Preoperative Evaluation for Non-Cardiac Surgery

Resident Core Curriculum

Lecture Series

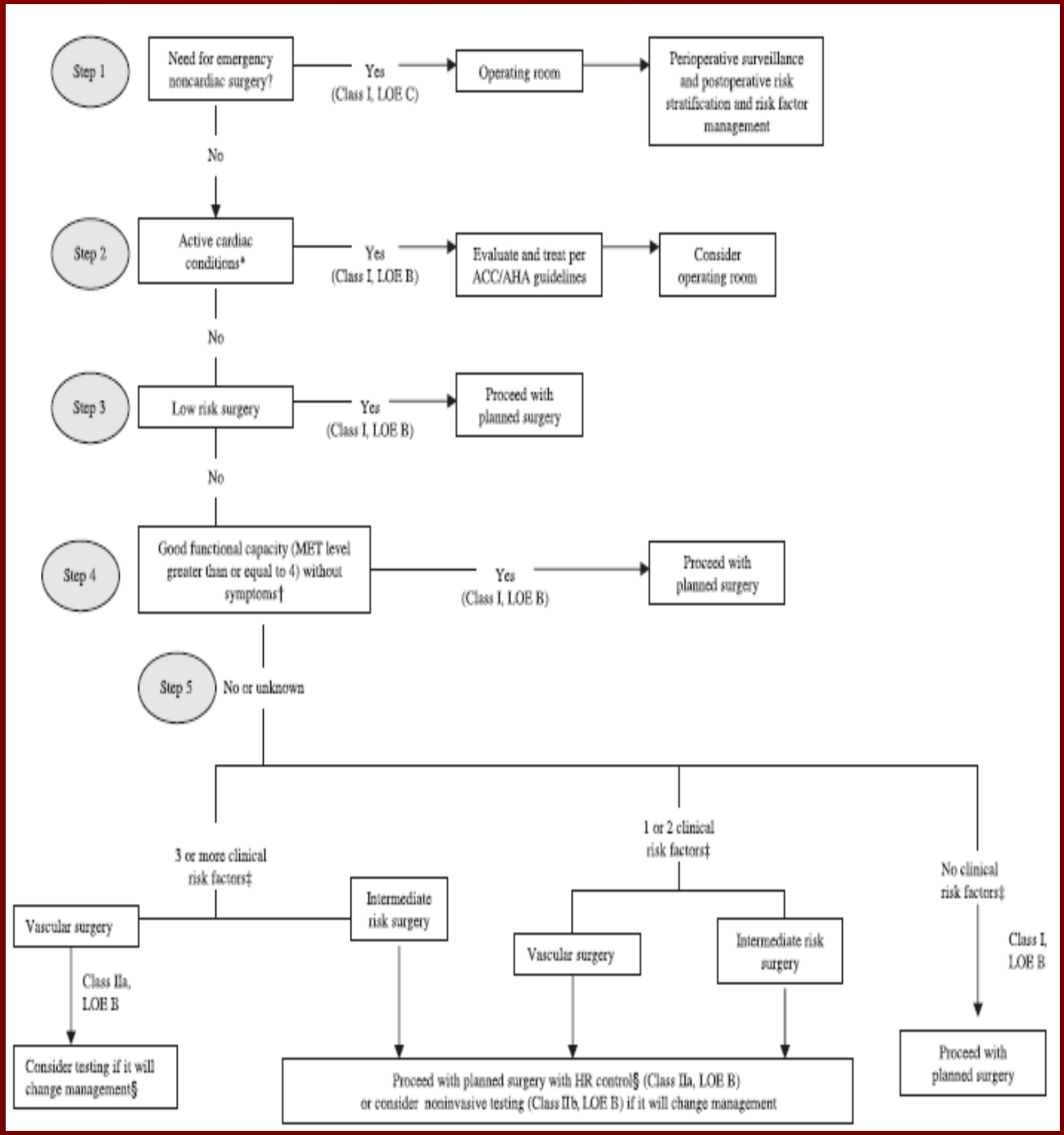
Cardiology Rotation

Goals of the Preoperative CV evaluation

- Focus on preoperative risk stratification
- Need for further testing
- Optimizing medical management

- There is no “cardiac clearance”!

New Guidelines

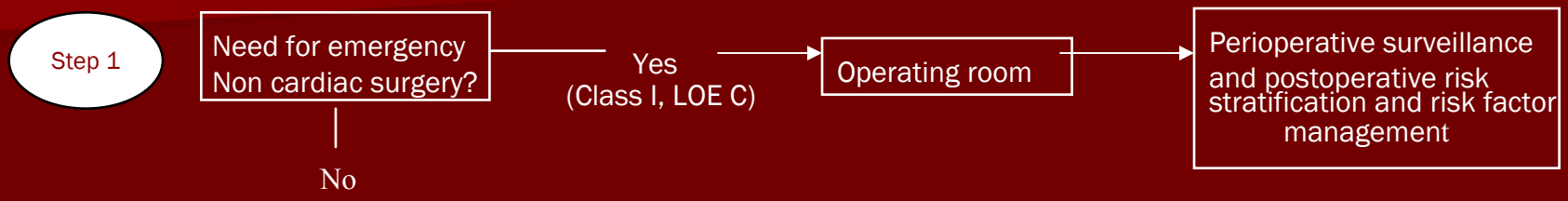


Fleicher, et al.
JACC 2009;54:e13-118

General Evaluation

- History
  - Any history of CAD, CV risk factors
  - Assess for clinic risk factors*
    - CAD
    - CHF
    - DM
    - CRI
    - CVA
  - Any prior testing on the heart
  - Assessment of functional ability
- PE

