Is Your Patient Ready for Surgery?: Update on An Age Old Question
Conflicts of Interest: None
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Resources

- American Colleges of Physicians (ACP)
- American College of Surgeons (ACS)
- American College of Chest Physicians (ACCP)
- American Society of Anesthesiologist (ASA)
- American College of Cardiology and American Heart Association (ACC/AHA)
Goals of Pre-operative Assessment

• Airway assessment
• Minimize risk and potential complications
• **Risk assessment** with informed and evidence-based decisions
• Alter/augment management to provide for optimal surgical outcome
• Strong evidence that it reduces morbidity and mortality (Hopkins 2009 > 13,000 patients)
• Improves patient experience and tempers anxiety
• Preoperative testing should be dictated by the patient’s clinical condition and abnormal findings on history or exam

• Preoperative testing is NOT INDICATED unless there is a specific reason to perform the test and the result will change management, or mitigate perioperative risk

ASA 2012
Is Pre-Operative Testing Expensive

• Yes,
  • It can wastes valuable resources (50% of consultant obtained unnecessary test)
  • It exposes patients to needless blood work and procedures
  • It can create anxiety for patients
  • It is costly...$30 billion/year (2007 $)
  • Results in unnecessary delay of surgery
  • It is still a problem-
    surgeons>anesthesiologists>preoperative directors

Katz, Anesth Analg 2011
Roizen, Anesthesiol Clin North Am 2013
When and Why Do We Test

The Usefulness of Preoperative Laboratory Screening

Eric B. Kaplan, MD; Lewis B. Sheiner, MD; Alison J. Boeckmann, MS; Michael F. Roizen, MD; Stuart L. Beal, PhD; Stephen N. Cohen, MD; C. Diana Nicoll, MD, PhD

- We assessed the usefulness of routine laboratory screening of preoperative patients. Computer-readable laboratory, demographic, and discharge diagnostic data were assembled for 2,000 patients undergoing elective surgery over a four-month period, and randomly selected samples of patients were studied. Several tests ordered by protocol and performed by the laboratory at the time of admission were examined in these samples, including complete blood cell count, differential cell count, prothrombin time, partial thromboplastin time, platelet count, six-factor automated multiple analysis, and glucose level.

Sixty percent of these routinely ordered tests would not have been performed if testing had only been done for recognizable indications, and only 0.22% of these revealed abnormalities that might influence perioperative management. Chart review indicated that these few abnormalities were not acted on nor did they have adverse surgical or anesthetic consequences. In the absence of specific indications, routine preoperative laboratory tests contribute little to patient care and could reasonably be eliminated.

(JAMA 1985;253:3576-3581)
2012 ASA Practice Advisory for Pre-anesthesia Evaluation

• To identify or verify a condition which could affect anesthetic care and surgical outcome

• Can the identified risk be mitigated?
  – Cardiac
  – Pulmonary/OSA
  – Anemia
  – Drugs
  – Bleeding, clotting, and bridging
  – DM
  – Smoking cessation
  – Other (liver, kidneys, endocrine)
Review and evaluate history leading up to planned surgery

Review medications; consider need for perioperative adjustment

Obtain detailed review of systems; collect clinical risk factors and assess functional status

Examine patient with attention to cardiac and pulmonary exam

Determine perioperative risk using risk prediction tool

New/unstable medical issue uncovered?

Y Postpone surgery until new problem resolved/stabilized

N Consider further cardiac testing in some clinical scenarios
What NOT to Do!

- **Routinely order lab work** - in the stable patient that has a normal value within the last 4 months of > 2000 patient evaluated there was a 0.04% change (Mahgese, et al 2009)
- **Routinely order ECG** – on asymptomatic or high risk patient undergoing low risk surgery (ACC/AHA 2014)
- **Routinely order CXR** - meta-analysis > 14,000 patients 10% abnormal and .1% changed management (Andrus, et al 2003)
- **Routinely start beta blockers** - within 48 hours of surgery (ACC/AHA 2014)
- **Routinely bridge anticoagulation** - ACCP 2012
- **Routinely stop DAPT** - (ACC/AHA 2014)
“Surgery is equivalent to being hit by a truck; only the wounds are tidier”
History of Anesthesia
History of Anesthesia

