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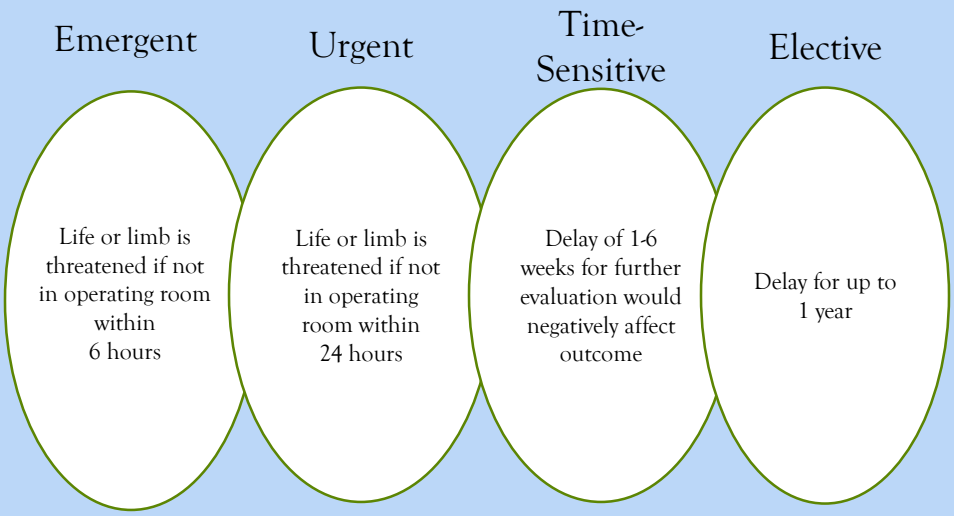
preoperative risk assessment

Cardiomilitary 2017

Disease Specific Approaches

- Heart Failure
- Hypertension

Definition of Timing of Surgery



Type of Surgery

- High surgical risk:
  - Emergent major operations, particularly in the elderly
  - Aortic and other major vascular surgery
  - Peripheral vascular surgery
  - Anticipated prolonged surgical procedures associated with large fluid shifts and/or blood loss.

Type of Surgery

- Intermediate surgical risk:
  - Carotid endarterectomy
  - Head and neck surgery
  - Intraperitoneal and intrathoracic
  - Orthopedic surgery
  - Prostate surgery

Type of Surgery

- Low surgical risk:
  - Endoscopic procedures
  - Superficial procedures
  - Cataract surgery
  - Breast surgery

Procedure Type

Low Risk

- Combined surgical and patient characteristics predict a risk of major adverse cardiac event (MACE) < 1%
- Ex: Cataracts, plastics

High Risk

- Any procedure with MACE risk > 1%
- No longer distinguishes between intermediate and high risk because recommendations the same
- Risk can be lowered by less invasive approach (endovascular AAA)
- Emergency procedures increase risk

4-Functional Capacity

- 1 MET
  - Can you take care of self?
  - Eat, dress, use toilet?
  - Walk indoors in house?
  - Walk a block or two on level at 2-3 mph?
  - Do light housework like dusting or dishes?
- 4 METs

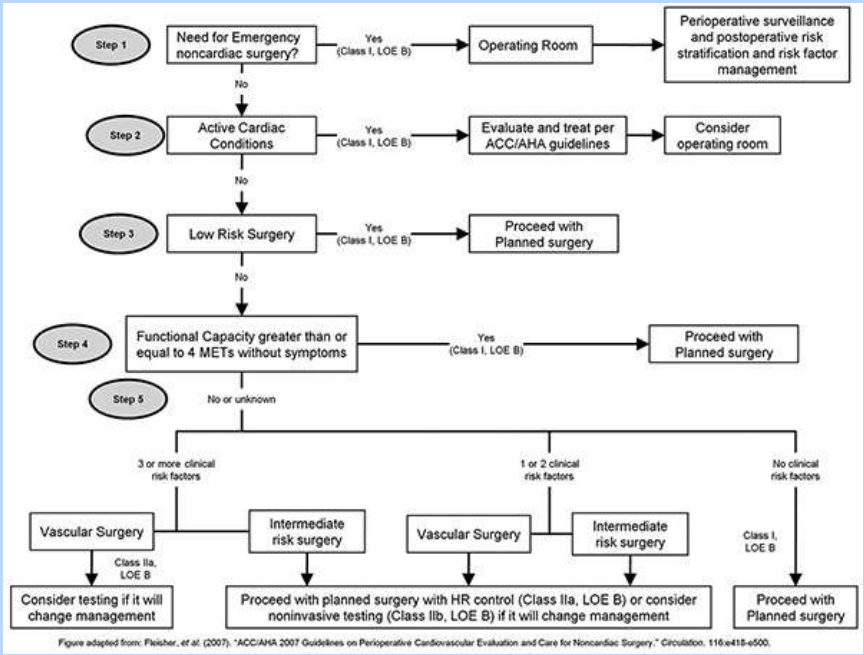
- 4 METs
  - Climb a flight of stairs, walk up hill?
  - Walk on level at 4 mph?
  - Run a short distance?
  - Heavy housework
  - Golf, bowling, dancing, doubles tennis
  - Swimming, singles tennis football, basketball, skiing
- >10 METs

