-output states, such as hyperthyroidism, pregnancy, or anemia. Functional murmurs are not associated with valvular abnormalities. It is difficult even for experienced cardiologists to differentiate functional from pathologic murmurs. (196)
44. Diastolic murmurs are always pathologic and require evaluation. (196)
45. Important factors for valvular disease include advanced age, CAD, a history of rheumatic fever, volume overload, pulmonary disease, cardiomegaly, an abnormal ECG, or a murmur. The same risk factors that predict CAD predict aortic sclerosis or stenosis. (196)
46. For patients with a cardiac murmur, a preoperative echocardiogram may be indicated if general or spinal anesthesia is planned, if a moderate or greater degree of valvular stenosis or regurgitation is suspected, and none has been done in the past year. It may also be indicated if there has been a significant change in clinical status. (196)
47. As long as the hemodynamic aspects of the valvular abnormality are taken into account, patients with moderate disease, asymptomatic severe aortic stenosis, asymptomatic severe mitral regurgitation, or asymptomatic severe aortic regurgitation with normal left ventricular function may undergo elective surgery. Appropriate intraoperative and postoperative monitoring is

recommended, as these patients are at elevated perioperative risk. If valvular intervention would otherwise be indicated based on either symptoms or disease severity, preoperative valvular intervention before elective noncardiac surgery is a class I recommendation for reducing perioperative risk. Replacement or repair may be indicated. (196)

48. Antibiotic prophylaxis for infective endocarditis is recommended for patients with prosthetic cardiac valves or prosthetic material for valve repair; patients with previous infective endocarditis; unrepaired cyanotic congenital heart disease, completely repaired defect with prosthetic material within the past 6 months, or repaired defect with residual disease; and cardiac transplant recipients with a structurally abnormal valve and regurgitation. In these patients, only a limited number of procedures require prophylaxis, including dental procedures involving manipulation of the gingiva or perforation of the oral mucosa. Nondental procedures may require prophylaxis only if manipulation of infected tissue is involved or for procedures on the respiratory tract. Genitourinary and gastrointestinal tract procedures do not routinely require antibiotic prophylaxis. (198)
49. Patients with heart failure, cardiomyopathies, or potentially lethal arrhythmias may have an ICD placed. Patients with bradyarrhythmias or heart block may require pacemakers. (198)
50. Electromagnetic interference (EMI) may interfere with the normal function of a cardiac implantable electronic device (CIED), both pacemakers and implantable cardioverter-defibrillators (ICD). EMI is caused most commonly by monopolar cautery ("Bovie"), external radiation, magnetism, or electrical stimulation. EMI may be oversensed by a pacemaker as electrical activity of the heart and cause the pacemaker to inappropriately suspend therapy. This can cause a pacemaker-dependent patient to have episodes of bradycardia and hemodynamic instability. EMI may be oversensed by an ICD as a malignant arrhythmia, causing the ICD to inappropriately discharge. Sudden unanticipated patient movement during critical moments of delicate surgery is potentially catastrophic, or the ICD may deliver inappropriate shocks to the myocardium. CIEDs must be set to "ignore" EMI (asynchronous mode for pacemakers and suspension of tachyarrhythmia therapies for ICDs) to avoid these complications. If a CIED is reprogrammed for a surgical procedure, the device must be re-interrogated and re-enabled before the patient leaves the monitored setting. (198)
51. A magnet will generally suspend the antitachycardia function of an ICD, and normal function is resumed once the magnet is removed. A magnet will generally place a pacemaker into an asynchronous mode at a set heart rate determined by the manufacturer of the device. A magnet will deactivate the ICD only but will have no effect on the pacing function of a CIED performing dual function. Therefore, a pacemaker-dependent patient with an CIED must have the device reprogrammed to an asynchronous pacing mode if EMI is anticipated and a magnet is used. Although usually true, these magnet modes may be altered in certain devices, and determination of the response to a magnet is best determined by an electrophysiology service. (198-199)
52. EMI is rarely caused by procedures below the umbilicus. If bipolar cautery is used, the risk is reduced. (199)
53. Predictors of postoperative pulmonary complications (PPCs) include advanced age, heart failure, chronic obstructive pulmonary disease, smoking, poor general health (impaired sensorium, functional dependency), and OSA. (199)
54. Risk of PPCs are reduced by maximizing airflow in obstructive disease (appropriate use of corticosteroids and β-adrenergic agonists), treating infections, treating heart failure, and postoperative use of incentive spirometry, deep breathing, positive end-expiratory pressure, and continuous positive airway pressure. Preoperative exercise regimens to increase functional capacity of patients may also reduce risk. (200)

