

An Evidence Based Approach to Preoperative Cardiac Evaluation

Darrell W. Harrington, MD

An Evidence-based Approach:

“Evaluation of the patient undergoing non-cardiac surgery”

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Disclosure of financial relationships

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Has disclosed relationships with entities producing, marketing, re-selling, or distributing health care goods or services consumed by, or used on, patients.

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Resolution of Potential Conflicts of Interest:
-All presented material is independent of industry produced content.
-Only material supported by published data and Evidence-based guidelines will be presented.

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Outline and Objectives

- Introduction
- Case Presentations
- Review of data and guidelines used to provide an “Evidence-based Preoperative Evaluation” for patients undergoing non-cardiac surgery - ACC/AHA 2007 guidelines.

Objective - To critically review available data and guidelines and their application to real world decision making related to the “Preop Consultation”

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Scope of the Problem . . .

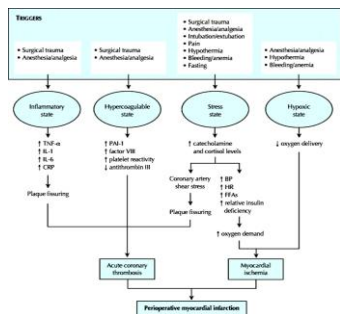
- 33 million North Americans undergo noncardiac surgery.
- 1 million of these will sustain medical complications
 - MI, heart failure, stroke, pneumonia, respiratory failure, venous thromboembolism, delirium, or renal failure.
- Complications cost \$25 billion dollars/year (50%↑in cost)
- The Geriatric angle:
 - The proportion of US adults older than 65 years will double in the next 20 years from 35 to 70 million people.
 - Resulting in 25% more surgeries; 50% surgery related cost; and 100% increase in surgical complications.

Scope of the problem continued. . .

- 25% of patients undergoing NCS have 1 or more co-morbid conditions (DM, HTN, CHF, PVD, CKD).
- 1-5% unselected patients suffer a major perioperative CV event.
 - 2/3rd Myocardial infarction; 1/3rd CHF and arrhythmia
 - MI's occur primarily in the first 3 days postoperatively (~14% with chest pain)
 - Perioperative MI have a in-hospital mortality of 15-25%
 - Recurrent events are ↑ 18x within the first 6 months
- Overall few RCT to evaluate interventions to decrease perioperative cardiovascular events.

Potential Triggers of States Associated with Perioperative CV Events

Devereaux, P.J. et al. CMAJ 2005;173:627-634



Complications and Cost

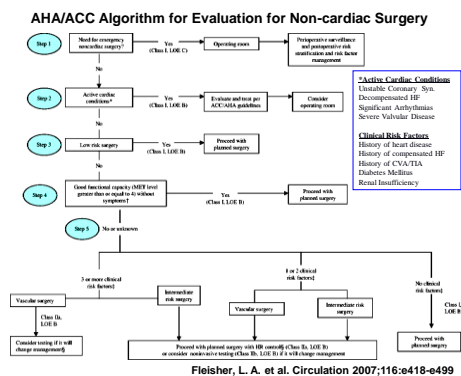
- Attributable costs:
 - Infectious complications - \$1,398
 - Cardiovascular complications - \$7,789
 - Respiratory complications - \$52,466
 - Thromboembolic complications - \$18,310

Dimick JB, et al. J Am Coll Surg 2004;199:531-7.

The Rule of 3's

Data Collection

- Acute History
 - Acute exacerbations of chronic problems or new important complaints
- Chronic History
 - Precisely and accurately define medical problems, extent of disease, physiologic limitations, optimization of treatment
- Physical Examination
 - Airway, functional status, patient expectations



