PREOPERATIVE EVALUATION:
A PRACTICAL APPROACH

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DISCLOSURES / DISCLAIMERS

- DISCLOSURES: NONE

- DISCLAIMER: NONE


OBJECTIVES
Review
guidelines and the different cardiac risk calculators
Understand
appropriate ordering of preoperative testing
Discuss
medication adjustment during the perioperative period
Review
unique surgical scenarios
Urinalysis
Urinalysis

Frank started to get a funny feeling that his doctor was a quack.

WHY DO WE PREOP?

- EVALUATE EXTENT OF KNOWN DISEASE PROCESSES
- UNCOVER NEW DIAGNOSES
- PREDICT WHICH PATIENTS ARE AT RISK FOR POSTOPERATIVE COMPLICATIONS

PREOPERATIVE EVALUATION

HISTORY

- EVALUATE CURRENT MEDICAL ISSUES
- UNCOVER ANY ACTIVE CARDIAC CONDITIONS (ANGINA/CHF/ETC.)
- PRIOR COMPLICATIONS WITH ANESTHESIA
- PRIOR SURGICAL COMPLICATIONS (HEMORRHAGE/DVT/PE)
- SCREEN FOR OBSTRUCTIVE SLEEP APNEA
- DETERMINE FUNCTIONAL CAPACITY

PREOPERATIVE EVALUATION

PHYSICAL

- VITALS
- CARDIAC: AUSCULTATION FOR MURMURS, S3, AND S4; CAROTID PALPATION AND AUSCULTATION
- RESPIRATORY: AUSCULTATION OF LUNGS
- EXTREMITIES: EXAMINE FOR EVIDENCE OF POOR CIRCULATION AND EDEMA

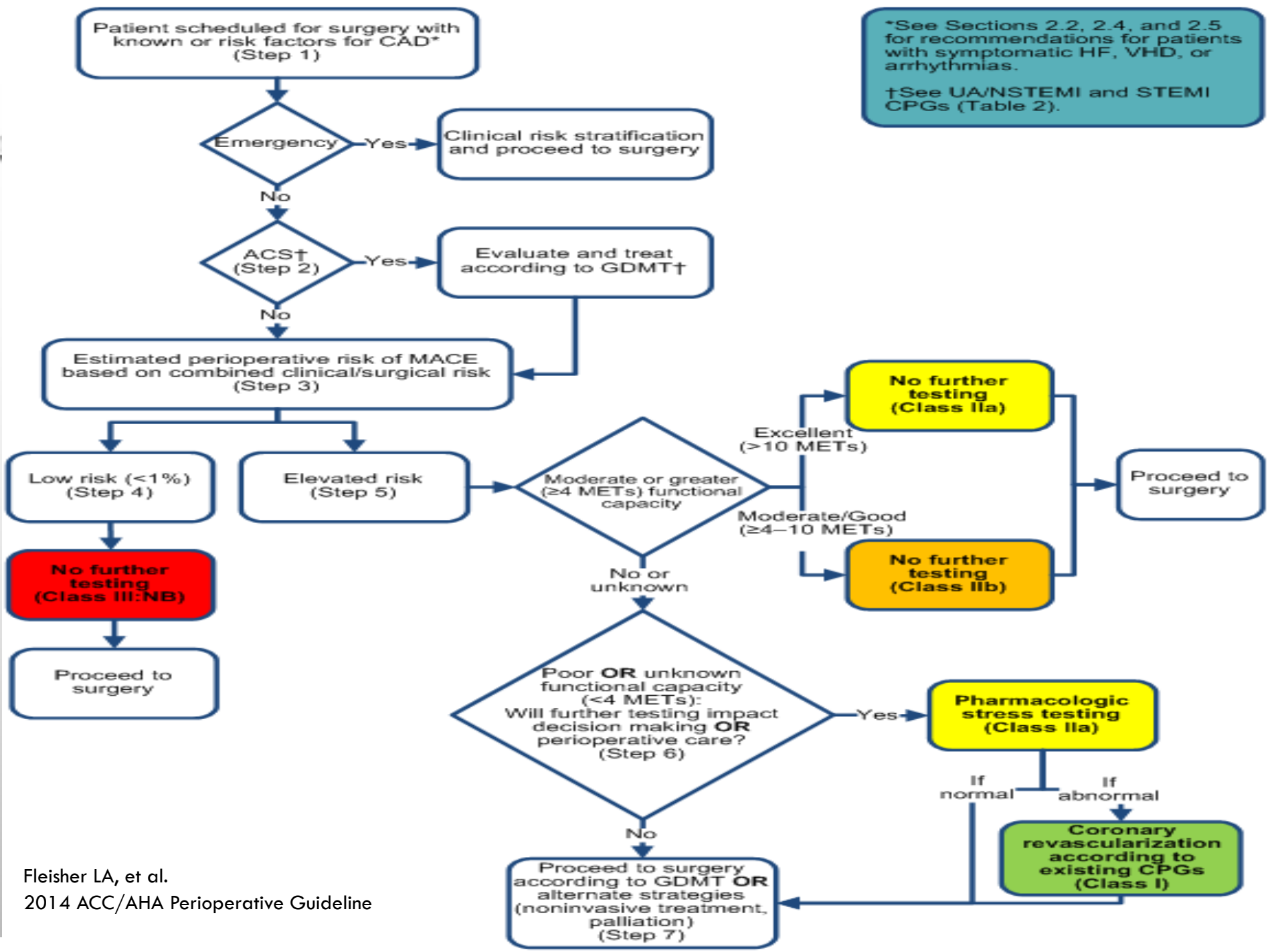
FUNCTIONAL CAPACITY

- 1 MET = 3.5 ML O2 UPTAKE/KG/MIN
- INCREASED PERIOPERATIVE RISK IF UNABLE TO ACHIEVE >4 METS

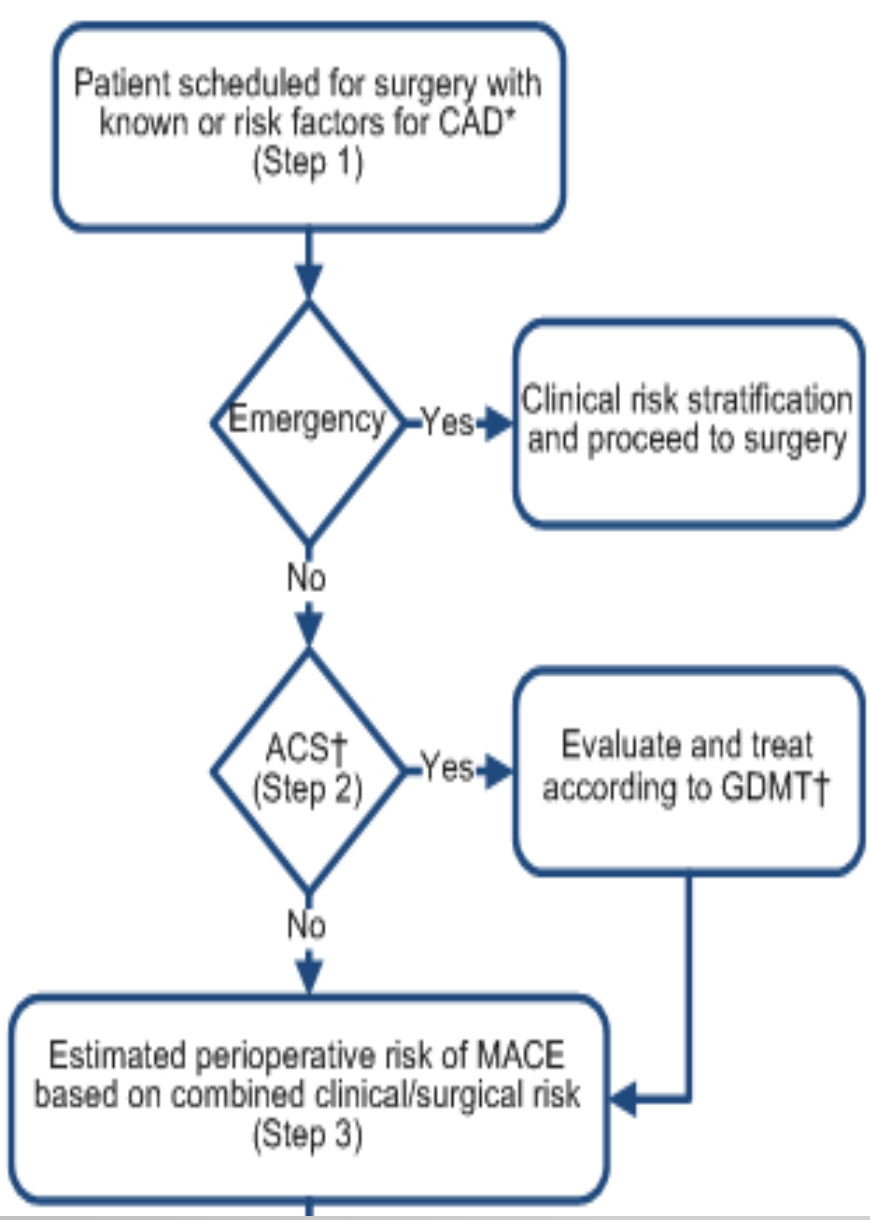
Moderate-intensity Physical Activity (Approximately 3-6 METs) Requires a moderate amount of effort and noticeably accelerates the heart rate.	Vigorous-intensity Physical Activity (Approximately >6 METs) Requires a large amount of effort and causes rapid breathing and a substantial increase in heart rate.
Examples of moderate-intensity exercise include:	Examples of vigorous-intensity exercise include:
• Brisk walking	• Running
• Dancing	• Walking / climbing briskly up a hill
• Gardening	• Fast cycling
• Housework and domestic chores	• Aerobics
• Traditional hunting and gathering	• Fast swimming
• Active involvement in games and sports with children / walking domestic animals	• Competitive sports and games (e.g. Traditional Games, Football, Volleyball, Hockey, Basketball)
• General building tasks (e.g. roofing, thatching, painting)	• Heavy shovelling or digging ditches
• Carrying / moving moderate loads (<20kg)	• Carrying / moving heavy loads (>20kg)