55. Routine testing with pulmonary function testing, chest radiography, or arterial blood gases does not predict or lower PPCs. (200)
56. OSA is intermittent airway obstruction or significant desaturations during sleep. (200)
57. OSA is associated with increased rates of diabetes, hypertension, atrial fibrillation, bradyarrythmias, ventricular ectopy, stroke, heart failure, pulmonary hypertension, dilated cardiomyopathy, and CAD. (200)
58. The STOP-BANG questionnaire can be used to identify patients at risk for OSA. The questions address snoring, daytime fatigue, observed apneas during sleep, treatment for high blood pressure, BMI of 35 or more, age of 50 or over, neck circumference greater than 15.7 inches (40 cm), and male gender. Patients are at high risk for OSA if they answer yes to three or more items. (201)
59. Ventilation by mask, direct laryngoscopy, endotracheal intubation, and fiberoptic visualization of the airway are more difficult in patients with OSA. Patients with OSA may have perioperative airway obstruction, hypoxemia, atelectasis, ischemia, pneumonia, need for postoperative reintubation, and prolonged hospitalizations. (201)
60. If CPAP is used at home, the patient should bring the home CPAP device on the day of the procedure for perioperative use. (201)
61. The ASA recommends that patients with OSA have preoperative diagnosis and treatment. The appropriateness of ambulatory surgery should be reviewed since patients with OSA are at a higher risk for perioperative complications and prolonged hospitalization than are patients without OSA. (201)
62. A BMI greater than 40 defines extreme obesity. (201)
63. Obesity is associated with OSA, heart failure, diabetes, hypertension, pulmonary hypertension, difficult airway management, and decreased arterial oxygenation. (201)
64. Chronic hyperglycemia can result in renal insufficiency, strokes, peripheral neuropathies, visual impairment, and cardiovascular disease. (201)
65. Chronic hyperglycemia contributes to impaired wound healing, surgical site infections, and bloodstream infections. (201)
66. Provided the patient is not showing signs of ketosis or dehydration, there is no evidence to support the cancellation of surgery of a patient with a preoperative hyperglycemia. Targeting tight glucose control in the immediate perioperative period is not likely to substantially impact outcomes in diabetics having surgery. No data support cancellation of procedures for any increased level of blood glucose. However, optimal preoperative control of blood sugar should be the goal for elective higher risk surgery. Poorly controlled diabetes is associated with increased perioperative infections and poor wound healing. Measuring HbA_{1c} is an accurate way to assess long-term control and predicts perioperative blood glucose levels. Avoiding perioperative hypoglycemia is critical. (201)
67. Renal disease is associated with hypertension, cardiovascular disease, intravascular volume overload, electrolyte abnormalities, metabolic acidosis, and often the need to alter the types or amounts of anesthetic drugs administered. (201)
68. Renal insufficiency with a creatinine level above 2 mg/dL is an RCRI criterion for risk of MACE. (201)
69. Dialysis is best performed within 24 hours of surgery but not immediately prior to surgery to avoid acute volume depletion and electrolyte alterations. (201)
70. Patients with chronic elevations in potassium tolerate slight hyperkalemia. If the potassium level is less than 6 mEq/dL and within the range of a patient's established levels, then chronic hyperkalemia does not need to be corrected. (201)
71. Radiocontrast medium transiently decreases the glomerular filtration rate (GFR) in most patients, but patients with diabetes or renal insufficiency are at highest risk. (201)