An Evidence Based Approach to Preoperative Cardiac Evaluation

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Case 1

- **HPI:** A 72 year old male with type II DM (insulin requiring), and HTN and severe DJD scheduled for elective total hip replacement under regional anesthesia. He has no complaint of chest pain or SOB. He is otherwise healthy, but unable to climb stairs or walk briskly because of joint discomfort. Previous smoker 30 years now abstinent.
- **MEDS:** Novolin (70/30) 20/10 units, Benazepril 40 mg qDay, Metformin 1000 mg BID, ASA 81 mg q Day.
- **EXAM:** VS: BP - 128/72 HR - 76 RR - 14 T - 98.2 F
Elderly male in NAD. Significant for no JVD, no carotid bruits and normal upstroke. Lungs both clear w/o crackles. Heart with RRR, with ectopy, soft SEM @ base w/o radiation to carotids. Abdomen was benign. Lower ext w/o edema and good pulses.
- **DATA:** Preop labs - normal. Last Hgb A1C = 7.2% (1 mo prior). His ECG shows only a few PACs per minute, isolated Q in III, and LVH. No obvious disease on CXR. LDL = 127 mg/dl three months ago.

Case 2

- **HPI:** An 85 year-old female with a known history of DM, HTN, s/p left AKA now evaluated for possible right Aorta-fem vs. fem-pop bypass for a slowly healing ulcer on her right heel. She requires assistance only for transfer in and out of a pickup truck. She spends the majority of her day sewing. Denies CP, PND, DOE.
- **MEDS:** Glipizide 10 mg BID, Benazepril 20 mg qDay, and ASA 81 mg q Day.
- **EXAM:** VS: BP - 142/82 HR - 66 RR - 14 T - 98.4 F
Small elderly female in NAD. Significant for no JVD, normal carotid upstrokes. Lungs both clear w/o crackles. Heart with RRR, with ectopy, soft II/VI SEM @ base with radiation to carotids. Abdomen was benign. Lower ext w/o edema and good pulses.
- **DATA:** Labs - nl, except Hgb-11 g/dl, Hgb A1C = 8.5% (4 mo prior). His ECG reveals LVH. No obvious disease on CXR. Lipid panel unknown.
 - Resting 2D-Echo (ordered by surgeons) - concentric LVH, normal WM, Aortic Sclerosis with mild stenosis, trace MR/TR, EF=50-55%.

Key Questions

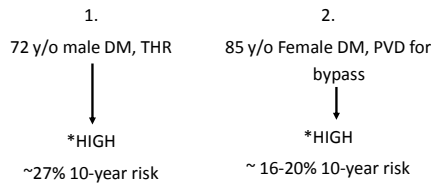
1. What is the likelihood that this patient has CAD?
2. "What is the risk of an adverse cardiac event?"
3. "What can be done to reduce this risk?"
 - Which patients should undergo further diagnostic tests?
 - When should patients be exposed to interventions (ie. pharmacological or mechanical)?

Key Questions

- 1. **What is the likelihood that this patient has CAD? (Explicit vs. Implicit)**
- 2. **“What is the risk of an adverse cardiac event?”**
- 3. **“What can be done to reduce this risk?”**
 - Which patients should undergo further diagnostic tests?
 - When should patients be exposed to interventions (ie. pharmacological or mechanical)?

Case Presentations

Likelihood for CAD



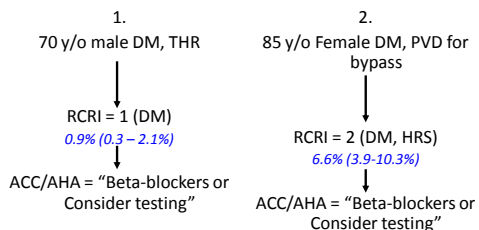
*Based on the modified Framingham Risk calculation

Key Questions

- 1. **What is the likelihood that this patient has CAD? (Explicit vs. Implicit)**
- 2. **“What is the risk of an adverse cardiac event?”**
- 3. **“What can be done to reduce this risk?”**
 - Which patients should undergo further diagnostic tests?
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Case Presentations

Risk for Adverse Cardiac Event (ACE)



Fueling the fire for β -blocker use . . .