1 MET = 3.5 ml/kg/mt VO2

>10 METs-Excellent
7-10 good
4-7 moderate
≤ 4 poor

Clinical Predictors of Increased Perioperative Cardiovascular Risk

- Major
  - Unstable coronary syndromes
  - Decompensated CHF
  - Significant Arrhythmias
- Intermediate
  - Mild angina pectoris
  - Prior MI
  - Compensated or prior HF
  - Diabetes Mellitus (particularly taking insulin)
  - Renal insufficiency
- Minor
  - Advanced Age.
  - Abnormal ECG.
  - Rhythm other than sinus.
  - Low functional capacity.
  - History of stroke.
  - Uncontrolled systemic hypertension



Fliesher et al, "ACC/AHA 2007 Guidelines on Perioperative Cardiovascular Evaluation and Care for Noncardiac Surgery." Circulation. 2007. 116:e418-500.

Supplemental Preoperative Evaluation

- Includes
  - ECG
  - Assessment of LV function
  - Exercise Stress Testing for Myocardial Ischemia and Functional Capacity
  - Pharmacological Stress Testing
    - Noninvasive
    - Radionuclide
    - DSE
  - Special Situations

  MRI or PET

Calculation of Risk to Predict Perioperative Cardiac Morbidity

Multivariate Risk Indices

Recommendations	COR	LOE
A validated risk-prediction tool can be useful in predicting the risk of perioperative MACE in patients undergoing noncardiac surgery.	IIa	B
For patients with a low risk of perioperative MACE, further testing is not recommended before the planned operation.	III: No Benefit	B

Duke Activity Status Index

Activity	Weight
Can you…	
1. take care of yourself, that is, eating, dressing, bathing, or using the toilet?	2.75
2. walk indoors, such as around your house?	1.75
3. walk a block or 2 on level ground?	2.75
4. climb a flight of stairs or walk up a hill?	5.50
5. run a short distance?	8.00
6. do light work around the house like dusting or washing dishes?	2.70
7. do moderate work around the house like vacuuming, sweeping floors, or carrying in groceries?	3.50
8. do heavy work around the house like scrubbing floors or lifting or moving heavy furniture?	8.00
9. do yardwork like raking leaves, weeding, or pushing a power mower?	4.50
10. have sexual relations?	5.25
11. participate in moderate recreational activities like golf, bowling, dancing, doubles tennis, or throwing a baseball or football?	6.00
12. participate in strenuous sports like swimming, singles tennis, football, basketball, or skiing?	7.50

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Supplemental Preoperative Evaluation

The 12-Lead ECG

Recommendations	COR	LOE
Preoperative resting 12-lead ECG is reasonable for patients with known coronary heart disease, significant arrhythmia, peripheral arterial disease, cerebrovascular disease, or other significant structural heart disease, except for those undergoing low-risk.	IIa	B
Preoperative resting 12-lead ECG may be considered for asymptomatic patients without known coronary heart disease, except for those undergoing low-risk surgery.	IIb	B
Routine preoperative resting 12-lead ECG is not useful for asymptomatic patients undergoing low-risk surgical procedures.	III: No Benefit	B

Supplemental Preoperative Evaluation

Assessment of LV Function

Recommendations	COR	LOE
It is reasonable for patients with dyspnea of unknown origin to undergo preoperative evaluation of LV function.	IIa	C
It is reasonable for patients with HF with worsening dyspnea or other change in clinical status to undergo preoperative evaluation of LV function.	IIa	C
Reassessment of LV function in clinically stable patients with previously documented LV dysfunction may be considered if there has been no assessment within a year.	IIb	C
Routine preoperative evaluation of LV function is not recommended.	III: No Benefit	B

