

# Preoperative Evaluation

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(no conflict of interests to disclose)

# Case

- 100 y/o WF, presents to ER after fall. Found to have hip fracture. Admitted to Orthopedic Surgery service. IM consult requested for “medical clearance for surgery”.

# Purpose of such consultation request?

- Eliminate the need for tedious informed consent?
- Transfer of medical-legal risk from surgeon to internist?
- Generation of H&P required to be on chart?

<http://www.gomerblog.com/2014/03/history-and-physical/>

- **Medicine Consulted For History and Physical**
  - **IOWA CITY, IA** – The University of Iowa Orthopedic Department has gone ‘all-in’. At 13:36 on Thursday, Orthopedic Surgery finally took the plunge from the on again off again relationship with Internal Medicine to a full symbiotic relationship. Bill Hutchins, the orthopedic surgeon, consulted Medicine for an H&P. “I called them to create my history and physical,” said Dr. Hutchins. “Internal medicine couldn’t be happier. Plus I don’t think Internal Medicine is allowed to turn down consults...”

Clearance?

# Clearance?

- Implies NO risk

# Purpose of preoperative evaluation

- To help guide a truly informed consent
- Clear outline of what is wrong, and how bad
- Determine if at optimal condition prior to procedure, and if not, develop plan to intervene
- Develop plan to prevent complications, including plan for chronic medications



# Outcomes of consultation

- Proceed, with risk management strategies in place
- Postpone for more testing
- Cancel, offer alternative treatment

In most cases pre-op eval won't result in delay or cancellation.

# General components

- History focusing on:
  - cardiopulmonary dysfunction, including assessment of exercise ability
  - Bleeding tendency
  - Substance use
- Medications
- Focused physical exam
- Limited preoperative testing

# Labs

- No overarching guideline
- Audience input?

# Type of surgery

- Influences level of our investigation
- Estimate risk of death or MI with:
  - High risk surgery
  - Intermediate risk surgery
  - Low-risk surgery

# Type of surgery

- Influences level of our investigation
- Estimate risk of death or MI with:
  - High risk surgery:  $> 5\%$
  - Intermediate risk surgery:  $1$  to  $5\%$
  - Low-risk surgery:  $< 1\%$
- New guidelines focus more on Low risk and Elevated risk (intermediate and high risk categories combined)

# Type of surgery

- High risk surgeries include aortic and peripheral vascular surgery
- Intermediate risk surgeries include intraperitoneal, intrathoracic, carotid endarterectomy, head and neck, orthopedic, and prostate surgeries
- Low risk surgeries include endoscopic and superficial procedures, cataract surgery, breast surgery, and ambulatory procedures

# Cardiovascular risk stratification

- First considerations:
  - Active coronary syndrome, decompensated heart failure, uncontrolled arrhythmia, severe valvular disease
  - Recent PCI
- Risk class of the planned procedure
- Risk class of the patient
  - RCRI (Revised Cardiac Risk Index)
  - NSQIP (National Surgical Quality Improvement Program)

# Risk stratification tools

- RCRI

Table 1

**Independent Predictors of Major Cardiac Complications and Estimation of Risk**

**Revised Cardiac Risk Index (RCRI)<sup>8</sup>**

1. High-risk surgery<sup>a</sup>
2. Ischemic heart disease<sup>b</sup>
3. History of congestive heart failure
4. History of cerebrovascular disease
5. Insulin therapy for diabetes
6. Preoperative serum creatinine >2.0 mg/dL

**Risk of Major Perioperative Cardiac Event<sup>c</sup> Based on Predictors in the RCRI<sup>9</sup>**

No. of Risk Factors	Risk of Cardiac Event, % (95% CI)
0	0.4 (0.1–0.8)
1	1.0 (0.5–1.4)
2	2.4 (1.3–3.5)
≥3	5.4 (2.8–7.9)

*Abbreviation: CI, confidence interval.*

<sup>a</sup>*Includes vascular surgery and any open intraperitoneal or intrathoracic procedures.*

<sup>b</sup>*History of myocardial infarction or a positive exercise test, current complaint of chest pain considered secondary to myocardial ischemia, use of nitrate therapy, or ECG with pathological Q-waves.*

<sup>c</sup>*Includes cardiac death, nonfatal myocardial infarction, and nonfatal cardiac arrest.*



# Risk stratification tools

- NSQIP [riskcalculator.facs.org](http://riskcalculator.facs.org)

**Enter Patient and Surgical Information**

Procedure:  Clear

Begin by entering the procedure name or CPT code. You may also search using two words (or two partial words) by placing a '+' in between, for example: "cholecystectomy+cholangiography"

Reset All Selections

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Please enter as much of the following information as you can to receive the best risk estimates.  
A rough estimate will still be generated if you cannot provide all of the information below.