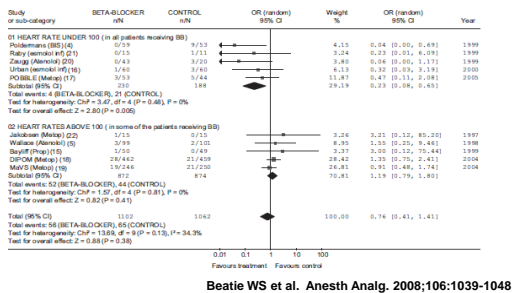
- **The Potential Preventability of Postoperative Myocardial Infraction - Underuse of Perioperative β -adrenergic blockade.** Lindenauer PK, et al. *Arch Intern Med.* 2004;164:762-766.
 - 97% of selected patients (RCRI score of 1 or more/2 or more CAD RF) who developed post-op MI could have been prevented with use of β -blockers
- **Lack of Physician Concordance with Guidelines on the Perioperative Use of β -blockers.** Siddiqui AK, et al. *Arch Intern Med.* 2004;164:664-667.
 - 146 selected patients (known CAD or 2 or more CAD RF) undergoing cholecystectomy. Only 70% did not receive β -blockers on admission with most never receiving a single preop dose. Cardiologist and General internist were just as unlikely to initiate preop.
- **Lack of Adherence with Preoperative β -blocker Recommendations in a Multicenter Study.** Kolodner DQ, et al. *J Gen Intern Med.* 2006;21:596-601.
 - Only 44% of 1305 patients received β -blockers before surgery (only 14% if naïve).

Applying classification of recommendations and level of evidence (ACC/AHA)

	"Size of Treatment Effect"			
	Class I	Class IIa	Class IIb	Class III
Level I	<p>Strong \rightarrow Best</p> <p>Benefit \gg Risk</p> <p>Procedure/Treatment MUST BE used</p> <p>IT IS REASONABLE to perform periprocedural/preoperative treatment</p>	<p>Benefit \gg Risk</p> <p>Additional studies with focused objectives needed</p> <p>IT IS REASONABLE to perform periprocedural/preoperative treatment</p>	<p>Benefit \gg Risk</p> <p>Additional studies with focused objectives needed, additional registry data would be helpful</p> <p>Procedure/Treatment MAY BE CONSIDERED</p>	<p>Risk \gg Benefit</p> <p>Additional studies needed</p> <p>Procedure/Treatment SHOULD NOT be performed/preoperatively</p>
Level II	<p>Multiple (II) population risk study indicated</p> <p>General consistency of direction and magnitude of effect</p> <p>Recommendation that treatment or procedure is useful/effective</p> <p>Conflicting evidence from multiple randomized trials or meta-analysis</p>	<p>Recommendation in favor of treatment or procedure being useful/effective</p> <p>Conflicting evidence from multiple randomized trials or meta-analysis</p>	<p>Recommendation's usefulness/effectiveness less well established</p> <p>Greater conflicting evidence from multiple randomized trials or meta-analysis</p>	<p>Recommendation that treatment or procedure is not useful/effective and may be harmful</p> <p>Conflicting evidence from multiple randomized trials or meta-analysis</p>
Level III	<p>Single (II) population risk study indicated</p> <p>Recommendation that treatment or procedure is useful/effective</p> <p>Only expert opinion, case studies, or standard of care</p>	<p>Recommendation in favor of treatment or procedure being useful/effective</p> <p>Only diverging expert opinion, case studies, or standard of care</p>	<p>Recommendation's usefulness/effectiveness less well established</p> <p>Only diverging expert opinion, case studies, or standard of care</p>	<p>Recommendation that treatment or procedure is not useful/effective and may be harmful</p> <p>Only expert opinion, case studies, or standard of care</p>

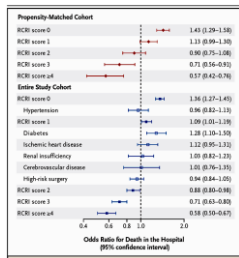
Fleisher, L. A. et al. *Circulation* 2007;116:e418-e499

Tight Heart Rate Control Improves Efficacy of Beta-blockers



Lindenauer et al, NEJM 2005

- Retrospective evaluation of 663K pts undergoing NCS
 - ~ 18% with periop BB use.
- Each patient's RCRI score was calculated.
- Concluded:** perioperative β -blockers reduced risk of in-hospital death among high risk patients, but not low risk patients
 - RCRI ≥ 3 : significant reduction in mortality
 - RCRI = 2: beneficial
 - RCRI 0-1: no benefit and possible harm (unless the score is for ischemic heart disease)



N Engl J Med 2005;353:349-61

The Cons' Explanation . . .