Cardiac Evaluation and Care Algorithm for Noncardiac Surgery (1)



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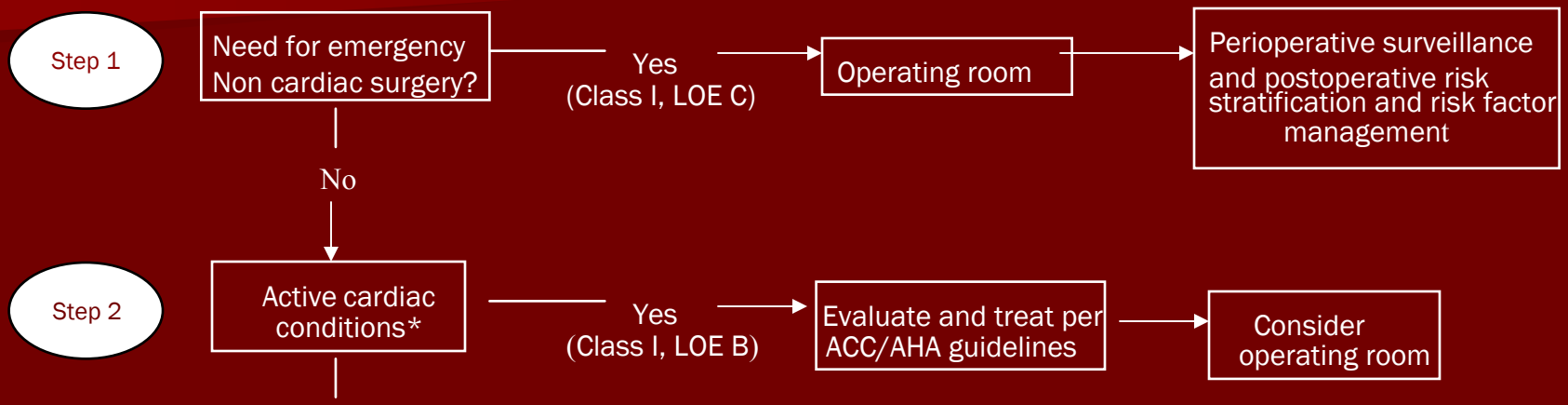

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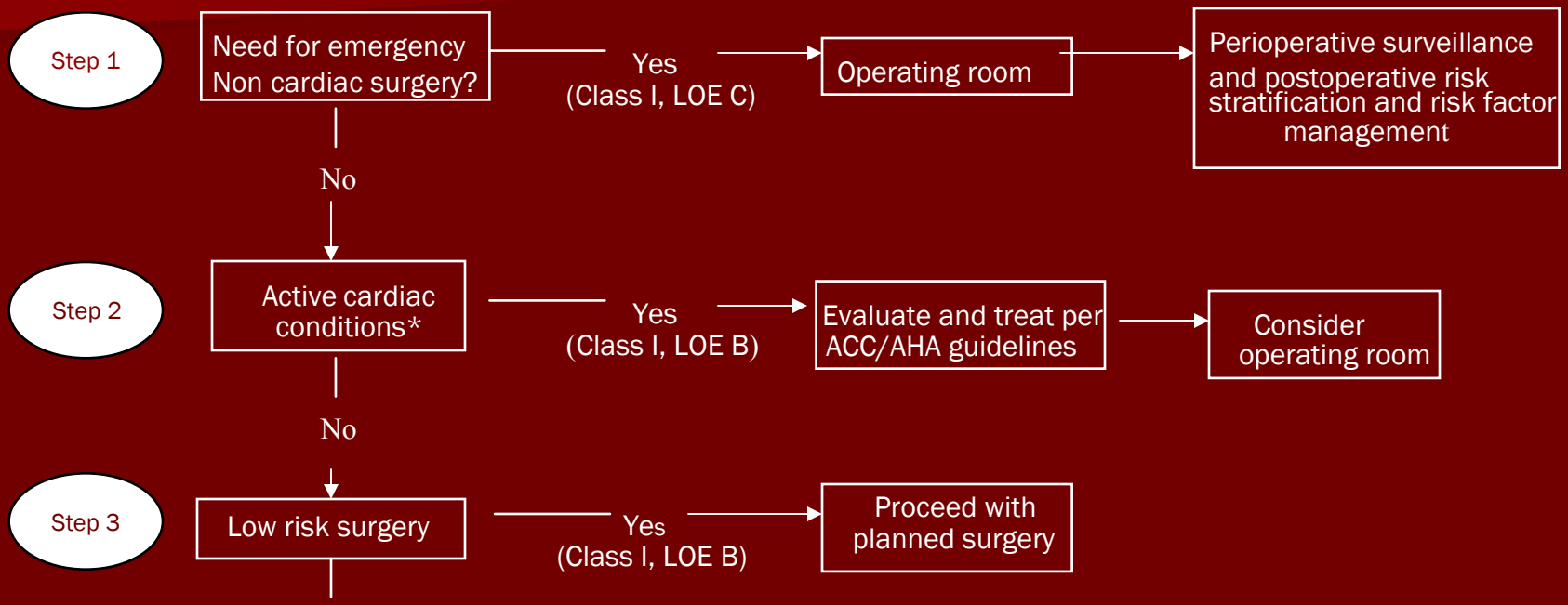
Active Cardiac Conditions for Which the Patient Should Undergo Evaluation and Treatment Before Noncardiac Surgery (Class 1, LOE: B)