• Ether synthesized in 1540 by Cordus
• Ether used as anesthetic in 1842 by Dr. Crawford W. Long
• Ether publicized as anesthetic in 1846 by Dr. William Morton
• Chloroform used as anesthetic in 1853 by Dr. John Snow
Adjuncts

- Endotracheal tube discovered in 1878
- Local anesthesia with cocaine in 1885
- Thiopental first used in 1934
- Curare first used in 1942

These developments opened the “Age of Anesthesia.”
Simpson and Queen Victoria
Principles of General Anesthesia

- Minimizing the potentially harmful direct and indirect effects of anesthetic agents and techniques
- Sustaining physiologic homeostasis during surgical procedures
- Improving post-operative outcomes
American Society of Anesthesiologists Score

- **ASA-1**: A completely healthy patient.
- **ASA-2**: A patient with mild systemic disease (1%)
- **ASA-3**: A patient with severe systemic disease that is not incapacitating (5%)
- **ASA-4**: A patient with incapacitating disease that is a constant threat to life (14%)
- **ASA-5**: A moribund patient who is not expected to live 24 hours with or without surgery (23%)
Procedure Risk

• High 5%
  Aortic, major vascular, peripheral vascular

• Intermediate 1-5%
  Intraperitoneal, transplant, carotid, head & neck, hip, spine, intrathoracic, major urologic

• Low 1%
  Dental, endoscopic, endocrine, breast, cataract, gyne, reconstructive, knee, minor urologic
Dying During Anesthesia

- Child Birth 5-10 /100,000 (.005-.01%)

- Hysterectomy 120-160/100,000 (.12-.16%)

- Cholecystectomy 500-1400/100,000 (.15-1.5%)

GETA 10-20/100,000 (.01-.16%)

ASA 2012
Evaluation for Surgical Readiness

It’s All About the “A”

• Airway assessment

• History of difficult intubation

• Head and neck examination for airway evaluation

• Face

• Oral cavity
It's Not All Fun and Games
Predicting A Difficult Airway

- Difficult for the Bag Valve Mask
  - presence of a beard
  - BMI of $> 26 \text{ kg/m}^2$
  - history of snoring
  - endentulousness
  - $>55\text{ years old}$

With $> 2$ of these factors there will be significant difficulty to bag with a 75% sensitivity and specificity.

Predictors of Difficult Intubation

The LEMON Law:

L = Look externally
- Short neck
- Full dentition
- Facial trauma
- Receding mandible

Evaluate the 3-3-2 rule

- The opening of the mouth should accommodate **3 fingers**

- The distance from the jaw to the hyoid should be **3 fingerbreaths**

- The distance from the floor of the mouth to the thyroid cartilage should be **2 fingerbreaths**
• **M**=Mallampati Classification

< 3 has a 95% first try success
• Obstruction
  --blood in airway
  --expanding hematoma
  --edema in the oral cavity
  --foreign body
  --laryngeal edema
• **N**=Neck mobility
  -- in-line stabilization

  -- collar intubations have > 5mm movement at c56

  -- >75 years have 30% loss of neck excursion
Orotracheal Intubation

- Adult tube size ~ 6-8 mm
- Most adults tracheas are ~15 cm long and the tube usually extrudes 5-7 cm from the mouth ~21-23 cm at the teeth
- Blades: MacIntosh or Miller
- Suction
- High flow oxygen
Airway Challenges
Airway Challenges
Difficult Intubation

- Mouth opening less than 3 cm.
- Limitation of neck movement
- Micrognatia
- Macroglossia
- Protusion of teeth
- Short neck
- Morbid obesity
Morbid Obesity
The Outcome is Obvious
“There Must Be A Plan B”
Complications of Intubation

- Right mainstem intubation
- Esophageal intubation
- Bradycardia/hemodynamic instability
- Dental trauma
- Failure to secure the airway
Glidescope

- Videolaryngoscopy
- Pros:
  Minimizes neck movement
  Good at visualizing glottis when neck unable to be moved or mouth unable to be opened wide
- Cons:
  Difficult to pass tube

Availability
Fiberoptic Intubation

• Pros:
  Good visualization
  Minimal neck motion

• Cons:
  Availability
  Operator dependent
  Relatively slow
Are You In???

