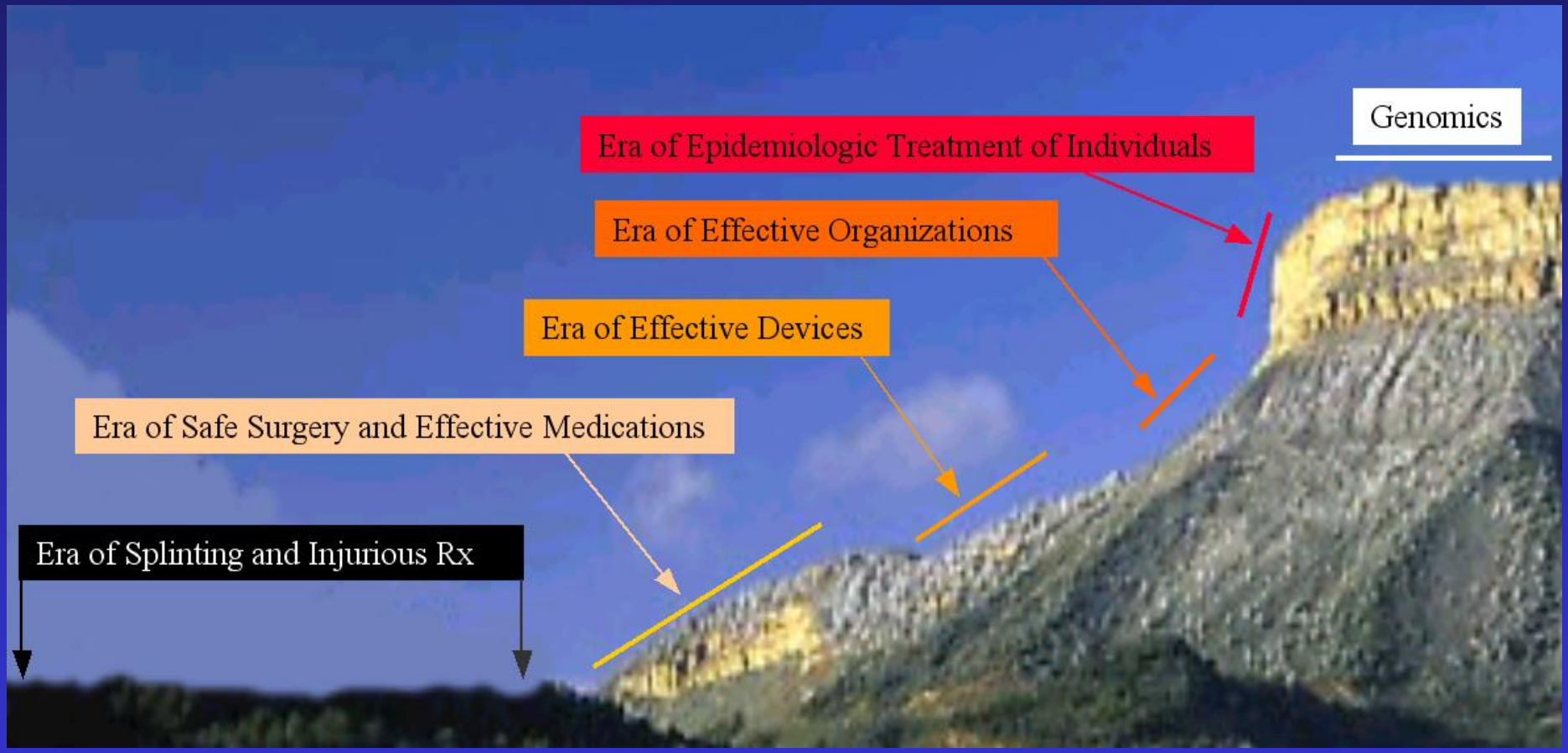
Perioperative Cardiovascular Evaluation and Care for Noncardiac Surgery

2008 Update Plus Overview of the *Guidelines* Concept

John Coyle, M.D.

