Goals

- Review important contact information for the Department of Anesthesiology and Critical Care
- Provide a framework for understanding preoperative medical evaluation (and why it is important)
- Review major societal recommendations regarding preoperative evaluation and testing
  - 2012 ASA Advisory for Preoperative Evaluation
  - 2014 ACC/AHA Guidelines for Perioperative Cardiovascular Evaluation for Noncardiac Surgery
  - 2016 ACC/AHA Guideline Focused Update on Duration of Dual Antiplatelet Therapy in Patients With Coronary Artery Disease
HOW DO I CONTACT THE DEPARTMENT OF ANESTHESIOLOGY AND CRITICAL CARE IF I HAVE QUESTIONS ABOUT A CASE?
Important Anesthesia Contact Information

- **Anesthesia Scheduler:**
  - Sandy Boyer (sandra.boyer-pellegrino@uphs.upenn.edu)

- **Directors of Preoperative Medicine:**
  - Marc Royo, MD MBA (Marc.Royo@uphs.upenn.edu)
  - Onyi Onuoha, MD MPH (Onyi.Onuoha@uphs.upenn.edu)

- **Anesthesia Consults:**
  - Email Sandy and Directors of Preoperative Medicine
  - Call Preoperative Medicine Resident (7a-5p): 215-964-5752
  - On call resident (evening): 215-908-0400

- **Anesthesia Coordinator:** 215-771-3498
WHAT IS PREOPERATIVE EVALUATION (AND WHY IS IT IMPORTANT)?

- What is risk assessment/stratification?
- What is medical optimization?
- What is “clearance”?
Risk Assessment/Stratification

• The decision to undergo surgery requires a complex weighing risks, benefits, and non-surgical alternatives for treatment
• Many factors play into this decision:
  – Surgical risk
  – Medical risk
  – Urgency of the procedure
• Many vested stakeholders in the decision:
  – Surgical team
  – Medical team
  – Patient and family
Risk Assessment/Stratification

• Risk assessment/stratification attempts to estimate a particular patient’s risk, based on surgical and medical factors, to predict likelihood of adverse events

• There is no such thing “clearance” of risk

• There is no safe surgery – even a healthy patient undergoing a minor procedure incurs risk!
How Can We Estimate Risk?

https://riskcalculator.facs.org/RiskCalculator/index.jsp
Risk Assessment/Stratification

- Our goal is to make surgery safer – to minimize the modifiable risk
  - Lifestyle changes
  - Diagnostic tests
  - Optimization of medical therapies
  - Procedural interventions

What is Optimization?

- Clear outline of what is wrong, and how bad
- Determination of whether the patient/condition is “the best s/he is going to get”
- If not optimized: what is the plan to intervene/improve?
- If optimized: what is the plan to try to mitigate risk or manage predictable complications?
This is a Bad Preop “Clearance” Note

Instant Features Include: Safety-Blue Tant Background, "Illegal" Pantograph
On Back, Quantity Check-Off Boxes, RenVend Orid W/ Form Batch Number

Ok for Surgery.
A Little Better...

[Handwritten notes on a prescription form]

- cardiac note for surgery
If you really want to see an anesthesiologist’s head explode

Due to the patient’s portopulmonary hypertension, it is important to avoid hypotension, hypoxia, and hypercarbia. Avoid vasodilatory agents such as propofol. Have inotropic agents available.
WHAT SHOULD PREOPERATIVE EVALUATION ENTAIL?
Preoperative Evaluation

- Evaluation of pertinent medical records
- Patient interview
- Physical Examination
- Additional laboratory studies, preoperative testing, and preoperative consultation as dictated by the above
- Thoughtful decision making about perioperative medication management
Practice Advisory for Preanesthesia Evaluation

An Updated Report by the American Society of Anesthesiologists Task Force on Preanesthesia Evaluation

**PRACTICE Advisories** are systematically developed reports that are intended to assist decision-making in areas of patient care. Advisories provide a synthesis and analysis of expert opinion, clinical feasibility data, open forum commentary, and consensus surveys. Practice Advisories developed by the American Society of Anesthesiologists (ASA) are not intended as standards, guidelines, or absolute requirements, and their use cannot guarantee any specific outcome. They may be adopted, modified, or rejected according to clinical needs and constraints and are not intended to replace local institutional policies.

