

The Art of Medical Consultation and Perioperative Risk Assessment

Susan D. Wolfsthal, MD

A. Key Reviews and General Articles

1. Eagle KA et al. ACC/AHA guideline update on perioperative cardiovascular evaluation for noncardiac surgery. A report of the ACC/AHA Task Force on practice guidelines. 2002. http://www.acc.org/clinical/guidelines/periop/Periop_pkt.pdf
Key review article with comprehensive review of evidence to support AHA/ACC guidelines. See web site for full article and ACC Pocket Guideline. Superb web site.
2. American College of Physicians. Guidelines for assessing and managing the perioperative risk from coronary artery disease associated with major noncardiac surgery. *Ann Intern Med* 1997; 127:309-312.
Excellent summary of ACP guidelines.
3. Smetana GW. Estimation of coronary risk before noncardiac surgery. *UpToDate* 2001;8(2).
Excellent review of entire topic of preop eval with EBM format. No benefit in routine preop CXR (unless >60 years), glucose, LFT's, PT/PTT, U/A or PFT's. Some rationale for ordering Hct, Cr, EKG and β -hcg depending on patient and surgical risk.
4. Mangano DT. Perioperative cardiac morbidity. *Anesthesiology* 1990; 72:153-184.
5. Mangano DT. Preoperative risk assessment: Many studies, few solutions: Is a cardiac risk assessment paradigm possible? *Anesthesiology* 1995;83:897-901.
Key to reducing postop CV morbidity and mortality rests in the preop identification of high-risk patients. Reviews PPV/NPV of various noninvasive cardiac tests.
6. Ashton CM, Petersen NJ, Wray NP, et al. The incidence of perioperative myocardial infarction in men undergoing noncardiac surgery. *Ann Intern Med* 1993;118:504-510.
7. Morrison RS, Chassin MR, Siu AL. The medical consultant's role in caring for the patient with hip fracture. *Ann Intern Med* 1998;128:1010-1020.
Evidence-based review of the medical management of the orthopedic patient. Discussion of use of antibiotics, DVT prophylaxis, nutrition, UTI's, delirium, rehabilitation, and assessment of fall risk.
8. Hollenberg SM. Preoperative cardiac risk assessment. *Chest* 1999;115:51S-57S.
Smetana GW. Current Concepts: Preoperative pulmonary evaluation. *N Engl J Med* 1999;340:937-944.
Excellent recent review of pulmonary preop evaluation, including patient and surgical risk factor analysis, value of PFT's, importance of preop smoking cessation, lung-expansion maneuvers, and pain control.
9. Claggett G, Anderson F, Heit J, et al. Prevention of venous thromboembolism. *Chest* 1995;108:312S-334S.
Overview of topic of DVT/PE prophylaxis, including rationale and therapeutic choices.
10. Froehlich JB, Karavite D, Russman PL et al. American College of Cardiology/American Heart Association preoperative assessment guidelines reduce resource utilization before aortic surgery. *J Vasc Surg* 2002;36:758-763.

B. Preoperative Screening for Medical Illnesses

1. Fischer SP. Cost-effective preoperative evaluation and testing. *Chest* 1999;115:96S-100S.
Short overview of evidence supporting and refuting use of preoperative screening tests.
2. Schein OD, Katz J, Bass E et al. The value of routine preoperative medical testing before cataract surgery. *N Engl J Med* 2000;342:168-175.
PRCT in elderly patients undergoing cataract surgery (n=19,557) demonstrated no benefit for routine preop testing and no difference in event rate or cancellations.