October 16, 2008

The History of Medicine As Mountaineering Feat



The **Sure Thing** Hall Of Fame

1. Hormone Replacement (CEE+Medroxyprogesterone) Therapy To Prevent Progression Of Heart Disease (HERS)

2. Antioxidants To Prevent Heart Disease And In-Stent Re-Stenosis (HPS, Bremen)

3. Antiarrhythmic Medication To Prevent Cardiac Sudden Death (CAST)

And the list goes on and on…

ACC/AHA Guidelines: A Partial List

ACC/AHA Joint Guidelines

Title	Year Published
ACC/AHA 2008 Guideline Update on Valvular Heart Disease: Focused Update on Infective Endocarditis	2008
ACC/AHA/HRS 2008 Guidelines for Device-Based Therapy of Cardiac Rhythm Abnormalities: Executive Summary	2008
ACC/AHA/HRS 2008 Guidelines for Device-Based Therapy of Cardiac Rhythm Abnormalities: Full Text	2008
ACC/AHA/Physician Consortium 2008 Clinical Performance Measures for Adults With Nonvalvular Atrial Fibrillation or Atrial Flutter	2008
ACCF/ASE/ACEP/AHA/ASNC/SCAI/SCCT/SCMR 2008 Appropriateness Criteria for Stress Echocardiography	2008
2007 Focused Update of the ACC/AHA/SCAI 2005 Guideline Update for Percutaneous Coronary Intervention	2007
2007 Focused Update of the ACC/AHA 2004 Guidelines for the Management of Patients With ST-Elevation Myocardial Infarction	2007
2007 Chronic Angina Focused Update of the ACC/AHA 2002 Guidelines for the Management of Patients With Chronic Stable Angina	2007
ACC/AHA 2007 Guidelines on Perioperative Cardiovascular Evaluation and Care for Noncardiac Surgery: Executive Summary	2007
ACC/AHA 2007 Guidelines on Perioperative Cardiovascular Evaluation and Care for Noncardiac Surgery: Full Text	2007
ACCF/AHA 2007 Clinical Competence Statement on Vascular Imaging With Computed Tomography and Magnetic Resonance	2007
ACC/AHA 2007 Guidelines for the Management of Patients With Unstable Angina/Non–ST-Elevation Myocardial Infarction: Executive Summary	2007
ACC/AHA 2007 Guidelines for the Management of Patients With Unstable Angina/Non–ST-Elevation Myocardial Infarction: Full Text	2007
ACCF/AHA/SCAI 2007 Update of the Clinical Competence Statement on Cardiac Interventional Procedures	2007
ACCF/AHA/CDC Conference Report on Emerging Infectious Diseases and Biological Terrorism Threats. The Clinical and Public Health Implications for the Prevention and Control of Cardiovascular Diseases. Participants	2007
ACCF/AHA/CDC Conference Report on Emerging Infectious Diseases and Biological Terrorism Threats. The Clinical and Public Health Implications for the Prevention and Control of Cardiovascular Diseases. Executive Summary	2007
ACCF/AHA/CDC Conference Report on Emerging Infectious Diseases and Biological Terrorism Threats. The Clinical and Public Health Implications for the Prevention and Control of Cardiovascular Diseases. Task Forces	2007
ACC/AHA 2007 Methodology for the Development of Clinical Data Standards	2007
ACCF/AHA 2007 Clinical Expert Consensus Document: Coronary Artery Calcium Scoring By Computed Tomography in Global Cardiovascular Risk Assessment	2007
ACC/AHA/HRS 2006 Key Data Elements and Definitions for Electrophysiological Studies and Procedures: A Report of the American College of Cardiology/American Heart Association Task Force on Clinical Data Standards	2006
ACC/AHA 2006 Update of the Clinical Competence Statement on Invasive Electrophysiology Studies, Catheter Ablation, and Cardioversion	2006
ACC/AHA/ESC 2006 Guidelines for Management of Patients With Ventricular Arrhythmias and the Prevention of Sudden Cardiac Death - Full Text	2006
ACC/AHA/ESC 2006 Guidelines for Management of Patients With Ventricular Arrhythmias and the Prevention of Sudden Cardiac Death - Pocket Guideline	2006
ACC/AHA/ESC 2006 Guidelines for Management of Patients With Ventricular Arrhythmias and the Prevention of Sudden Cardiac Death - Wallet Card	2006
ACC/AHA/ESC 2006 Guidelines for Management of Patients With Ventricular Arrhythmias and the Prevention of Sudden Cardiac Death - Executive Summary	2006
ACC/AHA/ESC 2006 Guidelines for the Management of Patients with Atrial Fibrillation - Full Text	2006
ACC/AHA/ESC 2006 Guidelines for the Management of Patients with Atrial Fibrillation - Executive Summary	2006
ACC/AHA 2006 Guidelines for the Management of Patients with Valvular Heart Disease - Executive Summary	2006
ACC/AHA 2006 Guidelines for the Management of Patients with Valvular Heart Disease - Full Text	2006
AHA/ACC Guidelines for Secondary Prevention for Patients With Coronary and Other Atherosclerotic Vascular Disease: 2006 Update	2006
ACC/AHA 2006 Guideline Update on Perioperative Cardiovascular Evaluation for Noncardiac Surgery: Focused Update on Perioperative Beta-Blocker Therapy	2006
ACC/AHA Clinical Performance Measures for Adults With ST-Elevation and Non-ST-Elevation Myocardial Infarction. A Report of the American College of Cardiology/American Heart Association Task Force on Performance Measures	2006

Guidelines And The Law

In the United States Court of Appeals For the Seventh Circuit

No. 96-3450

NICHOLAS KNAPP,

Plaintiff-Appellee,

v.

NORTHWESTERN UNIVERSITY, an Illinois not-for-profit corporation, and RICK TAYLOR,

Defendants-Appellants.

Appeal from the United States District Court for the Northern District of Illinois, Eastern Division. No. 95 C 6454--James B. Zagel, Judge.

ARGUED NOVEMBER 7, 1996--DECIDED NOVEMBER 22, 1996

Before BAUER, DIANE P. WOOD, and EVANS, Circuit Judges.

EVANS, Circuit Judge. Nicholas Knapp wants to play NCAA basketball for Northwestern University--so badly that he is willing to face an increased risk of death to do so. Knapp is a competent, intelligent adult capable of assessing whether playing intercollegiate basketball is worth the risk to his heart and possible death, and to him the risk is acceptable. Usually, competent, intelligent adults are allowed to make such decisions. This is especial- ly true when, as here, the individual's family approves of the decision and the individual and his parents are willing to sign liability waivers regarding the worst-case scenario should it occur.

We do not believe that, in cases where medical experts disagree in their assessment of the extent of a real risk of serious harm or death, Congress intended that the courts--neutral arbiters but generally less skilled in medicine than the experts involved--should make the final medical decision. Instead, in the midst of conflicting ex- pert testimony regarding the degree of serious risk of harm or death, the court's place is to ensure that the ex- clusion or disqualification of an individual was individual- ized, reasonably made, and based upon competent medical evidence.

2

Two national medical conferences were held in Bethesda, Maryland, for the specific purpose of establishing prudent consensus recommendations among cardiologists and sports medicine physicians regarding the eligibility of athletes with cardiovascular abnormalities to compete in sports. The first, known as the 16th Bethesda Conference, was held in 1984 and titled "Cardiovascular Abnormalities in the Athlete: Recommendations Regar- ding Eligibility for Competition." The consensus recom- mendations from that conference were published in the Journal of the American College of Cardiology in December 1985. The second, known as the 26th Bethesda Conference and titled "Recommendations for Determin- ing Eligibility for Competition in Athletes with Car- diovascular Abnormalities," was held in January 1994. The consensus recommendations of that conference were published in the Journal of the American College of Car- diology in October 1994.

The 26th Bethesda Conference's task force on ar- rhythmias addressed conditions like Knapp's and implanted cardioverter-defibrillators. This task force recommended that athletes with ventricular fibrillation "that result in cardiac arrest in the presence or absence of structural heart disease cannot participate in any moderate or high intensity competitive sports." 24 Journal of the American College of Cardiology 845, 897 (1994). "For athletes with implantable defibrillators . . . all moderate and high in- tensity sports are contraindicated." Id.

