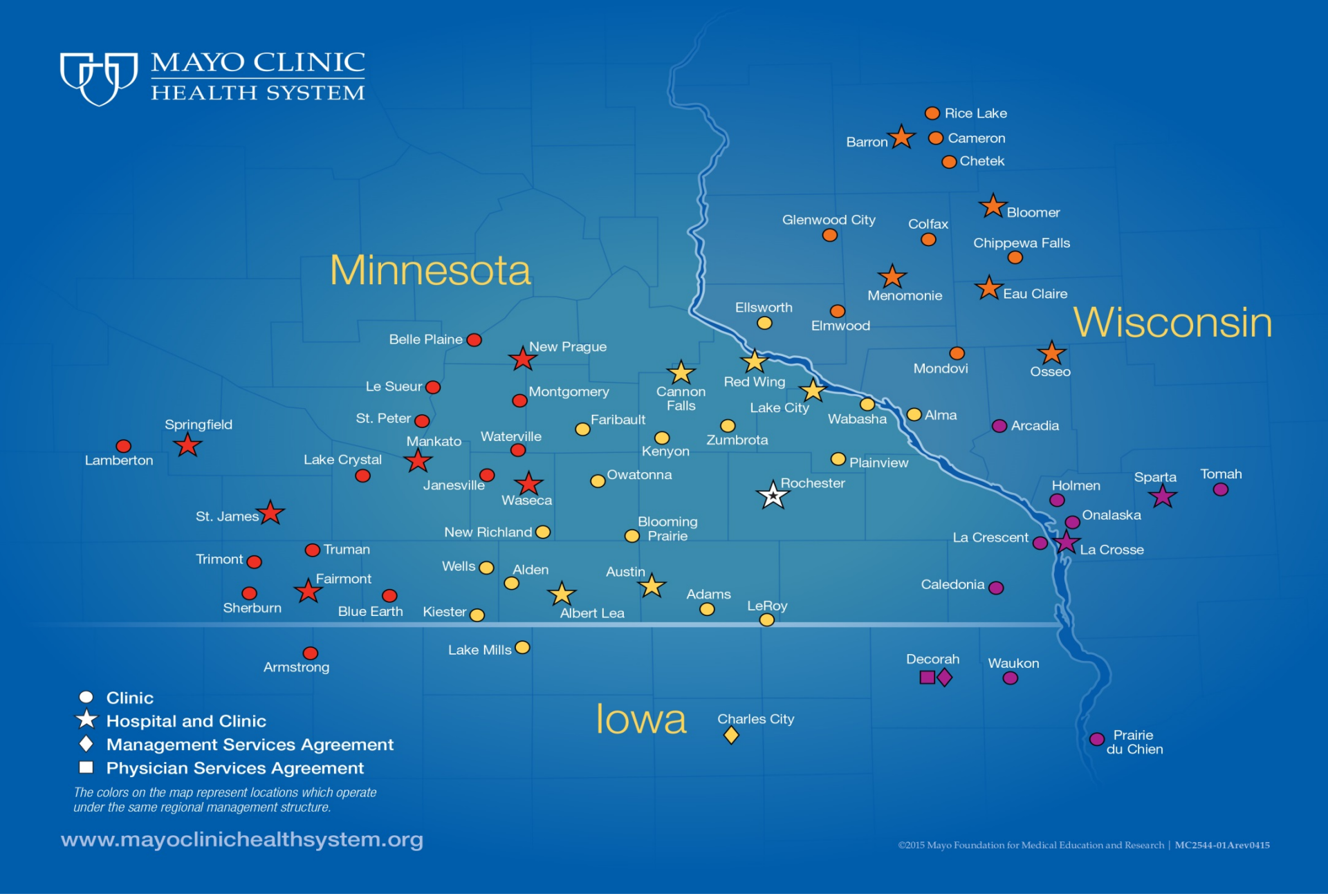
MAYO CLINIC
HEALTH SYSTEM

Peri-operative Medicine

Overcoming common medical challenges in surgical patients

Umesh Sharma MD, MBA, FACP



MAYO CLINIC
HEALTH SYSTEM

Objectives

- Discuss pearls in peri-operative care

- Understand the level of evidence behind the guidelines

- **Surgeon:**
- “ Can you clear my patient for surgery?”