C. Risk Criteria

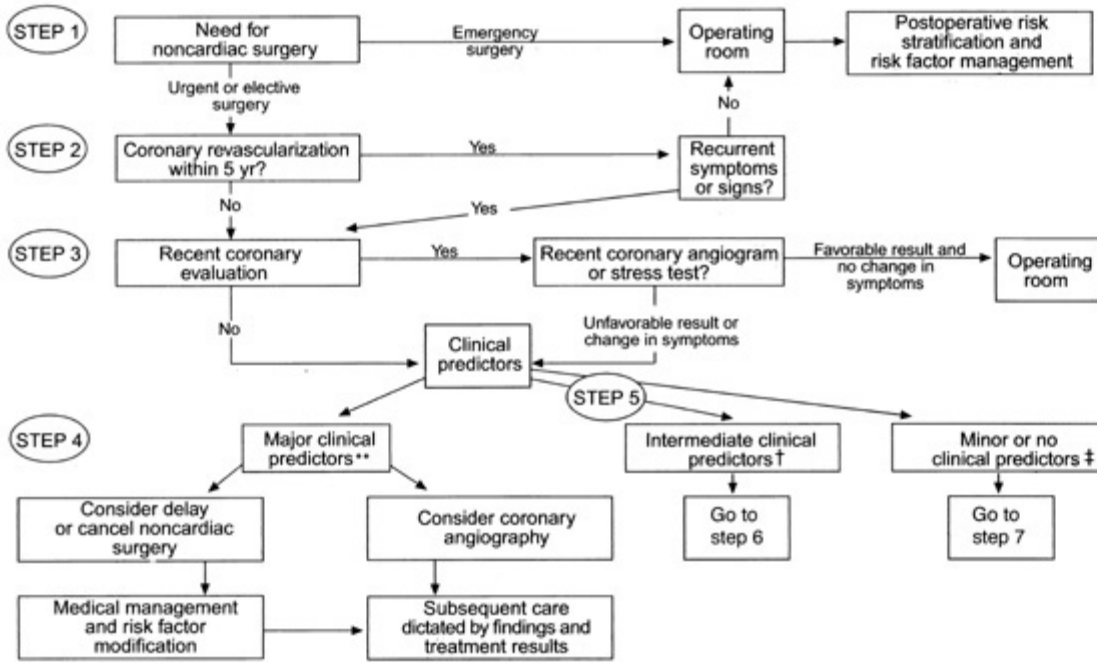
1. Goldman L, Caldera DL, Nussbaum SR, et al. Multifactorial index of cardiac risk in noncardiac surgical procedures. *N Engl J Med* 1977; 297:845-850.
First prospective trial to identify independent risk factors for postoperative cardiovascular morbidity and mortality. Created easy to use point system with emphasis that reversing risk factors improves outcome.
2. Lee TH, Mercantonio ER, Mangione CM, et al. Derivation and prospective validation of a simple index for prediction of cardiac risk of major noncardiac surgery. *Circulation* 1999;100:1043.
Simplified criteria to 6 independent predictors of postop complications, including high-risk surgery, ischemic HD, CHF, cerebrovascular disease, insulin use and Cr \geq 2.
3. Younis LT, Miller DD, Chaitman BR. Preoperative strategies to assess cardiac risk before noncardiac surgery. *Clin Cardiol* 1995;18:447.
Goldman and Detsky indices may underestimate cardiac risk.
4. Detsky AS, Abrams HB, McLaughlin JR, et al. Predicting cardiac complications in patients undergoing non-cardiac surgery. *J Gen Intern Med* 1986; 1:211-219.
Modified Goldman risk index to include recent unstable angina, stable angina with minimal activity and recent pulmonary edema.

D. Preoperative Cardiac Testing

1. Eagle KA, Coley CM, Newell JB, et al. Combining clinical and thallium data optimizes preoperative assessment of cardiac risk before major vascular surgery. *Ann Intern Med* 1989;110:859.
Identified risk factors of q waves, h/o angina, h/o ventricular ectopy requiring treatment, non-diet controlled diabetes and age >70. # of risk factors correlated with postop events.
2. Mangano DT, London MJ, Tubau JF, et al. Dipyridamole thallium-201 scintigraphy as a preoperative screening test: a reexamination of its predictive potential. *Circulation* 1991; 84:493-502.
3. Poldermans D, Fioretti PM, Forster T, et al. Dobutamine stress echocardiography for assessment of perioperative cardiac risk in patients undergoing major vascular surgery. *Circulation* 1993; 87:1506-1512.
4. Mantha S, Roizen MF, Barnard J, et al. Relative effectiveness of four preoperative tests for predicting adverse cardiac outcomes after vascular surgery: a meta-analysis. *Anesth Analg* 1994; 79:422-433.
5. Kontos MC, Akosah KO, Brath LK, et al. Cardiac complication in noncardiac surgery: value of dobutamine stress echocardiography versus dipyridamole thallium imaging. *J Cardiothoracic Vasc Anesth* 1996;10:329-335.