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August 19, 2008:000–00

Table 1. Applying Classification of Recommendations and Level of Evidence

SIZE OF TREATMENT EFFECT →

ESTIMATE OF CERTAINTY (PRECISION) OF TREATMENT EFFECT	CLASS I *Benefit >>> Risk* Procedure/Treatment **SHOULD** be performed/ administered	CLASS IIa *Benefit >> Risk* *Additional studies with focused objectives needed* **IT IS REASONABLE** to perform procedure/administer treatment	CLASS IIb *Benefit ≥ Risk* *Additional studies with broad objectives needed; additional registry data would be helpful* Procedure/Treatment **MAY BE CONSIDERED**	CLASS III *Risk ≥ Benefit* Procedure/Treatment should **NOT** be performed/administered **SINCE IT IS NOT HELPFUL AND MAY BE HARMFUL**
LEVEL A Multiple populations evaluated* Data derived from multiple randomized clinical trials or meta-analyses	■ Recommendation that procedure or treatment is useful/effective ■ Sufficient evidence from multiple randomized trials or meta-analyses	■ Recommendation in favor of treatment or procedure being useful/effective ■ Some conflicting evidence from multiple randomized trials or meta-analyses	■ Recommendation's usefulness/efficacy less well established ■ Greater conflicting evidence from multiple randomized trials or meta-analyses	■ Recommendation that procedure or treatment is not useful/effective and may be harmful ■ Sufficient evidence from multiple randomized trials or meta-analyses
LEVEL B Limited populations evaluated* Data derived from a single randomized trial or nonrandomized studies	■ Recommendation that procedure or treatment is useful/effective ■ Evidence from single randomized trial or nonrandomized studies	■ Recommendation in favor of treatment or procedure being useful/effective ■ Some conflicting evidence from single randomized trial or nonrandomized studies	■ Recommendation's usefulness/efficacy less well established ■ Greater conflicting evidence from single randomized trial or nonrandomized studies	■ Recommendation that procedure or treatment is not useful/effective and may be harmful ■ Evidence from single randomized trial or nonrandomized studies
LEVEL C Very limited populations evaluated* Only consensus opinion of experts, case studies, or standard of care	■ Recommendation that procedure or treatment is useful/effective ■ Only expert opinion, case studies, or standard of care	■ Recommendation in favor of treatment or procedure being useful/effective ■ Only diverging expert opinion, case studies, or standard of care	■ Recommendation's usefulness/efficacy less well established ■ Only diverging expert opinion, case studies, or standard of care	■ Recommendation that procedure or treatment is not useful/effective and may be harmful ■ Only expert opinion, case studies, or standard of care
Suggested phrases for writing recommendations†	should is recommended is indicated is useful/effective/beneficial	is reasonable can be useful/effective/beneficial is probably recommended or indicated	may/might be considered may/might be reasonable usefulness/effectiveness is unknown/unclear/uncertain or not well established	is not recommended is not indicated should not is not useful/effective/beneficial may be harmful

Preoperative Cardiac Evaluation Does Not Improve Or Predict Perioperative Or Late Survival In Asymptomatic [moderate risk] Diabetic Patients Undergoing Elective Infrainguinal Arterial Reconstruction. MonahanTS et al. J Vasc Surg 2005;41:38-45. Boston, Mass (Beth Israel)

Outcomes in Asymptomatic Patients with Diabetes Undergoing Elective Infrainguinal Arterial Reconstruction

	Cardiac Work-up (n=79)	No Cardiac Work-up (n=61)	p
Perioperative mortality	1%	2%	1.00
Postoperative cardiac morbidity*	5%	6%	0.71
Median length of hospitalization	10 days	8 days	0.11

*MI, CHF, arrhythmia requiring treatment

Sems SA, Summers EC, Jurrens TL. Cardiac stress testing has limited value prior to hip fracture surgery. Paper #49. Presented at the 23rd Annual Meeting of the Orthopaedic Trauma Association. Oct. 18-20, 2007. Boston. (Mayo Clinic)

Of the 1,973 patients older than 65 years who were included in the study (1,010 hip fractures), 54 (5.5%) underwent preoperative cardiac stress testing. This consisted of either a dobutamine stress echocardiogram (DSE) or a sestamibi scan. There were 39 women and 15 men, with an average age of 81.7 years.

The control group consisted of the remaining 919 patients (665 women and 254 men; average age, 83.2 years).

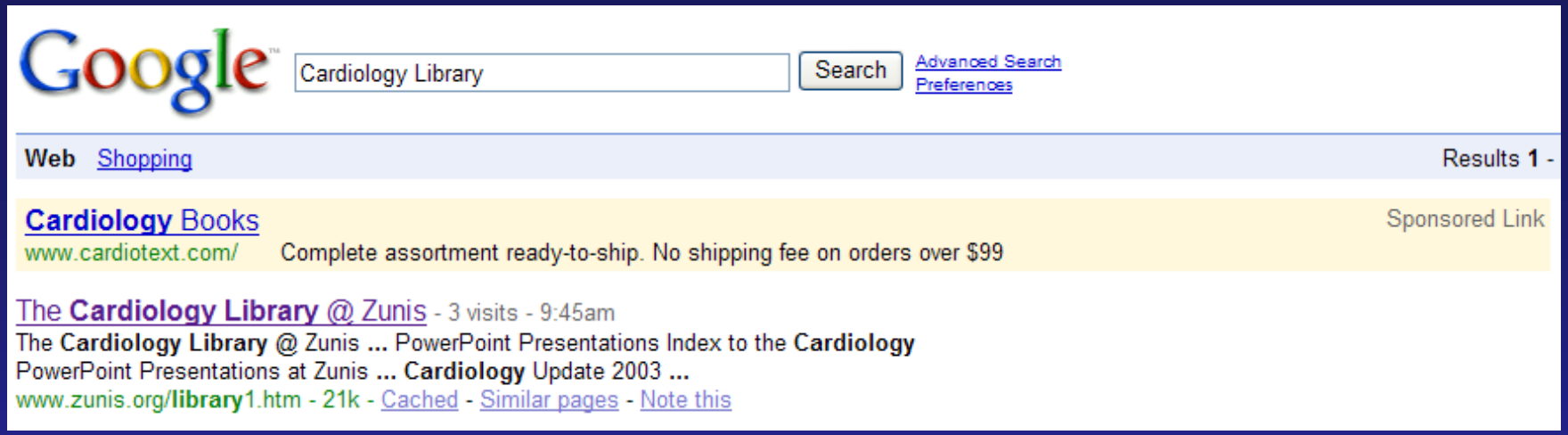
The stress tests were positive for ischemia in 13 patients (24%); 12 of the 13 patients underwent DSE and one underwent a sestamibi scan. Only one patient (1.8%), however, underwent an interventional cardiac procedure: coronary artery bypass grafting prior to hip fracture fixation; this patient died within 2 months. No patients with sestamibi scans underwent any cardiac interventional procedures.