Age Group	<input type="text" value="Under 65 years"/>	Diabetes	<input type="text" value="Oral"/>
Sex	<input type="text" value="Female"/>	Hypertension requiring medication	<input type="text" value="Yes"/>
Functional status	<input type="text" value="Partially Dependent"/>	Previous cardiac event	<input type="text" value="No"/>
Emergency case	<input type="text" value="No"/>	Congestive heart failure in 30 days prior to surgery	<input type="text" value="No"/>
ASA class	<input type="text" value="I - Healthy patient"/>		
Wound class	<input type="text" value="Clean/Contaminated"/>	Dyspnea	<input type="text" value="None"/>
Steroid use for chronic condition	<input type="text" value="No"/>	Current smoker within 1 year	<input type="text" value="Yes"/>
Ascites within 30 days prior to surgery	<input type="text" value="No"/>	History of severe COPD	<input type="text" value="No"/>
Systemic sepsis within 48 hours prior to surgery	<input type="text" value="None"/>	Dialysis	<input type="text" value="No"/>
		Acute Renal Failure	<input type="text" value="No"/>
Ventilator dependent	<input type="text" value="No"/>	BMI Calculation:	Height (in) <input type="text" value="62"/>
Disseminated cancer	<input type="text" value="No"/>		Weight (lbs) <input type="text" value="175"/>

# Risk stratification tools

- NSQIP [riskcalculator.facs.org](http://riskcalculator.facs.org)



# Cardiovascular risk stratification

- Who DOESN'T need extensive eval:
  - Emergency surgery
    - Life or limb threatened if not in OR within 6 hours
  - No active cardiac condition, low risk surgery
  - No active cardiac condition, no cardiac symptoms, good exercise capacity

"Heads, you get a quadruple bypass.  
Tails, you take a baby aspirin."