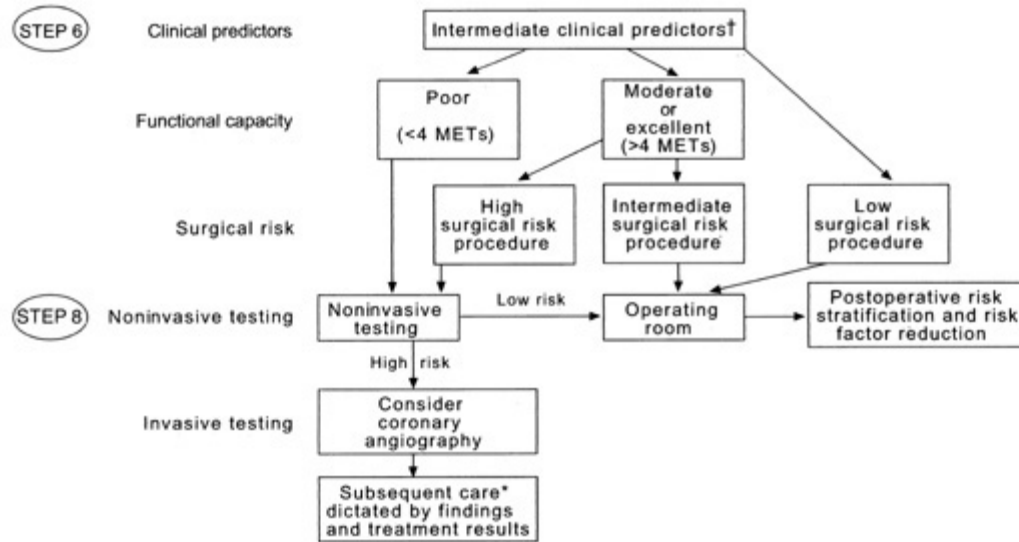
E. Preoperative Therapy to Reduce Risk

1. Mangano DT, Layug EL, Wallace A, et al. Effect of atenolol on mortality and cardiovascular morbidity after noncardiac surgery. *N Engl J Med* 1996;335:1713-1720.
DB RCT (n=200) of atenolol versus placebo. Decrease in cardiac event and increase in event-free survival in those receiving preop atenolol.
2. Poldermans D, Boersma E, Bax JJ, et al. The effect of bisoprolol on perioperative mortality and myocardial infarction in high-risk patients undergoing vascular surgery. Dutch echocardiographic cardiac risk evaluation applying stress echocardiography study group (DECREASE). *N Engl J Med* 1999;341:1789.
RCT (n=112) high-risk patients with positive dobutamine thallium; bisoprolol versus standard care. Decrease in 3-day complication rate, overall cardiac mortality and non-fatal MI.



