Perioperative Cases

by Brian Wolfe, MD
Assistant Professor of Medicine, University of Colorado Denver
75 yo for left knee arthroplasty

<table>
<thead>
<tr>
<th>Problem List</th>
<th>Social Hx:</th>
</tr>
</thead>
<tbody>
<tr>
<td>◆ obesity</td>
<td>◆ uses a walker because of knee pain</td>
</tr>
<tr>
<td>◆ diabetes</td>
<td></td>
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<td>◆ hypertension</td>
<td>Meds:</td>
</tr>
<tr>
<td>◆ chronic kidney disease</td>
<td>diltiazem, HCTZ, glargine insulin</td>
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</table>

Exam: Pulse 92, BP 165/95
◆ No murmur, clear lungs
Can we improve her outcome?

Outcomes and Processes of Care Related to Preoperative Medical Consultation

Drewenda M. Wypess, MD; Peter C. Ansell, MD; William C. Scott, MD, FACP; Jason E. Nix, MD, MSc; Andrew Lankenau, MD, MSc

Background: Preoperative consultations by internal medicine physicians before documentation of consented care, opiate use, or written medical advance directive, and accurate documentation measured to evaluate, showed that preoperative consultation, which may be performed by general surgeons or specialists, can improve outcomes.

Methods: We used propensity-score-matched analysis to evaluate a cohort of patients 50 years of age or older who underwent major elective noncardiac surgery in Canada, between 2001 and 2004. Preoperative consultation was performed by noncardiac surgeon. The outcomes of consultation were measured and were compared to a nonconsulted cohort within the matched cohort. A sensitivity analysis was then performed to evaluate the effectiveness of the consultation with mortality and hospital stay outcomes. The consultation was associated with increased 30-day mortality (RR 1.16, NNH 516) (RR 1.16, NNH 516), increased costs, and increased LOS. The causes for this are more frequent use of beta blockers, less DVT prophylaxis, and fewer cancelled cases.

- Preoperative consultation associated with increased 30-day mortality (RR 1.16, NNH 516)
- Increased costs
- Increased LOS
- Causes?
- More beta blockade
- Less DVT prophylaxis
- Few cancelled cases
Why no benefit?

- Risk and outcomes are fixed
- Studies show single interventions alter outcomes
  Beta blockers, anesthetic type, statins, etc
- Primary care providers lack skills to lower periop risk?
- No trials comparing preop clinic vs PCP preop evaluation
Risk Assessment - Inconsistent

**Assessment and Reporting of Perioperative Cardiac Risk by Canadian General Internists**

*Art or Science?*

Taha Taher, MD. Nadia A. Khan, MD, P. J. Devereaux, MD. Bruce W. Fisher, MD. MSc.

William A. Ghali, MD. MPH. Finlay A. McAlister, MD. MSc. for the Canadian Perioperative Research Group.


◆ 300 internists posed questions regarding risk and asked to comment on standardized case

◆ Widely different views of “low” “medium” “high” risk

◆ <20% of PCPs correctly assessed risk in standardized case

◆ Wide differences in recommended periop strategies
Risk Stratification

- Critical step of a Preoperative evaluation
- Strong evidence supports accuracy of several methods
- Risk usually stratified into:
  - low <1% risk of complication
  - moderate 1-5% risk
  - high >5%
Risk Stratification

Since 1960, many methods developed to assess risk

- ASA physical class, Goldman, Detsky, Eagle

- Most commonly used is Revised Cardiac Risk Index (RCRI)

  Updated/Simplified version of Goldman published in 1999
RCRI

- Ischemic Heart Disease
  - 0 point - 0.4% risk of MI or cardiovascular death
- History of CHF
  - 1 point - 1.0%
- History of CVA
  - 2 points - 2.4%
- Insulin-requiring diabetes
  - 3 points - 5.4%
- Creatinine >2gm/dL
- High risk surgery
  (vascular, intrathoracic, intraabdominal)