- The verification is more important than the intubation itself.
- Direct visualization: "I saw the cords"
- Auscultation: ~75% accuracy
- CXR: time-limiting
- Pulse oximetry: some limitations
- End-tidal CO2: GOLD STANDARD
Laryngospasm

Causes:
- Irritant-GERD
- Stimulation of ETT
- Smaller airways

Treatment/Intervention:
- Treat GERD
- Steroids/epinephrine
- PPV
- Surgical airway
What’s Wrong Here?
Securing Devices
Is This Secure?

Circulation. published online August 1, 2014; Circulation is published by the American Heart Association, 7272 Greenville Avenue, Dallas, TX 75231 Copyright © 2014 American Heart Association, Inc. All rights reserved. Print ISSN: 0009-7322. Online ISSN: 1524-4539
Strength of Recommendation

Class of recommendation:

- **Class I**: Benefit >>> Risk, should be done or administered
- **Class IIa**: Benefit >> Risk, reasonable to do or administer
- **Class IIb**: Benefit > Risk, consider doing or administering
- **Class III**: No benefit (or harm), not recommended or harmful

Level of Evidence:

- **Level A**: Data from multiple RCT or meta-analyses
- **Level B**: Data from single RCT or limited number of non-RCT
- **Level C**: Consensus opinion, case report, or standard of care only
Ms. Dianne Young is a 56 year old woman scheduled for tumor debulking and resection of ovarian mass for suspected ovarian cancer, referred for evaluation of heart murmur, arrhythmia, HTN, TIA, and diabetes. No other PMHx.

Does she need preoperative cardiac risk assessment?

A) Yes
B) No
Who Needs Preoperative Cardiac Risk Assessment?

Known CAD:
- History of MI
- Angina-type chest pain relieved with NTG
- EKG with pathological Q waves
- Abnormal non-invasive cardiac stress test or coronary angiogram
- Prior coronary intervention or CABG

Risk Factors for CAD:
- Age >55
- Diabetes
- Stroke (CVA/TIA)
- Heart failure
- Moderate-severe valvular disease
- Significant arrhythmia
Ms. Dianne Young is a 56 year old woman scheduled for tumor debulking and resection of ovarian mass for suspected ovarian cancer, referred for evaluation of heart murmur, arrhythmia, HTN, TIA, and diabetes. No other PMHx.

What is the urgency of the surgery?
A) Elective
B) Time sensitive
C) Urgent
D) Emergent
There is a new sense of urgency:

- **Emergent**: Life or limb threat if no surgery <6 hours
- **Urgent**: Life or limb threat if no surgery within 6 - 24 hours
- **Time Sensitive**: Delay of surgery for >6 weeks will negatively affect outcome
- **Elective**: Surgery could be delayed up to 1 year without harm
Ms. Dianne Young is a 56 year old woman scheduled for tumor debulking and resection of ovarian mass for suspected ovarian cancer, referred for evaluation of heart murmur, arrhythmia, HTN, TIA, and diabetes. No other PMHx.

What is the risk of the surgery?
A) Low
B) Elevated
C) Intermediate
D) High
Low Risk for Surgery

Procedural Risk <1% mortality:
- Herniorrhaphy
- Breast surgery
- Superficial / Derm procedures
- Cosmetic surgery
- Ophthalmologic surgery
- Dental / oral surgery
- Endoscopic / angiographic

Patient Risk Factors:
no unstable cardiac conditions:
- Recent MI (<1-6 months)
- Class III-IV angina (<4 METs)
- Decompensated HF < 1 week
- Unstable arrhythmia
- Severe-critical valvular disease

Safe!
Risk of Surgery

A new risk emerges:

- **Risk**: combined surgical and patient risk factors to predict major adverse cardiac event (MACE) = ACS, MI, HF, unstable arrhythmia, death
  - **Low**: <1% MACE
  - **Elevated**: >1% MACE

- Simplified risk assessment reflects management decisions:
  - Low risk: no intervention
  - Elevated risk: optimize or cancel

- For greater accuracy, use validated clinical risk predictors
Does Risk Assessment Change Management?