Practice Advisories are not supported by scientific literature to the same degree as standards or guidelines because of the lack of sufficient numbers of adequately controlled studies. Practice Advisories are subject to periodic update or reevaluation.

- What other guideline statements are available on this topic?
  - This Practice Advisory updates the “Practice Advisory for Preanesthesia Evaluation,” adopted by the ASA in 2001 and published in 2002.
- Why was this Advisory developed?
  - In October 2010, the Committee on Standards and Practice Parameters elected to collect new evidence to determine whether recommendations in the existing Practice Advisory were supported by current evidence.
- How does this statement differ from existing guidelines?
  - New evidence presented includes an updated evaluation of scientific literature. The new findings did not necessitate a change in recommendations.
- Why does this statement differ from existing guidelines?
  - The ASA Advisory differs from the existing guidelines because it provides new evidence obtained from recent scientific literature.

Updated by the Committee on Standards and Practice Parameters.
Preoperative Testing

• Ideally:
  – Cheap
  – High positive and negative predictive values
  – Add to information obtained from clinical history and physical exam
  – Change or modify perioperative decision making to prevent perioperative complications
Preoperative Testing

• Should be ordered for specific indication only
• Results should clarify questions about preexisting medical condition or establish a relevant new diagnosis in patients with significant risk factors for specific conditions
• The more tests ordered, the more chance of a false-positive result
  – Wasted time
  – Wasted money
  – Risk for complications
Preoperative Testing

• In the medical population, 50% of clinical diagnoses and nearly 50% of management decisions based on history alone

• Routine studies contribute to less than 1% of all diagnoses

• In the surgical world, routine preop screening rarely discovers abnormalities not predicted by history alone, and when detected, results are rarely actionable

Timing of Preoperative Testing

- Test results should be within 6 months of surgery, provided the patient’s medical history has not changed substantially in the interim.
- More recent test results may be desirable when the medical history has changed or when a test results may play a role in the selection of a specific anesthetic technique (e.g., regional anesthesia in the setting of anticoagulation therapy).

Complete Blood Count

• Clinically asymptomatic anemia has been shown to be present in about 1% of patients but surgically significant anemia in unselected patients is even more rare

• Should be considered if:
  – Highly invasive procedure/high risk of blood loss
  – Extremes of age
  – History of liver disease
  – History of anemia
  – History of bleeding diatheses

Coagulation Studies

• An unexpected coagulation defect leading to excessive surgical bleeding is extremely unlikely, provided a thorough history (both personal and family) and physical exam is performed

• Reasonable for patients with:
  – Bleeding diatheses (inherited or iatrogenic)
  – Renal dysfunction
  – Liver dysfunction
  – Undergoing highly invasive procedures


Regional Anesthesia in the Patient Receiving Antithrombotic or Thrombolytic Therapy

American Society of Regional Anesthesia and Pain Medicine
Evidence-Based Guidelines (Fourth Edition)

Terese T. Horlocker, MD, * Erik Vandermeulen, MD, † Sandra L. Kopp, MD, * Wiebke Gogarten, MD, ‡ Lisa R. Leffert, MD, § and Honorio T. Benzon, MD ||

Evolving standards for the prevention of perioperative venous thromboembolism (VTE) and the introduction of increasingly potent antithrombotic medications have resulted in concerns regarding the heightened risk of neuraxial bleeding. Furthermore, societies and organizations seeking to address these concerns through guidelines in perioperative management have issued conflicting recommendations. In response to these patient safety issues and the need for a more international approach to management, the American Society of Regional Anesthesia and Pain Medicine (ASRA), in conjunction with the European Society of Anaesthesiology (ESA), convened its Fourth Consensus Conference on Regional Anesthesia and Anticoagulation. Portions of the material presented here were published in the 1998, 2003, and 2010 ASRA Consensus Documents as well as the 2010 ESA Guidelines.1,8 The information has been updated to incorporate data available since the time of its publication.