Periop Cardiac Risk Calculator

- National Surgical Quality Improvement Project NSQIP
- >250 hospitals and >200,000 patients
- Based on 2007 data validated in 2008 data
- ROC 0.87 (RCRI - 0.75 in same data)

Inputs:
1. Age
2. Serum Creatinine
3. ASA physical class
4. Function status
5. Surgery type/site (21)

Range of risk: 0.5% to >50%

http://www.surgicalriskcalculator.com/miorcardiacarrest
IPhone/IPad/Droid app: QxMD

75 yo for left knee arthroplasty

Problem List
- obesity
- diabetes
- hypertension
- chronic kidney disease
- S Cr of 1.8

Social Hx:
- uses a walker because of knee pain
- Meds:
  - diltiazem, HCTZ, glargine insulin
- Exam: Pulse 92, BP 165/95
- No murmur, clear lungs

RCRI - 1.0%, NSQIP - 2.6%
75 yo for brain tumor resection

Problem List
- obesity
- diabetes
- hypertension
- chronic kidney disease  
  S Cr of 1.8

Social Hx:
- uses a walker because of knee pain
- Meds: diltiazem, HCTZ, glargine insulin
- Exam: Pulse 92, BP 165/95
- No murmur, clear lungs

RCRI - 1.0%, NSQIP - 4.6%
75 yo for brain tumor resection

Problem List

- obesity
- diabetes
- hypertension
- chronic kidney disease
  S Cr of 1.8

Social Hx:

- dependent on wife completely for ADLs
- Meds:
  - diltiazem, HCTZ, glargine insulin

Exam:

- Pulse 92, BP 165/95
- No murmur, clear lungs

RCRI - 1.0%, NSQIP - 6.6%
What does this risk mean?

Cohort study of patients enrolled in POISE trial

- >8000 patients, multi-national
- Surveyed for Periop MI (PMI) by daily biomarkers x 3
- Primary outcome: PMI
- PMI defined: biomarker rise plus ischemic ECG/Path/Sx
- 5% reached primary outcome
- 12% of those with PMI died within 30 days
- Compared with 2.2% in the remainder of cohort

What does this risk mean?

Cohort study of patients enrolled in NSQIP

- >200,000 patients, American centers only
- **No** active surveillance for PMI (only if ischemia suspected)
- Primary outcome PMI and cardiac arrest
- PMI defined: biomarker rise **plus** ischemic ECG or Sx
- 0.65% reached primary outcome
- 61% of those with PMI died within 30 days
- Compared with 1.4% in the remainder of cohort
Why different outcomes?

<table>
<thead>
<tr>
<th></th>
<th>% reach endpoint</th>
<th># to reach endpoint</th>
<th>30 day mortality %</th>
<th>30 day mortality total</th>
</tr>
</thead>
<tbody>
<tr>
<td>POISE</td>
<td>10,000 patients</td>
<td>5%</td>
<td>500 patients</td>
<td>12%</td>
</tr>
<tr>
<td>NSQIP</td>
<td>10,000 patients</td>
<td>0.65%</td>
<td>65 patients</td>
<td>61%</td>
</tr>
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</table>

Key difference: *screening* for perioperative ischemia/infarction

POISE: 2/3’s of patients had NO symptoms

Asymptomatic and symptomatic patients had same outcome

So why not screen everyone? Unclear how to improve outcomes
ACC/AHA Guidelines

1. Is the surgery an emergency? If so, to OR; if not step #2

2. Are active cardiac conditions present? If not, proceed to #3
   decomp CHF, unstable angina or recent MI, arrhythmias (HR>100), severe valve dz

3. Is the surgery low risk? If so proceed to OR, otherwise #4

4. Exercise 4 MET’s? If so proceed to OR, otherwise #5

5. Algorithm combining clinical risk factors and surgical risk
   Makes soft recommendations regarding non-invasive testing
To stress or not to stress?