72. The risk of renal injury from radiocontrast medium may be reduced by simple hydration in patients with a GFR less than 60 mL/kg/min and maintenance of adequate mean arterial pressure. (201)
73. Anemia is a marker for an increased risk of perioperative death. Both anemia and blood transfusions predict perioperative morbidity and mortality risks. (202)
74. For an elective procedure, anemia should be evaluated preoperatively. Efforts should be directed at correcting anemia to avoid transfusions. Erythropoietin administration is indicated in certain patients (e.g., renal insufficiency, anemia of chronic disease, refusal of transfusion) if significant blood loss is anticipated. If a patient is asymptomatic with chronic anemia and is undergoing a low-risk procedure, then transfusion is not warranted unless the hemoglobin is less than 6 g/dL. If a patient has CAD or significant blood loss is anticipated, transfusion to a higher hemoglobin level may be indicated. If the cause of the anemia is unknown, an evaluation is indicated. A patient with sickle cell disease should be evaluated by a hematologist perioperatively to guide therapy. (202)
75. Patients with advanced age are more likely to have comorbid conditions including arthritis, hypertension, cardiovascular diseases, diabetes, and renal insufficiency. They may also respond differently to medications, and dosing of medicines may need to be altered. (202)
76. Patients older than 85 years with a history of hospital admission within the previous 6 months are at risk for postoperative admission after ambulatory surgery. (202)
77. A patient has the right to self-determination in the perioperative period. DNR policies should be reviewed with the patient or the patient's surrogate before surgery and modified as needed to uphold the patient's wishes. There are three parts to the perioperative DNR. Choice A is full attempt at resuscitation. This choice requests full suspension of existing directives during the anesthetic and immediate postoperative period, thereby consenting to the use of any resuscitation procedures to treat clinical events during this time. Choice B is a limited attempt at resuscitation defined with regard to specific procedures, which may apply or reject certain specific resuscitation measures (e.g., chest compressions, defibrillation, tracheal intubation). Choice C is a limited attempt at resuscitation defined with regard to the patient's goals. This choice allows the anesthesiologist and surgical team to use clinical judgment in determining which resuscitation procedures are appropriate in the context of the situation and the patient's stated goals. (202)

FORMULATION OF ANESTHETIC PLAN

78. Many factors influence an anesthesiologist's choice of the optimal anesthetic technique. Patient factors include the patient's coexisting diseases, risk of aspiration, age, patient cooperation, anticipated ease of airway management, coagulation status, previous response to anesthesia, and expressed preferences of the patient. Factors related to the procedure include the site of surgery, operative technique, position of the patient during surgery, and anticipated duration of surgery. Logistical factors include the postoperative disposition, analgesia plan, and equipment availability for the desired technique. (202)
79. With general anesthesia, side effects that occur frequently but have minimal consequences include oral or dental damage, sore throat, hoarseness, postoperative nausea/vomiting, drowsiness/confusion, and urinary retention. Side effects of general anesthesia that occur infrequently but have severe consequences include intraoperative awareness, visual loss, aspiration, organ failure, malignant hyperthermia, drug reactions, failure to wake up/recover, and death. (202)
80. With regional anesthesia, side effects that occur frequently but with minimal impact include prolonged numbness/weakness, post–dural puncture headache, and failure of technique. Side effects of regional anesthesia that occur infrequently but with severe consequences include bleeding, infection, nerve damage/paralysis, persistent numbness/weakness, seizures, coma, and death. (202)

