**VENTURA COUNTY MEDICAL CENTER CLINICAL PRACTICE GUIDELINE / PROTOCOL Preoperative Comprehensive Medical Clearance Clinical Guidelines**

**The contents of this clinical practice guideline are to be used as a guide. Healthcare professionals should use sound clinical judgment and individualize patient care. This CPG is not meant to be a replacement for training, experience, CME or studying the latest literature and drug information.**

It is suggested that all patients undergoing elective non-cardiac surgery be evaluated by either the patient's primary care physician or the surgical department staff. The primary care physician may order additional evaluation(s) based upon the patient's associated medical condition and assessment of their risk for the proposed surgical procedure. For urgent/emergent procedures, the physician admitting the patient to the hospital should address the pre-operative evaluation issues.

**Suggested order of evaluation of the patient for surgery:**

I. Assess the risk for the procedure. There are several risk scoring calculators that can assist in determining the patient's risk for the proposed surgical procedure. There is value in combining calculators in estimating surgical risk. The calculators below are available free as smartphone apps.
   a. Risk Calculators
      i. **Revised Cardiac Risk Index** for Pre-Operative Risk which can be found at http://www.mdcalc.com/revised-cardiac-risk-index-for-pre-operative-risk/ This suggests the percent Risk of Major Cardiac Events (Myocardial Infarction, Pulmonary Embolism, Ventricular Fibrillation, Cardiac Arrest, or Complete Heart Block) for the patient, but not all cause mortality. The RCRI does not perform as well in estimating risk in patients undergoing vascular procedures, and so the Vascular Study Group of New England (VSGNE) developed a risk index, however it has not been externally validated.
      ii. **Myocardial Infarction or Cardiac Arrest (Gupta)** risk calculator can be found at http://www.qxmd.com/calculate-online/cardiology/gupta-perioperative-cardiac-risk This provides more specific risk scoring based on the type of proposed procedure and comes from the American College of Surgeons National Quality Improvement Program (NSQIP).
      iii. Vascular Surgery Risk Calculators can be found online at http://www.qxmd.com/calculate-online/vascular-surgery .

II. What is the proposed procedure and associated risk?
   i. Urgency of Procedure – Cardiac complications 2-5 times more likely with emergent procedures
   ii. Risk based on the type of proposed procedure
      1. Low risk – Procedures that involve superficial body systems, ophthalmologic
      2. Intermediate Risk – Endovascular, non-vascular open procedures
      3. High risk – Major vascular surgery; Intraperitoneal, intrathoracic, or suprainguinal vascular procedures

III. What risk factors does the patient have? *See table of rate of adverse outcomes based on risk factors.
   i. Coronary Artery Disease (CAD) – History of MI in past 6 months; positive exercise test; current ischemic chest pain or use of nitrate therapy; or ECG with pathologic Q waves. Prior CABG or PCI included as risk factor only if patient currently has chest pain presumed to be due to ischemia.

ii. Congestive Heart Failure (CHF) – presence of heart failure, or pulmonary edema, or paroxysmal nocturnal dyspnea (PND), or bilateral rales or S3 gallop, or chest x-ray evidence of vascular redistribution
iii. Cerebrovascular disease – defined as a history of TIA or confirmed Cerebrovascular Accident (CVA)
iv. Diabetes – Is the patient on insulin?
v. Renal disease – Serum creatinine >2 mg/dl?

IV. <u>What is the patient's functional capacity</u>?
a. Assess the patient's ability to perform at least 4 METS of work. This is equivalent to the ability to walk two blocks on level ground, or carry two bags of groceries up one flight of stairs without symptoms.
b. Since peri-operative risk is increased in those patients unable to perform 4 METS of work in daily activities, consider further non-invasive cardiac testing in this patient population.

V. <u>Other considerations in the pre-operative evaluation</u>.
a. "Routine" laboratory testing has not been shown to improve outcomes, and may lead to false positives.
b. Obtain baseline hemoglobin in patients >65 years of age or in patients undergoing procedures with expected significant blood loss. (Grade 2C)
c. Do not obtain serum creatinine except in patients >50 undergoing intermediate or high risk procedures, or in patients suspected of having renal disease, hypotension during the surgery, or when nephrotoxic drugs are used. (Grade 2B)
d. Pregnancy testing should be considered in all women of reproductive age (do not rely on history alone.)
e. Do not get routine ECGs for asymptomatic patients undergoing low risk procedures. (Grade 2B)
f. ECG is suggested for vascular surgical procedures. (Grade 2C)
g. Do not get Chest X-Rays or Pulmonary Function Tests in healthy patients. (Grade 2B)
h. Get Chest X-Rays in patients with cardiopulmonary disease or those >50 years of age undergoing abdominal aortic aneurysm (AAA) surgery or thoracic surgery 9Grade 2C)