- **MD Med:**
- “Your patient has been “cleared” and I guarantee that there will be no peri-operative complications and I take full responsibility for managing them should they arise upto 30 days post op”.


"Heads, you get a quadruple bypass.
Tails, you take a baby aspirin."
GLASBERGEN

Medical Consultant

http://secure360.org/2013/12/risk-management-overcoming-the-obstacles/

AHA: Evidence-based scoring system **Class of Recommendation**

- **Class I**: **Evidence/ agreement** that a procedure/ Treatment is **useful and effective**

- **Class II**: **Conflicting evidence**, divergence of opinion or both on the usefulness/efficacy

  IIa: Weight of **evidence is in favor** of the usefulness/ efficacy

  IIb: Usefulness/ Efficacy is **less well-established**

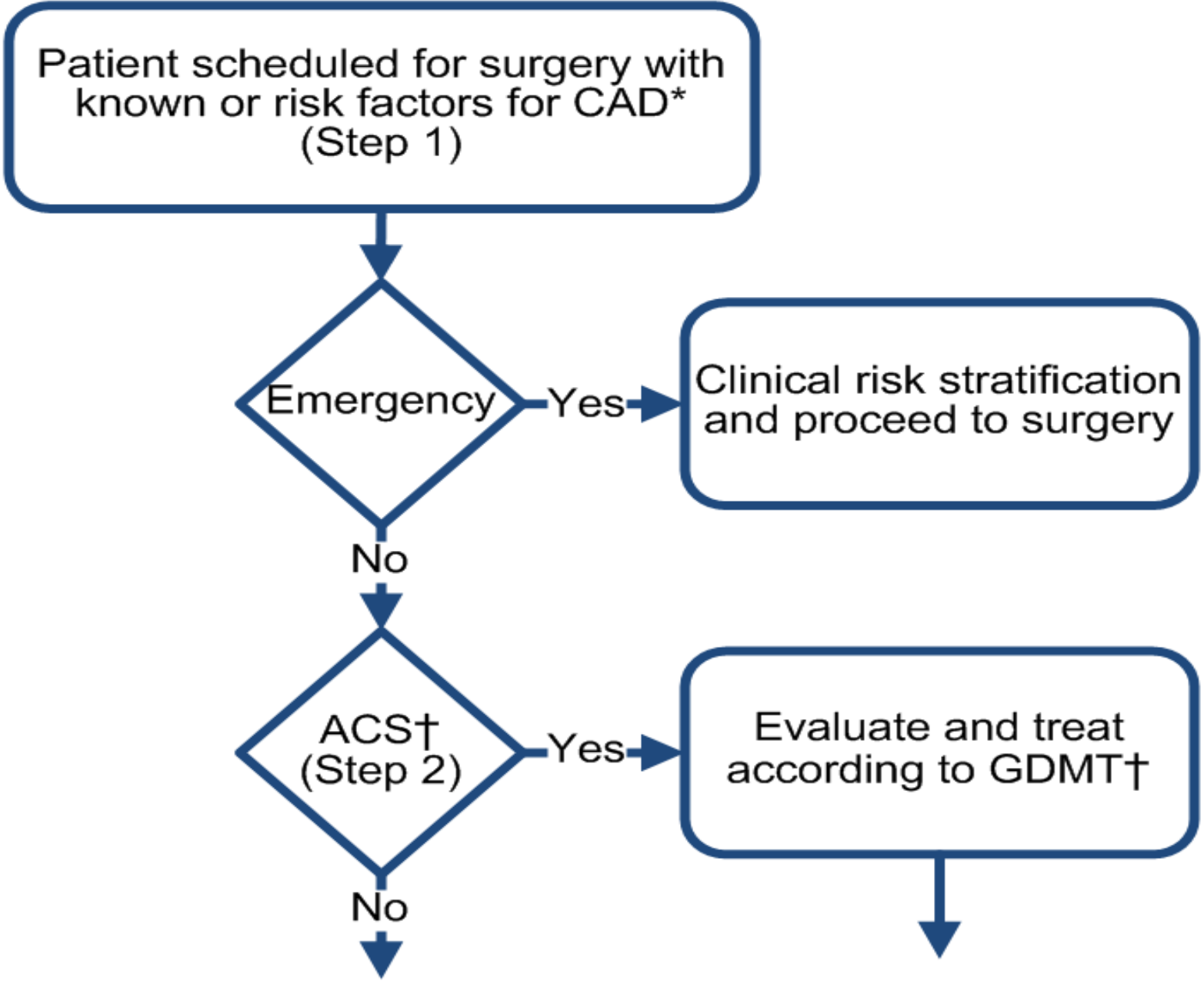
AHA: Evidence-based scoring system **Level of Evidence**

