

**CE EARLY RELEASE DECEMBER 2007
COLUMBIA UNIVERSITY MEDICAL CENTER**

Fleischer, Lee A., Beckman, Joshua A., Brown, Kenneth A., et. al. (2007). **ACC/AHA 2007 Guidelines on Perioperative Cardiovascular Evaluation and Cardiovascular Evaluation for Noncardiac Surgery. A Report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines** (Writing Committee to Revise the 2002 Guidelines on Perioperative Cardiovascular Evaluation for Noncardiac Surgery). *Circulation*, <http://circ.ahajournals.org> DOI10.1161/CIRCULATIONAHA.107.185699

The ACC/AHA 2007 Guidelines contain a vast amount of information on perioperative cardiovascular assessment in noncardiac surgery. More than 400 current studies and articles were reviewed to update the 2002 Guidelines, with Section 8 devoted to Anesthesia Care. Highlights from the 2007 recommendations are summarized here. The classification system for identifying risk has been revised. Patients with one or more 'active cardiac conditions' should undergo intensive management and surgery may be possibly delayed or cancelled based on the presence of these.

Active cardiac conditions	Clinical risk factors	Minor risk factors
Unstable coronary syndromes <ul style="list-style-type: none"> ▪ Unstable/severe angina ▪ Recent MI (>7d, <1mo from day of exam) 	History of ischemic heart disease*	Abnormal ECG (LVH, LBBB, ST-T abnormalities).
Decompensated heart failure	History of compensated/prior HF	Uncontrolled systemic hypertension
Significant arrhythmias	History of cerebrovascular disease	Advanced age
Severe valvular disease	Diabetes mellitus	Other than sinus rhythm
	Renal insufficiency	

*If stress test does not identify myocardial risk, reinfarction risk after noncardiac surgery is low. It is prudent to wait 4-6 weeks after MI before elective surgery.

Disease-specific recommendations:

Patients with CAD: Preoperative testing is recommended for patients in whom revascularization may be helpful. New studies have shown that revascularization, in general, has not substantially reduced cardiac morbidity in patients undergoing noncardiac surgery.

Treated Hypertension: Beta blockers are ideal agents for the treatment of hypertension in the perioperative period, if there is no contraindication. Hypertensive patients may experience more profound intraoperative hypotension, and part of this may be due to the use of ACEi or ARB agents. The authors suggest that on the morning of surgery, ACEi and ARB agents may be withheld to avoid intraoperative hypotension and possible cardiac complications.

Heart Failure: The presence of heart failure on the preoperative assessment has long been identified to increase cardiac risk. Knowledge of the etiology of the heart failure is helpful to the clinical management.

Cardiomyopathy: A preoperative echocardiogram is essential to evaluate systolic and diastolic function in patients with cardiomyopathy. Special considerations for hypertrophic cardiomyopathy include the avoidance of hypotension by either beta adrenergic blockade or reduced cardiac filling pressures.

Valvular Heart Disease: Recent recommendations as to endocarditis prophylaxis¹ and anticoagulation² should be carefully followed. The extent of valvular function should be established through the use of cardiac testing, and preoperative cardiac interventions should be planned prior to elective surgery based on the severity of dysfunction.

Dysrhythmias: Though recent study suggests that asymptomatic ventricular arrhythmias such as NSVT and ventricular coupling do not contribute to intraoperative cardiac morbidity, the issue of underlying myocardial ischemia, electrolyte imbalance, and drug toxicity should be addressed.

Surgery Specific recommendations: Morbidity and mortality risk varies depending on the surgical site, length of surgery, and anticipated fluid shifts.

Surgical procedures are now classified into low-risk, intermediate-risk and vascular surgery. The risk for cardiac morbidity during open vascular surgery has been demonstrated in a number of studies, including the CARP trial. Multiple studies support the value of preoperative cardiac evaluation in patients undergoing elective vascular surgery. (Endovascular AAA repair and carotid endarterectomy are considered intermediate risk.)

Nonthoracic solid organ transplantation is a high-risk procedure, owing largely to the existence of comorbidities, such as diabetes mellitus and CAD. Myocardial perfusion imaging in kidney transplantation has been correlated with predicting postoperative myocardial events. Two studies demonstrated that dobutamine stress echocardiogram for preoperative liver transplant patients with possible CAD was of value in predicting cardiac morbidity at the time of OLT. Stress echo is also recommended to determine cardiac function in patients having lung volume reduction surgery for obstructive pulmonary disease.

Classification system for recommendations:

Class I	<i>General agreement or evidence that procedure or treatment is beneficial, useful, and effective</i>
Class IIa	<i>Conflicting evidence about efficacy, but weight of evidence/opinion in favor of usefulness</i>
Class IIb	<i>Conflicting evidence about efficacy, but usefulness/efficacy is less well established by evidence</i>
Class III	<i>Evidence or agreement that the treatment is not useful or possible harmful.</i>

Preoperative Evaluation

Noninvasive evaluation of LV function: Probably useful (class IIa) for patients with dyspnea of unknown origin, or those with current/prior heart failure with worsening dyspnea, if testing not performed within last 12 months.

Resting ECG: Class I recommendation for patients with 1 clinical risk factor undergoing vascular surgery, or if patient has known CHD, peripheral arterial disease or cerebrovascular disease undergoing intermediate risk procedures. Rest ECG is probably useful for patients with no risk factors undergoing vascular procedures.