Will risk stratification affect the patient’s decision to proceed with surgery? If yes, then accurate risk assessment is needed.
Cardiac Risk Stratification: RCRI Criteria

Validation Set, N=1422

ROC Curves

- Goldman (0.70)
- Detsky (0.58)
- ASA (0.71)
- RCRI (0.81)

Revised Cardiac Risk Index (RCRI) Criteria

- Compensated CHF = OR 4.3
- Known coronary artery disease = OR 3.8:
  - angina or CP ↓ with NTG
  - remote MI > 3 -6 months
  - EKG: pathological Q waves
  - abnormal stress test
  - abnormal cardiac cath
  - prior CABG or PCI
- Hx TIA or CVA = OR 3
- Intra-abdominal or high risk surgery = OR 2.6
- DM requiring insulin = OR 1
- Renal insufficiency, Cr >2 = OR 0.9

0 RCRI = <1% mortality
1-2 RCRI = 2-7% mortality
3-4 RCRI = 9-18% mortality
≥5 RCRI = >32% mortality

BNP & CRP improve RCRI accuracy

Cardiac Risk Stratification: NSQIP 21 Questions

Cardiac Risk Stratification: Role of Cardiac Testing

When is it indicated?

- Surgery: non-emergent, elevated risk procedure
- Patient: suspected moderate-severe valvular heart disease or unstable cardiac conditions
- Unknown or poor functional capacity
- Testing will change management
  - Patient may decline surgery
  - Preoperative coronary intervention is needed

Cardiac Testing

- Echocardiography
- Exercise testing +/- imaging
- Noninvasive pharmacological stress testing
- Coronary angiography
- (Insufficient evidence for CT coronary angiogram)
Cardiac Risk Assessment Algorithm

Steps 1 - 3:
- Patient scheduled for surgery with known or risk factors for CAD* (Step 1)
- Emergency: Yes → Clinical risk stratification and proceed to surgery
- No → ACS† (Step 2)
  - Yes → Evaluate and treat according to GDMT†
  - No → Estimated perioperative risk of MACE based on combined clinical/surgical risk (Step 3)

Steps 4 - 7:
- Estimated perioperative risk of MACE based on combined clinical/surgical risk (Step 3)
- Low risk (<1%) (Step 4)
- Elevated risk (Step 5)
- No further testing (Class IIb/IIIb)
- Moderate or greater (≥4 METs) functional capacity
  - Moderate/Good (≥4–10 METs)
  - Excellent (>10 METs)
- No or unknown
- Poor OR unknown functional capacity (<4 METs)
  - Will further testing impact decision making OR perioperative care? (Step 6)
  - Yes → Pharmacologic stress testing (Class IIa)
  - No → Proceed to surgery according to GDMT OR alternate strategies (noninvasive treatment, palliation) (Step 7)
- Coronary revascularization according to existing CPGs (Class I)

MACE = major adverse cardiac event
MET = metabolic equivalent time
GDMT = guideline directed medical therapy
CPG = clinical practice guideline
Ms. Dianne Young is a 56 year old woman scheduled for tumor debulking and resection of ovarian mass for suspected ovarian cancer, referred for evaluation of heart murmur, arrhythmia, HTN, TIA, and diabetes. No other PMHx. She is only able to walk around the house, but without cardiac symptoms.

Does she need an EKG?
A) Yes
B) No
Indications for EKG

Class III-B (No Benefit, Not Indicated):
- Low risk surgery <1% MACE

Class IIb-C Recommendation:
- Preoperative EKG useful as baseline
- Q waves, ST changes, long QTc, LVH, & BBB may be predictive
- Obtain EKG <3 months if indicated & patient is stable [UCI guide <6m]

Class IIb-B Indication:
- Asymptomatic patient without CAD (+ cardiac risk factors)

Class IIa-B Indication:
- Known CAD
- Significant arrhythmia
- PAD
- Stroke (CVA/TIA)
- Major structural heart disease
Ms. Dianne Young is a 56 year old woman scheduled for tumor debulking and resection of ovarian mass for suspected ovarian cancer, referred for evaluation of heart murmur, arrhythmia, HTN, TIA, and diabetes. No other PMHx. She is only able to walk around the house. Exam reveals III/VI systolic murmur at apex radiating to axilla & clear lungs. No prior echocardiogram done.