- The only RCT in "average risk" patients undergoing NCS reporting benefit was the Mangano trial of 1996.
 - Little explanation for the purported long-term benefits and protection of a short course of therapy of beta-blockers perioperatively.
 - No data that beta-blockers prevent overt CAD or MI in patients with risk factors for CAD as primary prevention.
- The problem is not so much the patients with overt CAD, CHF or even those undergoing major vascular surgery. It's the widespread use which is the concern
- The Lindenauer study also describes the potential harm of widespread use.

Preoperative Cardiac Evaluation
 Trial

- Methods: RPCT of 8351 patients (> 45 yrs) with or at risk of atherosclerotic disease undergoing elective NCS.
 - ~ 43% with CAD and 6% with CHF
- Patients received 100 mg of long-acting (CR) Metoprolol 2-4 hrs before surgery and 6 hrs postop. 200 mg 12 hrs later then qDay for 30 days. Fixed regimen given unless safety endpoint reached (systolic BP < 100 mmHg or significant bradycardia)
- Patients: > 80% with criteria for CAD and/or PAD
- **Primary Endpoints:** composite of cardiovascular death, non-fatal MI, and non-fatal cardiac arrest.
- Secondary Endpoints: Revascularization, CVA, AF, Total Mortality

The POISE Study Group. Lancet May 2008

Poise Trial: The Results

Outcome	Metoprolol (n=4174), n (%)	Placebo (n=4177), n (%)	Hazard ratio	P value
Primary Composite	243 (5.8)	290 (6.9)	0.83	0.04
Nonfatal MI	151 (3.6)	215 (5.1)	0.70	0.0007
Total Mortality	129 (3.1)	97 (2.3)	1.33	0.03
Stroke	41 (1.0)	19 (0.5)	2.17	0.005

The POISE Study Group. The Lancet 2008;371:1839-47.

Poise Trial: The Results - continued

Outcome	Metoprolol (n=4174), n (%)	Placebo (n=4177), n (%)	Hazard ratio	P value
Revascularization	11 (0.3)	27 (0.6)	0.41	0.01
Atrial Fibrillation	91 (2.2)	120 (2.9)	0.76	0.04
Significant bradycardia	274 (6.6)	101 (2.4)	2.71	<0.0001
Significant hypotension	626 (15.0)	404 (9.7)	1.55	<0.0001

The POISE Study Group. The Lancet 2008;371:1839-47.

What does POISE really mean?

- For every 1000 patients treated this way:
 - Prevent 15 myocardial infarctions
 - Cause 8 deaths
 - Cause 5 strokes
 - Clinically significant hypotension in 53
 - Clinically significant bradycardia in 42
- “Although perioperative beta-blockers decreased postop MI and cardiac death, it did so at the expense of increased mortality and stroke.”

The POISE Study Group. The Lancet 2008;371:1839-47.

Implications for Practice

- POISE did prove that beta-blockers reduce perioperative CV events (Nonfatal MI's)
- Fixed-dose regimens may be too aggressive leading to increase risk of hypotension and bradycardia
- Many of the patients in the trial not “average risk” patients for CAD.
- If you are going to use BB must utilize a safe protocol of administration and monitoring.

Bangalore Meta-Analysis, 2008

- Findings: 33 trials included 12,306 patients.
- Results: β blockers were not associated with any significant reduction in the risk of all-cause mortality, cardiovascular mortality, or heart failure, but were associated with a decrease (odds ratio [OR] 0.65, 95% CI 0.54-0.79) in non-fatal myocardial infarction (number needed to treat [NNT] 63) and decrease (OR 0.36, 0.26-0.50) in myocardial ischemia (NNT 16) at the expense of an increase (OR 2.01, 1.27-3.68) in non-fatal strokes (number needed to harm [NNH] 293).
 - The beneficial effects were driven mainly by trials with high risk of bias. For the safety outcomes, β blockers were associated with a high risk of perioperative bradycardia requiring treatment (NNH 22), and perioperative hypotension requiring treatment (NNH 17). We recorded no increased risk of bronchospasm.