Review
guidelines and the different cardiac risk calculators

"Henry! Our party's total chaos! No one knows when to eat, where to stand, what to....
Oh, thank God! Here comes a border collie!"



Fleisher LA, et al.
2014 ACC/AHA Perioperative Guideline



EMERGENCY

- LIFE OR LIMB IS THREATENED IF NOT IN THE OR
- <6 HOURS

URGENT

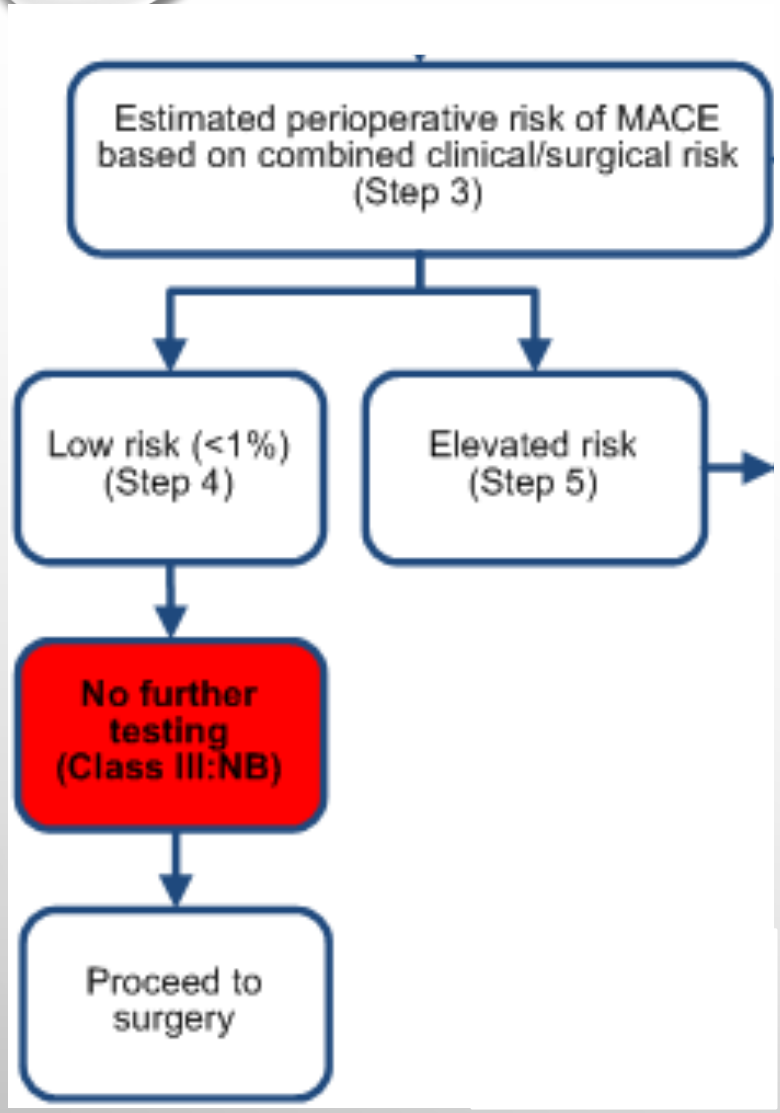
- TIME FOR LIMITED EVALUATION
- 6-24 HOURS

TIME SENSITIVE

- DELAYS OF >1-6 WEEKS WOULD NEGATIVELY AFFECT OUTCOME

ELECTIVE

- DELAYS UP TO A YEAR ACCEPTABLE



Estimating risk of major adverse cardiac event (MACE)

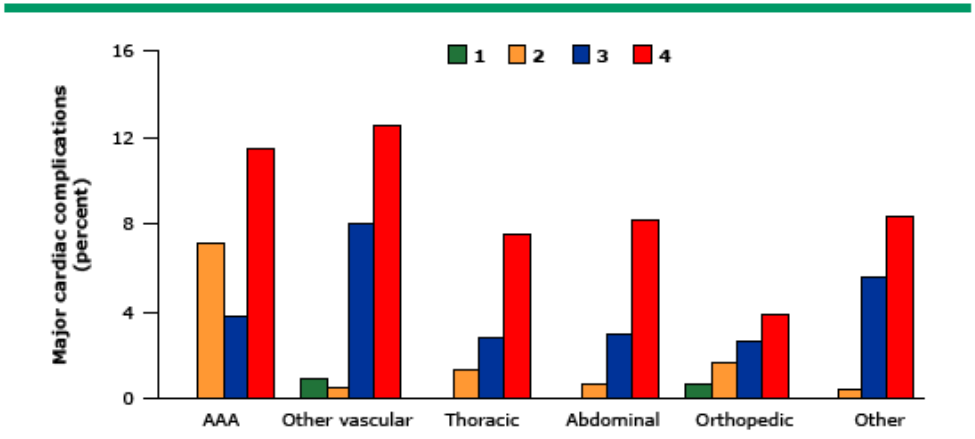
- Revised cardiac risk index (RCRI)
  - High risk surgery
  - CAD
  - CHF
  - Cr >2
  - TIA/CVA
  - IDDM
- NSQIP surgical risk calculator
  - www.riskcalculator.facs.org
- NSQIP MICA (Gupta)
  - www.surgicalriskcalculator.com

REVISED CARDIAC RISK INDEX

- DEVELOPED IN 1999
- WIDELY USED
- EASY TO CALCULATE
- FACTORS INCLUDED
  - HIGH RISK SURGERY
  - CAD
  - CHF
  - CR >2
  - TIA/CVA
  - IDDM

RCRI Score	Risk of major cardiac event*
0	0.4%
1	0.9%
2	6.6%
≥3	11%

Incidence of major cardiac complications increases with the number of risk factors



ACS NSQIP®

Surgical Risk Calculator

American College of Surgeons
100+ years
Inspiring Quality: Highest Standards, Better Outcomes

- WEB BASED TOOL
- INCLUDES 20 INDICATORS PLUS THE SURGICAL PROCEDURE
- PREDICTS MORTALITY WELL
- 11 ADDITIONAL OUTCOMES REPORTED
- MORE CUMBERSOME TO USE
- NOT EXTERNALLY VALIDATED

Procedure 27447 - Arthroplasty, knee, condyle and plateau; medial AND lateral compartments with or without patella resurfacing (total knee arthroplasty) **Clear**

Begin by entering the procedure name or CPT code. One or more procedures will appear below the procedure box. You will need to click on the desired procedure to properly select it. You may also search using two words (or two partial words) by placing a '+' in between, for example: "cholecystectomy + cholangiography"

Reset All Selections

Are there other potential appropriate treatment options? ☐ **Other Surgical Options** ☐ **Other Non-operative options** ☐ **None**

Please enter as much of the following information as you can to receive the best risk estimates.
A rough estimate will still be generated if you cannot provide all of the information below.