Safety (NPMS)13 developed a consensus bundle on VTE, which will likely result in more parturients receiving thromboprophylaxis. Integration of these recommendations in a patient population where there is a lack of a comparable “alternative” analgesic technique has again raised concern regarding the timing of epidural catheter placement/removal and initiation of postpartum thromboprophylaxis and is addressed in this update. Of note, ASRA collaborated with the NPMS and Society for Obstetric Anesthesia and Perinatology (SOAP) to develop a unified set of recommendations.15

The 2010 consensus conference also addressed, for the first time, the risk of significant bleeding in patients undergoing plexus and peripheral neural blockade. This section also is extensively updated as more information regarding frequency and severity of bleeding complications associated with nonneuraxial techniques has become available.

Finally, recent publications of cases of epidural hematoma during interventional pain procedures in patients receiving antiplatelet agents suggested a need for separate recommendations for these patients.16,19 The information presented in this update will be included in the next edition of the ASRA and ESA Guidelines.
# Guidelines for Anticoagulation and Neuraxial Anesthesia (2016)

Adapted from ASRA guidelines for use in Penn Medicine hospitals by the Department of Anesthesiology and Critical Care, Penn Medicine

<table>
<thead>
<tr>
<th>Medication</th>
<th>Pre Procedure</th>
<th>White catheter in place</th>
<th>Before catheter removal</th>
<th>Resume medication after procedure or catheter removal</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Heparin</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IV Heparin</td>
<td>Step solution</td>
<td>AVOID</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>for 48h</td>
<td>Turn off 6h</td>
<td>Wait 2 hours to restart</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(50U/ml - 100U/ml)</td>
<td>(50U/ml - 100U/ml)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SC Heparin</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5000 units</td>
<td>IV or IO</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5000 units</td>
<td>SC or IO</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>LMWH</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Fondaparinux (Lon傲in™) polyhexafluoropropylamide as full dose</td>
<td>AVOID</td>
<td></td>
<td>Wait 4 hours after catheter removal</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tinzaparin (Innohep™)</td>
<td>12h or 24h</td>
<td>CAUTION</td>
<td>Wait 24h after last dose</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Warfarin (Coumadin™)</td>
<td>Step for 4-5d</td>
<td>AVOID</td>
<td></td>
<td></td>
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<tr>
<td></td>
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<td></td>
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<tr>
<td><strong>Platelet Inhibitors</strong></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Clopidogrel (Plavix™)</td>
<td>7d</td>
<td>AVOID</td>
<td>2-6h</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ticagrelor (Brilliant™)</td>
<td>5-7d</td>
<td>AVOID</td>
<td>6h</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ticlopidine (Ticlid™)</td>
<td>10-14d</td>
<td>AVOID</td>
<td>2-4h</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clopidogrel (Plavix™)</td>
<td>1-2d</td>
<td>AVOID</td>
<td>2-4h</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aspirin</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>No restrictions</td>
<td>CAUTION</td>
<td>No restrictions</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Direct Thrombin Inhibitor</strong></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Dabigatran (Pradaxa™)</td>
<td>5d</td>
<td>AVOID</td>
<td>At least 6h</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Argatroban (Argent)</td>
<td>4-12h</td>
<td>AVOID</td>
<td>4-12h</td>
<td></td>
</tr>
<tr>
<td></td>
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<td></td>
<td></td>
<td></td>
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<tr>
<td>Factor Xa Inhibitors</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Apixaban (Eliquis™)</td>
<td>5d</td>
<td>AVOID</td>
<td>At least 6h</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rivaroxaban (Xarelto™)</td>
<td>5d</td>
<td>AVOID</td>
<td>At least 6h</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Idarucizumab (Revasc)</td>
<td>5e</td>
<td>AVOID</td>
<td>At least 6h</td>
<td></td>
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<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Argatroban (Argent)</td>
<td>4-12h</td>
<td>AVOID</td>
<td>4-12h</td>
<td></td>
</tr>
<tr>
<td></td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>
1. Heparins and heparinoids to be used on a case-by-case basis. Guidelines are for reference only.
2. Clopidogrel is contraindicated with antiplatelet agents (e.g., aspirin and ticlopidine) or clopidogrel or aspirin and abnormal platelet function
3. Warfarin should be monitored on a daily basis. Routine neurological testing every 14 to 28 days should be performed after catheter removal. If the local anesthetic solution is recommended to enhance memory and cognitive function.
4. LMWH should be monitored on a daily basis. Routine neurological testing every 14 to 28 days should be performed after catheter removal. If the local anesthetic solution is recommended to enhance memory and cognitive function.
5. Neuraxial anesthesia can be performed with LMWH, preferably with LMWH, as long as LMWH is used after discontinuation of LMWH.
6. LMWH should be discontinued prior to neuraxial anesthesia.
Serum Chemistries