- ACC/AHA Guidelines recommends preoperative stress testing IF it will change management

  - IIa recommendation (reasonable) for patients with 3 risk factors* undergoing vascular surgery

  - IIb recommendation (may consider) for patients with 1 or 2 risk factors* undergoing intermediate or high risk surgery

- What will be the change in management?

*Risk factors: ischemic heart disease, diabetes, CHF, Cr>2, CVA
Revascularization?

- Data supporting surgical revascularization from CASS trial
- History of CABG protective for later non-cardiac surgery
- Other non-randomized data support CABG/PCI preop
Revascularization?

- **Coronary Artery Revascularization Prophylaxis (CARP) trial**
- Screened VA pts undergoing AAA or suprainguinal surgery for high risk pts (clinical risk factors and/or stress testing)
- 1190 pts underwent coronary angiography
  - 680 excluded b/c of insignificant CAD, LVEF<20, severe AS
- 580 (9% of original screening) randomized to revascularization with PCI/CABG or medical management

McFalls EO, et al. NEJM.2004;351:2795
Revascularization?

- Coronary Artery Revascularization Prophylaxis (CARP) trial
  - Primary outcome: long term mortality
  - At 2.7 years, no significant difference in mortality 22 vs 23%
  - PMI (biomarkers + ECG changes) 8.4% in both groups

- Many criticisms... primarily that patients not that sick and stress testing was not performed in all patients pre-angio

McFalls EO, et al. NEJM.2004;351:2795
Revascularization?

- Decrease V – Pilot study
  - 101 pts undergoing vascular surgery with severe ischemia on stress testing randomized to PCI/CABG or med manage
  - All patients beta-blocked and continued on ASA
  - Primary outcome: all cause death/non-fatal MI at 30 days
  - 43% (invasive) v 33% (med manage) reached endpoint, non-significant difference
  - Secondary endpoints (1-year f/u) likewise no difference

Poldermans D et al. JACC. 2007;49:1763-9
Other benefits of Stress Test?

- Wijeysundera et al showed stress testing associated with improved outcomes in 200,000 Canadian patients

- Low RCRI – *increased risk of CV complications*

- High RCRI – *decreased risk of CV complications, LOS*

How did stress-testing help?

- Guidance with regard to Beta blockade and Statin use

- Targeted high risk monitoring

- Revascularization in the highest risk pts (very small #)

Wijeysundera *BMJ*. 2010;320:b5526
Meta-analysis of Preop Stress echo vs. Nuclear stress testing

- 68 studies, involving 10,000+ patients

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<tr>
<th></th>
<th>ROC</th>
<th>Positive LR</th>
<th>Negative LR</th>
<th>Positive LR if moderate-large defect</th>
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<tbody>
<tr>
<td>Stress echo</td>
<td>0.80</td>
<td>4.09</td>
<td>0.23</td>
<td>8.35</td>
</tr>
<tr>
<td>Nuclear Stress</td>
<td>0.75</td>
<td>1.83</td>
<td>0.44</td>
<td>8.35</td>
</tr>
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Beta blockers

- No significant data since 2009 ACCF/AHA focused update
- Continue beta blockers if chronically used (strong)
- Indication in pts with CAD or 1 or more risk factors for intermediate/high risk surgery (weak)
- Indication in pts w/o CAD w/1 risk factor or no risk factors for vascular surgery (very weak)
- When indicated, start early and titrate to heart rate 60-80
## Beta blockers

<table>
<thead>
<tr>
<th>Trial – patients</th>
<th>Drug, design</th>
<th>Outcomes</th>
<th>Lessons learned</th>
</tr>
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<tbody>
<tr>
<td>Decrease IV-intermediate risk patients</td>
<td>Bisoprolol, started 1 month previous HR&lt;70</td>
<td>2.1 vs 6%, HR 0.34,</td>
<td>Starting BB’s early safe/effective</td>
</tr>
<tr>
<td>MaVS- high risk vascular surg patients</td>
<td>Metoprolol, started at time of surgery</td>
<td>10.2 vs 12%, p=0.57</td>
<td>Starting at time of surgery ineffective</td>
</tr>
<tr>
<td>POISE-intermediate &amp; high risk patients</td>
<td>Metop XL 100mg started at time of surgery</td>
<td>MI- 4.2 v 5.7%, Death- 3.1 v 2.3%, 2x risk of CVA</td>
<td>BB does lower MI risk but increase CVA/death</td>
</tr>
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Statins