# 2014 ACC Guidelines

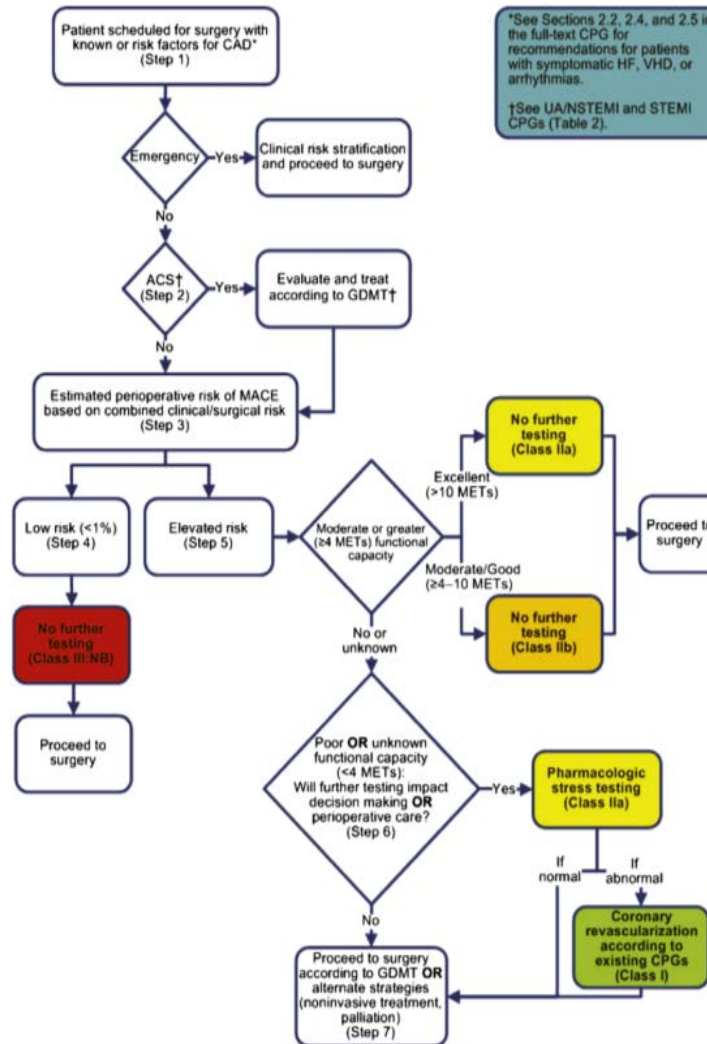


FIGURE 1 Stepwise Approach to Perioperative Cardiac Assessment for CAD

# Metabolic equivalents (METs)

- 1 MET: resting oxygen consumption
- 4 METs:
  - Climbing flight of stairs
  - Walking up a hill
  - Walking on level ground at 4 mph
  - Heavy house work
- < 4 METs:
  - Slow ballroom dancing
  - Golfing with a cart
  - Playing musical instrument
  - Walking slower than 4 mph



# 2014 ACC Guidelines

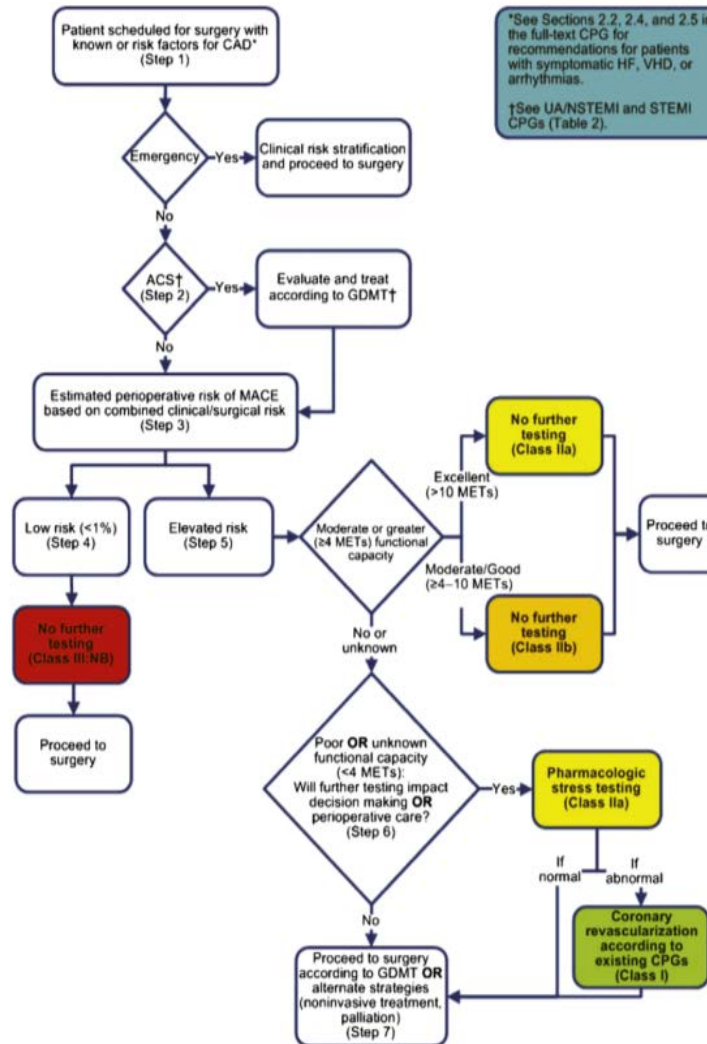


FIGURE 1 Stepwise Approach to Perioperative Cardiac Assessment for CAD

# ECG

- Known CAD, significant arrhythmia, peripheral arterial disease, cerebrovascular disease, other significant structural heart disease, EXCEPT for those undergoing low-risk surgery
- Considered for asymptomatic patients without known CAD, not having low risk procedure
  - Most authorities recommend for those with risk factors of CAD, some use age cut off
  - Most of the value is likely as a baseline to measure against any post-op changes
  - Time interval 1-3 months preop