Overall mortality rates at 30 days, 90 days and 1 year were 7.2%, 13.9% and 27.7%, respectively. There were no differences between the stress testing group and the control group with regard to mortality, according to Sems

Coronary-Artery Revascularization Before Elective Major Vascular Surgery (CARP). McFalls EO et al. N Engl J Med 2004;351:2795-804.

510 patients (9 percent) were eligible for the study and were randomly assigned to either coronary-artery revascularization before surgery or no revascularization before surgery. The indications for a vascular operation were an expanding abdominal aortic aneurysm (33 percent) or arterial occlusive disease of the legs (67 percent). Among the patients assigned to preoperative coronary-artery revascularization, percutaneous coronary intervention was performed in 59 percent, and bypass surgery was performed in 41 percent. The median time from randomization to vascular surgery was 54 days in the revascularization group and 18 days in the group not undergoing revascularization ($P<0.001$). At 2.7 years after randomization, mortality in the revascularization group was 22 percent and in the no-revascularization group 23 percent (relative risk, 0.98; 95 percent confidence interval, 0.70 to 1.37; $P=0.92$). Within 30 days after the vascular operation, a postoperative myocardial infarction, defined by elevated troponin levels, occurred in 12 percent of the revascularization group and 14 percent of the no-revascularization group ($P=0.37$). CONCLUSIONS: Coronary-artery revascularization before elective vascular surgery does not significantly alter the long-term outcome. On the basis of these data, a strategy of coronary-artery revascularization before elective vascular surgery among patients with stable cardiac symptoms cannot be recommended.

[Similar outcome in DECREASE –V. CONCLUSIONS: In this randomized pilot study (101 pts), designed to obtain efficacy and safety estimates, preoperative coronary revascularization in high-risk patients was not associated with an improved outcome. Erasmus Medical Center, Rotterdam, The Netherlands. JACC 2007 May 1;49(17):1763-9]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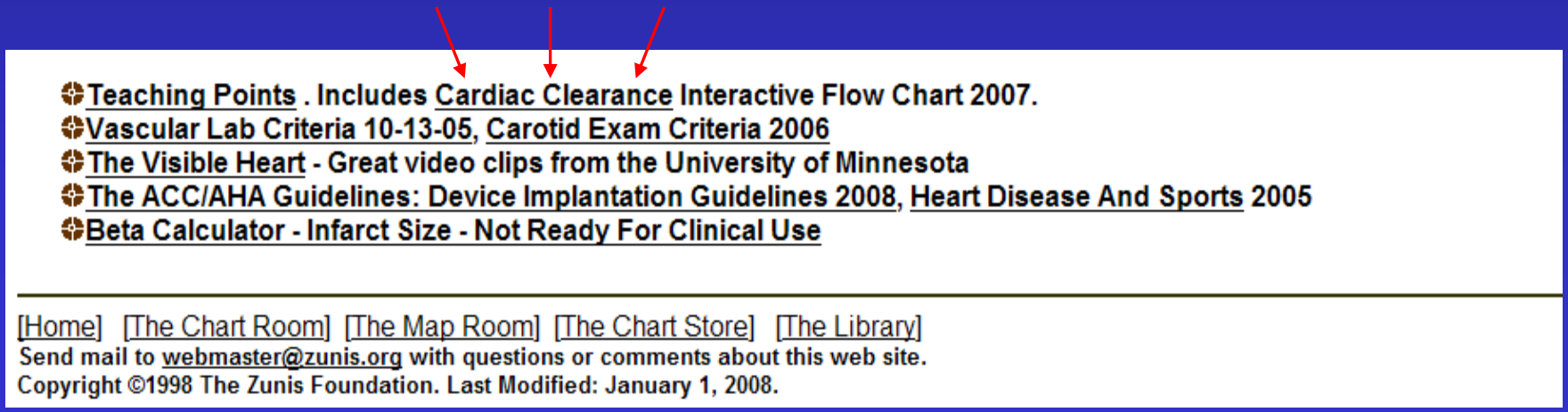
Teaching Points . Includes Cardiac Clearance Interactive Flow Chart 2007.
Vascular Lab Criteria 10-13-05, Carotid Exam Criteria 2006
The Visible Heart - Great video clips from the University of Minnesota
The ACC/AHA Guidelines: Device Implantation Guidelines 2008, Heart Disease And Sports 2005
Beta Calculator - Infarct Size - Not Ready For Clinical Use
[Home] [The Chart Room] [The Map Room] [The Chart Store] [The Library]
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ACC/AHA Perioperative Guidelines

Note: This Guidelines page is interactive. To gain more information, click on the box that contains the item in question.

