Preoperative Evaluation for Non-Cardiac Surgery

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Disclosures

I have no affiliations or financial relationships relevant to this presentation.
Objectives

- Major risk factors that result in increased perioperative morbidity and mortality
- Most useful history and physical exam elements for surgical patients
- Indications for laboratory, radiographic, and cardiac testing before non-cardiac surgery
- Areas for organizational improvement
Perioperative Mortality

30 day mortality after surgery: 1.32%


Causes of Mortality in the U.S.

- MACE: 42%
- Cancer: 37%
- Surgery: 12%
- CVA: 9%
Why do patients die after surgery?

<table>
<thead>
<tr>
<th>Population</th>
<th>Rate of Death</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Non-Cardiac Surgery</td>
<td>1:100</td>
</tr>
<tr>
<td>With Risk Factors</td>
<td>2:100</td>
</tr>
<tr>
<td>With Perioperative MI</td>
<td>11:100</td>
</tr>
<tr>
<td>With Perioperative CVA</td>
<td>30:100</td>
</tr>
</tbody>
</table>
Why do patients die after surgery?


Neurologic
Respiratory
Cardiac
Gastrointestinal
Endocrine
Hematologic
Renal
Musculoskeletal
Identifying Perioperative Neurologic Risk

History & Physical
- Cerebrovascular Disease
- Cognitive decline
- Maintenance medications for chronic diseases
  - Lipid lowering agents
  - Parkinson’s Disease medications
  - Chronic Pain Medications
- Peripheral neuropathies

Labs, Imaging, & Devices
- Ventricular shunts
- Spinal cord stimulators
- Intrathecal pumps
- Myelogram results
# Dosing and Conversion Chart for Opioid Analgesics

<table>
<thead>
<tr>
<th>Drug</th>
<th>Route</th>
<th>Equianalgesic Dose (mg)</th>
<th>Duration (h)</th>
<th>Plasma Half-Life (h)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Morphine</td>
<td>IM</td>
<td>10</td>
<td>4</td>
<td>2-3.5</td>
</tr>
<tr>
<td>Morphine</td>
<td>PO</td>
<td>30</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Codeine</td>
<td>IM</td>
<td>130</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>Codeine</td>
<td>PO</td>
<td>300</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Oxycodone</td>
<td>IM</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oxycodone</td>
<td>PO</td>
<td>30</td>
<td>3-4</td>
<td>4</td>
</tr>
<tr>
<td>Hydromorphone</td>
<td>IM</td>
<td>1.5</td>
<td>4</td>
<td>2-3</td>
</tr>
<tr>
<td>Hydromorphone</td>
<td>PO</td>
<td>7.5</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Meperidine</td>
<td>IM</td>
<td>75</td>
<td>3-4</td>
<td>2</td>
</tr>
<tr>
<td>Meperidine</td>
<td>PO</td>
<td>300</td>
<td>3-4</td>
<td>normeperidine</td>
</tr>
<tr>
<td>Methadone</td>
<td>IM</td>
<td>10*</td>
<td>6-8†</td>
<td>12-24</td>
</tr>
<tr>
<td>Methadone</td>
<td>PO</td>
<td>20*</td>
<td>6-8†</td>
<td>20-200</td>
</tr>
<tr>
<td>Fentanyl</td>
<td>IV</td>
<td>0.1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hydrocodone</td>
<td>IM</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hydrocodone</td>
<td>PO</td>
<td>30</td>
<td>3-4</td>
<td>4</td>
</tr>
</tbody>
</table>

Neurologic
Respiratory
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Musculoskeletal
Identifying Perioperative Respiratory Risk

**History & Physical**
- Smoking history
  - Nicotine replacement
- Smoking cessation plan
  - 4 weeks pre-op
- Sleep Apnea
  - STOP-BANG score
- Previous surgical lung resection or intubation for respiratory failure

**Labs, Imaging, & Devices**
- Acute disease → chest X-ray
- CPAP/BiPAP settings
- Pulmonary function tests
  - For thoracic or AAA surgery
| S | Snoring: Do you snore loudly (louder than talking or loud enough to be heard through a closed door)? |
| T | Tired: Do you often feel tired, fatigued, or sleepy during the daytime? |
| O | Observed: Has anyone observed you stop breathing in your sleep? |
| P | Pressure: Do you have treated or untreated high blood pressure? |
| B | BMI: Is your BMI > 35 kg/m²? |
| A | Age: Are you over 50 years old? |
| N | Neck circumference: Is your neck circumference > 40 cm or 16 in? |
| G | Gender: Are you male? |

≥ 3 affirmative answers is 90% specific for moderate to severe OSA

The STOP-BANG Questionnaire
A patient with known CAD risk factors is scheduled for surgery:

Emergency? 
- Yes: PROCEED
- No: Acute Coronary Syndrome?
  - Yes: EVALUATE and TREAT
  - No: Low Risk Procedure?
    - Yes: PROCEED
    - No: >4 METS?