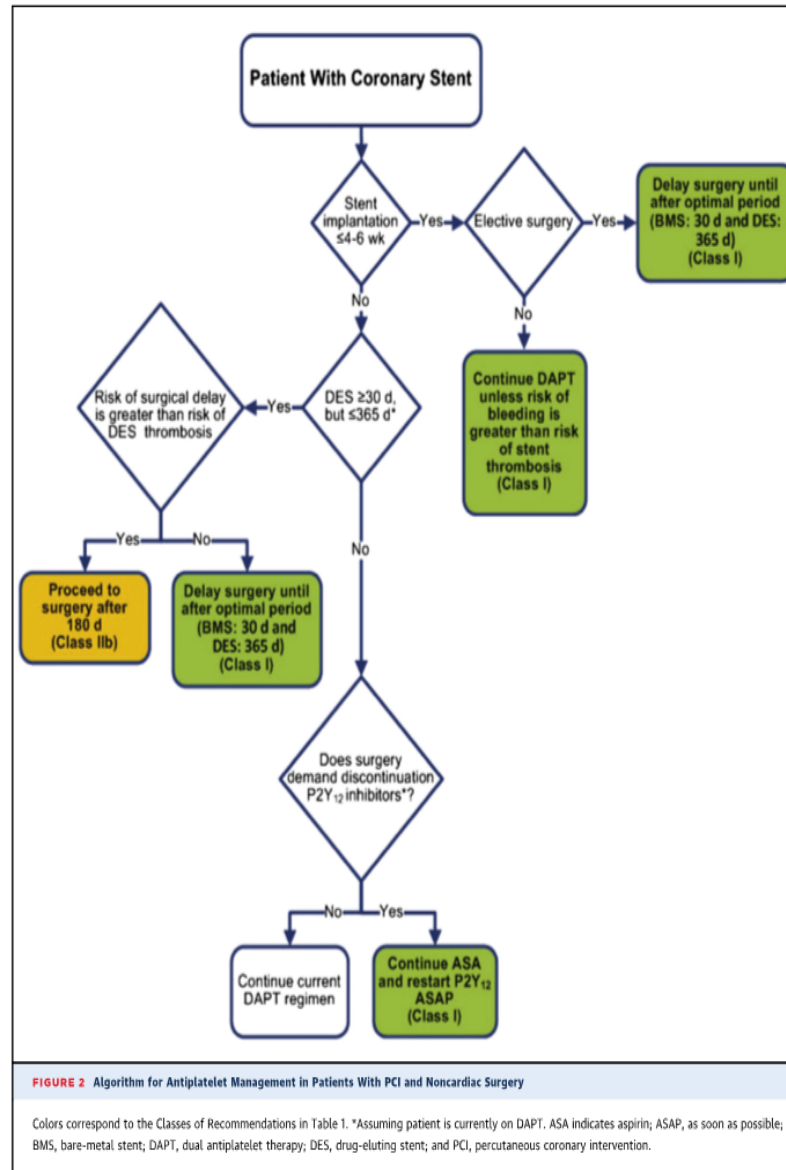
# Cardiology help needed:

- Recent coronary stenting
  - Bare metal stent
  - Drug eluting stent
- Severe aortic stenosis
  - Surgical repair
  - Management in emergency
- Unstable angina

# Cardiac valve dysfunction

- In known or suspected moderate or greater valve dysfunction, get echocardiogram if:
  - No prior echo within 1 year
  - or
  - Significant change in clinical status or exam since last echo
- To decrease perioperative risk, should have valve surgery if indicated
- If no time for, or can't tolerate, valve surgery:
  - Higher level of periop monitoring
  - IV fluid volume support
  - Alpha agonist (phenylephrine)

# Recent coronary stenting



# Recent coronary stenting

- “In patients in whom noncardiac surgery is required, a consensus decision among treating clinicians as to the relative risks of surgery and discontinuation or continuation of antiplatelet therapy can be useful”

I THOUGHT I WAS  
INTERESTED IN UNCERTAINTY  
BUT NOW I'M NOT SO SURE



“...if you want a profession in which everything is certain you had better give up medicine.”

