Categories of ambulatory surgery: 1) office-based procedures, typically with little support; 2) freestanding surgery center (remote from hospital, also with paucity of support); 3) ambulatory surgery center (ASC) adjacent to hospital, with full support of, eg, specialists, blood bank

Predictors of major morbidity and mortality: independent predictors of complications include chronic obstructive pulmonary disease (COPD), cardiovascular (CV) disease, stroke, prolonged operative times (≥2 hr), cancer, and age (controversial; physiologic age more predictive than chronologic age); American Society of Anesthesiologists (ASA) score as predictor — patients with ASA score of 3 now commonly treated in ASCs, but their risk for complications 6 to 7 times greater than in patients with ASA scores of 2; even greater increase in risk (including mortality) seen with ASA score of 4

Unanticipated admission after ambulatory surgery: Canadian study — rate of admission 3%, 20% of which related to anesthesia; Fleisher study — risk factors for unanticipated admission include length of surgery (risk greatest if 1-3 hr), ASA score of 3 to 4, age, and high body mass index (BMI); best overall outcomes seen in patients treated at freestanding ASCs; rates of hospital admission from ASCs adjacent to hospitals highest (possibly related to patient selection)

Risk associated with age: Chung study — among older patients, most major complications occurred in operating room, as opposed to postanesthesia care unit (PACU) or phase 2 level of care; CV events most common (incidence higher in elderly patient intraoperatively, in PACU, and in phase 2 care)

American College of Cardiology/American Heart Association guidelines for managing CV risk (2007): low-risk surgery — includes all ambulatory surgery; does not routinely require anesthesia consultation or extensive CV evaluation

Conditions that require postponement of surgery or change to non-ASC: active cardiac disease — 1) unstable coronary syndrome (eg, recent [within last 30 days] myocardial infarction, new-onset angina, angina at rest); 2) decompensated heart failure; 3) significant arrhythmias (eg, supraventricular tachycardia, atrial fibrillation with resting heart rate ≥100 bpm); 4) severe valvular heart disease, particularly stenotic lesions

Recent insertion of coronary stent: surgery should not be performed in ASC if patient had insertion of bare-metal stent during preceding 4 to 6 wk or drug-eluting stent within last 12 mo; within these time frames, surgery should be performed only if urgent, and must take place in facility with full cardiology support; interruption of antiplatelet therapy — increases risk in patients with coronary stents (coronary artery disease [CAD] itself associated with increased risk); patients with recent placement of stents should continue antiplatelet drugs, unless undergoing important surgery with significant risk for bleeding (typically, intracranial or intraspinal surgery); acute coronary thrombosis in patients with stents — if revascularization not achieved within 90 min of event (door-to-balloon time), risk for death significantly increases; every 15-min delay after 90 min doubles risk for death; if patients with stents cared for at ASC, plan must be formulated for expediting revascularization

Aortic stenosis (AS): associated with odds ratio of CV event as high as that with CAD; risk increases almost 10-fold in patients with CAD and AS; incidence increases with age; aortic sclerosis — typically precedes AS, with incidence of ≈25% in persons 64 to 74 yr of age; systolic murmur indistinguishable from that heard in AS; recommendations for follow-up echocardiography — every 5 yr for known aortic sclerosis; with mild AS, every 3 to 5 yr; with moderate AS, every 2 yr; with severe AS, yearly

Severe AS: clinically manifested by syncope, chest pain, and dyspnea; surgery for these patients should not be

Educational Objectives

The goal of this program is to improve the outcomes of patients who undergo ambulatory surgery. After hearing and assimilating this program, the clinician will be better able to:

1. Identify predictors of complications in patients who undergo ambulatory surgery.
2. Recognize cardiac risk factors and contraindications for ambulatory surgery.
3. Delineate strategies for the management of obstructive sleep apnea during and after ambulatory surgery.
4. Follow guidelines for ambulatory surgery in pregnant or diabetic patients.
5. Select anesthetic techniques that minimize risk during ambulatory surgery.

Faculty Disclosure

In adherence to ACCME Standards for Commercial Support, Audio-Digest requires all faculty and members of the planning committee to disclose relevant financial relationships within the past 12 months that might create any personal conflicts of interest. Any identified conflicts were resolved to ensure that this educational activity promotes quality in health care and not a proprietary business or commercial interest. For this program, Dr. Sweitzer and the planning committee reported nothing to disclose.
Other cardiac risk factors: congestive heart failure (CHF)—carries higher odds ratio for complications and death than CAD; clinical distinctions between CAD, AS, and CHF—patients with CAD rarely suffer myocardial infarction intraoperatively, as anesthetic effects generally reduce risk; in contrast, anesthetic effects (eg, hypotension, depression of cardiac function) tend to be harmful for AS and CHF; left ventricular assist devices—patients should only be treated in major centers

Obstructive sleep apnea (OSA): accumulating evidence suggests that moderate to severe OSA associated with increased risk for intraoperative and postoperative surgical complications, including challenges in airway management and CV and pulmonary complications

Guidelines for surgery during pregnancy (American Congress of Obstetricians and Gynecologists and ASA): when nonobstetric surgery planned, obstetric provider should be notified; if fetal monitoring required, procedure should be done at facility with neonatal and obstetric support (ie, capability to perform cesarean delivery and interpret fetal heart tracings); previable fetuses (first and first half of second trimester)—at minimum, fetal heart tones should be determined by Doppler pre- and postoperatively; intraoperative fetal monitoring—appropriate for viable fetuses if physically possible, provider capable of intervening available, and mother has consented to cesarean delivery; advisable for previable fetuses if intraoperative monitoring would change management (eg, change position, augment blood pressure, increase oxygenation or ventilation)