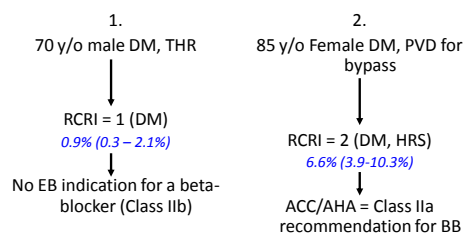
Bangalore Lancet 2008; 372: 1962-76

Application to Practice:

1. Use in patients with indications for BB or positive stress test undergoing major vascular surgery.
2. Empiric use likely beneficial in patients with RCR index ≥ 3 undergoing intermediate to high risk surgery.
3. Question utility in patients with RCR Index ≤ 2 (if no overt CAD or CHF). Risk for CAD not equal to risk for PCVE!
4. Start as early as possible prior to surgery (days or weeks)
5. Make sure that adequate sympatholysis is achieved (HR < 65-70). This may not be possible in a 1/3rd of patients.
6. Beta-blockers are not a substitute for a vigilant and appropriate preoperative evaluation!

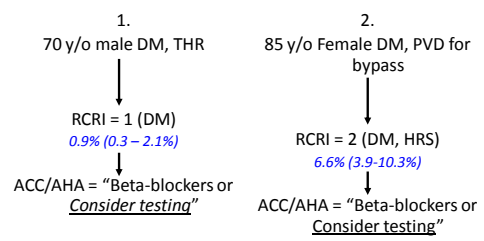
Case Presentations

Risk for Adverse Cardiac Event (ACE)



Case Presentations

Risk for Adverse Cardiac Event (ACE)



ACC/AHA Guideline – “Themes”

- “ . . . Intervention is rarely necessary simply to lower the risk of surgery unless such intervention is indicated irrespective of the preoperative context.”
- “ . . . The use of both noninvasive and invasive preoperative testing should be limited to those circumstances in which the results of such tests will clearly affect patient management.”

J Am Coll Cardiol. 2007

Key Questions

1. What is the likelihood that this patient has CAD? (Explicit vs. Implicit)
2. “What is the risk of an adverse cardiac event?”
3. “What can be done to reduce this risk?”
 - Which patients should undergo further diagnostic tests?
 - When should patients be exposed to interventions (ie. pharmacological or mechanical)?

What should I do with the patient who has a positive stress test?

Do subsequent interventions reduce the perioperative cardiac event rate?

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The role of noninvasive testing . . .

- Risk-assessment tool must be accurate
 - Predicts perioperative events (+ LR > 10)
 - Predicts absence of perioperative events (- LR < 0.2)
- Risk-assessment tool must influence outcome
 - Identifies subgroups in which surgery should be cancelled or treatment changed
 - Identifies subgroups that do or do not benefit from proven therapy to reduce risk
- Risk-assessment tool must have a favorable harms-benefit trade-off.

Studies of vasodilator stress nuclear perfusion imaging for risk stratification

Study (Reference)	Surgery	Patients n	Death or Myocardial Infarction	Predictive Values		Likelihood Ratios	
				Positive	Negative	Positive	Negative
Eagle et al. (23)	Vascular	200	8	16	98	2.32	0.21
Cutler and Leggio (28)	Abdominal aortic	116	10	20	100	2.44	0
Younis et al. (29)	Vascular	111	7	15	100	2.27	0.37
Hendel et al. (30)	Vascular	327	9	14	99	1.49	0.16
Letts et al. (31)	Mixed	365	8	17	99	2.27	0.12
Brown and Rowen (32)	Vascular	231	5	13	99	2.04	0.11
Vasanthakumari et al. (33)	Abdominal aortic	134	5	13	98	2.02	0.43
Bates et al. (34)	Abdominal aortic	457	5	4	96	0.91	1.65
Roy et al. (35)	Vascular	237	7	11	98	1.52	0.18
Younis et al. (36)	General	161	9	18	98	2.18	0.22
Roghi et al. (37)	Vascular	320	4	5	96	1.86	0.52

