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ACC/AHA GUIDELINE

ACC/AHA 2007 Guidelines on Perioperative Cardiovascular Evaluation and Care 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)

Developed in Collaboration With the American Society of Echocardiography, American Society of Nuclear Cardiology, Heart Rhythm Society, Society of Cardiovascular Anesthesiologists, Society for Cardiovascular Angiography and Interventions, Society for Vascular Medicine and Biology, and Society for Vascular Surgery

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Preamble

It is important that the medical profession play a significant role in critically evaluating the use of diagnostic procedures and therapies as they are introduced and tested in the detection, management, or prevention of disease states. Rigorous and expert analysis of the available data documenting absolute and relative benefits and risks of those procedures and therapies can produce helpful guidelines that improve the effectiveness of care, optimize patient outcomes, and favorably affect the overall cost of care by focusing resources on the most effective strategies.

The American College of Cardiology (ACC) Foundation and the American Heart Association (AHA) have jointly engaged in the production of such guidelines in the area of cardiovascular disease since 1980. The ACC/AHA Task Force on Practice Guidelines, whose charge is to develop, update, or revise practice guidelines for important cardiovascular diseases and procedures, directs this effort. Writing committees are charged with the task of performing an assessment of the evidence and acting as an independent group of authors to develop, update, or revise written recommendations for clinical practice.

Experts in the subject under consideration have been selected from both organizations to examine subject-specific data and write guidelines. The process includes additional representatives from other medical practitioner and specialty groups when appropriate. Writing committees are specifically charged to perform a formal literature review, weigh the strength of evidence for or against a particular treatment or procedure, and include estimates of expected health outcomes where data exist. Patient-specific modifiers, comorbidities, and issues of patient preference that may influence the choice of particular tests or therapies are considered, as well as frequency of follow-up and cost-effectiveness. When available, information from studies on cost will be considered; however, review of data on efficacy and clinical outcomes will constitute the primary basis for preparing recommendations in these guidelines.

The ACC/AHA Task Force on Practice Guidelines makes every effort to avoid any actual, potential, or perceived conflicts of interest that may arise as a result of an industry relationship or personal interest of the writing committee. Specifically, all members of the writing committee, as well as peer reviewers of the document, were asked to provide disclosure statements of all such relationships that may be perceived as real or potential conflicts of interest. Writing committee members are also strongly encouraged to declare a previous relationship with industry that may be perceived as relevant to guideline development. If a writing committee member develops a new relationship with industry during their tenure, they are required to notify guideline staff in writing. The continued participation of the writing committee member will be reviewed. These statements are reviewed by the parent task force, reported orally to all members of the writing committee at each meeting, and updated and reviewed by the writing committee as changes occur. Please refer to the methodology manual for ACC/AHA guideline writing committees, available on the ACC and AHA World Wide Web sites (http://www.acc.org/qualityandscience/clinical/manual/manual_I.htm and http://circ.ahajournals.org/manual/), for further description of the policy on relationships with industry. Please see Appendix I for author relationships with industry and Appendix II for peer reviewer relationships with industry that are pertinent to these guidelines.

These practice guidelines are intended to assist healthcare providers in clinical decision making by describing a range of generally acceptable approaches for the diagnosis, management, and prevention of specific diseases or conditions. These guidelines attempt to define practices that meet the needs of most patients in most circumstances. Clinical decision making should consider the quality and availability of expertise in the area where care is provided. These guideline recommendations reflect a consensus of expert opinion after a thorough review of the available, current scientific evidence and are intended to improve patient care.

Patient adherence to prescribed and agreed on medical regimens and lifestyles is an important aspect of treatment. Prescribed courses of treatment in accordance with these recommendations will only be effective if they are followed. Because lack of patient understanding and adherence may adversely affect treatment outcomes, physicians and other healthcare providers should make every effort to engage the patient in active participation with prescribed medical regimens and lifestyles.

If these guidelines are used as the basis for regulatory or payer decisions, the ultimate goal is quality of care and serving the patient's best interests. The ultimate judgment regarding care of a particular patient must be made by the healthcare provider and the patient in light of all of the circumstances presented by that patient. There are circumstances in which deviations from these guidelines are appropriate.

The guidelines will be reviewed annually by the ACC/AHA Task Force on Practice Guidelines and will be considered current unless they are updated, revised, or sunsetted and withdrawn from distribution. The executive summary and recommendations are published in the October 23, 2007, issue of the Journal of the American College of Cardiology and October 23, 2007, issue of Circulation. The full text-guidelines are e-published in the same issue of the journals noted above, as well as posted on the ACC (www.acc.org) and AHA (www.americanheart.org) Web sites. Copies of the full text and the executive summary are available from both organizations.

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1. Definition of the Problem

1.1. Purpose of These Guidelines

These guidelines are intended for physicians and nonphysician caregivers who are involved in the preoperative, operative, and postoperative care of patients undergoing noncardiac surgery. They provide a framework for considering cardiac risk of noncardiac surgery in a variety of patient and surgical situations. The writing committee that prepared these guidelines strove to incorporate what is currently known about perioperative risk and how this knowledge can be used in the individual patient.

The tables and algorithms provide quick references for decision making. The overriding theme of this document is that intervention is rarely necessary to simply lower the risk of surgery unless such intervention is indicated irrespective of the preoperative context. The purpose of preoperative evaluation is not to give medical clearance but rather to perform an evaluation of the patient's current medical status; make recommendations concerning the evaluation, management, and risk of cardiac problems over the entire perioperative period; and provide a clinical risk profile that the patient, primary physician, and nonphysician caregivers, anesthesiologist, and surgeon can use in making treatment decisions that may influence short- and long-term cardiac outcomes. No test should be performed unless it is likely to influence patient treatment. The goal of the consultation is the optimal care of the patient.