Age Group
Under 65 years

Sex
Female

Functional Status
Independent

Emergency Case
No

ASA Class
Severe systemic disease

Steroid use for chronic condition
No

Ascites within 30 days prior to surgery
No

Systemic Sepsis within 48 hours prior to surgery
None

Ventilator Dependent
No

Disseminated Cancer
No

Diabetes
Insulin

Hypertension requiring medication
Yes

Congestive Heart Failure in 30 days prior to surgery
Yes

Dyspnea
No

Current Smoker within 1 Year
No

History of Severe COPD
No

Dialysis
No

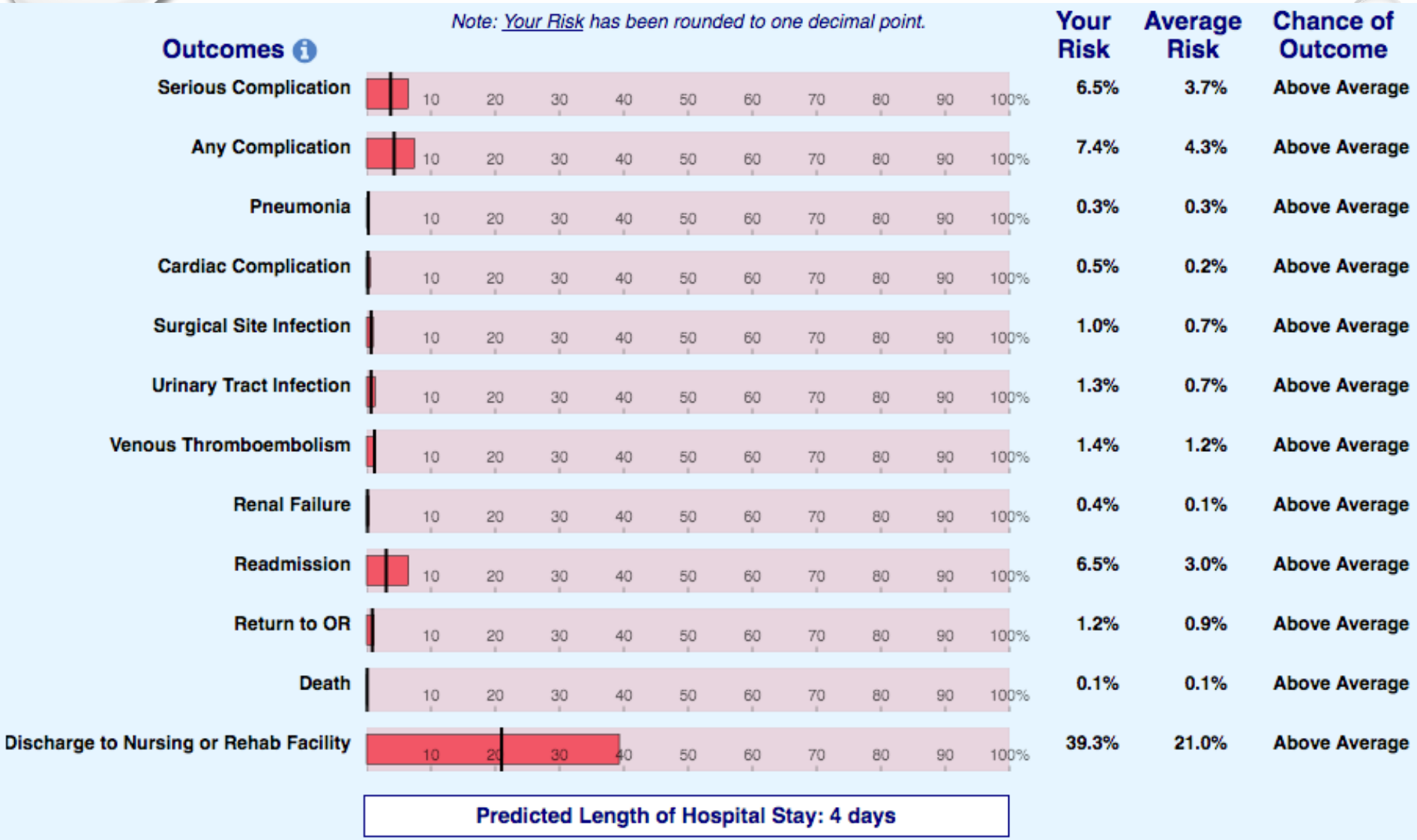
Acute Renal Failure
No

BMI Calculation:

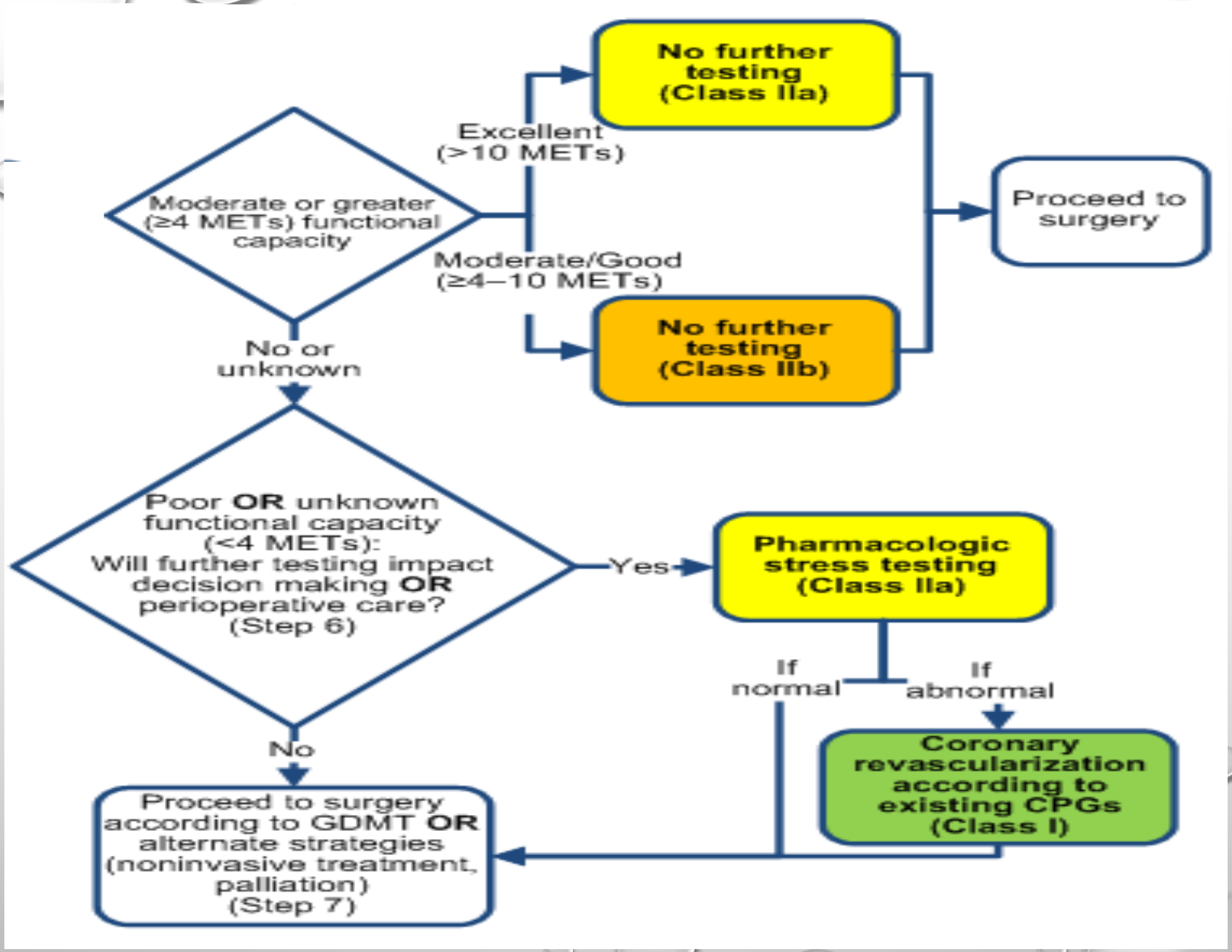
Height: 70 **in /** 178 **cm**

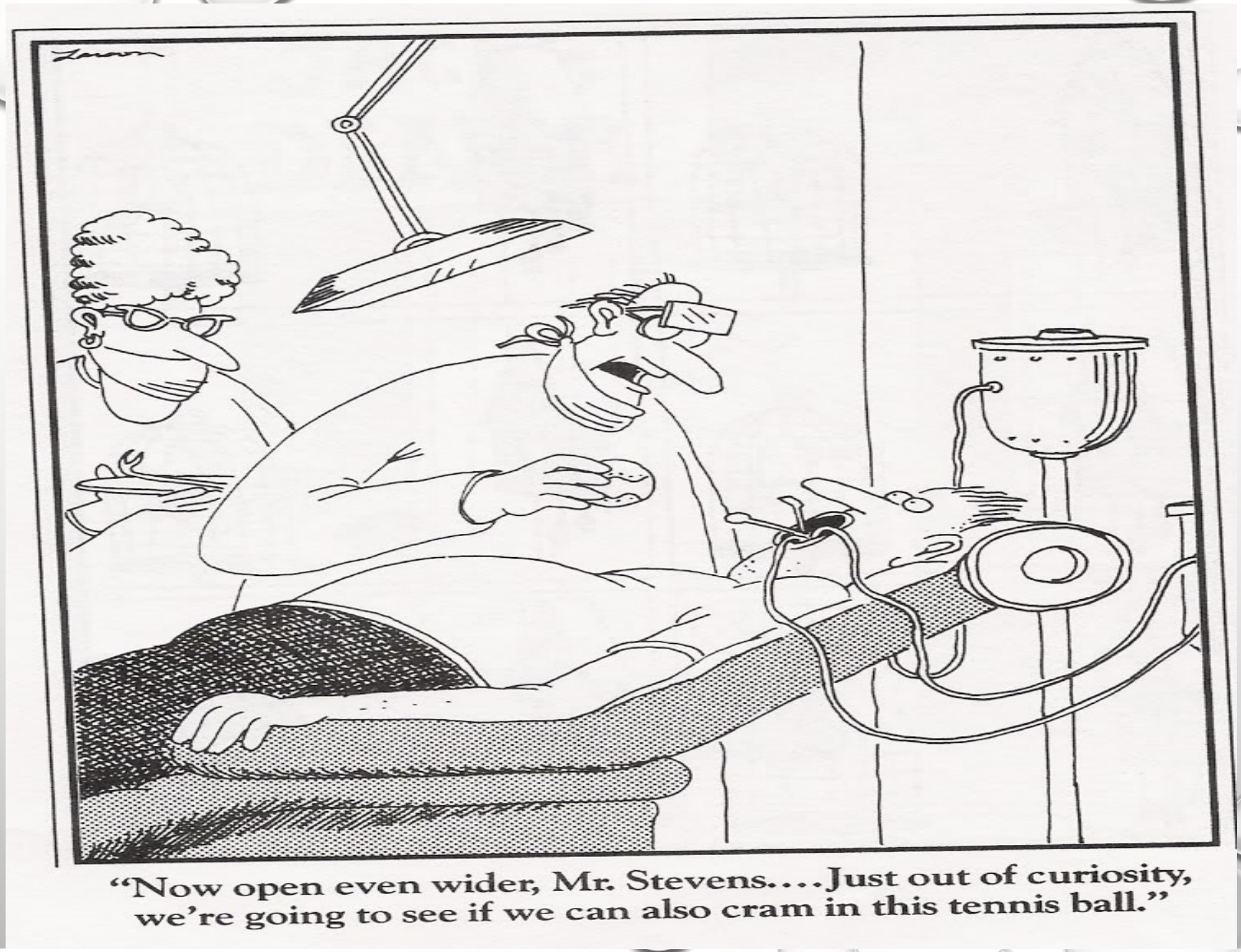
Weight: 220 **lb /** 99 **kg**

*American College of Surgeons: Surgical Risk Calculator



*American College of Surgeons: Surgical Risk Calculator


Moderate or greater (≥4 METs) functional capacity
Excellent (>10 METs)
Moderate/Good (≥4–10 METs)
No further testing (Class IIa)
No further testing (Class IIb)
Proceed to surgery
No or unknown
Poor OR unknown functional capacity (<4 METs): Will further testing impact decision making OR perioperative care? (Step 6)
Yes
Pharmacologic stress testing (Class IIa)
If normal
If abnormal
Coronary revascularization according to existing CPGs (Class I)
No
Proceed to surgery according to GDMT OR alternate strategies (noninvasive treatment, palliation) (Step 7)



"Now open even wider, Mr. Stevens....Just out of curiosity, we're going to see if we can also cram in this tennis ball."

Understand
appropriate ordering of preoperative testing

CASE

- 65 Y/O WHITE MALE PRESENTING FOR PREOP EVALUATION PRIOR TO ELECTIVE L TKA. HE STATES HE'S ABLE TO MOW HIS LAWN AND WALK FOR SEVERAL MILES WITHOUT CHEST PAIN OR PRESSURE.
- PMH: HTN, HL, CKD 4, AND DM
- MEDS: LISINOPRIL, NPH, ATORVASTATIN, ASA

- WHAT IS THIS PT'S RISK FOR MACE?
  - RCRI
  - NSQIP NSQIP CALCULATOR
  - NSQIP MICA (GUPTA) GUPTA CALCULATOR

CASE: CONTINUED

WHAT PREOP TESTING IS NEEDED?

A) CBC, CMP, COAGS, A1C, EKG, URINALYSIS

B) CBC, BMP, COAGS, A1C, EKG

C) CBC, BMP, A1C, EKG

D) CBC, BMP, A1C

E) H/H, BMP, A1C

Choosing Wisely®
An initiative of the ABIM Foundation

PREOPERATIVE LAB TESTING

American Society of Anesthesiologists	Don't obtain baseline laboratory studies in patients without significant systemic disease (ASA I or II) undergoing low-risk surgery – specifically complete blood count, basic or comprehensive metabolic panel, coagulation studies when blood loss (or fluid shifts) is/are expected to be minimal.
American Society for Clinical Pathology	Avoid routine preoperative testing for low risk surgeries without a clinical indication.
Society of General Internal Medicine	Don't perform routine pre-operative testing before low-risk surgical procedures.
The Society of Thoracic Surgeons	Patients who have no cardiac history and good functional status do not require preoperative stress testing prior to non-cardiac thoracic surgery.