- Is it accurate? No
- Does it influence outcome? No
- Is the harms-benefit tradeoff favorable? No

Meta-analysis: summary LH ratios and Post-test Probability of perioperative cardiac events for d-Pthal in patients undergoing vascular surgery

Extent of reversibility of myocardial defects	Likelihood ratio (95% CI)	Post-test probability† of MI or cardiac death, % (95% CI)	% of scans with this result
No defects	0.42 (0.20-0.88)	3 (1-6)	30
Fixed defects only	0.51 (0.24-1.1)	4 (2-8)	30
Reversibility < 20%	1.3 (0.88-1.9)	9 (6-13)	17
Reversibility 20%-29%	1.6 (1.0-2.6)	11 (7-16)	11
Reversibility 30%-39%	2.9 (1.6-5.1)	18 (11-28)	6
Reversibility 40%-49%	2.9 (1.4-6.2)	18 (10-32)	3
Reversibility ≥ 50%	11 (5.8-20)	45 (30-60)	3

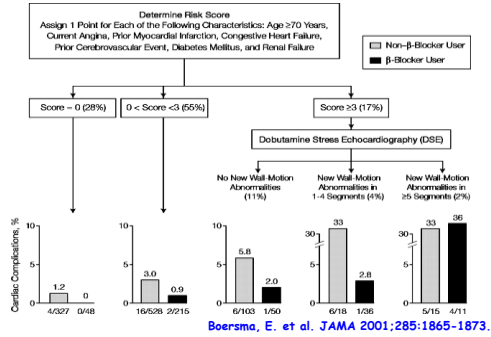
Etchells E. et al. J Vasc Surg 2002;36:534-40

Studies of Dobutamine Stress echocardiography for risk stratification

Study (Reference)	Surgery	Patients	Death or Myocardial Infarction	Predictive Values		Likelihood Ratios	
				Positive	Negative	Positive	Negative
Poldermans et al. (40)	Vascular	131	4	14	100	5.88	0
Poldermans et al. (41)	Vascular	300	6	24	100	5.26	0
Das et al. (42)	General	530	6	15	100	2.70	0
Boersma et al. (43)	Vascular	1097	3	14	98	3.78	0.39

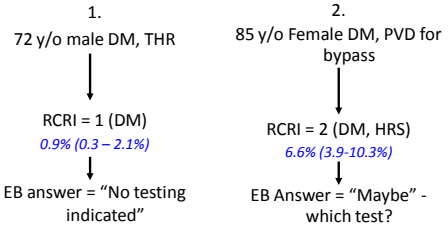
Is it accurate? No
 Does it influence outcome? Maybe
 Is the harms-benefit tradeoff favorable? No

Effect of Beta-blockers on High Risk Vascular Surgery Patients



Case Presentations

Do you want to order a NI test now? If so which one?



ACC/AHA Guideline – “Themes”

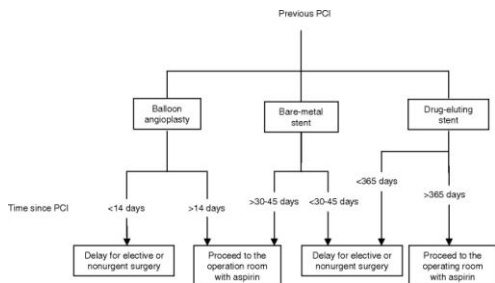
“The decision to perform revascularization on a patient before noncardiac surgery to “get them through” the noncardiac procedure is appropriate only in a small subset of very-high-risk patients. Patients undergoing elective noncardiac procedures who are found to have prognostic high-risk coronary anatomy and in whom long-term outcome would likely be improved by coronary bypass grafting should generally undergo revascularization before elective surgical procedure of high or intermediate risk.”