81. An accurate assessment of risk provides a common language for communication with both patient and surgeon, especially in making a recommendation to delay or cancel a procedure. Risk assessment helps in comparing outcomes, allocating resources, and compensation. It is also essential to obtaining informed consent from the patient. (202)
82. The ASA physical status is a robust and simple method to risk-stratify patients, although it does not account for risk inherent to the procedure. The American College of Surgeons (ACS) National Surgical Quality Improvement (NSQIP) tool, which is easily accessed online at www.riskcalculator.facs.org, provides a comprehensive estimate of patient and procedural risk. (202)
83. Informed consent is obtained when a patient agrees to proceed after hearing and understanding the indications for treatment as well as alternatives. Both risks and benefits of options for treatment are discussed in terms a layperson will understand. As patients are often under considerable stress immediately before a procedure, a calm and reassuring demeanor will help allay anxiety, which can impede the informed consent process. (202)
84. Perioperative medications should be evaluated on a case-by-case basis. Patient comorbid conditions and the nature of the procedure should be considered. Generally, cardiac medications, antihypertensive drugs, and non-loop diuretics when taken for hypertension are continued preoperatively. If angiotensin-converting enzyme inhibitors (ACEIs) or angiotensin receptor blockers (ARBs) are continued, doses of induction and other anesthetic drugs may be altered, and vasopressors should be available to prevent or mitigate hypotension. (202)
85. There are class I recommendations that β-blockers should be continued preoperatively in patients who take them to treat angina, symptomatic arrhythmias, or hypertension. (202)
86. Statins should be continued preoperatively as they have been shown to reduce length of hospital stay and the risk of stroke, renal dysfunction, MI, and even death. Terminating statin administration is associated with an increased risk. (202)
87. Continuing ACEIs or ARBs prior to surgery may contribute to hypotension under anesthesia, though no harm from these events has been established. Patients with heart failure or CAD may be at increased risk with discontinuation of ACEIs or ARBs. These medications may be discontinued 12 to 24 hours before surgery if taken only for hypertension and the surgical procedure will be lengthy, there will be significant blood loss or fluid shifts, or there is planned administration of general anesthesia. (202)
88. The perioperative management of aspirin is determined according to the risk of bleeding versus the risk of thrombotic complications with discontinuation. Generally, if aspirin is taken for primary prevention (no history of stroke, stents, or MI), it can safely be discontinued 5 to 7 days before surgery. In high-risk patients (history of stents or vascular disease), aspirin is continued unless the risk of bleeding into an enclosed space with surgery is too high (intracranial, intraspinal). (204)
89. The management of antiplatelet agents for regional/neuraxial anesthesia is guided by recommendations from the American Society of Regional Anesthesia (ASRA). In 2015, the guidelines were updated to stratify procedures by risk of bleeding including low risk (e.g., peripheral nerve blocks), intermediate risk (e.g., paravertebral blocks), and high risk (e.g., epidural instrumentation). Although nonsteroidal anti-inflammatory drugs (NSAIDs) are withheld for 5 half-lives of the drug for high-risk procedures only, clopidogrel is withheld for 7 days for intermediate- and high-risk procedures. Aspirin, if for primary prevention, is withheld for 6 days in high-risk procedures only. (204-206)
90. The management of anticoagulants for regional/neuraxial anesthesia is guided by ASRA guidelines. Intravenous heparin is held for 4 hours before any

procedure, and subcutaneous heparin is held for 8 to 10 hours. Low-molecular-weight heparin (LMWH) is held for 12 hours for prophylactic doses and 24 hours for therapeutic dosing. Warfarin is held for 5 days before intermediate- or high-risk procedures. Newer anticoagulants, such as dabigatran (4-5 days), rivaroxaban (3 days), and apixaban (3-5 days), are discontinued before intermediate- or high-risk procedures. (207-209)