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 > 100 bpm at rest) ■ Symptomatic bradycardia ■ Newly recognized ventricular tachycardia
Severe valvular disease	■ Severe aortic stenosis (mean pressure gradient > 40 mm Hg, aortic valve area < 1.0 cm^2, or symptomatic) ■ Symptomatic mitral stenosis (progressive dyspnea on exertion, exertional presyncope, or HF) or MVA< 1.5 cm^2

Cardiac Evaluation and Care Algorithm for Noncardiac Surgery (1)



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Cardiac Risk Stratification for Noncardiac Surgical Procedures

High (cardiac risk > 5%)	▪Aortic or other major vascular surgery ▪Peripheral vascular surgery ▪Anticipated prolonged procedure with major fluid shifts
Intermediate (cardiac risk < 5%)	▪Intrathoracic or Intraperitoneal ▪CEA ▪Head and Neck ▪Orthopedic ▪Prostate
Low (cardiac risk < 1%)	▪Endoscopic surgery ▪Breast ▪Superficial procedures ▪Cataracts ▪Ambulatory surgery

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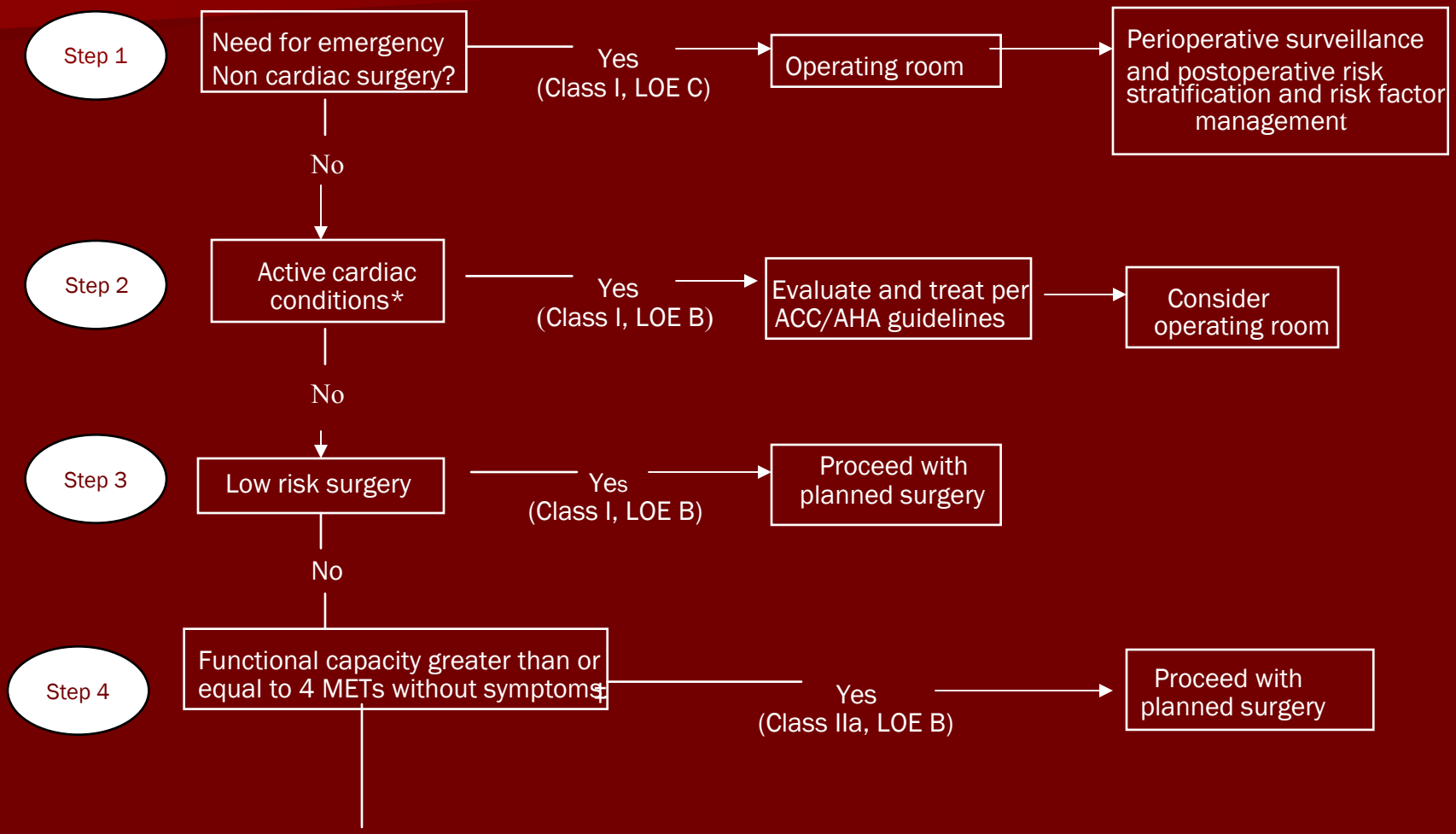