-Osler

# Beta blockers

- Don't stop them
- Don't start indiscriminately
  - Suspected ischemia, or 3 or more RCRI risk factors, IF risk of stroke felt to be low and no other contraindications
  - If choose to start, preferable to start more than 1 day ahead of surgery; titrate to effect. Should NOT be started on day of surgery.

# Statins

- Don't stop them
- Consider starting statin in at-risk patients, especially before vascular surgery

# ACE inhibitors

- Guidelines: continuation is “reasonable”, and if stopped, it is “reasonable” to restart as soon as clinically feasible post-op
- Jury is out, some experts suggest that they should be held pre-op



# Pulmonary risk assessment

- Pulmonary complications just as, if not more, likely to cause periop morbidity and mortality
  - More costly than cardiac, thromboembolic, and other infectious complications
  - Longest length of stay

# Pulmonary risk assessment

- Primary considerations:
  - COPD severity, and if at maximum compensation
  - Smoking status
  - Asthma controlled?
  - OSA present?
  - Location and duration of proposed surgery

# Pulmonary risk assessment

- Smoking cessation, does timing matter?
  - Stopping within a few weeks of surgery harmful?
    - No, subsequent meta-analyses found no increase in risks of post-op respiratory complications with short-term (< 4 weeks) smoking cessation compared with continued smoking
  - Quitting > 4 weeks before surgery = lower risk of pulmonary complications

# Pulmonary risk assessment

- Role of PFTs (FEV1 and FVC)
  - Not for routine assessment
  - Reserve for thoracic or upper abdominal surgery, in patients who have unexplained dyspnea or unexplained poor exercise tolerance
    - No evidence that PFTs helpful when H&P clearly identifies cause of dyspnea/poor exercise tolerance

# Pulmonary risk assessment

- Role of CXR
  - ?
- Role of arterial blood gas
  - ?

# Pulmonary risk assessment

- Role of CXR
  - Not indicated routinely
- Role of arterial blood gas
  - Not indicated routinely

These are needed ONLY if another indication present independent from need for surgery

# Pulmonary risk assessment

- Optimize COPD treatment before surgery if possible
- Optimize asthma treatment before surgery if possible
- OSA
  - Preop eval
  - Continued treatment if already diagnosed
  - Role of empiric treatment?
- Chest physiotherapy and incentive spirometry

# Preoperative medication management

- Diabetic management
  - Level of control in risk stratification
  - Insulin management
  - Oral medications



# Preoperative medication management

- “Essential” medications:
  - ?
- Medications to withhold:
  - ?

# Preoperative medication management

- “Essential” medications:
  - Beta blockers, clonidine, calcium channel blockers
- Medications to withhold:
  - ACE inhibitors, ARBs, and diuretics the morning of surgery
  - NSAIDs stopped 1 week prior to surgery
- Antiplatelet medications: depends on indication and type of surgery/bleed risk