ACC/AHA 2007 Perioperative Guidelines

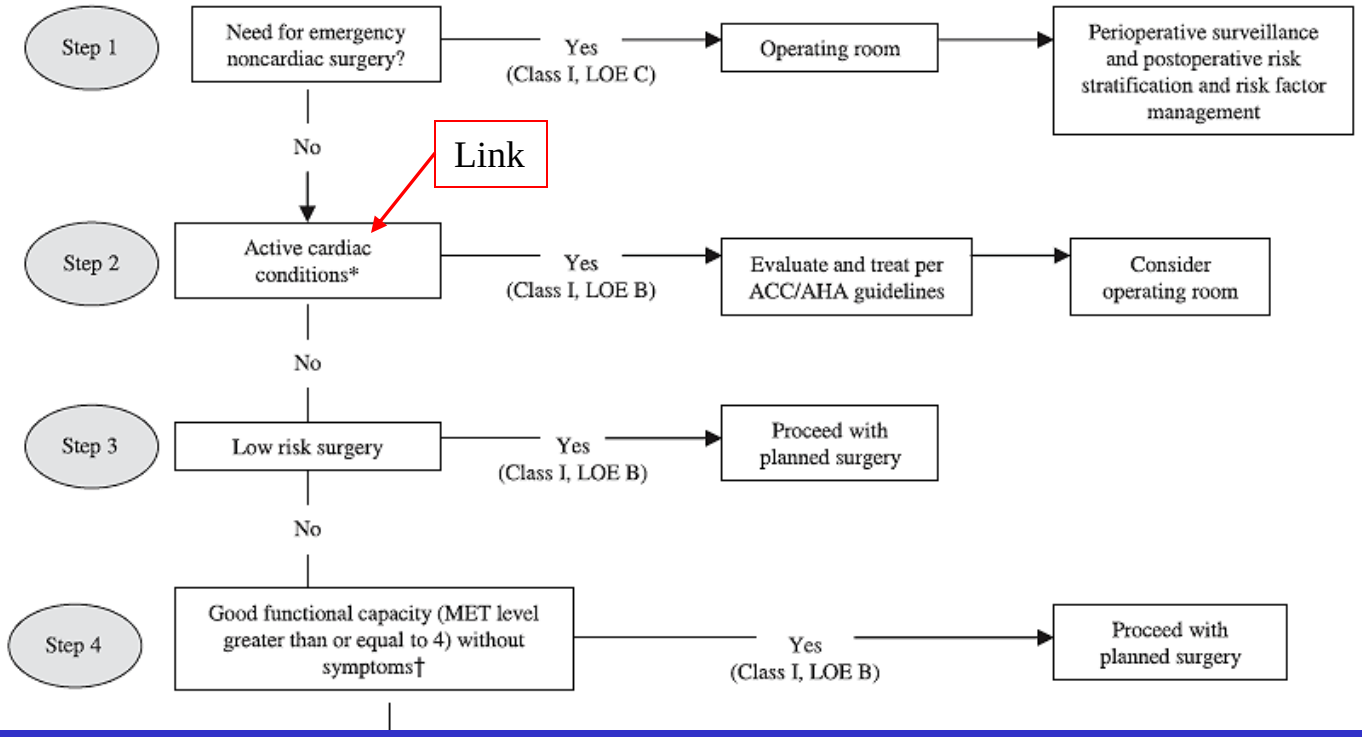

Table 2. Active Cardiac Conditions for Which the Patient Should Undergo Evaluation and Treatment Before Noncardiac Surgery (Class I, Level of Evidence: B)

Condition	Examples
Unstable coronary syndromes	Unstable or severe angina* (CCS class III or IV)†
	Recent MI‡
Decompensated HF (NYHA functional class IV; worsening or new-onset HF)	
Significant arrhythmias	High-grade atrioventricular block
	Mobitz II atrioventricular block
	Third-degree atrioventricular heart block
	Symptomatic ventricular arrhythmias
	Supraventricular arrhythmias (including atrial fibrillation) with uncontrolled ventricular rate (HR greater than 100 beats per minute at rest)
	Symptomatic bradycardia
	Newly recognized ventricular tachycardia
Severe valvular disease	Severe aortic stenosis (mean pressure gradient greater than 40 mm Hg, aortic valve area less than 1.0 cm^2, or symptomatic)
	Symptomatic mitral stenosis (progressive dyspnea on exertion, exertional presyncope, or HF)

*According to Campeau (9).

†May include "stable" angina in patients who are unusually sedentary.

‡The American College of Cardiology National Database Library defines recent MI as more than 7 days but less than or equal to 1 month (within 30 days).

CCS indicates Canadian Cardiovascular Society; HF, heart failure; HR, heart rate; MI, myocardial infarction; NYHA, New York Heart Association.

ACC/AHA Perioperative Guidelines

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ACC/AHA 2007 Perioperative Guidelines