• Significant electrolyte abnormalities noted on routine screening are extremely rare

• Increased glucose in patients having noncardiac, nonvascular surgery are associated with increased perioperative cardiovascular mortality compared to normoglycemic patients

• Consider if:
  – Known endocrine abnormalities
  – Renal dysfunction
  – Liver dysfunction
  – Use of certain medicine/therapies (diuretics, dialysis..)

Chest Radiograph

- Abnormalities on chest radiograph are incredibly common but rarely change perioperative outcome or management
- Exception is to evaluate possible acute processes (pneumonia, decompensated CHF)

Chest Radiograph

• ASA says consider for:
  – Smoking
  – Recent upper respiratory infection
  – COPD
  – Cardiac disease

• ACP suggests CXR may be helpful in patients >50yo who are undergoing AAA repair, upper abdominal, or thoracic surgery

• AHA adds BMI > 40 kg/m²


Pulmonary Function Testing

- Range from noninvasive passive or provocative screening tests (e.g., PFTs or spirometry) to invasive assessment of pulmonary function (e.g., ABG, split lung function, right heart catheterization)
- Incidence of pulmonary complications is higher in patients with preexisting lung disease
- Preoperative PFTs have not proven to be better predictors than clinical findings in predicting significant postoperative pulmonary complications after surgical procedures not involving lung resection

Risk Factors for Postoperative Pulmonary Complications

Patient factors:
• Advanced age
• ASA PS 2 or higher
• Functional dependence
• COPD
• Smoking
• CHF
• OSA
• PHTN

Surgical Factors:
• Surgery close to the diaphragm (thoracic and upper abdominal)
• Emergency surgery
• Prolonged duration
• Neurosurgery
• Head and neck surgery
• Vascular surgery
• General anesthesia


# UPHS PreOp Testing Guidelines

<table>
<thead>
<tr>
<th>UPHS Recommendation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>No Testing</strong></td>
</tr>
<tr>
<td>NO testing in ASA 1 or 2 regardless of age having a low risk procedure.</td>
</tr>
<tr>
<td><strong>Duration of acceptability of tests</strong></td>
</tr>
<tr>
<td>SIX MONTHS before surgery if the patient’s medical history has not changed.</td>
</tr>
<tr>
<td><strong>Basic Metabolic Panel</strong></td>
</tr>
<tr>
<td>In patients having major surgery, taking diuretics, digoxin, potassium supplements, with a history of CKD, or if IV contrast dye will be injected</td>
</tr>
<tr>
<td><strong>CBC</strong></td>
</tr>
<tr>
<td>Having major surgery, anemia history, or cirrhosis</td>
</tr>
<tr>
<td><strong>CXR</strong></td>
</tr>
<tr>
<td>Not Required</td>
</tr>
<tr>
<td><strong>EKG</strong></td>
</tr>
<tr>
<td>In patients with known Diabetes, CAD, CVD, arrhythmias, structural heart disease, or peripheral arterial disease having elevated risk surgery. No age or BMI inclusion.</td>
</tr>
<tr>
<td><strong>Finger Stick (Glucose)</strong></td>
</tr>
<tr>
<td>All Diabetics the day of surgery</td>
</tr>
<tr>
<td><strong>Pregnancy</strong></td>
</tr>
<tr>
<td>Urine HCG for all females with potential of pregnancy</td>
</tr>
<tr>
<td><strong>PT/PTT/INR</strong></td>
</tr>
<tr>
<td>Any patient on anticoagulants, with a bleeding history, or cirrhosis</td>
</tr>
<tr>
<td><strong>T &amp; S</strong></td>
</tr>
<tr>
<td>If indicated</td>
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</tbody>
</table>
WHAT ABOUT PREOPERATIVE CARDIAC EVALUATION AND TESTING?
Preoperative Cardiac Testing