J Am Coll Cardiol. 2007

Preoperative Interventions

1. Cancel Procedure
2. Delay Procedure
3. Change the Procedure
4. Start a “Miracle Drug”
5. Preoperative Revascularization
 - A. PCI
 - B. CABG

ACC/AHA 2007



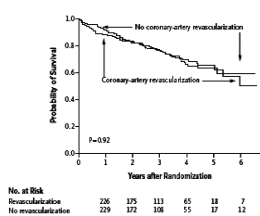
Grines CL, et al. Circulation 2007;115:812-8

CARP Trial

- Coronary Artery Revascularization Prophylaxis (CARP) Trial: US Veterans, 510-patients in 18 hospitals
 - Coronary revascularization (PCI or CABG) vs. no revascularization (medical therapy-poorly defined) in patients undergoing elective AAA or for severe PVD.
 - 5859 Patients screened, 1190 angiography (680 excluded for anatomical criteria - not amenable to RV, severe AS, LM, 3V with ↓EF) → 510 for randomization (33% each for 1, 2, or 3V)
 - Inclusion: elective high-risk abdominal/lower limb vascular surgery. Eligible if one or more major vessels with > 70% stenosis. Local investigators decided on which interventional procedure.
 - Exclusion (4669 or 80%): insufficient risk (1654), need for urgent/emergent surgery (1025), severe coexisting co-morbid condition (731), CAD anatomy, valve disease, ↓ EF
 - Primary outcome - long-term mortality. Patients followed for at least 2.5 years

McFalls EO, et al. N Engl J Med 2004;2795-804

CARP Trial - results



- Follow-up
- 2.6 years in medically treated group vs. 2.8 years in revascularization group/
- Results:
- Mortality 22% vs. 23%, Relative risk=0.98;95% CI 0.70-1.37; P=0.92.
 - Postop MIs - 12% vs. 14% (p=0.37)
 - Median wait time to surgery 54 days vs. 18 days.

McFalls EO, et al. N Engl J Med 2004;2795-804

CARP Results - detailed

	Revasc (n=225)	No Revasc (n=237)
Death before surgery	10	1
Death w/in 30 d of surg (postop)	7 (3%)	8 (3%)
Postop MI: enzymes	26 (12%)	34 (14%)
Enzymes and ECG	19 (8%)	20 (8%)
Long-term death (2.7 years after random)	70 (22%)	67 (23%)
Required later revasc	N/A	21 (8%)

DECREASE - continued

- CONCLUSIONS: "Cardiac testing can safely be omitted in intermediate-risk patients, provided that beta-blockers aiming at tight HR control are prescribed."
- LIMITATIONS:
 - No control group for beta-blockers and thus it is possible that beta-blockers did not add any benefit compared to placebo.
 - Although testing did identify a small group of intermediate risk patients with severe ischemia, only a small number (12) underwent revascularization. Therefore this study can not make conclusions about the benefits procedures in individual patients.

The DECREASE-V Pilot Study

- Feasibility study: utility of preoperative prophylactic coronary revascularization in patients with extensive ischemia.
- Screened 1880 pts -> 430 with RCRI \geq 3.
- 430 screened with DSE or DPNS. Only those with extensive ischemia (\geq 5/17 segments or \geq 3/6 walls); n = 101
- All received "best medical therapy" and randomized to revascularization vs. no revascularization (Antiplatelets were continued).
- Primary outcome: 30d and 1 year composite - all cause death and MI

Poldermans D et al. J Am Coll Cardiol 2007;49:1763 - 1769

Study Outcomes

	No Revasc - 52 N (%)	Revasc - 49 N (%)
30 day events		
All-cause mortality	6 (11.5)	11 (22.5)
MI	16 (30.8)	17 (34.7)
Composite	17 (32.7)	21 (42.9)
1 yr events		
All-cause mortality	12 (23.1)	13 (26.5)
MI	19 (36.5)	18 (36.7)
Composite	23 (44.2)	24 (49.0)

Poldermans D et al. J Am Coll Cardiol 2007;49:1763 - 1769

Author Conclusions:

- Prophylactic revascularization did not improve perioperative outcomes above “best medical therapy” in patients with inducible ischemia undergoing vascular surgery.
 - Larger study required with greater than 2000 patients with RCRI ≥ 3 to provide adequate power.