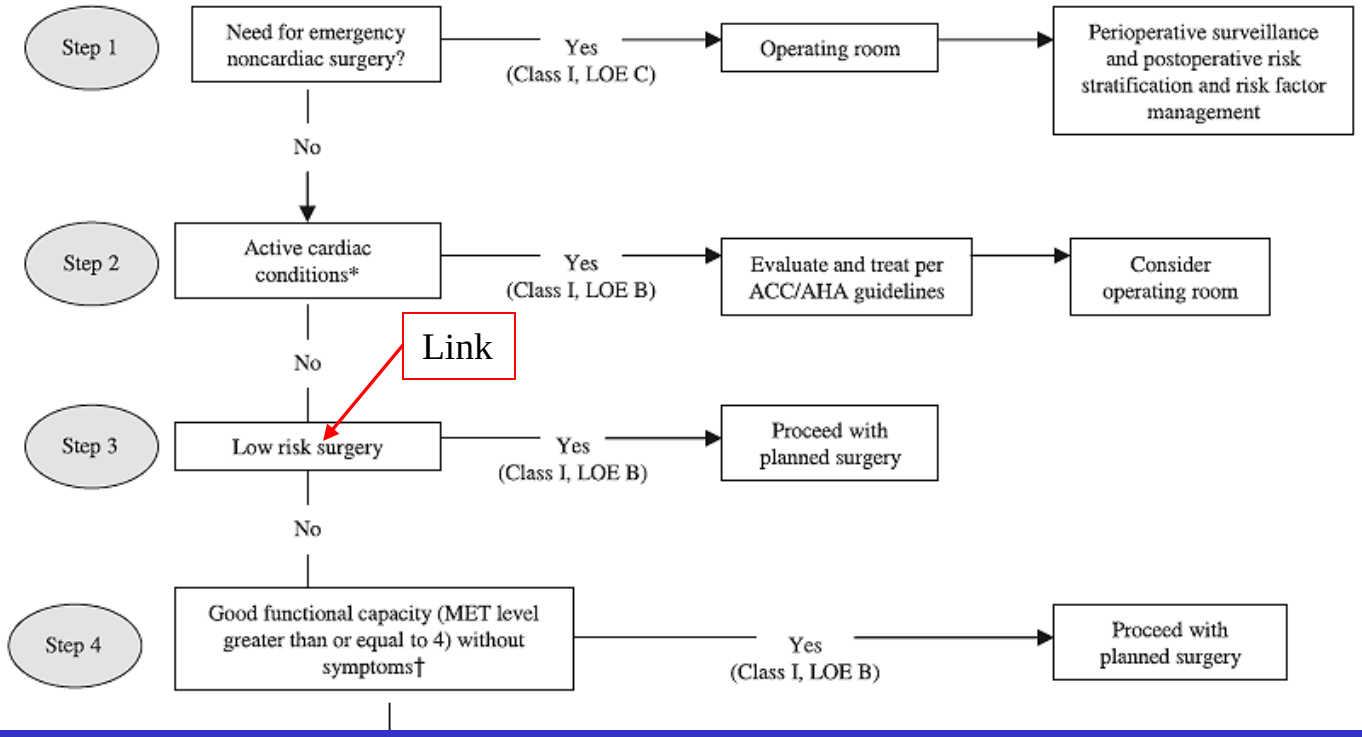


Table 4. Cardiac Risk* Stratification for Noncardiac Surgical Procedures

Risk Stratification	Procedure Examples
Vascular (reported cardiac risk often more than 5%)	Aortic and other major vascular surgery
	Peripheral vascular surgery
Intermediate (reported cardiac risk generally 1% to 5%)	Intraperitoneal and intrathoracic surgery
	Carotid endarterectomy
	Head and neck surgery
	Orthopedic surgery
	Prostate surgery
Low† (reported cardiac risk generally less than 1%)	Endoscopic procedures
	Superficial procedure
	Cataract surgery
	Breast surgery
	Ambulatory surgery

*Combined incidence of cardiac death and nonfatal myocardial infarction.
†These procedures do not generally require further preoperative cardiac testing.

ACC/AHA Perioperative Guidelines

Note: This Guidelines page is interactive. To gain more information, click on the box that contains the item in question.

ACC/AHA 2007 Perioperative Guidelines

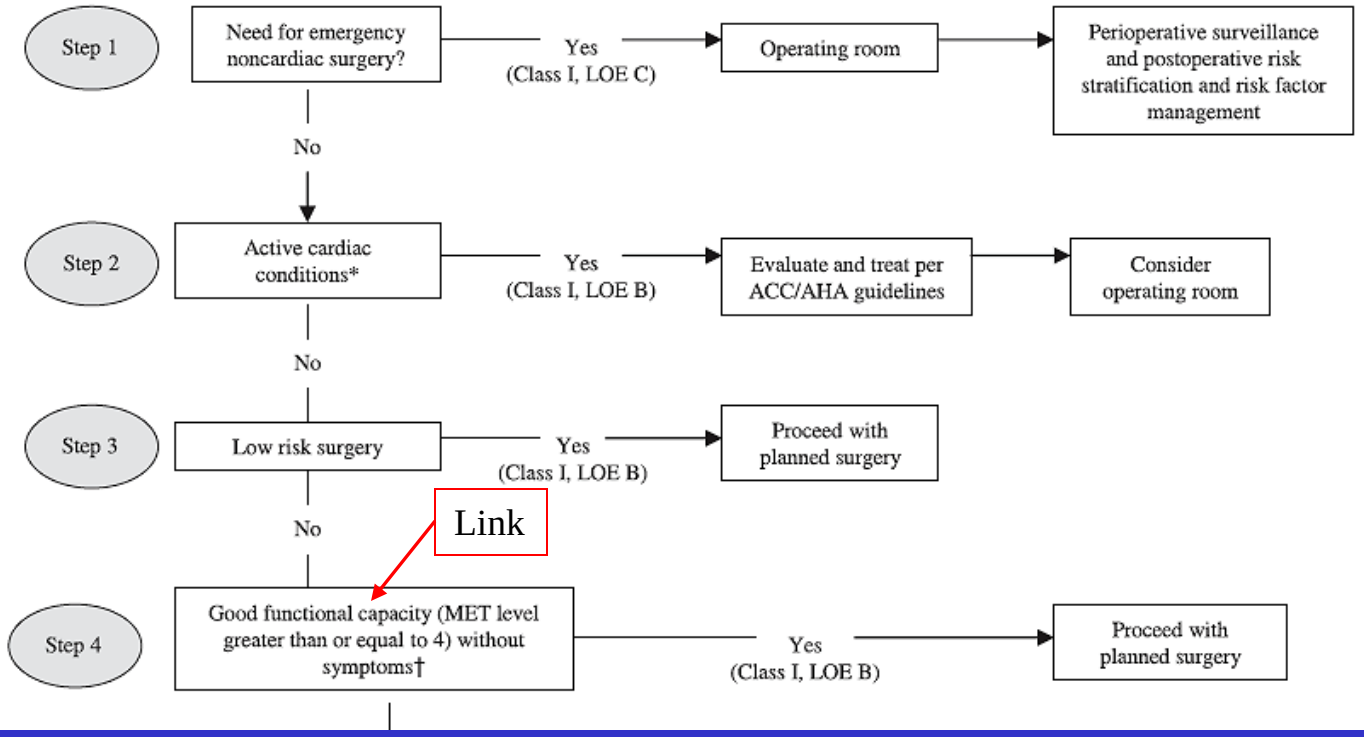
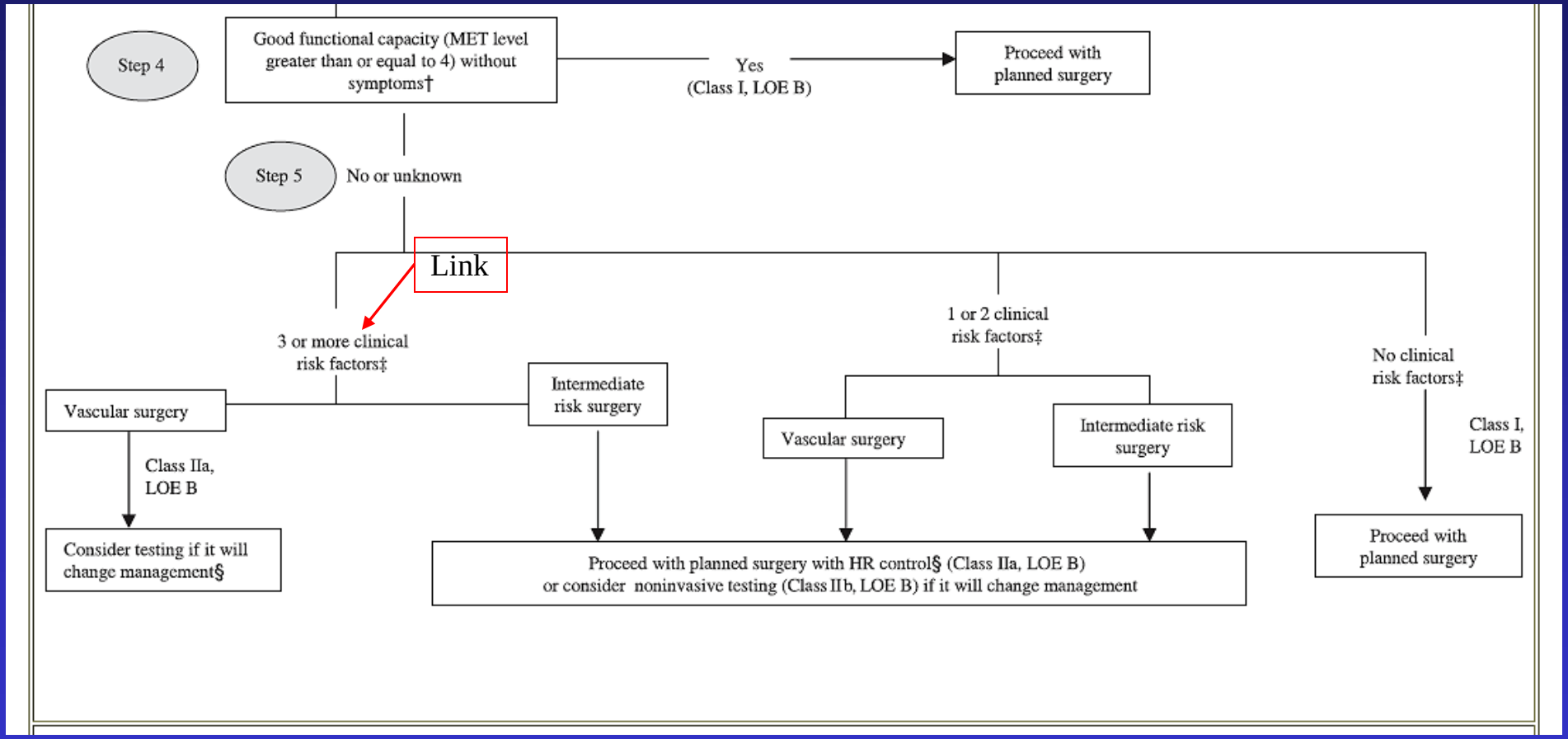