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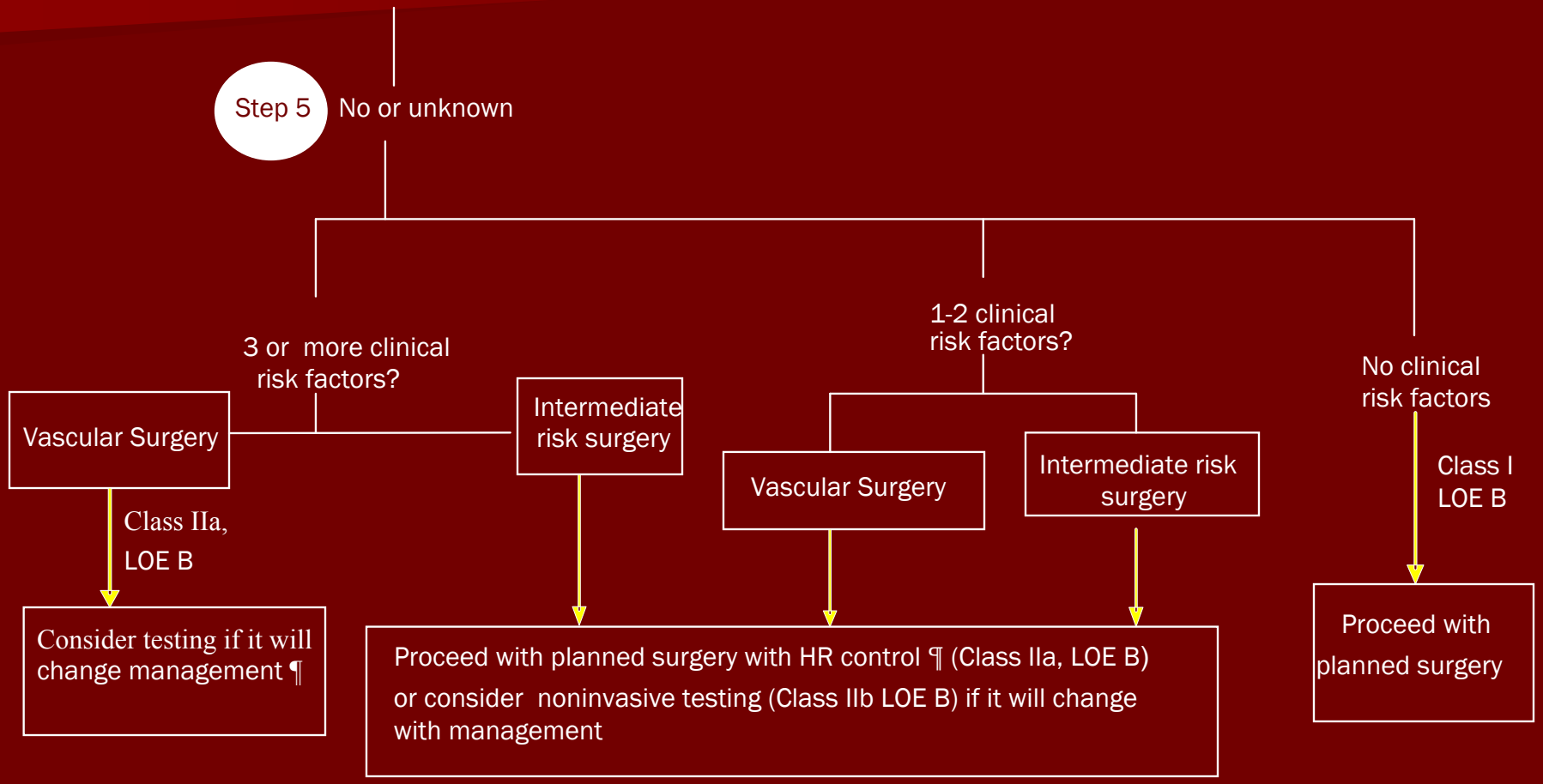
Estimated Energy Requirements for Various Activities

	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?		Do heavy work around the house like scrubbing floors or lifting or moving heavy furniture?
	Walk a block or 2 on level ground at 2 to 3 mph (3.2 to 4.8 kph)?		Participate in moderate recreational activities like golf, bowling, dancing, doubles tennis, or throwing a baseball or football?
4 Mets	Do light work around the house like dusting or washing dishes?	> 10 Mets	Participate in strenuous sports like swimming, singles tennis, football, basketball, or skiing?

Cardiac Evaluation and Care Algorithm for Noncardiac Surgery (2)



* Clinical RF: CAD, CHF, DM, PAD, CRI, Cerebrovascular disease

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Stress test: to do or not to do?