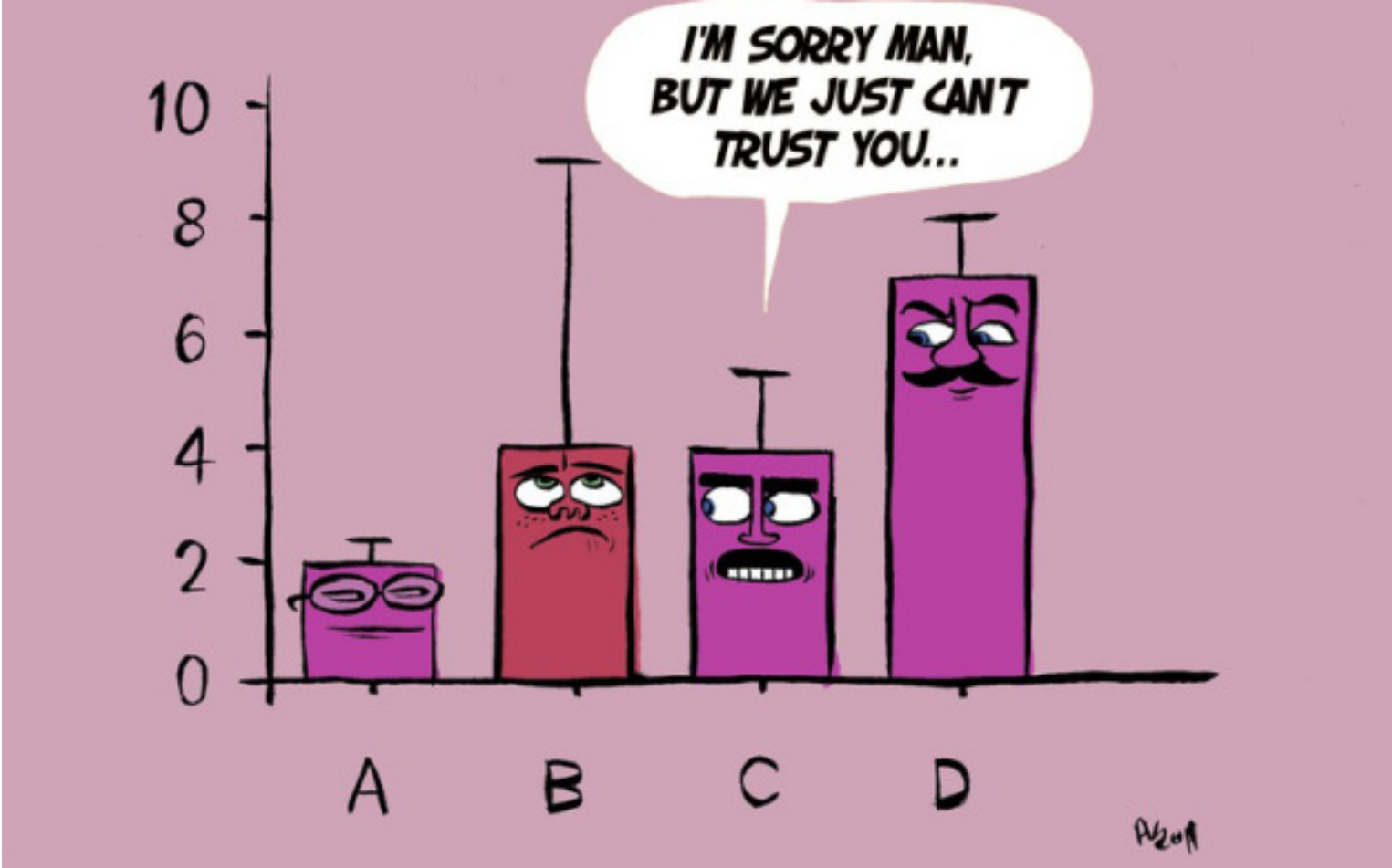
# Does medical preoperative evaluation affect outcome?

- Periop mortality: conflicting studies, either showing no difference, or increased risk. No study has shown a decrease in periop morbidity associated with medical consultation
- Cost and LOS: Studies have shown decrease LOS and cost, while others have demonstrated increased LOS and cost

Overall, strong evidence for improved outcomes not present

# Does medical preoperative evaluation affect outcome?

- Huge variation in practice, and limited well-done studies
- Biggest value is likely in discussion of risk with patients and referring physicians, and targeting of expected concerns during periop period



# Back to the case:

- 100 y/o WF, presents to ER after fall. Found to have hip fracture. Admitted to Orthopedic Surgery service. IM consult requested for “medical clearance for surgery”.
- History:
- Exam:
- Outcome:

# Another case

- 81 y/o WF, presents to MWH after mechanical trip and fall, found to have hip fracture.
- History:
- Exam:
- Testing:
- Outcome:

# Pearls

- Collaborative approach, better informed consent (consider NSQIP to guide counseling further)
- Framework for monitoring
- CV risk important, and best structured by guidelines, but don't forget pulmonary risk
- Myriad of condition specific problems to also consider



# References

- 2014 ACC/AHA Guideline on Perioperative Cardiovascular Evaluation and Management of Patients Undergoing Noncardiac Surgery, JACC vol 64, no 22, December 9, 2014: e77-137
- ACP SmartMedicine, select modules from Perioperative Medicine:  
[smartmedicine.acponline.org](http://smartmedicine.acponline.org)
- [riskcalculator.facs.org](http://riskcalculator.facs.org)
- [www.mdcalc.com/revised-cardiac-risk-index-for-pre-operative-risk](http://www.mdcalc.com/revised-cardiac-risk-index-for-pre-operative-risk)
- UpToDate, multiple modules