- Studies agree statins started or continued in periop safe
- Decrease III and others support use in high risk patients undergoing vascular surgery
- Decrease IV did not show benefit in intermediate risk patients
- Retrospective data supports protective effect of statins

Schouten O et al. *NEJM.* 2009; 361:980-9
Summary of CV preop eval

- Accurate risk assessment central to preop evaluation
- Standardized methods exist to risk stratify
- Consideration of risk vs. benefit and potentially canceling surgery or having patient-centered discussion critical
- Communicate plan clearly in high risk situations: to patient, surgeon, anesthesiologist, hospitalist/internist
- Specific consideration of beta blockers and statins needs to be undertaken... but no “one fit for all” approach
78 yo  preop for nephrectomy

- **Problem List**
  - diabetes
  - Hypertension
  - COPD with moderate dyspnea

- **Current smoker**

- **Meds:**
  - losartan, glyburide, tiotropium, prn albuterol

- **Exam:**
  - Pulse 78, BP 139/85
  - Normal heart sounds, diffuse rhonchi, no respiratory distress
Risk Assessment... again

Postoperative Pulmonary Complications (PPC’s)

- NSQIP 2011- PPCs and postop respiratory failure (PRF)
  - PRF Common- 3.1% of cohort
    - mortality with PRF >25% (c/w ~1% in remaining cohort)
  - PPCs have highest surgical complication cost
    - (avg increase of $54,000 and increase of 5.5 in LOS)
  - Respiratory failure can be predicted accurately

Gupta Chest 2011; 150:1207-15
Dimick J Amer C Surg 2004; 199:531
Postop Respiratory Failure

- National Surgical Quality Improvement Project NSQIP
- >250 hospitals and >200,000 patients
- Based on 2007 data validated in 2008 data
- ROC 0.89

Inputs:
1. Age
2. COPD gold 2 or >
3. ASA physical class
4. Function status
5. Surgery type/site (21)
6. Preop sepsis presence
7. Smoking in last year

http://www.surgicalriskcalculator.com/prf-risk-calculator

Not currently available on hand-helds

PPC prevention?

- Few interventions associated with decreased complications
- Smoking cessation
- Incentive spirometry, breathing exercises (in some cases), avoidance of nasogastric tubes, early ambulation
- Risk assessment/patient counseling is critical role for PCP
To quit or not to quit (smoking)

- Quitting smoking ~4wks prior to OR reduces complications (in one study, reduced infectious/wound-issues by ½!)

- Intensive counseling perioperatively associated with short and long-term abstinence

- 2011 Meta-analysis showed no increase in complications when quitting < 8 weeks prior to surgery

78 yo preop for nephrectomy

• Problem List
  ◆ diabetes
  ◆ Hypertension
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◆ Current smoker
◆ Meds:
  losartan, glyburide, tiotropium, prn albuterol

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NSQIP – 10.37%
78 yo preop for brain surgery

- Problem List
  - diabetes
  - Hypertension
  - COPD with moderate dyspnea

- Current smoker
- Meds:
  - losartan, glyburide, tiotropium, prn albuterol

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NSQIP – 17.07%
What else is new?

- Risk Assessment
  VSGNE – surgery specific risk assessment
  Biomarker data growing specifically BNP

- Postop anemia
  TARGET study - not published no difference b/w
  transfusion at hgb <10gm vs. 8gm/dl in CV outcomes

- Periop DVT proph
  DTI- dabigatran
  Xa inhibitors – rivaroxaban, apixaban
Thank you for your time

Questions? Comments?

brian.wolfe@ucdenver.edu