Table 3. Estimated Energy Requirements for Various Activities

	Can you. . .		Can you. . .
1 MET	Take care of yourself?	4 METs	Climb a flight of stairs or walk up a hill?
	Eat, dress, or use the toilet?		Walk on level ground at 4 mph (6.4 kph)?
	Walk indoors around the house?		Run a short distance?
	Walk a block or 2 on level ground at 2 to 3 mph (3.2 to 4.8 kph)?		Do heavy work around the house like scrubbing floors or lifting or moving heavy furniture?
4 METs	Do light work around the house like dusting or washing dishes?		Participate in moderate recreational activities like golf, bowling, dancing, doubles tennis, or throwing a baseball or football?
		Greater than 10 METs	Participate in strenuous sports like swimming, singles tennis, football, basketball, or skiing?

kph indicates kilometers per hour; MET, metabolic equivalent; and mph, miles per hour.
*Modified from Hlatky et al. (10), copyright 1989, with permission from Elsevier, and adapted from Fletcher et al. (11).


Step 4
Good functional capacity (MET level greater than or equal to 4) without symptoms†
Yes
(Class I, LOE B)
Proceed with planned surgery
Step 5
No or unknown
Link
3 or more clinical risk factors‡
1 or 2 clinical risk factors‡
No clinical risk factors‡
Vascular surgery
Intermediate risk surgery
Vascular surgery
Intermediate risk surgery
Class IIa, LOE B
Class I, LOE B
Consider testing if it will change management§
Proceed with planned surgery with HR control§ (Class IIa, LOE B)
or consider noninvasive testing (Class IIb, LOE B) if it will change management
Proceed with planned surgery

- history of heart disease,
- history of compensated or prior heart failure,
- history of cerebrovascular disease,
- diabetes mellitus, and
- renal insufficiency (8).