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

A patient with known CAD risk factors is scheduled for surgery:

- Emergency? Yes → PROCEED
  No → Acute Coronary Syndrome?
    Yes → EVALUATE and TREAT
    No → Low Risk Procedure?
      Yes → PROCEED
      No → >4 METS?
        Yes → PROCEED
        No or Unknown
          No → PROCEED
          Yes → Will it make a difference?
            Yes → EVALUATE and TREAT
            No → PALLIATION OR PROCEED to surgery with medical management

2014 AHA/ACC Guidelines
Surgery after a Percutaneous Coronary Intervention:

**Angioplasty**: 14 Days

**Bare Metal**: 30 Days

**Drug Eluting**: Consider @180 Days, if antiplatelet con’t

**Drug Eluting**: 365 Days

Proceed to surgery if the risk of delay is greater than the risk of stent thrombosis.

Identifying Perioperative GI Risk

History & Physical
- Gastroesophageal Reflux
  - Controlled or Uncontrolled
- Liver disease
  - Hepatitis
  - Liver failure
  - Bleeding tendencies

Labs, Imaging, & Devices
- Gastric band
- Hepatic shunt
- Liver failure
  1. PTT, INR
  2. Platelets
  3. Bilirubin
  4. Liver enzymes
Neurologic
Respiratory
Cardiac
Gastrointestinal
Endocrine
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Renal
Musculoskeletal
These people are committed to their endocrine systems!
Identifying Perioperative Endocrine Risk

History & Physical
- Diabetes medication regimen
- Thyroid disease
  - Goiter
  - New hyperthyroidism
  - Poorly controlled hypothyroidism
- Hyper- or hypocalcemia

Labs, Imaging, & Devices
- Baseline Glucose, FBG on day of surgery
- EKG if indicated
- Chemistry if indicated
Neurologic
Respiratory
Cardiac
Gastrointestinal
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Hematologic
Renal
Musculoskeletal
Identifying Perioperative Hematologic Risk

History & Physical
- Familial coagulopathies or bleeding tendency
- Anticoagulation status
- Cell line dyscrasias
  - Anemia, Neutropenia, Thrombocytopenia
- Inducible disorders
  - Porphyrias, ITP
- History of DVT/PE
- Sickle cell disease or trait
- History of difficult IV access

Labs, Imaging, & Devices
- CBC w/o differential
- Labs for monitoring anticoagulation
  - INR on day of surgery
- Location of ports
Neurologic
Respiratory
Cardiac
Gastrointestinal
Endocrine
Hematologic
Renal
Musculoskeletal
Identifying Perioperative Renal Risk

History & Physical
- Chronic Kidney Disease
- End-Stage Renal Disease
  - Location of HD access
  - HD schedule
- History of difficult Foley access

Labs, Imaging, & Devices
- Advanced CKD/ESRD:
  - Chemistry within 2 weeks of surgery
  - Potassium on the day of surgery
Neurologic
Respiratory
Cardiac
Gastrointestinal
Endocrine
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Musculoskeletal
Perioperative Musculoskeletal Issues

History & Physical
- Scoliosis or spinal abnormalities
- Contractures/limited range of motion
- Spinal fusions
- Locations of prostheses (total hip, total knee, total shoulder)
- Surgically absent limbs

Labs, Imaging, & Devices
- Imaging is rarely needed
<table>
<thead>
<tr>
<th>Test</th>
<th>Screening</th>
<th>Indications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chemistry</td>
<td>Never</td>
<td>Cardiac, endocrine, renal or liver disease, medications that affect electrolytes</td>
</tr>
<tr>
<td>CBC</td>
<td>Never</td>
<td>Surgical (vascular, thoracic, major joint) or medical indication</td>
</tr>
<tr>
<td>Coags</td>
<td>Never</td>
<td>Hx of bleeding, known disease, monitoring anticoagulation</td>
</tr>
<tr>
<td>EKG</td>
<td>Never</td>
<td>RCRI &gt;1 AND high risk surgery, known vascular disease AND intermediate risk surgery, Medication that may affect EKG</td>
</tr>
<tr>
<td>Cardiac Tests</td>
<td>Never</td>
<td>For CHF: get TTE yearly or when there’s a change, otherwise Follow AHA/ACC algorithm</td>
</tr>
<tr>
<td>Chest X-ray</td>
<td>Never</td>
<td>Clinical concern for an acute process (ASA and CSA), BMI &gt;40 (AHA), Age &gt;50 and AAA surgery (ACP)</td>
</tr>
<tr>
<td>PFTs</td>
<td>Never</td>
<td>Lung resection, COPD and AAA surgery</td>
</tr>
<tr>
<td>Pregnancy Test</td>
<td>Premenopausal women</td>
<td>Premenopausal = after menarche and &lt;1 year since last menses</td>
</tr>
</tbody>
</table>
REFERENCES