Supplemental Preoperative Evaluation

Exercise Stress Testing for Myocardial Ischemia and Functional Capacity

Recommendations	COR	LOE
For patients with elevated risk and excellent (>10 METs) functional capacity, it is reasonable to forgo further exercise testing with cardiac imaging and proceed to surgery.	IIa	B
For patients with elevated risk and unknown functional capacity, it may be reasonable to perform exercise testing to assess for functional capacity if it will change management.	IIb	B
For patients with elevated risk and moderate to good (≥4 METs to 10 METs) functional capacity, it may be reasonable to forgo further exercise testing with cardiac imaging and proceed to surgery.	IIb	B

Supplemental Preoperative Evaluation

Exercise Stress Testing for Myocardia Ischemia and Functional Capacity (cont'd)

Recommendations	COR	LOE
For patients with elevated risk and poor (<4 METs) or unknown functional capacity, it may be reasonable to perform exercise testing with cardiac imaging to assess for myocardial ischemia if it will change management.	IIb	C
Routine screening with noninvasive stress testing is not useful for patients at low risk for noncardiac surgery.	III: No Benefit	B

Supplemental Preoperative Evaluation

Cardiopulmonary Exercise Testing

Recommendation	COR	LOE
Cardiopulmonary exercise testing may be considered for patients undergoing elevated risk procedures in whom functional capacity is unknown.	IIb	B

Supplemental Preoperative Evaluation

Noninvasive Pharmacological Stress Testing Before Noncardiac Surgery

Recommendations	COR	LOE
It is reasonable for patients who are at an elevated risk for noncardiac surgery and have poor functional capacity (<4 METs) to undergo noninvasive pharmacological stress testing (either DSE or pharmacological stress MPI) if it will change management.	IIa	B
Routine screening with noninvasive stress testing is not useful for patients undergoing low-risk noncardiac surgery.	III: No Benefit	B

Perioperative Therapy

Perioperative Beta-Blocker Therapy

Recommendations	COR	LOE
Beta blockers should be continued in patients undergoing surgery who have been on beta blockers chronically.	I	B^{SR}
It is reasonable for the management of beta blockers after surgery to be guided by clinical circumstances, independent of when the agent was started.	IIa	B^{SR}
In patients with intermediate- or high-risk myocardial ischemia noted in preoperative risk stratification tests, it may be reasonable to begin perioperative beta blockers.	IIb	C^{SR}
In patients with 3 or more RCRI risk factors (e.g., diabetes mellitus, HF, CAD, renal insufficiency, cerebrovascular accident), it may be reasonable to begin beta blockers before surgery.	IIb	B^{SR}

These recommendations have been designated with a SR to emphasize the rigor of support from the ERC's systematic review. See the ERC systematic review report, "Perioperative beta blockade in noncardiac surgery: a systematic review for the 2014 ACC/AHA guideline on perioperative cardiovascular evaluation and management of patients undergoing noncardiac surgery" for the complete evidence review on perioperative beta-blocker therapy.

Perioperative Therapy

Perioperative Beta-Blocker Therapy (cont'd)

Recommendations	COR	LOE
In patients with a compelling long-term indication for beta-blocker therapy but no other RCRI risk factors, initiating beta blockers in the perioperative setting as an approach to reduce perioperative risk is of uncertain benefit.	IIb	B^{SR}
In patients in whom beta-blocker therapy is initiated, it may be reasonable to begin perioperative beta blockers long enough in advance to assess safety and tolerability, preferably more than 1 day before surgery.	IIb	B^{SR}
Beta-blocker therapy should not be started on the day of surgery.	III: Harm	B^{SR}

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Perioperative Therapy

Perioperative Statin Therapy

Recommendations	COR	LOE
Statins should be continued in patients currently taking statins and scheduled for noncardiac surgery.	I	B
Perioperative initiation of statin use is reasonable in patients undergoing vascular surgery.	IIa	B
Perioperative initiation of statins may be considered in patients with clinical indications according to GDMT who are undergoing elevated-risk procedures.	IIb	C

Alpha-2 Agonists

Recommendation	COR	LOE
Alpha-2 agonists for prevention of cardiac events are not recommended in patients who are undergoing noncardiac surgery.	III: No Benefit	B