- Consider if:
  - Unable to assess function status
  - > 1 clinical risk factor and it will change management
- Alternative is: proceed with optimal HR control

Prognostic Gradient of Ischemic Responses During an ECG-Monitored Exercise Test in Patients With Suspected or Proven CAD

<u>High Risk Ischemic Response</u>

Ischemia induced by low-level exercise* (less than 4 METs or heart rate < 100 bpm or < 70% of age-predicted heart rate)

manifested by 1 or more of the following:

- Horizontal or downsloping ST depression > 0.1 mV
- ST-segment elevation > 0.1 mV in noninfarct lead
- Five or more abnormal leads
- Persistent ischemic response >3 minutes after exertion
- Typical angina
- Exercise-induced decrease in systolic BP by 10 mm Hg

Prognostic Gradient of Ischemic Responses During an ECG-Monitored Exercise Test in Patients With Suspected or Proven CAD

Intermediate:

Ischemia induced by moderate-level exercise (4 to 6 METs or HR 100 to 130 bpm (70% to 85% of age-predicted heart rate)) manifested by ≥ 1 of the following:

- Horizontal or downsloping ST depression > 0.1 mV
- Persistent ischemic response greater than 1 to 3 minutes after exertion
- 3- 4 abnormal leads

Low

No ischemia or ischemia induced at high-level exercise (> 7 METs or HR >130 bpm (> 85% of age-predicted heart rate)) manifested by:

- Horizontal or downsloping ST depression > 0.1 mV
- 1- 2 abnormal leads

Inadequate test

Inability to reach adequate target workload or heart rate response for age without an ischemic response. For patients undergoing noncardiac surgery, the inability to exercise to at least the intermediate-risk level without ischemia should be considered an inadequate test.

B-Blockers

- Continue in patients who are already on it for angina, CHF or HTN (class I)
- Give to (class IIa)
  - Vascular surgery pts with ischemia on preop testing (CAD)
  - Vascular surgery pts with >1 clinical risk factor
  - Intermediate surgery pts with >1 RF undergoing intermediate risk surgery
- Titrate to HR and BP

Recommendations for Perioperative Beta-Blocker Therapy

Surgery	Low Cardiac Risk	CAD or High Risk (1 or more clinical risk factors)	Patients Currently Taking Beta Blockers
Vascular	Class IIb, Level of Evidence: B	Class IIa, Level of Evidence: B	Class 1, Level of Evidence: C
Intermediate risk	…	Class IIa, Level of Evidence: B	Class 1, Level of Evidence: C
Low risk	…	…	Class 1, Level of Evidence: C

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Revascularization prior to surgery

Class I indications

- Stable angina with L. Main dz
- Stable angina and 3v. Dz
- Stable angina and 2v. Dz with prox LAD and either low EF or ischemia on stress
- High risk USA or NSTEMI
- Acute STEMI