91. Bridging anticoagulation with LMWH is indicated for patients at high risk (>10% annually) of thrombotic complications. This group includes patients with specific mechanical heart valves (mitral prosthesis, caged-ball or tilting disk valve, and stroke/TIA within past 6 months); atrial fibrillation and a $CHADS_2$ score of 5 or 6, stroke/TIA within the past 3 months, rheumatic valvular disease; venous thromboembolism in the past 3 months or severe thrombophilia (e.g., protein C or S deficiency, antithrombin deficiency, antiphospholipid antibodies). Bridging is not recommended for low-risk patients. (207-209)
92. If the INR is 2 to 3, warfarin administration is stopped 5 days before most surgeries (unless the procedure is minor such as cataract surgery) to allow the INR to decrease to less than 1.5. (207-209)
93. LMWH is discontinued 12 hours if prophylactic dosing 0.5 mg/kg/day or 24 hours if therapeutic dosing 1 mg/kg/day before procedures with a risk of bleeding or planned neuraxial anesthesia. (207-209)
94. If the INR is measured a day or two before surgery and is greater than 1.8, a small dose of vitamin K (1-5 mg orally or subcutaneously) can reverse anticoagulation. (207-209)
95. LMWH is typically contraindicated in patients with creatinine clearance less than 40 mL/min, body weight greater than 150 kg, porcine allergy, heparin-induced thrombocytopenia, or a history of bleeding complications while on LMWH. (207-209)
96. Type 1 diabetics have an absolute insulin deficiency and require insulin to prevent ketoacidosis even if they are not hyperglycemic. Type 2 diabetics are often insulin resistant and prone to extreme hyperglycemia. Both type 1 and type 2 diabetics should discontinue intermittent short-acting regular insulin with the exception of the insulin pump. The insulin pump should be continued at the lowest basal rate, which is generally the nighttime dose. Insulin is discontinued if the blood sugar level is less than 100 mg/dL. Type 1 diabetics should take half of their usual intermediate- to long-acting morning insulin (lente or NPH) the day of surgery to avoid ketoacidosis. Type 2 diabetics should take none or up to a half-dose of intermediate- to long-acting insulin (lente or NPH) or a combination of a 70/30 preparation insulin on the day of surgery. (207-209)
97. An ultra-long-acting insulin such as glargine is continued on the day of surgery, but the dose should not exceed 1 unit/kg or more. (207-209)
98. Metformin is held on the day of surgery. However, it will not cause hypoglycemia during fasting periods of 1 to 2 days, and there is no risk of lactic acidosis with metformin in patients with functioning liver and kidneys, so surgery does not need to be canceled if a patient has taken metformin. (207-209)
99. To avoid potential hypoglycemia in fasting patients from some oral agents, oral hypoglycemics are generally withheld on the day of surgery. (209)
100. On the day of surgery patients should continue asthma medications, birth control pills, cardiac medications, triamterine and hydrochlorothiazide if used for hypertension (while loop diuretics are typically withheld), eye drops, gastrointestinal reflux medications, seizure medications, steroids (oral or inhaled), thyroid medications, and autoimmune medications such as methotrexate. Entanercept, infliximab, and adalimumab are generally discontinued, but one should check with the prescribers and surgeon. Patients may continue estrogen compounds when used for birth control or cancer therapy and narcotics for pain or addiction. (209)