Surgery on infants born prematurely: risk for postoperative apnea increased in infants with postconceptional age <60 wk; unless blood bank available, anemia (ie, hematocrit <30%) or procedure associated with significant blood loss increases risks of surgery in ASC; ASC not suitable for patients with coagulopathy or thrombocytopenia

Liver disease: high-risk categories—patients with acute hepatitis or bilirubin >11 mg/dL; those undergoing surgery in close proximity to liver (risk highest with cholecystectomy); type of anesthesia—has no impact if blood pressure maintained; risk stratification—calculate Model for End-stage Liver Disease (MELD) score (or use online calculator); MELD score ≥15 or Childs-Pugh score of C indicates high risk

Obesity: controversial; not considered by SAMBA to be independent risk factor for unanticipated admission after ambulatory surgery, but superobesity may increase risk; considered risk factor in more recently published risk stratifiers; basing purely on BMI problematic (increased risk associated with central obesity, concomitant comorbidities, and obesity in head and neck area)

Diabetes: poorly controlled patients, even those with normal blood glucose on day of surgery, at increased risk for infection; in patients with long-term glycemic control, high blood glucose reading alone not associated with higher risk, except with cardiac surgery (cancellation of surgery unnecessary unless patient has diabetic ketoacidosis or volume depletion)

Metformin: cancellation of procedure unnecessary when taken on day of surgery; risk for lactic acidosis only seen in patients with complete liver failure; associated with hypoglycemia only after fasting for several days; patients who miss doses and then restart often experience gastrointestinal upset; speaker recommends continuing metformin on day of surgery (may protect against myocardial ischemia)
Risk for thromboembolism: low overall in ASCs; rate in high-risk patients treated at ASC as high as that in low-risk inpatient population (≤1.5%); therefore, preoperative dose of heparin should be considered.

Postoperative nausea and vomiting: development after discharge most problematic, and common reason for postoperative emergency department visit or admission; patients with nausea and vomiting in PACU at increased risk (may need to be observed longer and/or discharged on oral ondansetron).

Anesthetic considerations: ASA Closed Claims Project data—MAC associated with slightly higher risk for death or permanent brain injury, compared with general anesthesia; minimal or light sedation likely safe, but deep sedation may pose greater risk than general anesthesia, particularly in patients with, eg, OSA.

Cataract surgery: exceedingly low-risk surgery; virtually no conditions necessitate cancellation (only requirement patient with ability to lie still); if general anesthesia required, risk may be slightly increased (optimization desirable).

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Suggested Reading

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CRNAs may earn 1 credit per issue in Volume 56 from January 1, 2014 to December 31, 2015.
PATIENT SELECTION FOR AMBULATORY SURGERY

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To submit a test form by mail or fax, complete Pretest section before listening and Posttest section after listening.

1. Risk for surgical complications in patients with American Society of Anesthesiologists (ASA) score of 3 is _______ that of patients with ASA scores of 1 or 2.
   (A) Twice  
   (B) 3 to 4 times  
   (C) 6 to 7 times  
   (D) 9 to 10 times

2. All the following are correlated with unanticipated admissions after ambulatory surgery, except:
   (A) Female sex  
   (B) Age  
   (C) High body mass index  
   (D) ASA score of 3 to 4

3. Choose the correct statement about performing ambulatory surgery in a patient with a coronary stent.
   (A) Ambulatory surgery should not be performed within 6 mo of insertion of a bare-metal stent
   (B) Antiplatelet therapy can be safely discontinued 6 mo after insertion of a drug-eluting stent
   (C) After stent placement, risk for death from coronary thrombosis doubles for every 15-min delay of revascularization beyond 90 min
   (D) It is safe to perform ambulatory surgery 6 mo after insertion of a drug-eluting stent

4. Anesthesia is associated with reduced intraoperative risks in patients with:
   (A) Coronary artery disease  
   (B) Congestive heart failure  
   (C) Aortic stenosis  
   (D) All the above

5. Which of the following statements about management strategies for obstructive sleep apnea (OSA) is incorrect?
   (A) Treated at an ambulatory surgery center is contraindicated for patients with severe OSA, even if comorbid conditions are optimized
   (B) Deep sedation should be avoided
   (C) Patients are at greatest risk during first 24 to 72 hr after discharge home
   (D) End-tidal CO₂ should be monitored in all patients with OSA who are receiving sedation

6. Intraoperative fetal monitoring is never recommended if the fetus is at a previable stage.
   (A) True  
   (B) False

7. Surgery may be performed safely in the ambulatory setting for patients with:
   (A) Severe primary pulmonary hypertension  
   (B) Thrombocytopenia  
   (C) Active cardiac disease  
   (D) Implantable cardioverter-defibrillators

8. Which of the following does not generally influence outcomes of ambulatory surgery in patients with liver disease?
   (A) Bilirubin level >11 mg/dL  
   (B) Surgery in close proximity to the liver  
   (C) Model for End-stage Liver Disease (MELD) score ≥15  
   (D) Type of anesthesia chosen

9. Which of the following is true of diabetic patients undergoing ambulatory surgery?
   (A) High blood glucose on the day of surgery is sufficient reason to cancel the operation  
   (B) Poor long-term glycemic control is associated with increased surgical risk  
   (C) Cancellation of the procedure is necessary if the patient took metformin on the morning of surgery  
   (D) Hypoglycemia is likely to develop in patients who ingest metformin and fast for 24 hr

10. Data from the ASA Closed Claims Project suggests that monitored anesthesia care is associated with a higher risk for death or permanent brain injury, compared with general anesthesia.
    (A) True  
    (B) False

Answers to Audio-Digest Anesthesiology Volume 56, Issue 23: 1-B, 2-C, 3-A, 4-C, 5-D, 6-C, 7-A, 8-B, 9-C, 10-D