• Range from noninvasive (e.g., electrocardiogram or echocardiogram) to invasive (e.g., cardiac catheterization) assessment of cardiac structure, function, and vascularity

• May be passive or provocative (e.g., stress testing)

• Clinical characteristics to consider include:
  – cardiovascular risk factors
  – type and invasiveness of surgery

2014 ACC/AHA Guideline on Perioperative Cardiovascular Evaluation and Management of Patients Undergoing Noncardiac Surgery

A Report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines

Developed in Collaboration With the American College of Surgeons, American Society of Anesthesiologists, American Society of Echocardiography, American Society of Nuclear Cardiology, Heart Rhythm Society, Society for Cardiovascular Angiography and Interventions, Society of Cardiovascular Anesthesiologists, and Society of Vascular Medicine

Endorsed by the Society of Hospital Medicine
**TABLE 5  Summary of Recommendations for Supplemental Preoperative Evaluation**

<table>
<thead>
<tr>
<th>Recommendations</th>
<th>COR</th>
<th>LOE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>The 12-lead ECG</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Preoperative resting 12-lead ECG is reasonable for patients with known coronary</td>
<td>IIa</td>
<td>B</td>
</tr>
<tr>
<td>heart disease or other significant structural heart disease, except for low-risk</td>
<td></td>
<td></td>
</tr>
<tr>
<td>surgery</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Preoperative resting 12-lead ECG may be considered for asymptomatic patients,</td>
<td>IIb</td>
<td>B</td>
</tr>
<tr>
<td>except for low-risk surgery</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Routine preoperative resting 12-lead ECG is not useful for asymptomatic patients</td>
<td>III: No Benefit</td>
<td>B</td>
</tr>
<tr>
<td>undergoing low-risk surgical procedures</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Assessment of LV function</td>
<td></td>
<td></td>
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<tr>
<td>------------------------------------------------------------------------------------------</td>
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<td>---</td>
</tr>
<tr>
<td>It is reasonable for patients with dyspnea of unknown origin to undergo preoperative evaluation of LV function</td>
<td>IIa</td>
<td>C</td>
</tr>
<tr>
<td>It is reasonable for patients with HF with worsening dyspnea or other change in clinical status to undergo preoperative evaluation of LV function</td>
<td>IIa</td>
<td>C</td>
</tr>
<tr>
<td>Reassessment of LV function in clinically stable patients may be considered</td>
<td>IIb</td>
<td>C</td>
</tr>
<tr>
<td>Routine preoperative evaluation of LV function is not recommended</td>
<td>III: No Benefit</td>
<td>B</td>
</tr>
</tbody>
</table>
Valvular heart disease

• Preoperative echo is recommended for patients with clinically suspected moderate or greater degree of valvular regurgitation or stenosis if: (1) no prior echo w/in 1y; or (2) significant change in clinical status since last exam. (Class I, LOE C)

• Valve replacement or repair before noncardiac surgery for patients who meet standard criteria for valve replacement/repair is effective in reducing perioperative risk (Class I, LOE C)

• Elevated-risk noncardiac surgery w/appropriate monitoring is reasonable in patients with: (1) asymptomatic severe AS; (2) asymptomatic severe MR; (3) asymptomatic severe AI with normal LVEF (Class IIa/b, LOE B/C)
2014 ACC/AHA Guidelines for Perioperative Cardiovascular Evaluation for Noncardiac Surgery
2014 ACC/AHA Guidelines for Perioperative Cardiovascular Evaluation for Noncardiac Surgery

Risk Factors:
Age
Sex
HTN
CVD
CKD
IDDM
Obesity

FIGURE 1 Stepwise Approach to Perioperative Cardiac Assessment for CAD
2014 ACC/AHA Guidelines for Perioperative Cardiovascular Evaluation for Noncardiac Surgery

**Emergency** procedure = life or limb is threatened if not in the operating room with no or very limited time for preoperative clinical evaluation, typically within <6 hours.

