

Cardiac Risk Stratification and Protection



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KEYWORDS

• Cardiac evaluation • Preoperative evaluation • Cardiac risk assessment

KEY POINTS

- Preoperative history and physical examination should be directed at assessment of known cardiac conditions (ischemic heart disease, heart failure), comorbidities that increase the chance of perioperative cardiac complications (diabetes requiring insulin, renal insufficiency, cerebrovascular disease), and patient functional status.
- Guidelines for perioperative cardiovascular evaluation are continuously updated by the American College of Cardiology and the American Heart Association and provide an algorithmic approach to this evaluation.
- Guidelines for the use of beta-blockers and statins in the perioperative period are in evolution.

INTRODUCTION

Cardiac risk assessment is important in the preoperative evaluation of surgical patients. The heart, although seemingly simple in its 4-chamber design, must be thoroughly evaluated before surgery because of the significant risks that can be incurred. It is estimated that cardiovascular complications cause half of all morbidity and mortality experienced in the perioperative period for patients undergoing noncardiac surgery, with even higher rates among vascular patients.¹

Cardiovascular disease is the leading cause of death in the United States. Thus, it is no surprise that it is a significant contributing factor to perioperative morbidity and mortality.^{2,3} The population of persons aged 65 years and older is estimated to increase 25% to 35% in the next 30 years, and this is the age group in which the largest number of operations is performed.⁴ It is also estimated that the number of surgical

The authors have nothing to disclose.

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Surg Clin N Am 95 (2015) 217–235
<http://dx.doi.org/10.1016/j.suc.2014.11.007>

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procedures in this age group will increase from 6 million to 12 million over the next 30 years.⁴

Every year, approximately 27 million patients undergo a noncardiac operation in the United States; 8 million, or 30%, have significant underlying coronary artery disease (CAD) or other cardiac conditions at the time of their procedure.^{1,3,5} Of people undergoing noncardiac surgery, 1 million, or 3%, of these patients will experience perioperative cardiac complications.^{3,6} The mortality after perioperative myocardial infarction (MI) has been quoted to be as high as 40% to 50% and tends to occur on postoperative day 3.⁵

Because of the risk of a cardiac event, emphasis must be placed on the preoperative cardiac evaluation. The goal of the preoperative evaluation is to screen broadly for undiagnosed disease or to find evidence of known conditions that are poorly controlled. The preoperative evaluation also helps determine if an additional cardiac work-up is necessary for patients. It also helps define realistic risks and goals for the forthcoming procedure, involves additional care teams, and helps determine whether the procedure is a realistic option. There are some cases when canceling an operation is necessary so that an underlying cardiac problem can be evaluated and managed to improve the safety of patients.⁷

Operations with major extracellular shift causing hemodynamic stress, prolonged operative times, or extensive anatomic dissections or that are performed on an urgent or emergent basis place patients at the highest risk for a cardiac event (Table 1).^{2,4,5} Patients can be placed into low-, intermediate-, or high-risk groups, with cardiac event rates being 1% or less, 1% to 5%, or 5% or more, respectively. Patients need to be medically optimized in the preoperative period, if possible.⁸ Some patients may never

Table 1	
Cardiac risk stratification for noncardiac surgical procedures	
Risk^{a,b}	Example
High ($\geq 5\%$ cardiac risk)	Emergent major operations, particularly elderly Aortic or major vascular surgery Peripheral vascular surgery Upper abdominal
Intermediate (1%–5% cardiac risk)	Intraperitoneal and intrathoracic surgery Carotid endarterectomy Head and neck surgery Gynecologic surgery Neurosurgery Orthopedic surgery Urologic surgery
Low ($\leq 1\%$ cardiac risk)	Endoscopic procedures Superficial procedures Cataract surgery Breast surgery Ambulatory surgery

^a Cardiac events include fatal and nonfatal cardiac events.

^b This table incorporates perioperative cardiovascular events within 30 days after surgery.¹²

Adapted from Fleisher LA, Beckman JA, Brown KA, et al. 2009 ACCF/AHA focused update on perioperative beta blockade incorporated into the ACC/AHA 2007 guidelines on perioperative cardiovascular evaluation and care for noncardiac surgery; a report of the American College of Cardiology Foundation/American Heart Association task force on practice guidelines. *Circulation* 2009;120:169–276; and Mukherjee D, Eagle KA. Perioperative cardiac assessment for noncardiac surgery: eight steps to the best possible outcome. *Circulation* 2003;107:2771–74.

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