The Courage Trial Investigators . . .

“ . . .Therefore, unstable coronary lesions that lead to myocardial infarction are not necessarily severely stenotic, and severely stenotic lesions are not necessarily unstable.”

Boden WE, et al. N Eng J Med 2007;356:1503-16.

Application to Practice

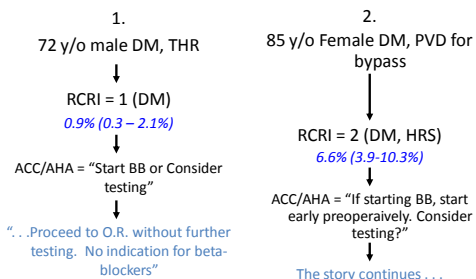
- Routine testing in asymptomatic patients (even in those with multiple clinical predictors) is not warranted in the majority of patients undergoing elective NCS.
- Only testing in which results will clearly alter the planned procedure or dictate a preoperative intervention with proven efficacy and safety should be performed.

So where does that leave us?

- While we can estimate overall risk of adverse perioperative cardiac events, we can not predict when or where this will happen.
- Adoption of a aggressive strategy exposing many to potential dangerous interventions to only save a few is risky business.
- In the end we are left with using “knowledge” and “judgment” to make informed, efficacious, and safe decisions regarding patient care during the preoperative consult.
- What does the patient think about all this? After all their the ones taking the biggest risk!

Case Presentations

So what are you going to do?



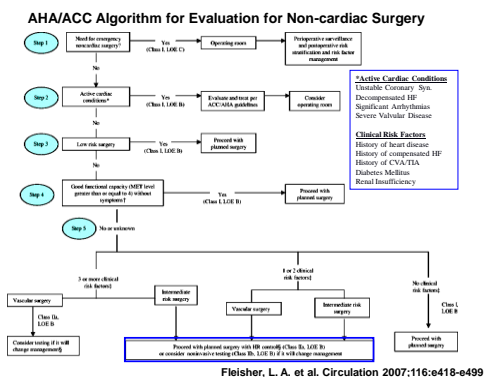
Schouten et al, NEJM 2009

Decrease III

- Prospective randomized placebo controlled double blind clinical trial
- 497 patients about to undergo vascular surgery randomized to placebo (n=247) or Fluvastatin 80mg (n=250) preoperatively
- Patients were followed for 30 days
- End point: Myocardial ischemia; death from cardiac cause and nonfatal MI
- Event rates: Fluvastatin vs. Placebo
 - Myocardial Ischemia: 10.8% vs. 19.0%; HR=0.55 [CI 0.34-0.88], P<0.01
 - Fatal and Nonfatal MI: 4.8% vs. 10.1%; HR=0.47 [CI 0.24-0.94], P=0.03

Case 2- continued

- An 85 year-old female with a known history of DM, HTN, s/p left AKA now evaluated for possible right Aorta-fem vs. fem-pop bypass for a slowly healing ulcer on her right heel.
- When confronted with the possibility of revascularization the patient sternly refused.
- In addition, she stated that she wanted to save the foot at all cost as sewing clothes for her grandchildren and great grandchildren was extremely important to her.
- At the bedside the patient's family was asked how does she (the patient) get around at home with one foot and a walker without other assistance. The reply, "She hops around the house".
- Puzzled I asked the patient to get out of bed and demonstrate. She then hopped out the room and down the hall
- The rest was history . . . A BB and a Statin were begun. She had an uneventful revascularization procedure and was discharged on POD#4.



Key Messages . . .

- The ACC/AHA guideline is a sensitive tool to decide who does not require additional testing or interventions.
- Asymptomatic patients [regardless of functional status] with an RCRI score of ≤ 2 do not routinely require additional diagnostic testing or preoperative interventions
- An accurate history and physical assessment is the most important preoperative tool available to minimize unnecessary harm to a specific patient.
- Beta-blockers are not a substitute for responsible and vigilant evaluation.
 - Empiric use for Class I indications and RCRI ≥ 3 . If used preoperatively they should be used days to weeks before surgery to ensure adequate sympatholysis (HR < 65)