- **Level A**: Data from **multiple RCT** or meta-analyses
- **Level B**: **Single RCT** or non-randomized studies
- **Level C**: **Consensus opinion** of experts/ case studies or “standard of care”

SIZE OF TREATMENT EFFECT

ESTIMATE OF CERTAINTY (PRECISION) OF TREATMENT EFFECT

	CLASS I *Benefit >>> Risk* Procedure/Treatment **SHOULD** be performed/ administered	CLASS IIa *Benefit >> Risk* *Additional studies with focused objectives needed* **IT IS REASONABLE** to perform procedure/administer treatment	CLASS IIb *Benefit ≥ Risk* *Additional studies with broad objectives needed; additional registry data would be helpful* Procedure/Treatment **MAY BE CONSIDERED**	CLASS III *No Benefit* or CLASS III *Harm* Procedure/Test / Treatment COR III: No benefit — Not Helpful / No Proven Benefit COR III: Harm — Excess Cost w/o Benefit or Harmful / Harmful to Patients
LEVEL A Multiple populations evaluated* Data derived from multiple randomized clinical trials or meta-analyses	■ Recommendation that procedure or treatment is useful/effective ■ Sufficient evidence from multiple randomized trials or meta-analyses	■ Recommendation in favor of treatment or procedure being useful/effective ■ Some conflicting evidence from multiple randomized trials or meta-analyses	■ Recommendation's usefulness/efficacy less well established ■ Greater conflicting evidence from multiple randomized trials or meta-analyses	■ Recommendation that procedure or treatment is not useful/effective and may be harmful ■ Sufficient evidence from multiple randomized trials or meta-analyses
LEVEL B Limited populations evaluated* Data derived from a single randomized trial or nonrandomized studies	■ Recommendation that procedure or treatment is useful/effective ■ Evidence from single randomized trial or nonrandomized studies	■ Recommendation in favor of treatment or procedure being useful/effective ■ Some conflicting evidence from single randomized trial or nonrandomized studies	■ Recommendation's usefulness/efficacy less well established ■ Greater conflicting evidence from single randomized trial or nonrandomized studies	■ Recommendation that procedure or treatment is not useful/effective and may be harmful ■ Evidence from single randomized trial or nonrandomized studies
LEVEL C Very limited populations evaluated* Only consensus opinion of experts, case studies, or standard of care	■ Recommendation that procedure or treatment is useful/effective ■ Only expert opinion, case studies, or standard of care	■ Recommendation in favor of treatment or procedure being useful/effective ■ Only diverging expert opinion, case studies, or standard of care	■ Recommendation's usefulness/efficacy less well established ■ Only diverging expert opinion, case studies, or standard of care	■ Recommendation that procedure or treatment is not useful/effective and may be harmful ■ Only expert opinion, case studies, or standard of care
Suggested phrases for writing recommendations	should is recommended is indicated is useful/effective/beneficial	is reasonable can be useful/effective/beneficial is probably recommended or indicated	may/might be considered may/might be reasonable usefulness/effectiveness is unknown/unclear/uncertain or not well established	COR III: No Benefit is not recommended is not indicated should not be performed/ administered/ other is not useful/ beneficial/ effective COR III: Harm potentially harmful causes harm associated with excess morbidity/mortality should not be performed/ administered/ other
Comparative effectiveness phrases†	treatment/strategy A is recommended/indicated in preference to treatment B treatment A should be chosen over treatment B	treatment/strategy A is probably recommended/indicated in preference to treatment B it is reasonable to choose treatment A over treatment B		