Noninvasive stress testing: Class I recommendation for patients with active cardiac conditions for noncardiac surgery. It is probably helpful (Class IIa) in patients with ≥ 3 clinical risk factors and poor functional capacity. Class IIb recommendation for those with 1-2 clinical risk factors and poor functional capacity having intermediate risk noncardiac surgery if management would change, and for 1-2 clinical risk factors with good functional capacity undergoing vascular surgery.

When is preoperative (non cardiac surgery) coronary revascularization with CABG or PCI recommended?

Class I: Useful for patients with stable angina and significant left main coronary artery stenosis

Useful in patients with stable angina and 3-vessel disease

Useful for patients with stable angina and 2-vessel disease with significant proximal LAD stenosis and either EF < 50% or demonstrable ischemia on noninvasive testing.

Recommended for patients with high-risk unstable angina or non-ST-segment elevation MI

Recommended for patients with acute ST-elevation MI

Recommendations for perioperative management of patients with prior PCI undergoing noncardiac surgery related to anticoagulation management post-PCI * *Fleischer et al, p. 40.*

Balloon angioplasty		Bare-metal stent		Drug-eluting stent	
<14 days	>14 days	>30-45 days	<30-45 days	<365 days	>365 days
Delay for elective surgery	OK for OR with aspirin		Delay for elective surgery		OK for OR with aspirin

Intraoperative Considerations:

Beta Blockers

Class I: Continue in patients already treated with B blockers for angina, arrhythmia, hypertension
Administer to vascular surgery patients at high cardiac risk (ischemia on preop testing)

Class IIa: Probably recommended for vascular surgery patients with preoperative findings of CHD

Probably recommended for vascular surgery patients if preop testing identifies high cardiac risk (1 clinical factor)*

Probably recommended for patients identified with CHD or high cardiac risk with > 1 clinical risk factor who are to undergo intermediate-risk or vascular surgery.

* *Careful consideration is required for use of b-blockers in decompensated HF, non ischemic CM or severe valvular disease in the absence of CHD*

Statins

Class I: If currently taking statins prior to noncardiac surgery, continue statins throughout periop period.

Class IIa: Probably helpful for patients having vascular surgery with or without clinical risk factors

Alpha-2 Agonists

Class IIb: Alpha-2 agonists for perioperative hypertension control are possibly helpful for patients with known CAD or at least 1 clinical risk factor for surgery.

Anesthesia Considerations

Volatile agents

Class IIa: The use of volatile anesthetic agents in noncardiac surgery for maintenance of GA in hemodynamically stable patients at risk for myocardial ischemia is probably beneficial.

Pain Management: There are not enough randomized controlled trials to recommend one pain strategy over another; however, the perioperative pain management has a strong role in the reduction of myocardial morbidity.

Prophylactic Intraoperative Nitroglycerin

Class IIb: Intraoperative nitroglycerin for prevention of myocardial ischemia and morbidity is not clearly useful in high-risk patients for noncardiac surgery, especially if the patient is treated with nitrates preop. Use of prophylactic IV nitroglycerin must be considered with full knowledge of the implications for changes in hemodynamics during the intraoperative period.

TEE

Class IIa: Intraoperative/perioperative use of the TEE is probably useful in the presence of acute, persistent and life-threatening hemodynamics.

Maintenance of Body Temperature

Class I: Maintenance of body temperature (normothermia) is recommended unless mild hypothermia is intended as in the case for organ protection.

Blood Glucose Control

Class IIa: For patients with diabetes mellitus or acute hyperglycemia at high risk for myocardial ischemia, or who are undergoing vascular and major noncardiac surgery with subsequent planned ICU admission, blood glucose concentration < 150 mg/dL is probably useful in reducing cardiac morbidity.

Class IIb: For patients with DM or acute hyperglycemia, if admission is not to the ICU, the usefulness of tight glucose control is less helpful.

Pulmonary Artery Catheters

Class IIb: The use of a PAC should be based on three parameters: patient disease, surgical procedure and practice setting. It is possibly useful if patients are deemed at-risk for major hemodynamic disturbances easily detected by PAC.

Class III: Routine use of PAC perioperatively, in particular for patients at low risk for hemodynamic disturbances, is not recommended.

ST-Segment monitoring

Class IIa: Intraoperative and postop ST-segment monitoring is probably useful for patients with CAD or those having vascular surgery, using computerized ST-segment analysis.

Class IIb: Intraoperative and postop ST-segment monitoring is possibly helpful for patients with single or multiple risk factors for CAD undergoing noncardiac surgery.

Surveillance for Perioperative MI

Class I: Postop troponin measurement recommended for patients with ECG changes or chest pain.

Class IIb: Postop troponin measurement not recommended for clinically stable patients after vascular and intermediate risk surgery

M. Clark, NP

Reviewed by: S. Mercer, M.D. 11/07

¹ Wilson W, Taubert KA, Gewitz M, et al. (2007). Prevention of infective endocarditis: guidelines from the American Heart Association: a guideline from the American Heart Association Rheumatic Fever, Endocarditis, and Kawasaki Disease Committee, Council on Cardiovascular Disease in the Young, and the Council on Clinical Cardiology, Council on Cardiovascular Surgery and Anesthesia, and the Quality of Care and Outcomes Research Interdisciplinary Working Group. *Circulation*. DOI:10.1161/CIRCULATIONAHA.106.183095. Available at: <http://circ.ahajournals.org/cgi/reprint/CIRCULATIONAHA.106.183095>.

² Geerts WH, Pineo GF, Heit JA, et al. (2004). Prevention of venous thromboembolism: the Seventh ACCP Conference on Antithrombotic and Thrombolytic Therapy. *Chest*. 126:338S– 400S.