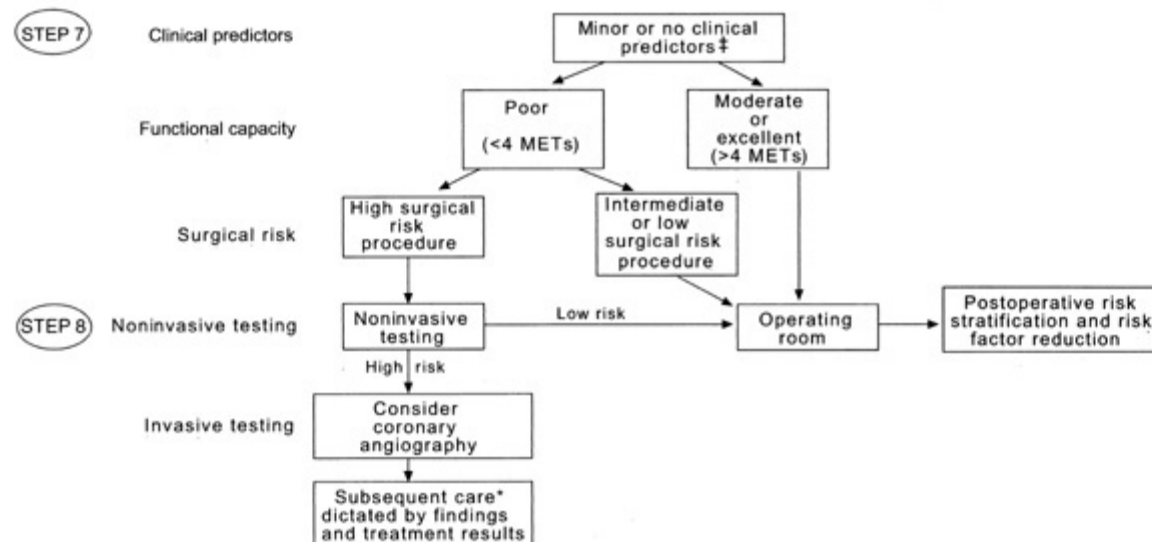
Major Clinical Predictors**

- Unstable coronary syndromes
- Decompensated CHF
- Significant arrhythmias
- Severe valvular disease