Procedure	CBC	H&H	INR	Type and Screen	Type and Cross	Send Units to OR
Open vascular procedures (peripheral bypass, carotid surgery)		X		X		
Open aneurysm repair (cerebral, thoracic aortic, abdominal aortic)	X				X	X
Open cerebral vascular (aneurysm, AVM)	X				X	
Endovascular repairs (cerebral, peripheral, aortic)	X			X		
Craniotomy	X		X	X		
Major head and neck surgery		X		X		
Major spine surgery (≥ 3 levels)		X			X	
Open abdominal cases (not vascular)		X		X		
Major orthopedic surgery (joint revision, hemipelvectomy, pelvic fractures, large cancer resections)		X			X	
Thoracotomy, VATs, lung resections		X		X		
Cardiac surgery	X				X	X
Significant anemia (Hgb <10) with surgical risk 3		X		X		
Surgical risk class 4		X			X	
Surgical risk class 5	X				X	X

References:

1. State Operations Manual. Centers of Medicare and Medicaid Services. Available at: https://www.cms.gov/Regulations-andGuidance/Guidance/Transmittals/downloads/R22SOMA.pdf Accessed Sept 2015.
2. Laboratory Monitoring Interval (in Months) Recommended for Chronic Medications, Table 2: Consult Pharm. 2008 May; 23(5): 387–395.

Nebraska Medicine
SERIOUS MEDICINE. EXTRAORDINARY CARE.

Clinical Diagnosis	CBC w/o Diff	H&H	PT/INR	BMP	CMP	K+	Glucose	Hgb A1C	TSH	UA
Patients on ACE/ARB				- Within 6 months if no recent dose adjustment - Within 30 days if recent dose adjustment						
Liver disease (chronic, end-stage, or clinical concern for coagulopathy)	Within 30 days		- Within 30 days - DOS if receiving neuraxial anesthesia		Within 30 days					
Radiation therapy to neck and not taking thyroid supplement									Within 90 days	
Renal Insufficiency (not on dialysis)	Within 6 months			Within 60 days						
Suspected UTI										Collect during PAS visit
Systemic Lupus				Within 6 months						
Thrombocytopenia (<100K)	- Within 30 days - DOS if receiving neuraxial anesthesia									
Diabetes				Within 90 days			DOS	Within 90 days		

PREOPERATIVE TESTING: EKG

- CLASS IIA: *REASONABLE TO PERFORM*
  - PREOPERATIVE RESTING 12-LEAD ELECTROCARDIOGRAM (ECG) IS REASONABLE FOR PATIENTS WITH KNOWN CORONARY HEART DISEASE, SIGNIFICANT ARRHYTHMIA, PERIPHERAL ARTERIAL DISEASE, CEREBROVASCULAR DISEASE, OR OTHER SIGNIFICANT STRUCTURAL HEART DISEASE, EXCEPT FOR THOSE UNDERGOING LOW-RISK SURGERY. *(LEVEL OF EVIDENCE: B)*
- CLASS IIB: *CONSIDER*
  - PREOPERATIVE RESTING 12-LEAD ECG MAY BE CONSIDERED FOR ASYMPTOMATIC PATIENTS WITHOUT KNOWN CORONARY HEART DISEASE, EXCEPT FOR THOSE UNDERGOING LOW-RISK SURGERY. *(LEVEL OF EVIDENCE: B)*
- CLASS III: *NO BENEFIT*
  - ROUTINE PREOPERATIVE RESTING 12-LEAD ECG IS NOT USEFUL FOR ASYMPTOMATIC PATIENTS UNDERGOING LOW RISK SURGICAL PROCEDURES. *(LEVEL OF EVIDENCE: B)*

FLEISHER LA, ET AL. 2014 ACC/AHA PERIOPERATIVE GUIDELINE

Discuss

medication adjustment during the perioperative period

CASE: CONTINUED

WHAT PREOP TESTING IS NEEDED?

A) CBC, CMP, COAGS, A1C, EKG, URINALYSIS

B) CBC, BMP, COAGS, A1C, EKG

C) CBC, BMP, A1C, EKG

D) CBC, BMP, A1C

E) H/H, BMP, A1C

CASE: CONTINUED

- 65 Y/O WHITE MALE PRESENTING FOR PREOP EVALUATION PRIOR TO ELECTIVE L TKA. HE STATES HE'S ABLE TO MOW HIS LAWN AND WALK FOR SEVERAL MILES WITHOUT CHEST PAIN OR PRESSURE.
- PMH: HTN, HL, CKD 4, AND DM
- MEDS: LISINOPRIL, NPH, ATORVASTATIN, ASA

SHOULD A BETA BLOCKER BE STARTED PRIOR TO SURGERY?

PERIOPERATIVE BETA BLOCKAGE

- CONTINUE CHRONIC BETA BLOCKERS *(CLASS I/LOE B)*
- MANAGE BETA BLOCKER USAGE BASED ON CLINICAL COURSE REGARDLESS OF WHEN THERAPY STARTED *(CLASS IIA/LOE B)*
- ≥3 RCRI REASONABLE TO START BETA BLOCKER *(CLASS IIB/LOE B)*
- INITIATION OF BETA BLOCKAGE SHOULD LIKELY START >1 DAY PRIOR TO SURGERY *(CLASS IIB/LOE B)*
- BETA BLOCKER SHOULD NOT BE STARTED ON DAY OF SURGERY *(CLASS III/LOE B)*

PERIOPERATIVE BETA BLOCKER USAGE

- WHY THE SHIFT AWAY FROM BETA BLOCKERS?
  - DECREASE I/IV
    - LARGE RCTS FAVORABLE TOWARDS PERIOP BB
    - POLDERMANS-CONCERNS ABOUT SCIENTIFIC MISCONDUCT
  - POISE-1
    - LARGE RCT CRITICAL TOWARDS PERIOP BB
    - BB PREVENTED MI, BUT INCREASED RISK OF DEATH, STROKE, HYPOTENSION, AND BRADYCARDIA
    - CONCERNS ABOUT UNCONVENTIONAL BB DOSING
  - ACC/AHA CONVENED A SEPARATE EVIDENCE REVIEW COMMITTEE

EVIDENCE REVIEW COMMITTEE

- 17 ELIGIBLE STUDIES (16 RCT/1 COHORT)
- SUBGROUP ANALYSIS
  - DECREASE I/IV AGAINST OTHER STUDIES

RR for all fields ** significant difference*	MI	Stroke	CV Death	All Death
DECREASE vs. Others	0.68*	1.79	0.17*	0.42*
POISE-1 vs. Others	0.72	1.93	1.25	1.30

CASE: CONTINUED

- 65 Y/O WHITE MALE PRESENTING FOR PREOP EVALUATION PRIOR TO ELECTIVE L TKA. HE STATES HE'S ABLE TO MOW HIS LAWN AND WALK FOR SEVERAL MILES WITHOUT CHEST PAIN OR PRESSURE.
- PMH: HTN, HL, CKD 4, AND DM
- MEDS: LISINOPRIL, NPH, ATORVASTATIN, ASA

ADJUSTMENTS NEEDED FOR HIS OTHER MEDS?