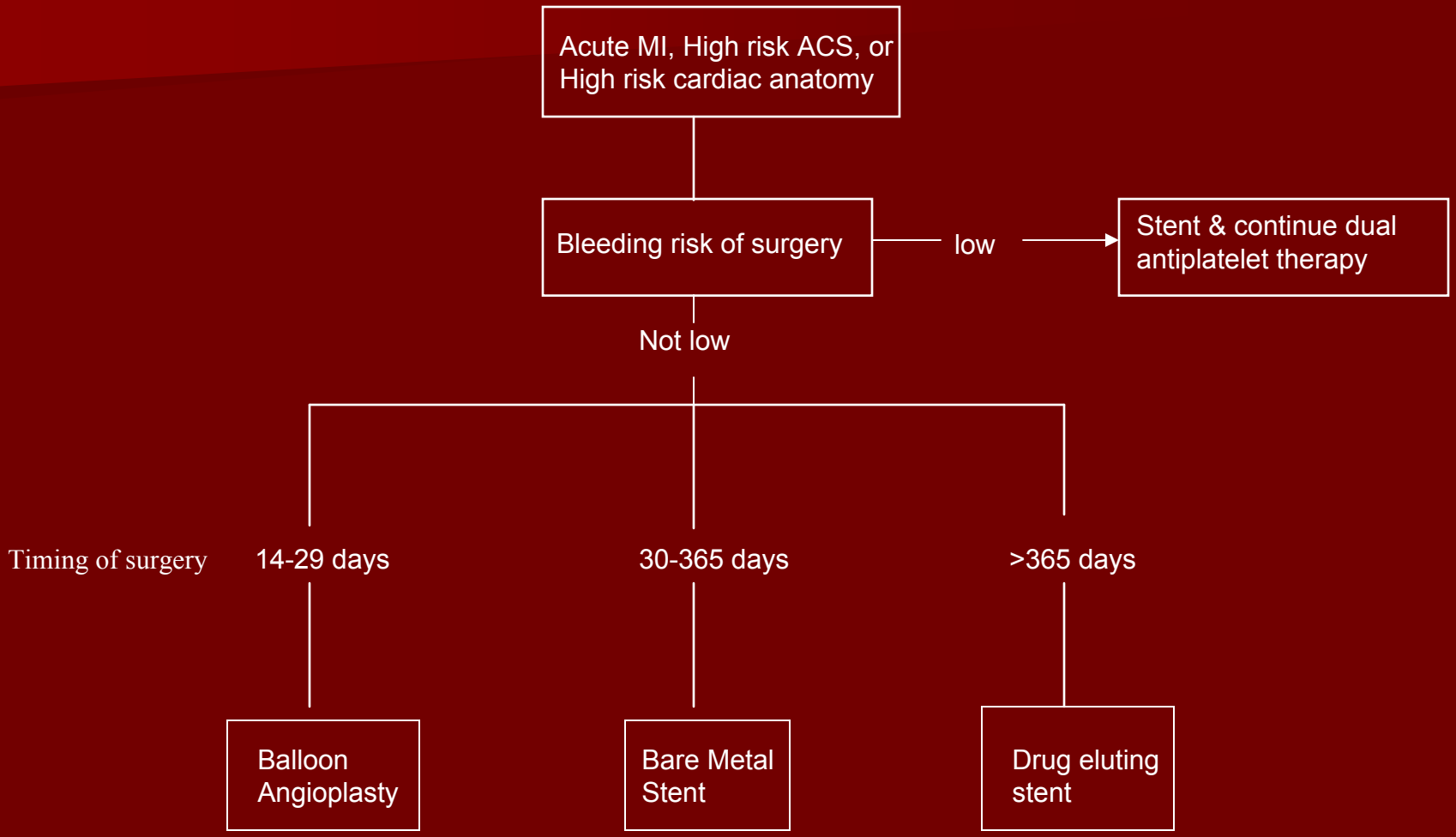
Class IIa Indications

- Symptomatic, appropriate for PCI, elective surgery

NOT recommended

- As prophylaxis in patient with stable CAD prior to elective surgery

Proposed Treatment for Patients Requiring PCI Who Need Subsequent Surgery



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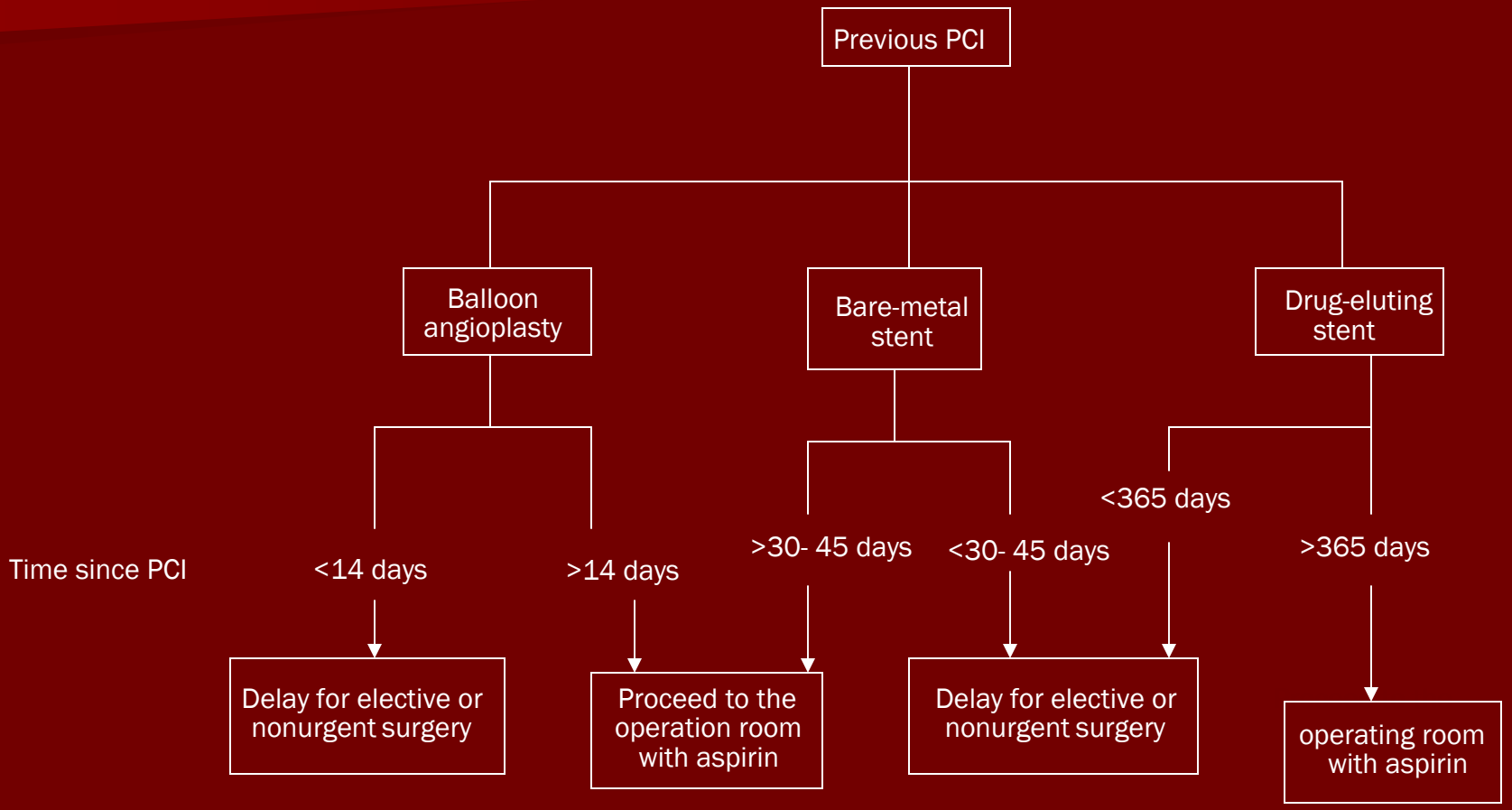
Proposed Approach to the Management of Patients with Previous PCI Who Require Noncardiac Surgery