Does she need an echocardiogram?
A) Yes
B) No
Indications for Echocardiogram

Class III-B (No Benefit, Not Indicated):
- Routine preoperative screening
- Low risk surgery <1% MACE

Class IIb-C Indication:
- Known LV dysfunction in stable patient with study >1 year ago

Class IIa-C Indication:
- Unknown cause of dyspnea (or new Dx of clinically suspected HF)
- Known HF with worsening dyspnea

Class IIb-B Recommendation:
- EF <30-35% predictive of MACE but no better than clinical prediction
- High specificity but poor sensitivity

Class I-C Indication:
- Clinically suspected moderate-severe valvular disease if no study <1 year, or if change in clinical status

Class III-B (No Benefit, Not Indicated):
Ms. Dianne Young is a 56 year old woman scheduled for tumor debulking and resection of ovarian mass for suspected ovarian cancer, referred for evaluation of heart murmur, arrhythmia, HTN, TIA, and diabetes. No other PMHx. She is only able to walk around the house, but without symptoms. Exam shows apical murmur and clear lungs.

What is her functional capacity?
A) Unknown
B) <4 METs
C) 4-10 METs
D) >10 METs
Functional Capacity

Poor:
- 1 MET = ADLs (3.5 mL O2/Kg/min)
- 2 METs = walk around house
- 3 METs = walk 1-2 blocks, carry 5-10 lbs

Good:
- 4 METs = light yard/house work (sweep)
- 5 METs = climb >1 floor stairs, lift >20 lbs., walk >4 blocks
- 6 METs = heavy yard/house work (mow)
- 7 METs = golf, bowling, dance, carry 60 lbs, walk uphill or >1 mile
- 8 METs = carry weight upstairs, move heavy furniture
- 9 METs = bike at moderate pace, jump rope
- 10 METs = bike uphill, brisk swim, jog quickly

Excellent:
- >10 METs = sustained fast run, competitive sport

Case

Ms. Dianne Young is a 56 year old woman scheduled for tumor debulking and resection of ovarian mass for suspected ovarian cancer, referred for evaluation of heart murmur, arrhythmia, HTN, TIA, and diabetes. No other PMHx. She is only able to walk around the house, but without symptoms. Exam shows apical murmur and clear lungs. EKG shows sinus rhythm & non-specific ST changes.

Does she need a stress test?
A) Yes
B) No
Indications for Exercise Stress Testing

Class III-B (No Benefit, Not Indicated):

- Routine preoperative screening for low risk surgery <1% MACE

Class IIb-C Indication:

- <4 METs functional capacity, stress test with imaging may help

Class IIb-B Indication:

- Unknown functional capacity, exercise stress test (no imaging) may help

Class IIa-B Indication:

- 4-10 METs functional capacity, stress test not needed

Class IIa-B Indication:

- >10 METs functional capacity, stress test not needed

If it will change management & elevated risk surgery, then:

Class IIb-C Indication:

- <4 METs functional capacity, stress test with imaging may help
Indications for Pharmacological Stress Testing

Class III-B (No Benefit, Not Indicated):
- Routine preoperative screening for low risk surgery <1% MACE

If it will change management & elevated risk surgery, then:

Class IIa-B Indication:
- <4 METs functional capacity, then dobutamine echocardiogram or pharmacological nuclear stress test is helpful
  - Drug:
    - Dipyridamole (Persantine)
    - Adenosine (Adenocard)
    - Regadenoson (Lexiscan)
  - Nuclear Agent:
    - Thallium-201 (Mibi)
    - Technitium-99m (Cardiolyte or Sestamibi)
- Moderate to large reversible defect predicts increased risk of MACE
- Fixed defect is not predictive
Ms. Dianne Young is a 56 year old woman scheduled for tumor debulking and resection of ovarian mass for suspected ovarian cancer, referred for evaluation of heart murmur, arrhythmia, HTN, TIA, and diabetes. No other PMHx. She is only able to walk around the house, but without symptoms. Exam shows apical murmur and clear lungs. EKG shows sinus rhythm & non-specific ST changes. She prefers chemoTx to surgery if she is very high risk for surgery but does not want to consider CABG.

Will a stress test change management?

A) Yes
B) No
Ms. Dianne Young is a 56 year old woman scheduled for tumor debulking and resection of ovarian mass for suspected ovarian cancer, referred for evaluation of heart murmur, arrhythmia, HTN, TIA, and diabetes. No other PMHx. She is only able to walk around the house, but without symptoms. Exam shows apical murmur and clear lungs. EKG shows sinus rhythm & non-specific ST changes.