**Urgent** procedure = life or limb is threatened but there may be time for a limited clinical evaluation, typically between 6 and 24 hours.

**Time-sensitive** procedure = a delay of >1 to 6 weeks to allow for an evaluation and significant changes in management will negatively affect outcome.

**Elective** procedure = the procedure could be delayed for up to 1 year.
2014 ACC/AHA Guidelines for Perioperative Cardiovascular Evaluation for Noncardiac Surgery

Acute Coronary Syndrome Equivalents:
- Unstable (active or crescendo angina) coronary syndromes or recent MI
- Decompensated HF (NYHA Class IV, new onset, worsening)
- Suspected new or significant worsening of valvular heart disease
- Unstable arrhythmias (Symptomatic or new ventricular arrhythmias, supraventricular arrhythmias with uncontrolled ventricular rate, High grade AV block, symptomatic bradycardia
2014 ACC/AHA Guidelines for Perioperative Cardiovascular Evaluation for Noncardiac Surgery


2014 ACC/AHA Guidelines for Perioperative Cardiovascular Evaluation for Noncardiac Surgery

American College of Surgeons NSQIP risk calculator

www.surgicalriskcalculator.com
2014 ACC/AHA Guidelines for Perioperative Cardiovascular Evaluation for Noncardiac Surgery

Low risk = can proceed to surgery without any further testing
If elevated risk, it’s all about symptomatology and functional capacity
Functional capacity > 4 METS

<table>
<thead>
<tr>
<th>No. of METs</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 (baseline)</td>
<td>An oxygen uptake of 3.5 mL/kg/min, the typical resting oxygen uptake in a sitting position</td>
</tr>
<tr>
<td>1–3</td>
<td>Can take care of self, such as ambulate, eat, dress, or use the toilet</td>
</tr>
<tr>
<td>4</td>
<td>Can walk about two blocks, up a flight of steps, or carry groceries</td>
</tr>
<tr>
<td>5–10</td>
<td>Can do heavy work around the house (scrubbing floors or lifting or moving heavy furniture)</td>
</tr>
<tr>
<td>&gt; 10</td>
<td>Can participate in strenuous sports (swimming, football, basketball, tennis, and skiing)</td>
</tr>
</tbody>
</table>

MET = metabolic equivalent of tasks.
*An MET expresses the rate of energy consumption for given activities.
2014 ACC/AHA Guidelines for Perioperative Cardiovascular Evaluation for Noncardiac Surgery

Elevated risk but moderate/good to excellent functional status = can go to surgery
2014 ACC/AHA Guidelines for Perioperative Cardiovascular Evaluation for Noncardiac Surgery

Elevated risk and poor to unknown functional status = pharmacologic stress IF IT WILL IMPACT CARE
## Provocative/invasive cardiac testing

### Exercise stress testing for myocardial ischemia and functional capacity

<table>
<thead>
<tr>
<th>Description</th>
<th>Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>For patients with elevated risk and excellent functional capacity, it is reasonable to forgo further exercise testing and proceed to surgery</td>
<td>IIa B</td>
</tr>
<tr>
<td>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</td>
<td>IIb B</td>
</tr>
<tr>
<td>For patients with elevated risk and moderate to good functional capacity, it may be reasonable to forgo further exercise testing and proceed to surgery</td>
<td>IIb B</td>
</tr>
<tr>
<td>For patients with elevated risk and poor or unknown functional capacity it may be reasonable to perform exercise testing with cardiac imaging to assess for myocardial ischemia</td>
<td>IIb C</td>
</tr>
<tr>
<td>Routine screening with noninvasive stress testing is not useful for low-risk noncardiac surgery</td>
<td>III: No Benefit B</td>
</tr>
</tbody>
</table>