Patient scheduled for surgery with known or risk factors for CAD* (Step 1)
Emergency
Yes
Clinical risk stratification and proceed to surgery
No
ACS† (Step 2)
Yes
Evaluate and treat according to GDMT†
No

ASA Physical Status Classification

- I A normal **healthy** patient
- II A patient with **mild systemic disease**
- III A patient with **severe systemic disease**
- IV A patient with **severe systemic disease that is a constant threat to life**
- V A **moribund patient** who is not expected to survive without the operation
-
- *Glance LG, et al. Ann Surg 2012;255:696-702.*

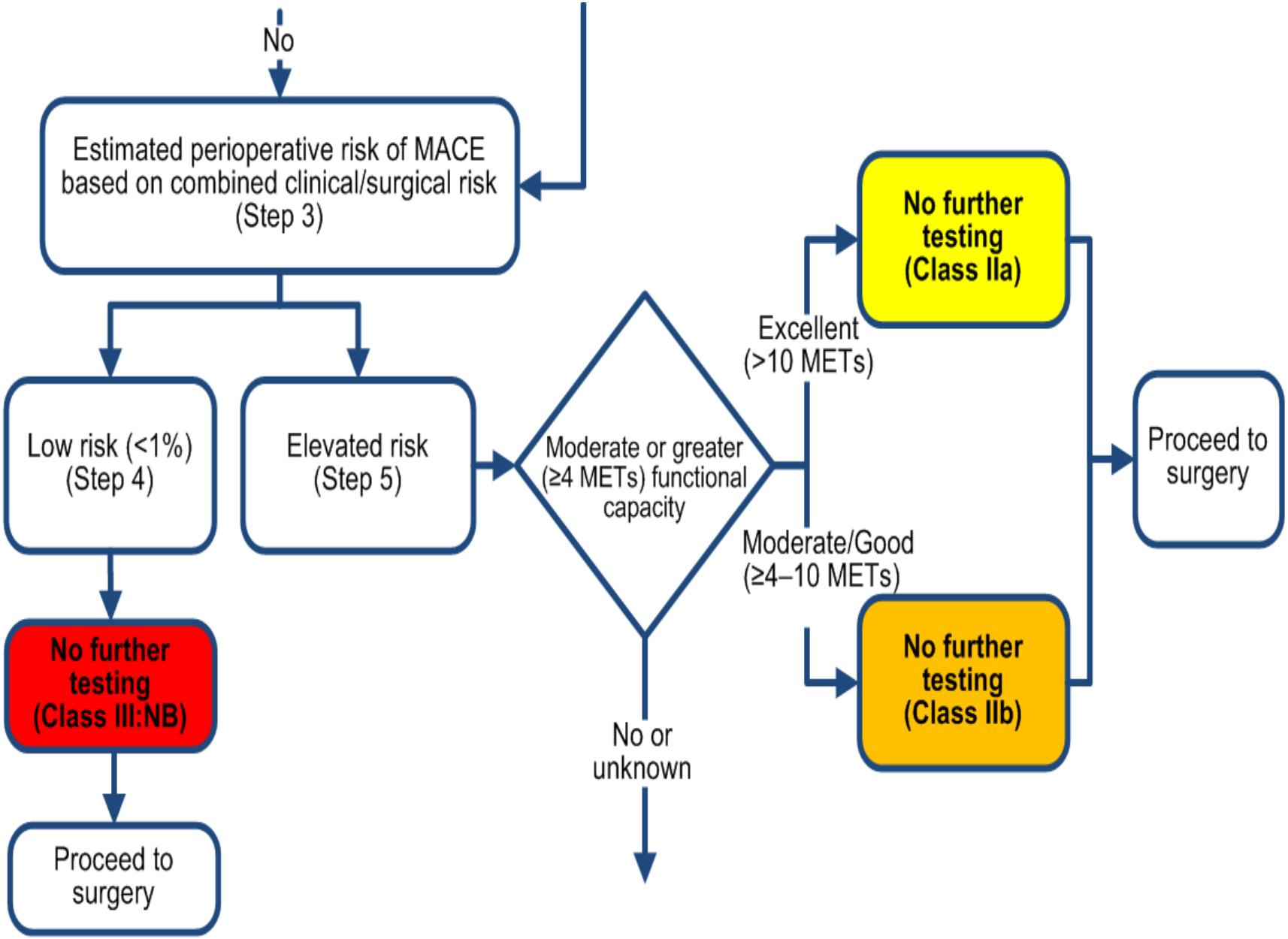
Lee: Revised Cardiac Risk Index (RCRI)