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Anticoagulation in CAD pts

- Continue ASA if at all possible
- Plavix
  - Discontinue 4-6 weeks after POBA or BMS
  - For DES, Discontinue a minimum of:
    - Ideally continued for 1 year
    - Discontinue for the shortest time duration possible perioperatively

Non-Cardiac Surgery Cardiac Stressors

- Many potential cardiovascular stressors
  - Pre-operative
    - potential discontinuation cardiac, anti-hypertensive medicines
    - limited activity level
  - Intra-operative
    - Anesthesia (HR and BP variability) fluid shifts / blood loss, cathecholamine surges, arrhythmias, pain
    - high risk techniques (aortic cross clamping, etc)
  - Post-operative
    - pain, pulmonary complications, hypoxia , infection, fluid and electrolyte imbalances
    - high norepinephrine levels
    - hypercoaguability (peaks day 2-5)

Surveillance Postoperatively for Myocardial Infarction

- Guidelines
  - Low / Intermediate risk patients:
    - Cardiac enzymes not routinely recommended because incidence of peri-op MI is low
    - only if ECG, clinical course suggest ischemia
  - High risk patients:
    - ECG suggested immediately post-op and on POD # 1 & 2.
    - cardiac enzymes reasonable

Case

- 45 y/o male with history of DM, HTN, Chol, CRI and CVA presents for lung resection surgery for lung cancer.
- Asymptomatic (no CP or SOB)
- He doesn't really leave the house but can do normal daily activities/take care of himself. His wife does most of the cleaning. Can walk about 1 block.
- Takes ASA, Lisinopril, Zocor, Metformin

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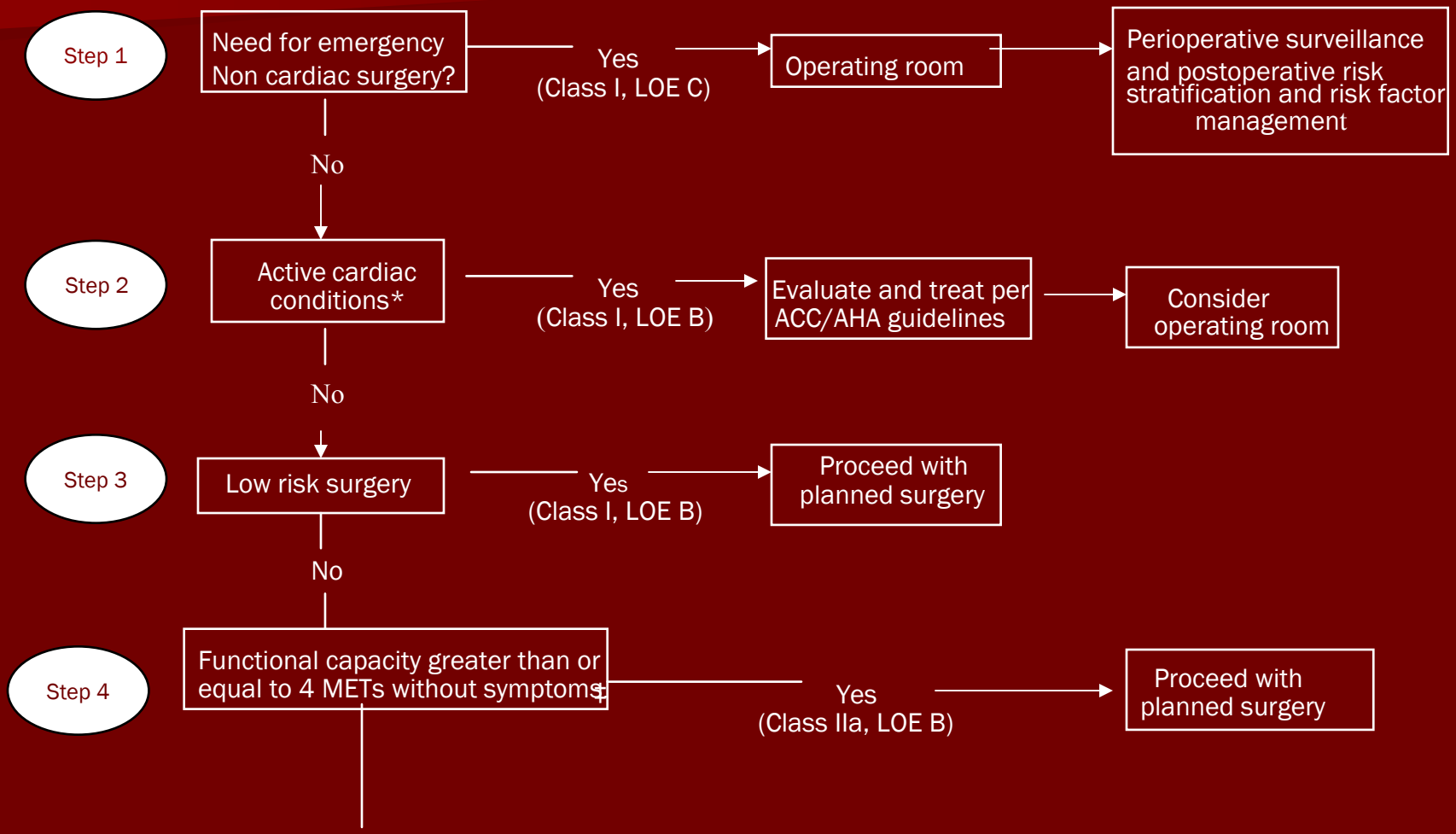