VI. Specific clinical conditions with suggested additional evaluation if indicated and deemed necessary by the patient's physician.
a. **Coronary Artery Disease** (CAD) – If the patient has symptoms suggestive of ischemia, or cannot perform at least 4 METS of work without symptoms, then consider non-invasive cardiac testing, such as Myocardial Perfusion Study or Exercise Treadmill Testing.
b. **Heart Failure** – If there is the presence of Heart Failure, unexplained paroxysmal nocturnal dyspnea, bilateral rates, or an S3, consider a 2-D Echo to assess LV function and Ejection Fraction if it has not been done in the past 6 months.
c. **Diabetes** – For VCMC specifically, all adult patients with a diagnosis of diabetes require a HgbA1C within the past 6 months. If there is not a diagnosis of diabetes, then an HgbA1C must be performed prior to surgery. All elective procedures require an HgbA1c <8.
d. **Chronic Obstructive Pulmonary Disease** (COPD) – May consider Pulmonary Function Testing (PFT) and/or room air Arterial Blood Gas (ABG), and/or exercise treadmill and then optimize patient prior to surgery.
e. **Chronic Anticoagulation** therapy with warfarin – Obtain current PT INR. Discuss with the surgeon the optimum timing of holding warfarin and whether bridging is required with heparin.

VII. Summary Recommendations (see attached algorithm)

a. All patients should have an assessment of peri-operative cardiac risk with management based on risk. The recommendation is to divide patients into **low** or **higher-risk** groups.

b. The Revised Cardiac Risk Index (RCRI) and ACS-NSQIP (GUPTA) calculators have the most external validation in predicting surgical risk in non-cardiac surgery.

   i. **Low-risk** patients are those whose estimated risk of mortality is < 1 percent. They do not require any additional cardiovascular testing.

   ii. **Higher-risk** patients whose risk of death is 1 percent or higher may require further evaluation. Evaluation should be considered if it would be done even if the patient were not having surgery. There is little evidence that prophylactic intervention solely to improve surgical outcome is of benefit.

      1. If the patient cannot perform >4 METS of physical activity, consider non-invasive cardiac testing if they have symptoms and would be tested even if they were not having surgery.
      2. Echocardiography is not routinely indicated, unless there is another indication such as to evaluate cardiac function in a patient with a murmur, or LV function in a patient with known heart failure.

   iii. Electrocardiograms are not routinely indicated and rarely provide additional information in asymptomatic patients. There may be an argument to obtain a pre-operative ECG in large part to have a comparison to a post-operative ECG when there is an adverse event.

*See III.