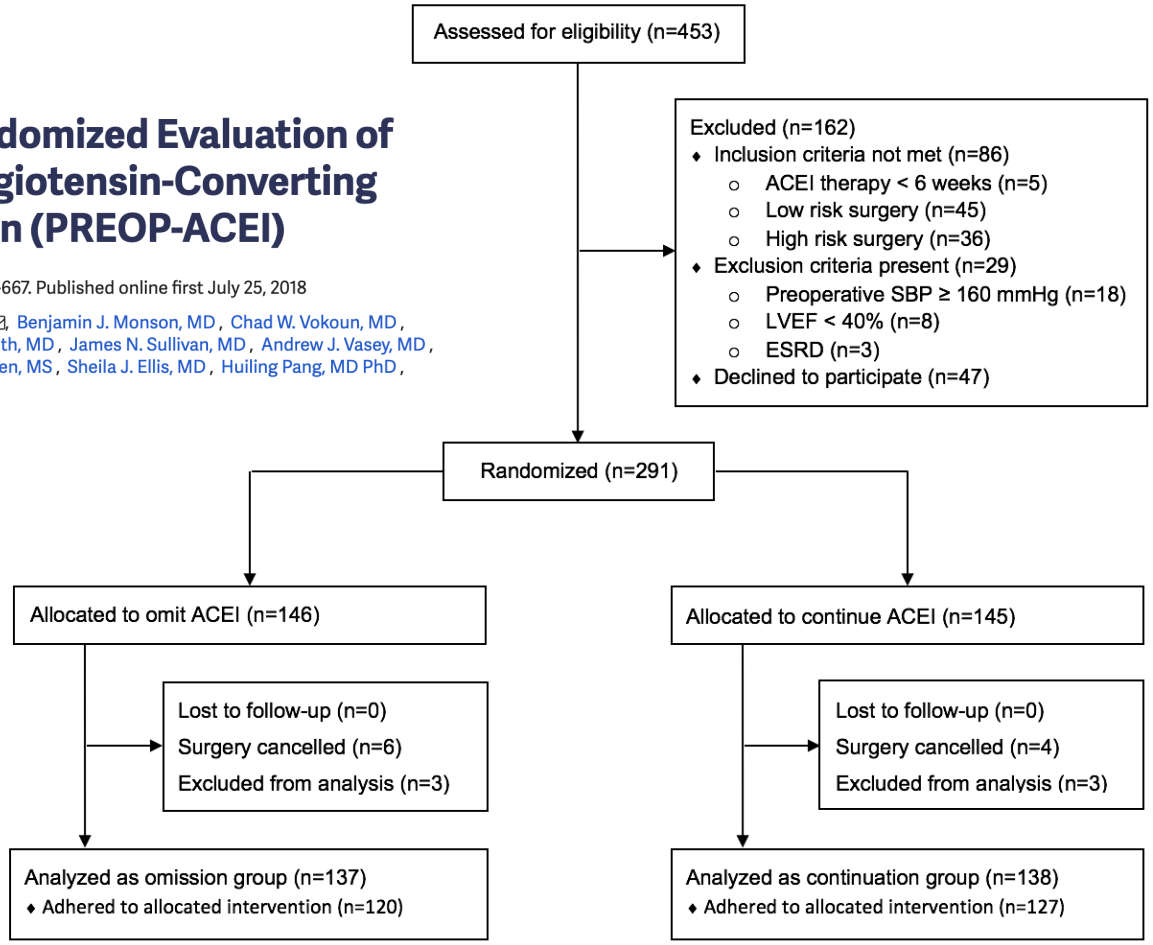
NEBRASKA MEDICINE ACE-I STUDY

ORIGINAL RESEARCH

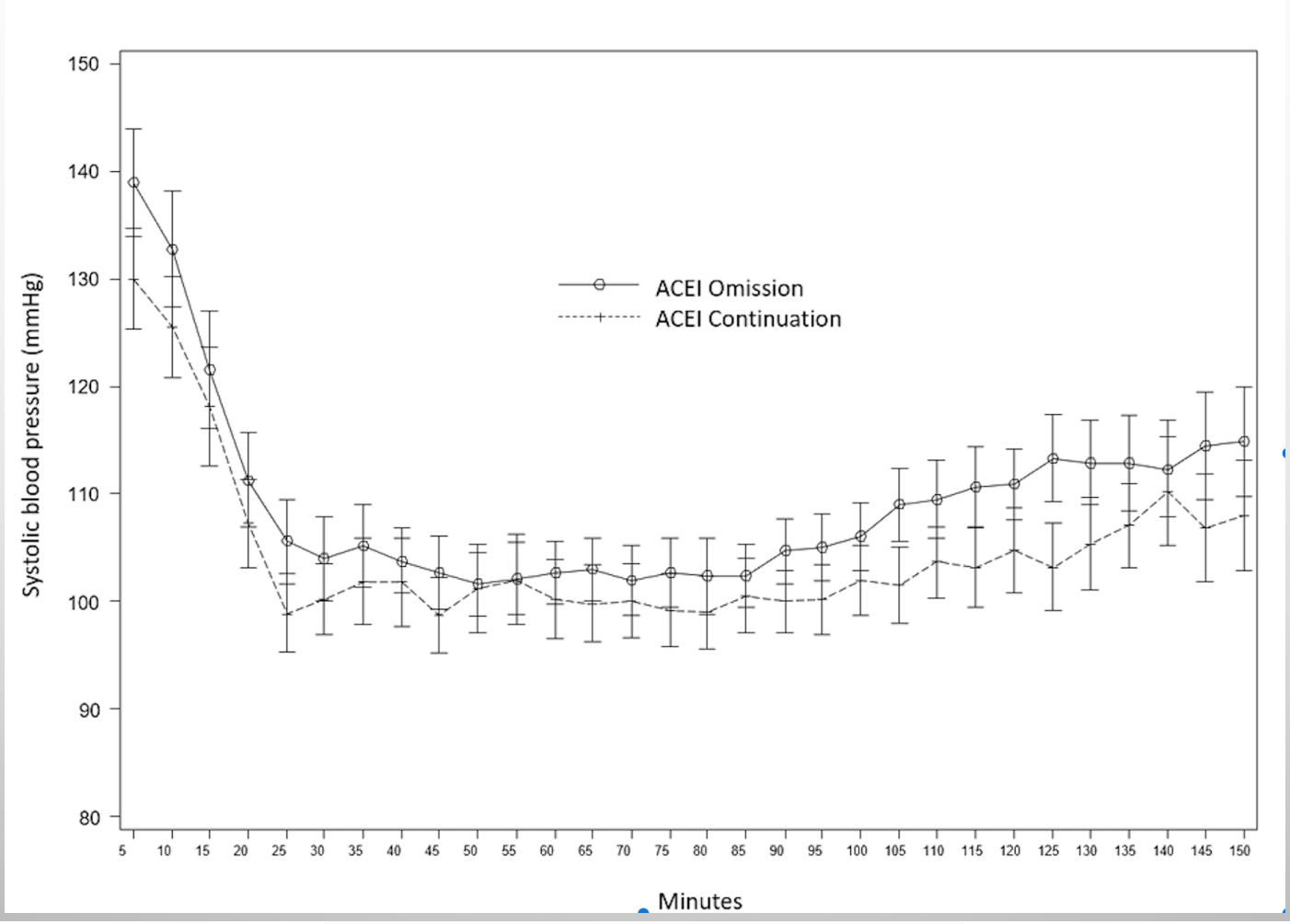
Prospective Randomized Evaluation of Preoperative Angiotensin-Converting Enzyme Inhibition (PREOP-ACEI)

J. Hosp. Med. 2018 October;13(10):661-667. Published online first July 25, 2018

By: Jason F. Shiffermiller, MD, MPH ✉, Benjamin J. Monson, MD, Chad W. Vokoun, MD, Micah W. Beachy, DO, Michael P. Smith, MD, James N. Sullivan, MD, Andrew J. Vasey, MD, Purnima Guda, PhD, Elizabeth R. Lyden, MS, Sheila J. Ellis, MD, Huiling Pang, MD PhD, Rachel E. Thompson, MD, MPH



NEBRASKA MEDICINE ACE-I STUDY



ACE-I

- PROLONGED INTRAOPERATIVE HYPOTENSION IS ASSOCIATED WITH INCREASED RISK OF COMPLICATIONS AND MORTALITY MASCHA, MONK
- OMISSION OF THE FINAL PREOPERATIVE ACEI DOSE WAS ASSOCIATED WITH A SIGNIFICANT REDUCTION IN THE RISK OF INTRAOPERATIVE HYPOTENSION
- CONSIDER HOLDING PREOPERATIVE DOSE OF ACE-I

STATINS

- CONTINUE STATIN IF PATIENT IS CURRENTLY TAKING (CLASS I, LOE B)

- CONCERNS OF INCREASED RISK OF MYOPATHY/RHABDO HAVEN'T BEEN SUPPORTED TO DATE

Annals of Internal Medicine

ORIGINAL RESEARCH

Aspirin in Patients With Previous Percutaneous Coronary Intervention Undergoing Noncardiac Surgery