101. Herbal and nonvitamin supplements are discontinued 7 to 14 days before surgery. The administration of NSAIDs should be stopped 48 hours before surgery unless neuraxial anesthesia is planned, for which stopping NSAIDs for at least 5 half-lives is recommended. Topical creams, ointments, and erectile dysfunction medications are discontinued 24 hours before surgery. Sildenafil should only be continued perioperatively if taken for right-sided heart failure or pulmonary hypertension. Vitamins, minerals, and iron should not be taken on the day of surgery. (209)
102. Valerian is a central nervous system depressant, which may cause a benzodiazepine-like withdrawal when abruptly discontinued. It is safest to taper this medication. (209)
103. Herbal therapy alone is not an absolute contraindication to neuraxial or regional anesthesia per ASRA guidelines. However, for elective procedures that are at high risk of bleeding, discontinuation of agents known to potentiate bleeding is recommended for 7 days (garlic, dong quai, danshen, ginkgo biloba, ginseng). The same recommendations are followed for low- or medium-risk procedures in patients who have other risk factors (advanced age, renal/hepatic dysfunction, history of major bleeding with procedures). (209)
104. Antidepressant, antianxiety, and psychiatric medications including monoamine oxidase inhibitors (MAOIs) are continued preoperatively. Anesthesia management may need to be altered for patients taking MAOIs. (209)
105. MAOIs have a long duration of action, approximately 3 weeks. Discontinuation of MAOIs may produce severe depression or result in suicide. The safest alternative is to continue MAOIs and adjust the anesthetic plan. (209)
106. Patients may continue narcotic pain medications to prevent withdrawal symptoms and discomfort. Anxiolytics are continued as well. Drugs used to treat addiction, such as methadone or nicotine-replacement therapies, are also continued. (209)
107. Patients taking oral steroids should take their usual dose on the day of surgery. (209)
108. A normal daily adrenal output of cortisol is 30 mg, which is equivalent to 5 to 7.5 mg of prednisone. (209)
109. The hypothalamic-pituitary axis (HPA) may be suppressed in patients taking 5 to 20 mg/day of prednisone or its equivalent for more than 3 weeks. The HPA is usually suppressed with more than 20 mg/day of prednisone for more than 3 weeks. The risk of adrenal insufficiency remains for up to 1 year after the cessation of high-dose steroids. A patient with a suppressed HPA may need supplemental perioperative steroids if his or her HPA cannot increase the output of glucocorticoids during the period of surgery, trauma, or infection. (209)
110. High-dose steroids are associated with infections, psychosis, poor wound healing, and hyperglycemia. (209)
111. Patients on chronic steroids should have their perioperative glucocorticoid dosing guided by the stress and duration of the surgery. For a minor procedure (e.g., inguinal herniorrhaphy), the target hydrocortisone equivalent is 25 mg/day, so additional supplementation is not necessary and the patient should just take the usual daily dose of steroid. For a moderate-stress surgical procedure (colon resection, total joint replacement, lower extremity revascularization) the target hydrocortisone equivalent is 50 to 75 mg/day for 1 to 2 days. The patient takes the usual daily dose of steroid, receives 50 mg hydrocortisone intraoperatively, then 20 mg hydrocortisone every 8 hours through postoperative day 1, and then resumes home dosing of steroid. If a major surgery is planned (pancreatoduodenectomy, esophagectomy), then the target hydrocortisone equivalent is 100 to 150 mg/day for 2 to 3 days. The patient should take the usual daily dose of steroid, receive 50 mg hydrocortisone intraoperatively, and continue with 50 mg hydrocortisone every 8 hours through postoperative day 2. After postoperative day 2, the patient resumes the home dose of steroid. (209)

112. Patients at risk for PONV may be prescribed a scopolamine patch to be placed 2 to 4 hours preoperatively. Scopolamine is contraindicated in patients with angle-closure glaucoma. (209)
113. Patients at increased risk for pulmonary aspiration include laboring parturients, those with intra-abdominal masses, nonfasting individuals, and patients with an incompetent lower esophageal sphincter with reflux, symptomatic hiatal hernia, diabetes mellitus, gastric motility disorders, anticipated difficult airway, bowel obstruction, and ascites. Alteration of gastric contents to increase pH and limit the severity of potential pulmonary aspiration can be achieved with histamine-2 (H_2) antagonists, proton pump inhibitors, and nonparticulate antacids. Gastric emptying can be stimulated with prokinetic agents. (209)
114. The ASA has released practice guidelines for preoperative fasting. Up to 8 hours prior to surgery, any food or fluid may be consumed. For patients without risk factors for pulmonary aspiration the following applies: up to 6 hours before surgery, the patient may have a light meal (toast and clear liquids), infant formula, or nonhuman milk; up to 4 hours before surgery, breast milk may be consumed; up to 2 hours before surgery, the patient may take clear liquids without milk, pulp, or alcohol. During the 2 hours before surgery, no solids or liquids may be taken orally. If the patient has risk factors for pulmonary aspiration, no food or fluid should be consumed within 8 hours of the surgery. Preoperative consumption of clear liquids with carbohydrates has advantages and should be strongly encouraged in individuals at low risk for aspiration. (209)