### Cardiopulmonary exercise testing

<table>
<thead>
<tr>
<th>Description</th>
<th>Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cardiopulmonary exercise testing may be considered for patients undergoing elevated risk procedures</td>
<td>IIb B</td>
</tr>
</tbody>
</table>

### Noninvasive pharmacological stress testing before noncardiac surgery

<table>
<thead>
<tr>
<th>Description</th>
<th>Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>It is reasonable for patients at elevated risk for noncardiac surgery with poor functional capacity to undergo either DSE or MPI if it will change management</td>
<td>IIa B</td>
</tr>
<tr>
<td>Routine screening with noninvasive stress testing is not useful for low-risk noncardiac surgery</td>
<td>III: No Benefit B</td>
</tr>
</tbody>
</table>

### Preoperative coronary angiography

<table>
<thead>
<tr>
<th>Description</th>
<th>Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>Routine preoperative coronary angiography is not recommended</td>
<td>III: No Benefit C</td>
</tr>
</tbody>
</table>
Should we revascularize everyone preoperatively?
Should we revascularize everyone preoperatively?

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.

• Based largely on the CARP trial, ACC/AHA guidelines do not recommend revascularization for the general population
• Follow the recommendations found in routine clinical practice guidelines for revascularization (CABG/PCI)
• There are subsets of populations who benefit from preop revascularization – probably worth having cardiology and anesthesia weigh in on perioperative management
What if the patient already had a recent cardiac revascularization?
Treatment Algorithm for the Timing of Elective Noncardiac Surgery in Patients With Coronary Stents

Patients Treated With PCI Undergoing Elective Noncardiac Surgery

BMS treated with DAPT

0 d

<30 d since BMS implantation

Class III: Harm Delay surgery

≥30 d since BMS implantation

Class I: Proceed with surgery

30 d

3 mo

<3 mo since DES implantation

Class III: Harm Delay surgery

3-6 mo since DES implantation, discontinue DAPT; delayed surgery risk is greater than stent thrombosis risk

≥6 mo since DES implantation, discontinue DAPT

≥30 d since BMS implantation

Class IIb: Proceeding with surgery may be considered

≥6 mo since DES implantation, discontinue DAPT

Class I: Proceed with surgery
Perioperative Management: Timing of Elective Noncardiac Surgery in Patients Treated With PCI and DAPT

<table>
<thead>
<tr>
<th>COR</th>
<th>LOE</th>
<th>RECOMMENDATIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>B-NR</td>
<td>Elective noncardiac surgery should be delayed 30 days after BMS implantation and optimally 6 months after DES implantation (101-103,143-146).</td>
</tr>
<tr>
<td>I</td>
<td>C-EO</td>
<td>In patients treated with DAPT after coronary stent implantation who must undergo surgical procedures that mandate the discontinuation of P2Y₁₂ inhibitor therapy, it is recommended that aspirin be continued if possible and the P2Y₁₂ platelet receptor inhibitor be restarted as soon as possible after surgery.</td>
</tr>
<tr>
<td>IIA</td>
<td>C-EO</td>
<td>When noncardiac surgery is required in patients currently taking a P2Y₁₂ inhibitor, a consensus decision among treating clinicians as to the relative risks of surgery and discontinuation or continuation of antiplatelet therapy can be useful.</td>
</tr>
<tr>
<td>IIb</td>
<td>C-EO</td>
<td>Elective noncardiac surgery after DES implantation in patients for whom P2Y₁₂ inhibitor therapy will need to be discontinued may be considered after 3 months if the risk of further delay of surgery is greater than the expected risks of stent thrombosis.</td>
</tr>
<tr>
<td>III: Harm</td>
<td>B-NR</td>
<td>Elective noncardiac surgery should not be performed within 30 days after BMS implantation or within 3 months after DES implantation in patients in whom DAPT will need to be discontinued perioperatively (101-103,143-146).</td>
</tr>
</tbody>
</table>
Conclusions

- A good history and physical exam will get you far
- Most extensive workups are unnecessary unless a change in clinical status
- Determining functional status answers a lot of questions
- Early multidisciplinary involvement in complex patients can help ensure appropriate optimization
- We are happy to help answer any questions!