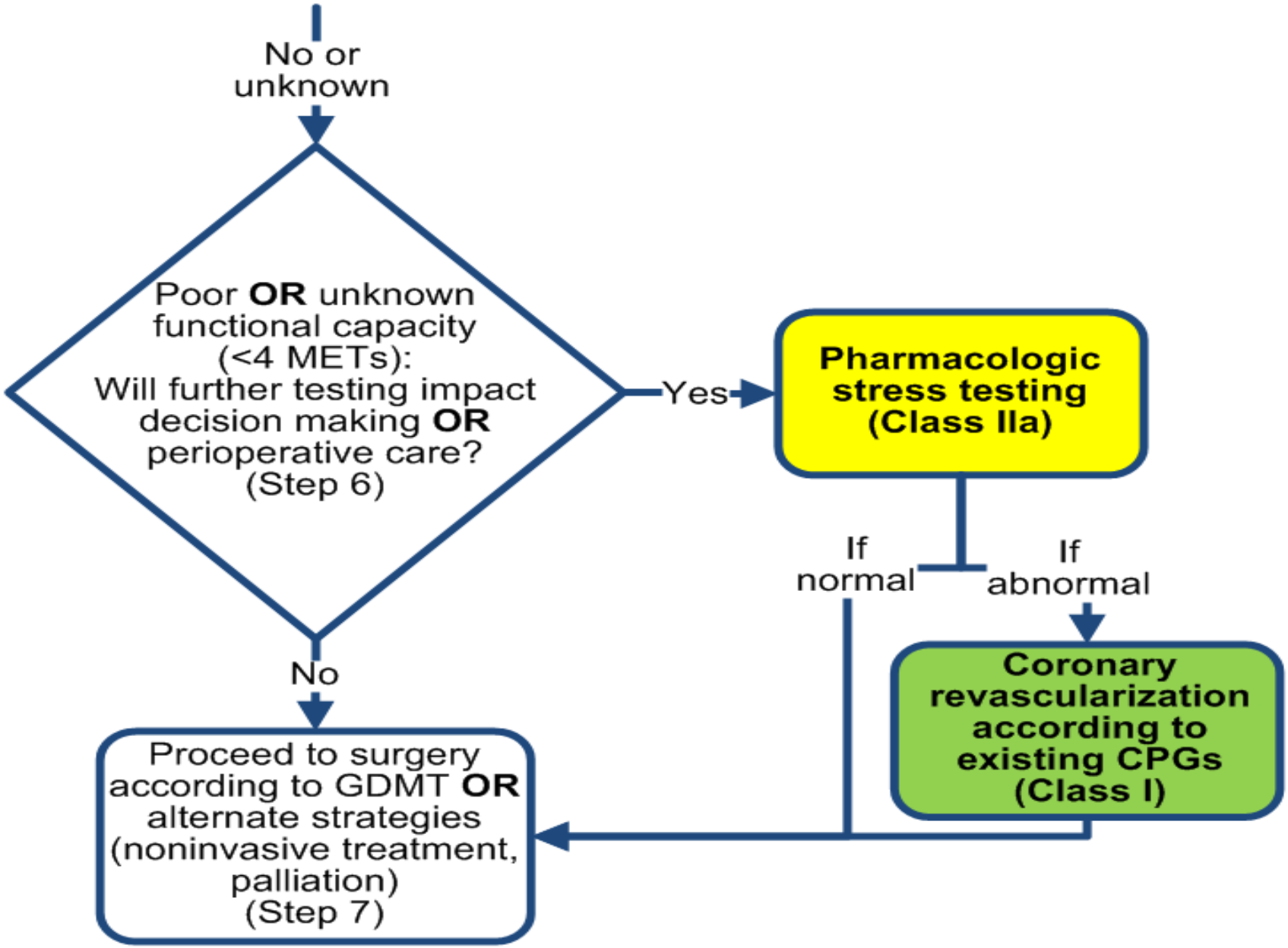
- Ischemic Heart Disease
- CHF
- CKD (Sr.Cr. >2mg/dl)
- DM
- Cerebrovascular disease
- Supra-inguinal vascular, intra-thoracic or intra-peritoneal surgery