What type of stress test should she get?

A) Exercise only
B) Exercise with imaging
C) Dobutamine echocardiogram
D) Pharmacological nuclear
Exercise or Pharmacological Stress Test?

Choice of stress:
- Patient’s ability to exercise
- Baseline EKG (i.e. BBB or paced)

Choice of drug:
- Adenosine and Dipyridamole cause bronchospasm, transient AV block, hypotension, and are inhibited by xanthine use
- Dobutamine causes elevated BP and/or HR, increasing ischemia, and is inhibited by beta-blocker
- Regadenoson is contraindicated in high grade AV block or sinus node dysfunction
Preoperative Testing
Positive Predictive Value

18.6 13.1 14.8

Stress ECG  Dipyramidamole TI  Dobutamine Echo

Eagle et al. JACC 2011;27:910.
Case

Ms. Dianne Young is a 56 year old woman scheduled for tumor debulking and resection of ovarian mass for suspected ovarian cancer, referred for evaluation of heart murmur, arrhythmia, HTN, TIA, and diabetes. No other PMHx. She is only able to walk around the house, but without symptoms. Exam shows apical murmur and clear lungs. Dob Echo shows RWMA in mid-distal LAD & LCx distribution. She does not want to consider CABG.

Does she need a cardiac catheterization?
A) Yes
B) No
Indications for Preoperative Coronary Angiogram

Class III-C (No Benefit, Not Indicated):
- Routine preoperative screening

If it will change management & elevated risk surgery, then:

Class IIb-C Indication:
- CT coronary angiography is lower risk than invasive angiogram, but insufficient evidence
- Indication is the same as non-preoperative setting (defer to Cardiologist)

Some Considerations if Abnormal:
- Will delay from PCI or CABG increase risk of surgical condition?
- Can surgery be done safely with anti-platelet therapy?
Indications for Preoperative PCI

Class III-C (No Benefit, Not Indicated):
- Routine preoperative revascularization

Class III-B (Harm, Not Indicated):
- Candidate for CABG & poor PCI anatomy

Class II-III, B-C Indications per PCI CPG

Class IIb-B Recommendation:
- DES: surgery >180 days if urgent

Class IIa-C Recommendation:
- Hold anti-platelet therapy if risk of bleeding > risk of MACE

Class I-B Recommendations:
- PTCA without stent: delay 14 days
- BM stent: delay 30 days
- DES: delay 365 days
- Continue dual anti-platelet therapy within above time frames
Indications for Preoperative CABG

Class III-C (No Benefit, Not Indicated):
- Routine preoperative revascularization

If it will change management & elevated risk surgery, then:

Class I-B Indication:
- Significant LM disease
- Complex CAD
- 3-vessel disease
- 2-vessel disease with proximal LAD
- Survivor of sudden death

Class IIa-B Indication:
- 2-vessel disease without proximal LAD and extensive ischemia
- 1-vessel disease with proximal LAD
- 1-vessel disease with EF 35 - 50%

Class IIb-B Indication:
- 2-vessel disease without extensive ischemia
- 1-vessel disease without proximal LAD and EF<35%
Ms. Dianne Young is a 56 year old woman scheduled for tumor debulking and resection of ovarian mass for suspected ovarian cancer, referred for evaluation of heart murmur, arrhythmia, HTN, TIA, and diabetes. No other PMHx. She is only able to walk around the house, but without symptoms. Exam shows apical murmur and clear lungs. Cardiac cath was not done. Meds include ACE-I.

What medical optimization is indicated?
A) Beta-blocker
B) Statin
C) Alpha-2-agonist
D) Anti-platelet
Beta-Blocker Controversy

Beta-blocker benefit: DECREASE Trials
  - Lead researcher discredited and data not used

Beta-blocker harm: POISE Trial
  - Clinically unsound study, but good methodology & large study
Indications for Beta-Blocker to Reduce MACE

If elevated risk surgery:

Class IIb-C Indication:
- Intermediate-high risk ischemia seen on preoperative testing

Class IIb-B Indication:
- ≥3 RCRI Criteria
- <3 RCRI with primary long-term indication (CAD, HF, HTN)
- Start >1 day preoperatively

Class IIa-B Recommendation:
- May be continued postoperatively if clinically safe (SBP>100, HR>55, no acute anemia or Hgb >10)