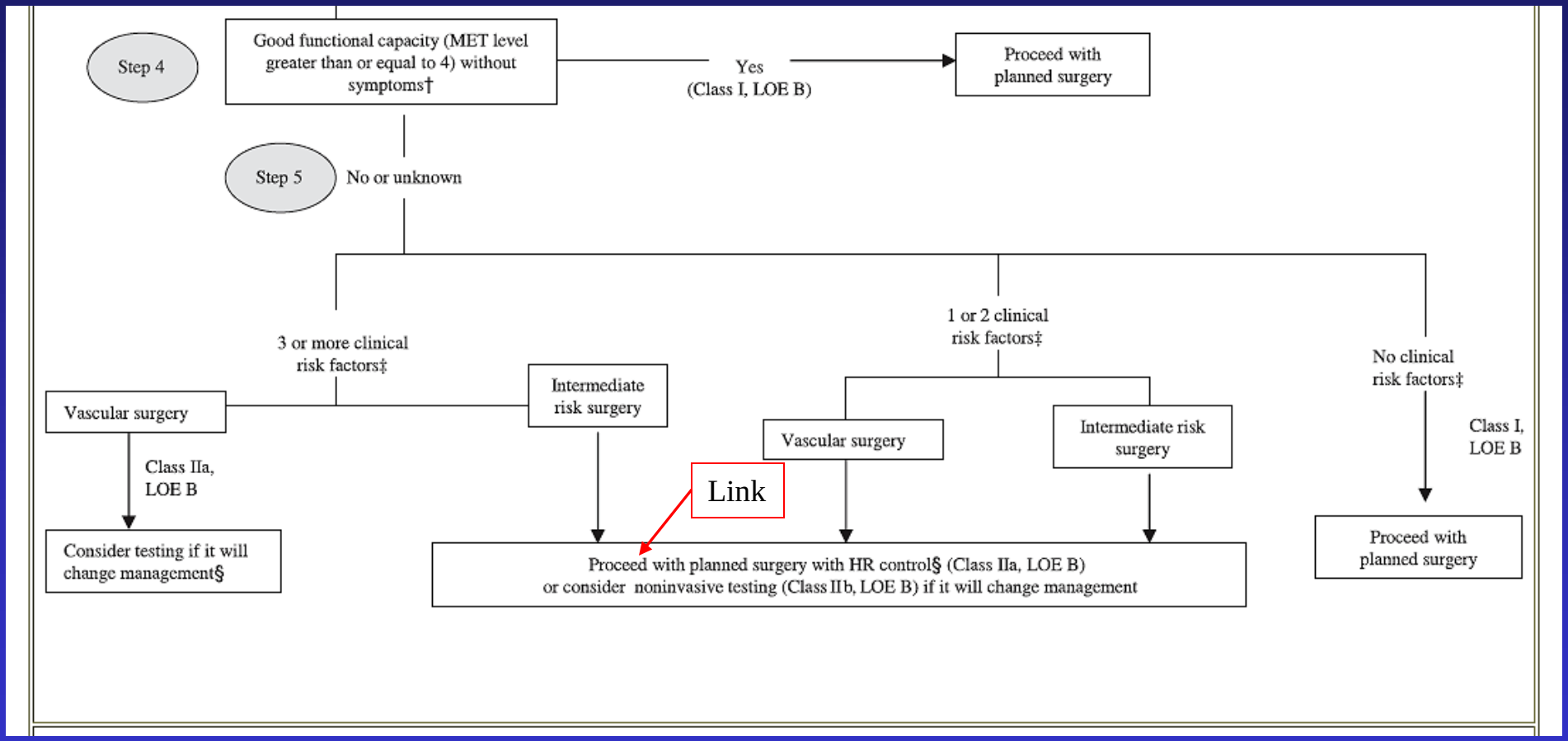

Step 4
Good functional capacity (MET level greater than or equal to 4) without symptoms†
Yes
(Class I, LOE B)
Proceed with planned surgery
Step 5
No or unknown
3 or more clinical risk factors‡
1 or 2 clinical risk factors‡
No clinical risk factors‡
Vascular surgery
Intermediate risk surgery
Vascular surgery
Intermediate risk surgery
Class I, LOE B
Class IIa, LOE B
Link
Consider testing if it will change management§
Proceed with planned surgery with HR control§ (Class IIa, LOE B)
or consider noninvasive testing (Class IIb, LOE B) if it will change management
Proceed with planned surgery

Table 5. Recommendations for Perioperative Beta-Blocker Therapy Based on Published Randomized Clinical Trials

Surgery	No Clinical Risk Factors	1 or More Clinical Risk Factors	CHD or High Cardiac Risk	Patients Currently Taking Beta Blockers
Vascular	Class IIb, Level of Evidence: B	Class IIa, Level of Evidence: B	Patients found to have myocardial ischemia on preoperative testing: Class I, Level of Evidence: B* Patients without ischemia or no previous test: Class IIa, Level of Evidence: B	Class I, Level of Evidence: B
Intermediate risk	. . .	Class IIb, Level of Evidence: C	Class IIa, Level of Evidence: B	Class I, Level of Evidence: C
Low risk	. . .	. . .	. . .	Class I, Level of Evidence: C

See Table 4 for definition of procedures. Ellipses (. . .) indicate that data were insufficient to determine a class of recommendation or level of evidence. See text for further discussion. CHD indicates coronary heart disease.

*Applies to patients found to have coronary ischemia on preoperative testing.

†Applies to patients found to have coronary heart disease.

The Big Picture

Ten important recommendations from this document include:

1. The purpose of the 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, anesthesiologists, and surgeon can use in making treatment decisions that may influence short-and long-term cardiac outcomes.

2. No test should be performed unless it is likely to influence patient treatment.

3. Preoperative resting 12-lead electrocardiogram (ECG) is recommended for patients with at least one clinical risk factor (ischemic heart disease, history of prior uncompensated or prior heart failure, history of cerebrovascular disease, diabetes mellitus, and renal insufficiency) who are undergoing vascular surgical procedures.

4. Coronary revascularization before noncardiac surgery is useful in patients with: left main coronary stenosis or three-vessel coronary artery disease with stable angina.

5- Percutaneous coronary intervention (PCI) before noncardiac surgery is of no value in preventing perioperative cardiac events, except in those patients in whom PCI is independently indicated, such as for an acute coronary syndrome.

6. Beta-blockers should be continued in patients undergoing surgery who are receiving beta-blockers to treat angina, symptomatic arrhythmias, hypertension, or other American College of Cardiology/American Heart Association Class I guideline indications.

7. For patients currently taking statins and scheduled for noncardiac surgery, statins should be continued.

8. Elective procedures for which there is a significant risk of perioperative or postoperative bleeding should be deferred until patients have completed an appropriate course of thienopyridine therapy (12 months after drug-eluting stent implantation if they are not at high risk of bleeding and a minimum of 1 month for bare-metal stent implantation).

9. Postoperative troponin measurement is recommended in patients with ECG changes or chest pain typical of acute coronary syndrome.

10. An effective analgesic regimen must be included in the perioperative plan and should be based on issues unique to a given patient undergoing a specific procedure at a specific institution.

Fleisher LA, Beckman JA, Brown KA, et al. *J Am Coll Cadiol*. 2007;50:1707-1732


THANK YOU