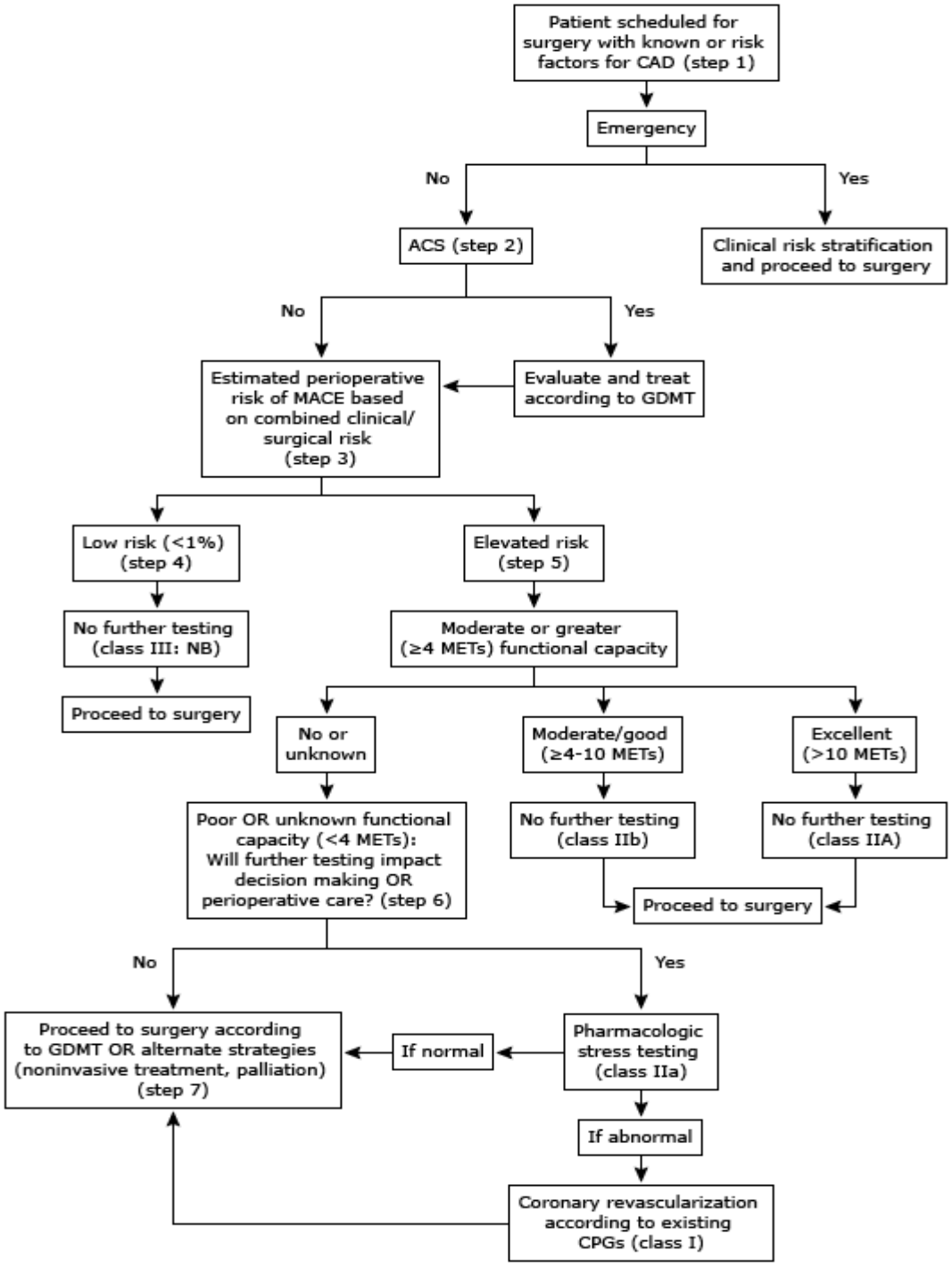
**Rates of adverse cardiac outcomes from noncardiac surgery**

| Number of risk factors | Lee derivation | Lee validation | Devereaux* | Lindenauer ¶ | Davis 6 factor RCRI | Davis 5 factor RCRI |
|---|---|---|---|---|---|---|
| 0 | 0.5% | 0.4% | 0.4% | 1.4% | 0.5% | 0.5% |
| 1 | 1.3% | 0.9% | 1% | 2.2% | 2.6% | 2.9% |
| 2 | 3.6% | 6.6% | 2.4% | 3.9% | 7.2% | 7.4% |
| 3 or more | 9.1% | 11% | 5.4% | 5.8 - 7.4% | 14.4% | 17% |

RCRI: Revised cardiac risk index.
* Excluded pulmonary edema and complete heart block.
¶ Hospital mortality only.


1. 1. Devereaux PJ, Goldman L, Cook DJ, et al. Perioperative cardiac events in patients undergoing noncardiac surgery: a review of the magnitude of the problem, the pathophysiology of the events and methods to estimate and communicate risk. CMAJ 2005; 173:627.
2. 2. Lindenauer PK, Pekow P, Wang K, et al. Perioperative beta-blocker therapy and mortality after major noncardiac surgery. N Engl J Med 2005; 353:349.
3. 3. Davis C, Tait G, Carroll J, et al. The Revised Cardiac Risk Index in the new millennium: a single-centre prospective cohort re-evaluation of the original variables in 9,519 consecutive elective surgical patients. Can J Anaesth 2013; 60:855.

Stepwise approach to perioperative cardiac assessment for CAD




ACS: acute coronary syndrome; CABG: coronary artery bypass graft surgery; CAD: coronary artery disease; CPG: clinical practice guideline; DASI: Duke Activity Status Index; GDMT: guideline-directed therapy; HF: heart failure; MACE: major adverse cardiac event; MET: metabolic equivalent; NB: no benefit; NSQIP: National Surgical Quality Improvement Program; PCI: percutaneous coronary intervention; RCRI: Revised Cardiac Risk Index; STEMI: ST elevation myocardial infarction; UA/NSTEMI: unstable angina/ non-ST elevation myocardial infarction; VHD: valvular heart disease.Reproduced from: Fleisher LA, Fleischmann KE, Auerbach AD. 2014 ACC/AHA Guideline on Perioperative Cardiovascular Evaluation and Management of Patients Undergoing Noncardiac Surgery: A Report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines. J Am Coll Cardiol 2014. [Epub ahead of print]. 