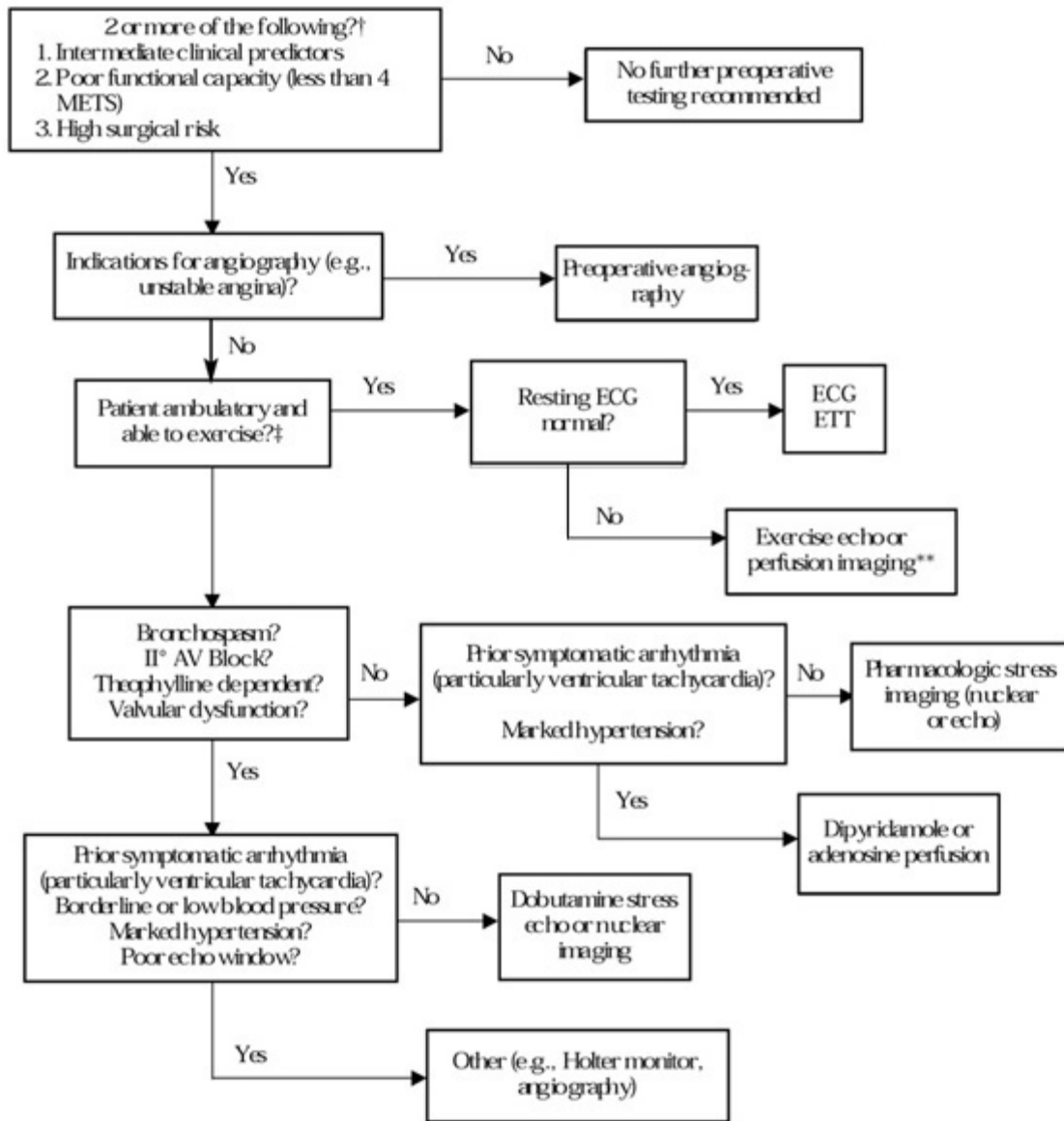
Intermediate Clinical Predictors†

- Mild angina pectoris
- Prior MI
- Compensated or prior CHF
- Diabetes mellitus
- Renal Insufficiency



Minor Clinical Predictors‡

- Advanced age
- Abnormal ECG
- Rhythm other than sinus
- Low functional capacity
- History of stroke
- Uncontrolled systemic hypertension



*Testing is only indicated if the results will impact care.

†See Table 1 for the list of intermediate clinical predictors, Table 2 for the metabolic equivalents, and Table 3 for the definition of high-risk surgical procedure.

‡Able to achieve more than or equal to 85% MPHR.

**In the presence of LBBB, vasodilator perfusion imaging is preferred.

General Guidelines for Perioperative Prophylaxis for Venous Thromboembolism*

Type of Patient/Surgery	Recommendation
Minor surgery in a patient <40 yrs old with no correlates of venous TE risk†	Early ambulation
Moderate-risk surgery in a patient more than 40 to 60 yrs old with no correlates of TE risk	ES; LDH (2 h preoperatively and every 12 h after) or IPC (intraoperatively and postoperatively)
Major surgery in a patient <40 to 60 yrs old with clinical conditions associated with venous TE risk, or older than 60 years old without risk factors	LDH (every 8 h) or LMWH, IPC if prone to wound bleeding
Very-high-risk surgery in a patient with multiple clinical conditions associated with TE risk	LDH, LMWH, or dextran combined with IPC. In selected patients, perioperative warfarin (INR 2 to 3) may be used.
Total hip replacement	LMWH (postoperative, SQ BID, fixed dose unmonitored) or warfarin (INR 2-3, started preop or immediately after surgery) or adjusted-dose unfractionated heparin (started preop). ES or IPC may provide additional efficacy.
Total knee replacement	LMWH (postoperative, subcutaneous, twice daily, fixed dose unmonitored) or IPC
Hip fracture surgery	LMWH (preoperative, subcutaneous, fixed dose unmonitored) or warfarin (INR 2 to 3). IPC may provide additional benefit.
Intracranial neurosurgery	IPC +/- ES. Consider addition of LDH or LMWH in high-risk pts.
Acute spinal cord injury with lower-extremity paralysis	LMWH for prophylaxis. Warfarin may also be effective. ES and IPC may have benefit when used with LMWH.
Patients with multiple trauma	LMWH when feasible; serial surveillance with duplex ultrasonography may be useful. In selected very-high-risk pts, consider prophylactic caval filter. If LMWH not feasible, IPC may be useful.

ES, graded-compression elastic stockings; LDH, low-dose SQ heparin; IPC, intermittent pneumatic compression; LMWH, low-molecular-weight heparin; TE, Thromboembolism.

*Developed from Clagett Chest 114: 531s-560s 1998.

Adapted from: Eagle et al., Perioperative cardiovascular evaluation for noncardiac surgery update http://www.acc.org/clinical/guidelines/perio/update/periupdate_index.htm

†Clinical conditions associated with increased risk of venous thromboembolism: advanced age; prolonged immobility or paralysis; previous venous thromboembolism; malignancy; major surgery of abdomen, pelvis, or lower extremity; obesity; varicose veins; heart failure; myocardial infarction; stroke; fracture(s) of the pelvis, hip, or leg; hypercoagulable states; and possibly high-dose estrogen use.