- **0-1 predictors = low risk (1%** risk of major adverse cardiovascular event (MACE))
- **2+** = **high risk (>5%** risk of MACE)

4 Mets

- Brisk walking
- Climbing 1 flight with grocery bags
- Washing dishes
- Sexual activity
- Bicycling


No
Estimated perioperative risk of MACE based on combined clinical/surgical risk (Step 3)
Low risk (<1%) (Step 4)
Elevated risk (Step 5)
Moderate or greater (≥4 METs) functional capacity
Excellent (>10 METs)
Moderate/Good (≥4–10 METs)
No or unknown
No further testing (Class IIa)
No further testing (Class IIb)
No further testing (Class III:NB)
Proceed to surgery
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)

- On call surgeon (Dr. Big Shot) is requesting a “pre-op clearance” for Lap Chole. on an asymptomatic, active, 65 yr. male with Htn. Besides taking clinical history and performing a physical examination, what else should you do.
- A) pre-op EKG
- B) Echocardiogram
- C) Exercise Stress Test
- D) Nothing

Supplemental Preoperative Evaluation

The 12-Lead ECG

Recommendations	COR	LOE
Known CAD, sig. arrhythmia, PAD, CVD, sig. structural heart disease, except for those undergoing low-risk surgery.	IIa	B
Asymptomatic patients without CAD + **non low-risk surgery**.	IIb	B
Asymptomatic + low-risk surgery.	III: No Benefit	B

Supplemental Preoperative Evaluation

Echocardiogram: Assessment of LV Function

Recommendations	COR	LOE
Dyspnea of unknown origin (reasonable)	IIa	C
CHF with worsening dyspnea (reasonable)	IIa	C
Stable CHF patients with **no assessment within a year** (may be considered)	IIb	C
Routine preoperative echo (not recommended)	III: No Benefit	B

- 65yr old patient with exertional dyspnea, with 4/6 crescendo, systolic murmur in Aortic area radiating to carotids, 8cm JVD, b/l basal crackles, and 2+ edema, needs hip replaced. Next step?