- RCT >1
  - CC
    AS
  - INI
    AS
- PRIMAR
  - AS
  - PL
  - IN
- CONCL
  RISK O

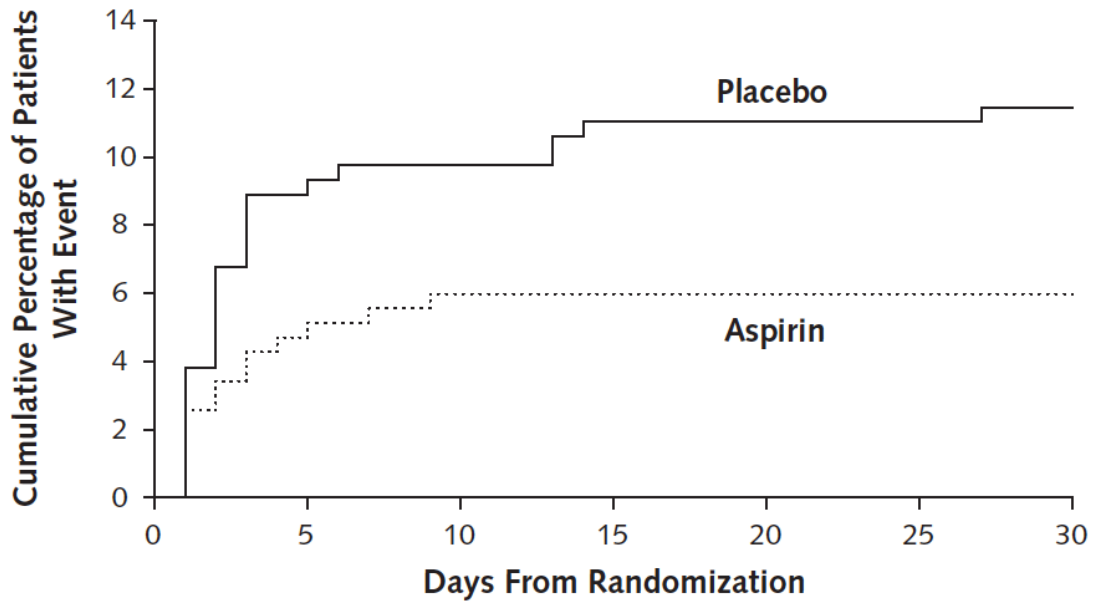
MIZED TO

TO

UP

EDUCE

Figure 2. Effect of aspirin on risk for composite of death and nonfatal myocardial infarction among patients with a history of percutaneous coronary intervention.



P for interaction = 0.036.

Review

unique surgical scenarios

CASE

- 60 Y/O WHITE MALE PRESENTS FOR PREOP PRIOR TO REPAIR OF A LEFT RADIAL FX NON-UNION. HE TOLERATED SURGERY WELL IN MARCH AT OSH. HIGHEST LEVEL OF EXERTION WAS CLIMBING A GRAIN ELEVATOR.
- PMH: DM, HL
- MEDS: METFORMIN, ROSUVASTATIN
- EXAM: 4/6 HOLOSYSTOLIC MR >EST RUSB. S2 IS AUDIBLE. NO RADIATION TO THE CAROTIDS. NO PULSUS TARDAS.

WHAT IS THE NEXT STEP?

SEVERE/SYMPTOMATIC AORTIC STENOSIS

CLASS I *ADOPT PRACTICE*

- IT IS RECOMMENDED THAT PATIENTS WITH CLINICALLY SUSPECTED MODERATE OR GREATER DEGREES OF VALVULAR STENOSIS OR REGURGITATION UNDERGO PREOPERATIVE ECHOCARDIOGRAPHY IF THERE HAS BEEN EITHER 1) NO PRIOR ECHOCARDIOGRAPHY WITHIN 1 YEAR OR 2) A SIGNIFICANT CHANGE IN CLINICAL STATUS OR PHYSICAL EXAMINATION SINCE LAST EVALUATION. *(LEVEL OF EVIDENCE: C)*
- FOR ADULTS WHO MEET STANDARD INDICATIONS FOR VALVULAR INTERVENTION (REPLACEMENT AND REPAIR) ON THE BASIS OF SYMPTOMS AND SEVERITY OF STENOSIS OR REGURGITATION, VALVULAR INTERVENTION BEFORE ELECTIVE NON-CARDIAC SURGERY IS EFFECTIVE IN REDUCING PERIOPERATIVE RISK. *(LEVEL OF EVIDENCE: C)*

FLEISHER LA, ET AL. 2014 ACC/AHA PERIOPERATIVE GUIDELINE

CASE: CONTINUED

- ECHO PERFORMED
  - AVA OF 0.7 CM2
  - PEAK GRADIENT 102 MMHG

CASE: CONTINUED

- SEVERAL SMALL STUDIES SUGGEST 10-30% RISK
  - MI
  - HYPOTENSION
  - CHF
  - ARRHYTHMIAS
  - DEATH
  - INCREASED BLEEDING (ACQUIRED VON WILLEBRAND)
- AS IS **NOT** INCLUDED IN MOST RISK CALCULATORS

CASE

- 55 Y/O MALE PRESENTING FOR ELECTIVE TKA. HE HAD A NSTEMI 9 MONTHS AGO WITH DRUG ELUDING STENT PLACED. DENIES ANY CHEST PAIN WHEN HE'S RIDING HIS BIKE.
- PMH: MI, CAD S/P STENTING, HTN, HL, SYSTOLIC HF
- MEDS: ASA, CLOPIDOGREL, ATORVASTATIN, METOPROLOL, LISINOPRIL

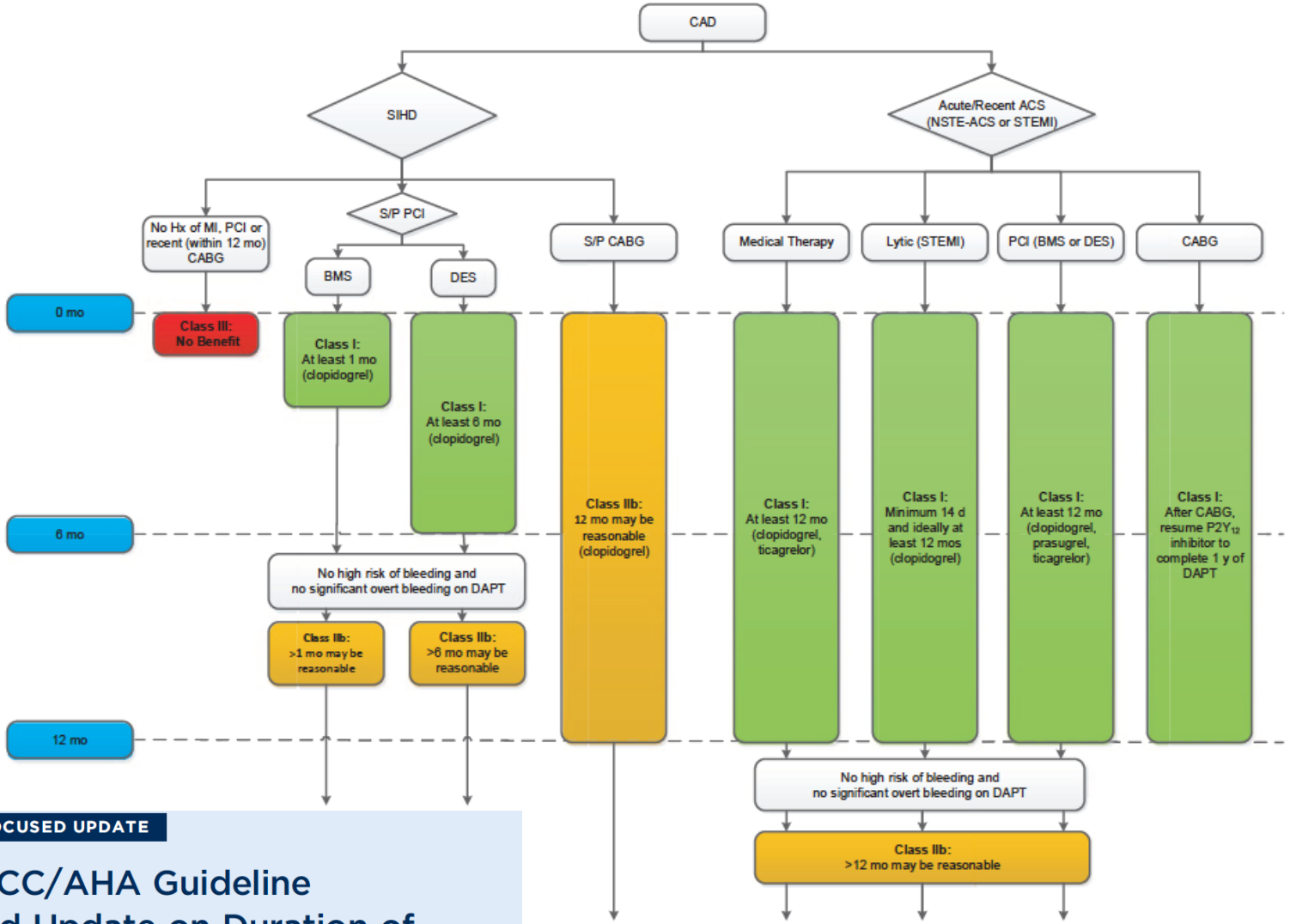
- WHAT IS THE NEXT STEP IN PATIENT'S CARE?

