



# Perioperative Cases

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# 75 yo for left knee arthroplasty

## Problem List

- ◆ obesity
- ◆ diabetes
- ◆ hypertension
- ◆ chronic kidney disease

## Social Hx:

- ◆ uses a walker  
because of knee pain

## Meds:

diltiazem, HCTZ,  
glargine insulin

- ◆ 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

Devvadas N. Wiprusadasa, MD; Peter C. Austin, PhD; W. Anne Stamer, MD, PhD;  
James H. Naig, MD, MEd; Andrew Laporte, MD, MSc

**Background:** Preoperative consultation by general medicine physicians includes documentation of comorbid disease, optimization of medical conditions, risk stratification, and the extent of interventions intended to reduce risk. Nevertheless, the impact of these consultations, which may be performed by general internists or specialists, on outcomes is unclear.

**Methods:** We used population-based administrative data to conduct a cohort study of patients 70 years or older who underwent major elective noncardiac surgery in Ontario, Canada, between 1994 and 2004. Population trends were used to establish a medical-pain cohort that reduced differences between patients who did and did not undergo preoperative consultation by general internists or specialists. The association of consultation with mortality and hospital stay was determined within this matched cohort. Age, sensitivity analysis, we evaluated the association of consultation with an outcome for which no difference would be expected: preoperative second admission.

**Results:** Of 16,000 patients in the cohort, 3,800 (24%) underwent consultation. Within the

matched cohort (n = 14,200), consultation was associated with increased 30-day mortality (odds ratio [OR], 1.36; 95% confidence interval [CI], 1.07-1.74), number needed to harm, 240; 1-year mortality (OR, 1.04-1.12), number needed to harm, 227), mean hospital stay (difference, 0.67 days; CI, 0.36-0.78), preoperative testing, and postoperative pharmacologic interventions. Notably, consultation was not associated with any difference in postoperative second admissions (OR, 0.98; 95% CI, 0.83-1.16). These findings were confirmed in subsequent sensitivity analyses that tested for unmeasured confounding.

**Conclusions:** Medical consultation before major elective noncardiac surgery is associated with increased mortality and hospital stay, as well as increases in preoperative pharmacologic interventions and testing. These findings highlight the need to better understand mechanisms by which consultation influences outcomes and to identify efficacious interventions to decrease preoperative risk.

*Arch Intern Med.* 2006;176(13):1485-1494

- Preoperative consultation associated with **Increased 30-day mortality** (RR 1.16, NNH 516)
- Increased costs
- Increased LOS
- Causes?
- more beta blockade
- less DVT proph
- 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. J GEN INTERN MED 2002; 17:933-938.*

- ◆ 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
- ◆ History of CHF
- ◆ History of CVA
- ◆ Insulin-requiring diabetes
- ◆ Creatinine >2gm/dL
- ◆ High risk surgery  
(vascular, intrathoracic, intraabdominal)

◆ 0 point - 0.4% risk of MI or cardiovascular death

◆ 1 point - 1.0%

◆ 2 points - 2.4%

◆ 3 points - 5.4%

# 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  
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diltiazem, HCTZ,  
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- ◆ Exam: Pulse 92, BP 165/95

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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?

		% reach endpoint	# to reach endpoint	30 day mortality %	30 day mortality total
POISE	10,000 patients	5%	500 patients	12%	60 patients
NSQIP	10,000 patients	0.65%	65 patients	61%	40 patients

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

# 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

# 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 30days
  - ◆ 43% (invasive) v 33% (med manage) reached endpoint, non-significant difference
  - ◆ Secondary endpoints (1-year f/u) likewise no difference

# Other benefits of Stress Test?

- ◆ Wijeyesundera 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 #)

# Additional risk tool

- ◆ Meta-analysis of Preop Stress echo vs. Nuclear stress testing
  - ◆ 68 studies, involving 10,000+ patients

	ROC	Positive LR	Negative LR	Positive LR if moderate-large defect
Stress echo	0.80	4.09	0.23	8.35
Nuclear Stress	0.75	1.83	0.44	8.35

# 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

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

# 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

# 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

# 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 1/2!)
- ◆ 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

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NSQIP – 10.37%

# 78 yo preop for brain surgery

- Problem List

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- ◆ 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

NSQIP – 17.07%

# What else is new?

- Risk Assessment
  - VSGNE – surgery specific risk assessment
  - Biomarker data growing specifically BNP
- Periop DVT proph
  - DTI- dabigatran
  - Xa inhibitors – rivaroxaban, apixaban
- Postop anemia
  - TARGET study- not published no difference b/w transfusion at hgb <10gm vs. 8gm/dl in CV outcomes

Thank you for your time

Questions? Comments?

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