Class I-B Recommendation:
- May be safely continued if tolerated as chronic therapy

Class III-B (Harm, Not Indicated):
- Do not initiate on day of surgery
Perioperative Beta-Blocker & Mortality

Perioperative Beta-Blockers & Statins


Fig. 1. Incidence of perioperative mortality and myocardial infarction. Results are based on the number of clinical risk factors by the revised cardiac risk index (ischemic heart disease, history of congestive heart failure, history of cerebrovascular disease, insulin therapy for diabetes, preoperative serum creatinine > 2 mg/dl), statin and beta-blocker use.
RCRI Criteria & Beta-Blockers

Probability That RCRI is Primary Indication for Beta-Blocker

RCRI Criteria:
- CHF*
- CAD*
- CVA/TIA
- DM
- RF
- Major surgery

RCRI Criteria

Primary Indication

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

Single Criteria
Total Criteria

RCRI Criteria

Single Criteria Total Criteria
Indications for Perioperative Statin

If elevated risk surgery:

Class IIb-C Indication:
- Consider initiating if undergoing high risk procedure

Class IIa-B Indication:
- Initiate for vascular surgery

Class I-B Indication:
- Continue if chronically using

RCRI-based indication was discarded with DECREASE data
Indications for Perioperative Antiplatelet

Class III-C Indication:
- Consider if risk of coronary ischemia outweighs bleeding

Class III-B (No Benefit, Not Indicated):
- Initiating in non-coronary stent patient

Class I-C Indication:
- Continue for coronary stent or PTCA per stent guidelines
Antiplatelet Therapy

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Recommendations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Balloon angioplasty</td>
<td>● Delay surgery for 14 days</td>
</tr>
<tr>
<td>Bare-metal intracoronary stent</td>
<td>● Delay surgery for 30 days</td>
</tr>
<tr>
<td>Drug-eluting stent</td>
<td>● Delay surgery 1 year</td>
</tr>
</tbody>
</table>

Always try to continue DAPT; if not, at least continue aspirin. Discuss with cardiology and surgery to balance risks.
Medications to Hold

• ACEI DOS
• ARB DOS
• Diuretics continue
• Oral hypoglycemics DOS
• Short acting insulins DOS
• Non-peaking insulins check glucose DOS > 100 ¾ dose < 100 hold
• Insulin pump remains at basal rate
• Phentermine 3 day hold
• Suboxone 7 day hold
• NSAIDS (1/2 life differ)
• Supplements >48 hours
• ASA > 3 days
• NOACs difference (1/2 life differ)
• Coumadin 4-5 days
• DAPT
Additional Considerations

Moderate-Severe Valvular Heart Disease:
Class I-C Recommendation:
- Obtain echocardiogram if clinically suspected and none <1 year or change in symptoms
- Replace or repair valve for elective surgery

Aortic Stenosis:
- Elevated risk surgery can be performed with hemodynamic monitoring in asymptomatic patients if not candidate for intervention [Class IIa-B]
- TVAR is option for high risk patients [Class IIb-C]

Mitral Stenosis:
- Elevated risk surgery can be performed with hemodynamic monitoring in asymptomatic patients if not candidate for intervention [Class IIb-C]
Additional Considerations

Arrhythmias:

- Asymptomatic PVCs, couplets, NSVT did not increase MACE and require no therapy
- Ventricular arrhythmias caused by structural heart disease should be treated
- High-grade AV block or sinus node dysfunction may require pacing
- Beta-blocker can be used in BBB or bifascicular block
- SVT should be rate-controlled
- Anticoagulation for A-fib should be adjusted perioperatively
Summary Recommendation for 2014 Guideline

Guidelines are used if easy

- Evaluate urgency of surgery
- Evaluate for unstable cardiac conditions: ACS, recent MI, ADHF, moderate-severe valvular disease, significant arrhythmias
- Use RCRI (easy) criteria; +/- EKG
- If elevated risk, are METS $\geq 4$?
- If not, stress test if it changes Tx
- Medically optimize: beta-blocker based on RCRI/indication, statin, continue antiplatelet if stent
- Estimate risk
Questions ???????

BAGHDAD
35 km

OBJECTS IN MIRROR ARE CLOSER THAN THEY APPEAR.