  A) "CLEAR" HIM FOR SURGERY, CONT DAPT

  B) PROCEED TO SURGERY WITH ASA ONLY

  C) PROCEED TO SURGERY WITHOUT DAPT

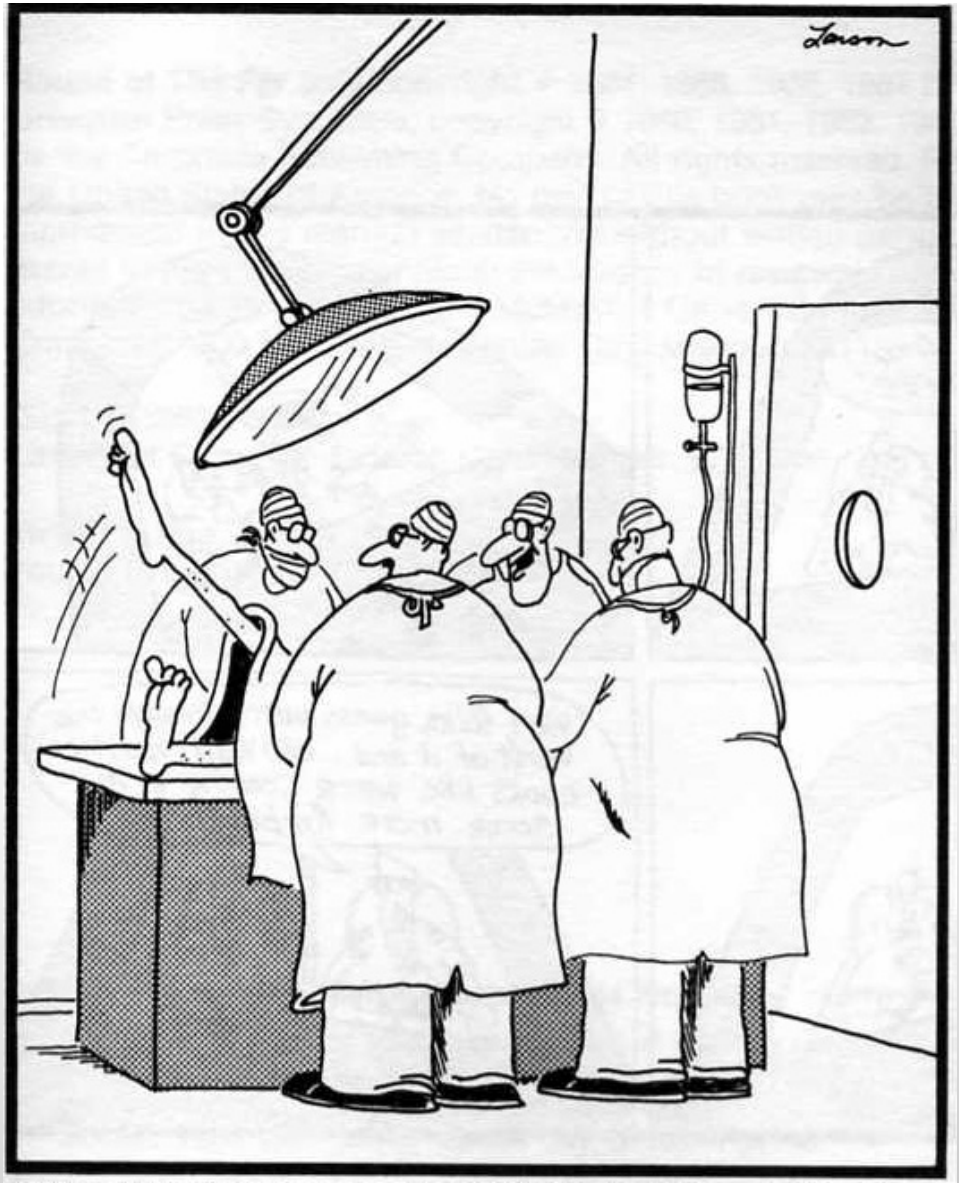
  D) CANCEL HIS SURGERY



ACC/AHA FOCUSED UPDATE

2016 ACC/AHA Guideline Focused Update on Duration of Dual Antiplatelet Therapy in Patients With Coronary Artery Disease

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



"Whoa! *That* was a good one! Try it, Hobbs — just poke his brain right where my finger is."

UNMC

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University of Nebraska Medical Center

MEDICATIONS: RHEUMATOLOGIC AGENTS

2017 American College of Rheumatology/American Association of Hip and Knee Surgeons Guideline for the Perioperative Management of Antirheumatic Medication in Patients With Rheumatic Diseases Undergoing Elective Total Hip or Total Knee Arthroplasty

- 7 recommendations on withholding, continuing, and restarting anti-rheumatic medications
- Recommendations based on low-medium quality of evidence given paucity of evidence
- Recommendations are specific for THA/TKA patients
- Includes following rheumatologic diseases
  - Rheumatoid arthritis
  - Spondyloarthritis
  - Juvenile idiopathic arthritis
  - Systemic Lupus Erythematosus

MEDICATIONS: RHEUMATOLOGIC AGENTS

- NON-BIOLOGIC DMARDS
  - CONTINUE MTX, LEFLUNOMIDE, HYDROXYCHLOROQUINE, AND/OR SULFASALAZINE
- BIOLOGICS
  - WITHHOLD BIOLOGIC AGENTS PRIOR TO SURGERY AND PLAN THE SURGERY AT THE END OF THE DOSING CYCLE FOR THAT SPECIFIC MEDICATION
  - WITHHOLD TOFACITINIB FOR AT LEAST 7 DAYS PRIOR TO SURGERY
  - RESTART BIOLOGIC ONCE THE WOUND SHOWS EVIDENCE OF HEALING (TYPICALLY ~14 DAYS)

Goodman SM et al., Arthritis & Rheumatology, Vol 69, No. 8, Aug 2017, pp1538-1551

MEDICATIONS: RHEUMATOLOGIC AGENTS

- SEVERE LUPUS
  - CONTINUE MTX, MYCOPHENOLATE MOFETIL, AZA, CYCLOSPORINE, OR TACROLIMUS
- NON-SEVERE LUPUS
  - WITHHOLD MYCOPHENOLATE MOFETIL, AZA, CYCLOSPORINE, OR TACROLIMUS 1 WEEK PRIOR
- STEROIDS
  - CONTINUE HOME GLUCOCORTICOIDS RATHER THAN ADMINISTERING PERIOPERATIVE SUPRA-PHYSIOLOGIC GLUCOCORTICOID DOSES

Goodman SM et al., Arthritis & Rheumatology, Vol 69, No. 8, Aug 2017, pp1538-1551