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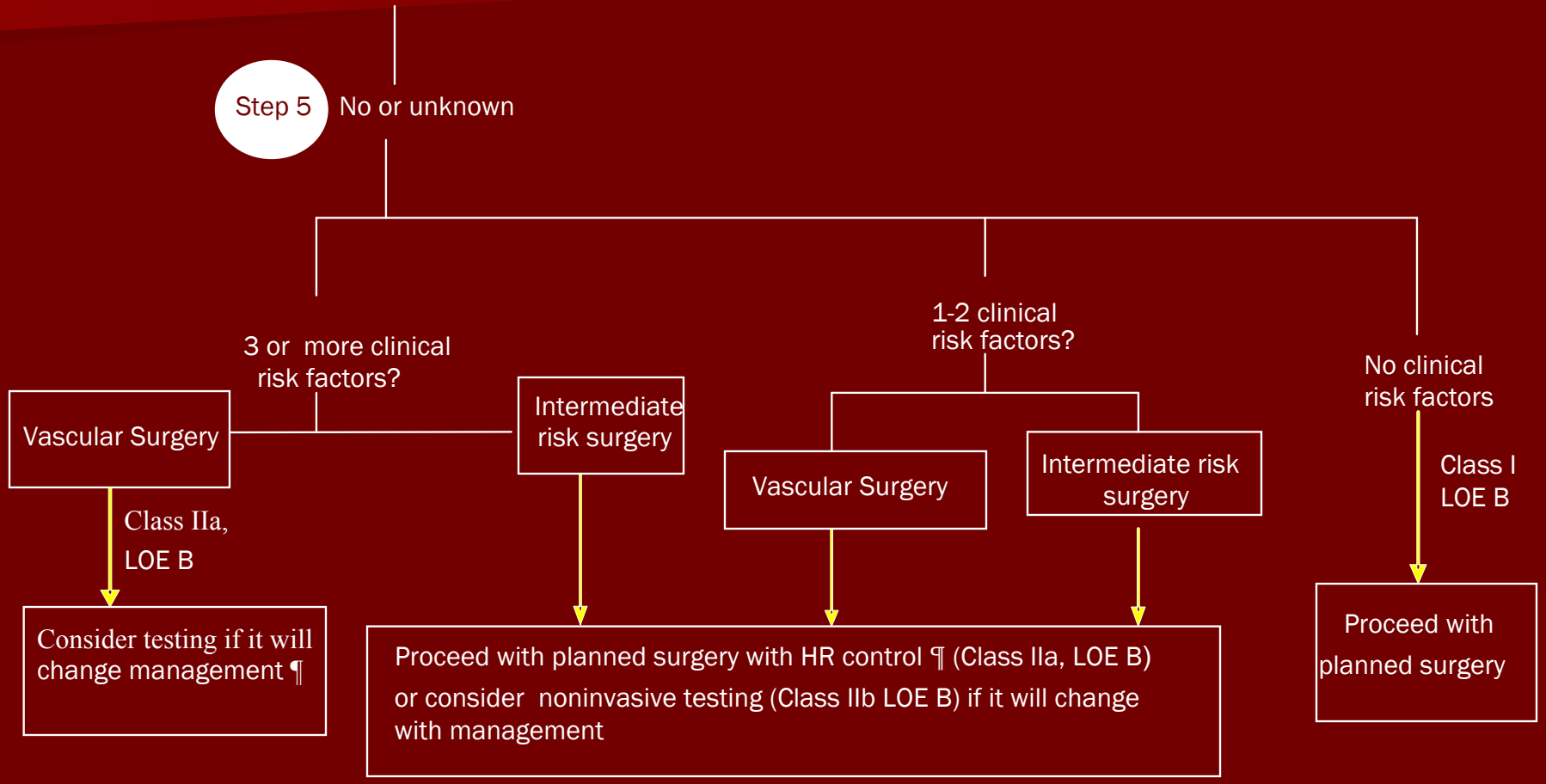

Decision tree

- Non-emergent surgery
- No active cardiac conditions
- Intermediate risk surgery
- Poor/unable to assess functional status
- 3 clinical risk factors

- Proceed with planned surgery with HR control or consider non-invasive testing if it will change management
  - Regedenoson Nuclear Stress test showed borderline-mild multivessel ischemia, SSS= 7. No focal abnormalities, EF 50%

Plan

- Stress shows only mild ischemia
- NO indication for prophylactic revascularization in this patient with stable CAD undergoing elective (semi-urgent) surgery
- B-blocker added for medical optimization
- Patient did well post-operatively

Key Points

- Preop Risk assessment
  - Functional status is key
  - Risk of surgery
  - Clinical risk factors
- Stress test if it will change management
- B-blockers
- Postop surveillance