CE

Guidelines and Implications for Selecting Preoperative Cardiac Stress Tests

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ABSTRACT

Nurse practitioners frequently manage patients who have cardiac risks and need further evaluation before their elective surgery. Cardiac stress testing can provide important needed data. Cardiac stress testing includes exercise treadmill testing; echocardiography, with exercise or pharmacologically; myocardial perfusion stress testing; and magnetic resonance angiography. Although a number of factors need to be considered, including prior cardiovascular history and type of surgical risk, a nurse practitioner's selection of the appropriate cardiac stress test needs to include the benefit-risk ratio and the level of evidence supporting the clinical decision-making process.

Keywords: cardiac stress testing, level of evidence, NP, preoperative testing

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Managing patients' peri- and postoperative cardiac risks begins in the preoperative setting. Common risk factors that reflect a potential increased risk of developing cardiac complications include the age of the patient, the patient's functional status, abnormal creatinine levels, and type of surgery.[1] Procedures such as endoscopy and ambulatory surgery are considered low-risk surgical procedures, and have a < 1% risk of a cardiac event. Additional cardiac testing is typically not recommended these interventions.[2] For procedures considered intermediate risk, such as abdominal, orthopedic, and prostate surgeries, the risk of a cardiac event perioperatively is < 1.5%.[3] However, the overall surgical risk increases if the patient has additional signs or symptoms of coronary artery disease (CAD), unstable angina, hypertension, a recent myocardial infarction, or a history of dysrhythmias.[3] In comparison, patients undergoing major procedures, such as peripheral vascular, aortic, or major vascular surgery, the risk of a perioperative cardiac event increases to 5%.[3] This group of patients may also require additional cardiac testing if there is a prior cardiac history.[3]

This CE learning activity is designed to augment the knowledge, skills, and attitudes of nurse practitioners and assist in their understanding of how to choose the most appropriate preoperative cardiac stress test.

At the conclusion of this activity, the participant will be able to:

A. Describe differences between exercise stress testing, pharmacological stress testing, and myocardial perfusion studies
B. Discuss significant history and physical exam data that impact the selection of each type of cardiac stress test
C. Apply the significant data provided in the case study to determine which stress test is most appropriate

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The authors do not present any off-label or non-FDA-approved recommendations for treatment.

This activity has been awarded 1.0 Contact Hours of which 0 credits are in the area of Pharmacology. The activity is valid for CE credit until October 1, 2019.

To determine whether a patient has an increased risk for a peri- or postoperative event, current guidelines recommend a preoperative assessment aimed at identifying signs and symptoms of CAD, unstable angina, a previous myocardial infarction, hypertension, history of dysrhythmias, and the patient's activity tolerance.[1] Although there are a number of tools used to estimate perioperative cardiac risk, one validated tool is the Revised Cardiac Risk Index (RCRI).[1] The RCRI predicts the rate of cardiac death or myocardial infarction based on the presence of 6 possible variables. These variables include type of surgery, preoperative serum creatinine $>$ 2.0 mg/dL, history of ischemic heart disease, heart failure, cerebrovascular disease, and diabetes requiring insulin. For example, if a patient has 1 of these 6 variables, the risk of a significant event is 1.0%. If they have 2 of these variables, the risk of a significant event is 2.4%. If a patient has $\geq$ 3 of these variables, their risk of a significant event is 5.4%.[1]

Other important assessment findings that need to be included are the presence of aortic stenosis, or a history of an aortic aneurysm, carotid disease, or chronic obstructive pulmonary disease (COPD). In addition, for individuals $>$ 55 years old, signs or symptoms of cerebrovascular disease and diabetes should be assessed, as these 2 factors alone increase the overall risk of a major adverse cardiac event to $>$ 1%.[4] Research also shows that individuals who cannot walk 2-3 mph, or who cannot expend an equivalent of at least 4 metabolic equivalents of energy, or what is referred to as METs (with 1 MET being the energy expended while at rest), are at risk for both perioperative events and long-term postoperative risks.[4] For individuals in all of these situations the issue becomes determining which stress test would provide the best data for evaluating the patient's cardiac status.

THE GOAL OF STRESS TESTING

The goal of performing a stress test is to determine whether myocardial ischemia can be identified when the oxygen demand is increased. Hence, stress testing becomes a way to evaluate the fundamental issue of oxygen supply versus oxygen demand. Myocardial ischemia may present as chest pain or angina, or it may become apparent on a 12-lead electrocardiogram (ECG) as ST segment changes. A number of stress tests can identify areas of ischemia as reversible lesions. These lesions become apparent when the myocardium is stressed, and they signal an increase in a patient's perioperative risk of having a myocardial infarction. Fixed, or nonreversible, lesions can also be identified. They are present both at rest and with stress, and fixed lesions represent areas of scarring or a previous infarction. After identification of reversible and fixed lesions, consultation with a cardiologist can help determine the potential need for cardiac interventions, such as placement of a stent, before a scheduled surgery can proceed.

LEVELS OF EVIDENCE

Guidelines from the American College of Cardiology/American Heart Association adopted a tool that facilitates applying evidence-based research findings to the actual clinical decisionmaking, and these can guide a nurse practitioner's (NP's) decision about which stress test is most appropriate. A common tool used in making these decisions is the Classification of Recommendation and Level of Evidence Guidelines.[4] This tool combines the benefit-risk ratio with levels of researchable evidence. Using this tool as a guide, a Class I recommendation indicates that the benefits strongly outweigh the risks of a procedure, and the procedure *should be done*. A Class IIa recommendation indicates that the benefits outweigh the risks, and it is *reasonable* to do the procedure. In comparison, a Class IIb recommendation indicates that the procedure may be *considered*, but the benefits are not viewed as strongly as for Class IIa. The last class is Class III, which indicates the procedure is considered either *harmful or of no benefit*. When pairing the benefit-risk classifications with the level of evidence, it is important to note that there are 3 tiers of evidence. Level of Evidence A is derived from multiple, randomized studies or meta-analyses. Level of Evidence B is derived from a single, randomized study or from a number of nonrandomized studies. Level of Evidence C is derived from consensus or case studies.[4]