Perioperative Therapy

Angiotensin-Converting Enzyme Inhibitors

Recommendations	COR	LOE
Continuation of ACE inhibitors or angiotensin-receptor ARBs perioperatively is reasonable.	IIa	B
If ACE inhibitors or ARBs are held before surgery, it is reasonable to restart as soon as clinically feasible postoperatively.	IIa	C

Perioperative Therapy

Perioperative Management of Patients With CIEDs

Recommendation	COR	LOE
Patients with ICDs who have preoperative reprogramming to inactivate tachytherapy should be on cardiac monitoring continuously during the entire period of inactivation, and external defibrillation equipment should be readily available. Systems should be in place to ensure that ICDs are reprogrammed to active therapy before discontinuation of cardiac monitoring and discharge from the facility.	I	C

Preoperative Intensive Care

Recommendation:

- Based on scant evidence, preoperative preparation in intensive care unit may benefit certain high risk patients, particularly those with decompensated HF.

Management of Preoperative Cardiovascular Conditions

- Myocardial Heart Disease
  - Dilated and hypertrophic cardiomyopathy are associated with an increased incidence of perioperative CHF.
  - Maximizing preoperative hemodynamic status and providing intensive postoperative medical therapy and surveillance.

Management of Preoperative Cardiovascular Conditions

- Hypertension
  - Severe HBP(DBP >110) should be controlled before surgery when possible
  - Continuation of preoperative antihypertensive treatment is critical to avoid severe postoperative hypertension.
  - Consider the urgency of surgery and the potential benefit of more intensive medical therapy.

Peri-operative Hypertension

- Hypertension occuring in the pre-operative, intra-operative or post-operative period.
- Importance:
  - Increased risk of cardiovascular events,e.g. myocardial ischemia
  - Increased post-operative morbidity and mortality
  - Association with end-organ damage such as renal failure.

- Stage 1 or stage 2 hypertension (systolic blood pressure < 180 mm Hg and diastolic blood pressure < 110 mm Hg) not independent risks for perioperative cardiovascular complications, hence cancellation not always justified.

- **On initial evaluation, hypertension mild or moderate & no associated metabolic or cardiovascular abnormalities, do not delay surgery.**

- Stage 3 hypertension (systolic blood pressure ≥ 180 mm Hg and diastolic blood pressure ≥ 110 mm Hg) should be controlled before surgery.

- More prone to perioperative ischemia, arrhythmias and cardiovascular lability, but no clear cut difference that deferring and anesthesia decreases perioperative risk.

- Patients with newly diagnosed mild hypertension, treatment may be delayed till after surgery.

- Preoperative history and examination
  - End-organ damage
  - Associated cardiovascular pathology
  - Current anti hypertensive medications
    - To be continued during perioperative period
    - Special care regarding β-blockers and clonidine
- Patients with preoperative HTN, more likely to develop intra-operative hypotension. (ACE inhibitors)

- Preoperative β blockers:
  - Controversial
  - Proven to be beneficial in cardiac surgeries
  - For non-cardiac surgeries good results in high-risk patients but not in low-risk patients (NEJM 1996, 2005)
    - Associated with lesser incidences of perioperative ischemia
    - Intraoperative hypotension, precipitation of asthamatic attack, major disadvantage

- Preoperative ACE inhibitors & AT-1 antagonists:
  - Controversy regarding exaggerated hypotension
  - As long as euvolumia, no hypotension
- Pts. with preoperative BP elevations; exaggerated intraoperative BP fluctuations & ECG evidence of ischemia.
- Preop. Control of BP; ↓tendency to perioperative ischemia.

- Controversy over when to delay surgery and at what BP to accept the patient
  - Individualize the patient
  - Anaesthesiologists perogative
  - Hospital protocol

Intraoperative concerns

- Target range for intraoperative BP control:
  - BP days to weeks before surgery
  - Presence of associated comorbidity
  - Type of surgery
- Maintained within 20% of the preoperative level
- Stressful intraoperative events:
  - Intubation
  - Surgical incision
  - Emergence from GA and extubation

Conclusions

- Perioperative evaluation and management results from good communication between surgeon, anesthesiologist, primary care physician, and consultant

- Perioperative evaluation goals:
  - Accurately estimate perioperative risk
  - Lowering perioperative cardiac risk, if possible
  - Assess long-term risk
  - Address modifiable coronary risk factors


Thank You