1.2. Methodology and Evidence

The ACC/AHA Committee to Revise the 2002 Guidelines on Perioperative Cardiovascular Evaluation for Noncardiac Surgery conducted a comprehensive review of the literature relevant to perioperative cardiac evaluation published since the last publication of these guidelines in 2002. Literature searches were conducted in the following databases: PubMed, MEDLINE, and the Cochrane Library (including the Cochrane Database of Systematic Reviews and the Cochrane Controlled Trials Register). Searches were limited to the English language, the years 2002 through 2007, and human subjects. Related-article searches were conducted in MEDLINE to find additional relevant articles. Finally, committee members recommended applicable articles outside the scope of the formal searches.

Major search topics included perioperative risk, cardiac risk, noncardiac surgery, intraoperative risk, postoperative risk, risk stratification, cardiac complication, cardiac evaluation, perioperative care, preoperative evaluation, preoperative assessment, and intraoperative complications. Additional searches cross-referenced these topics with the following subtopics: troponin, myocardial infarction (MI), myocardial ischemia, Duke activity status index, functional capacity, dobutamine, adenosine, venous thrombosis, thromboembolism, warfarin, percutaneous transluminal coronary angioplasty (PTCA), stent, adrenergic beta agonists, echocardiography, anticoagulant, beta blocker, coronary artery bypass surgery, valve, diabetes mellitus, wound infection, blood sugar control, normothermia, body temperature changes, body temperature regulation, hypertension, pulmonary hypertension, anemia, aspirin, arrhythmia, implantable defibrillator, artificial pacemaker, pulmonary artery catheters, Swan-Ganz catheter, and platelet aggregation inhibitors.

As a result of these searches, more than 400 relevant, new articles were identified and reviewed by the committee for the revision of these guidelines. Using evidence-based methodologies developed by the ACC/AHA Task Force on Practice Guidelines, the committee revised the guidelines text and recommendations.

All of the recommendations in this guideline revision were converted from the tabular format used in the 2002 guidelines to a listing of recommendations that has been written in full sentences to express a complete thought, such that a recommendation, even if separated and presented apart from the rest of the document, would still convey the full intent of the recommendation. It is hoped that this will increase the reader's comprehension of the guidelines. Also, the level of evidence, either an A, B, or C, for each recommendation is now provided.

The schema for classification of recommendations and level of evidence are summarized in Table 1, which also illustrates how the grading system provides an estimate of the size of treatment effect and an estimate of the certainty of the treatment effect.

1.3. Epidemiology

The prevalence of cardiovascular disease increases with age, and it is estimated that the number of persons older than 65 years in the United States will increase 25% to 35% over the next 30 years (1). Coincidentally, this is the same age group in which the largest number of surgical procedures is performed (2). Thus, it is conceivable that the number of noncardiac surgical procedures performed in older persons will increase from the current 6 million to nearly 12 million per year, and nearly one fourth of these—major intra-abdominal, thoracic, vascular, and orthopedic procedures—have been associated with significant perioperative cardiovascular morbidity and mortality.

1.4. Practice Patterns

There are few reliable data available regarding 1) how often a family physician, general internist, physician extender, specialist, or surgeon performs a preoperative evaluation on his or her own patient without a formal cardiovascular consultation and 2) how often a formal preoperative consultation is requested from either a generalist or a subspecialist such as a cardiologist for different types of surgical procedures and different categories of patients. The actual patterns of practice with regard to the practitioner performing the evaluation and utilization of testing varies widely, suggesting the need to determine which practices lead to the best clinical and economic outcomes (3). There is an important need to determine the relative cost-effectiveness of different strategies of perioperative evaluation. In many institutions, patients are evaluated in an anesthesia preoperative evaluation setting. If sufficient information about the patient's cardiovascular status is available, the symptoms are stable, and further evaluation will not influence perioperative management, a formal consultation may not be required or obtained. This is

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Table 1. Applying classification of recommendations and level of evidence.

		Class III ***Risk ≥ Benefit*** ***No additional studies needed*** **Procedure/Treatment should NOT be performed/administered SINCE IT IS NOT HELPFUL AND MAY BE HARMFUL**
	es with broad d; Additional uld be helpful **atment SIDERED**	
	ion's acy less well **cting evidence randomized trials es**	• **Recommendation that procedure or treatment not useful/effective and may be harmful** • **Sufficient evidence from multiple randomized trials or meta-analyses**
	ion's acy less well **cting evidence domized trial or d studies**	• **Recommendation that procedure or treatment not useful/effective and may be harmful** • **Limited evidence from single randomized trial or non-randomized studies**
	ion's acy less well **expert opinion, standard-of-care**	• **Recommendation that procedure or treatment not useful/effective and may be harmful** • **Only expert opinion, case studies, or standard-of-care**

nsidered	is not recommended
asonable	is not indicated
iveness is	should not
ear/uncertain or	is not useful/effective/beneficial
ished	may be harmful

I, history of heart failure, and prior aspirin use. A recommendation
s to clinical trials. Even though randomized trials are not available,

guideline have been written in full sentences that express a complete
d still convey the full intent of the recommendation. It is hoped that

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