- A) Cancel surgery
- B) Call a cardiology consult
- C) Urgent Echocardiogram
- D) Place patient in ICU

Clinical Risk Factors (Symptomatic patients)

Valvular Heart Disease

Recommendations	COR	LOE
Echocardiogram: clinically suspected moderate or greater degrees of **valvular stenosis or regurgitation** 1) **no prior echocardiography** within 1 year 2) **significant change** in clinical status or physical examination	I	C
Valvular intervention (replacement and repair) if clinically indicated is effective in reducing peri-operative risk of non-cardiac surgery.	I	C

Clinical Risk Factors (Asymptomatic patients)

Severe Aortic Stenosis

Intraoperative and postoperative hemodynamic monitoring	COR	LOE
Elevated-risk elective noncardiac surgery monitoring is **reasonable**	IIa	B

Severe Mitral Stenosis

Recommendation	COR	LOE
Elevated-risk elective noncardiac surgery monitoring **may be reasonable** if valve morphology not favorable for percutaneous mitral balloon commissurotomy.	IIb	C

Which of the following patients require endocarditis prophylaxis?

a) 75 yr. man with dual chamber pacemaker undergoing dental extraction

b) 42 yr. lady with h/o aortic valve endocarditis scheduled for placement of a dental brace

c) 72 yr. male with severe MR scheduled for screening colonoscopy

d) 79 yr. male with heart transplant and transplant valvulopathy getting root canal

e) 39 yr. lady with history of surgical repair of congenital heart disease as a child, scheduled for dental extraction

Prevention of Infective Endocarditis
Guidelines From the American Heart Association
A Guideline From the American Heart Association Rheumatic Fever, Endocarditis, and Kawasaki Disease Committee, Council on Cardiovascular Disease in the Young, and the Council on Clinical Cardiology, Council on Cardiovascular Surgery and Anesthesia, and the Quality of Care and Outcomes Research Interdisciplinary Working Group

Walter Wilson, MD, Chair; Kathryn A. Taubert, PhD, FAHA; Michael Gewitz, MD, FAHA; Peter B. Lockhart, DDS; **Larry M. Baddour, MD**; Matthew Levison, MD; Ann Bolger, MD, FAHA; Christopher H. Cabell, MD, MHS; Masato Takahashi, MD, FAHA; Robert S. Baltimore, MD; Jane W. Newburger, MD, MPH, FAHA; Brian L. Strom, MD; Lloyd Y. Tani, MD; Michael Gerber, MD; Robert O. Bonow, MD, FAHA; Thomas Pallasch, DDS, MS; Stanford T. Shulman, MD, FAHA; Anne H. Rowley, MD; Jane C. Burns, MD; Patricia Ferrieri, MD; Timothy Gardner, MD, FAHA; David Goff, MD, PhD, FAHA; David T. Durack, MD, PhD

The Council on Scientific Affairs of the American Dental Association has approved the guideline

Circulation. 2007; 116: 1736-1754

Prosthetic valve

Previous Infective endocarditis

Unrepaired Congenital cyanotic heart disease or residual defects after repair

Completely repaired CHD with prosthesis during the first 6 months

Cardiac transplantation recipients who develop cardiac valvulopathy

Invasive dental procedure (none for GI/ GU procedures)

87yr. female, HTn, DM, CKD-3, PAD, CAD, systolic CHF EF 30%, 2 prior CVA, non-valvular Atrial Fib on Coumadin with Acute Small bowel Obstruction(OR visit seems very likely)- surgeon wants to try conservative management for 48 hours and then consider OR if no improvement

How do you manage Anticoagulation?

- Call a pharmacy consult
- Continue Coumadin
- Stop Coumadin and start DVT prophylaxis with heparin/ lovenox subcutaneous
- Stop Coumadin, start heparin drip when INR <2

https://www.chadsvasc.org/

Chadsvasc risk factors [click on present risk factors]

RISK FACTORS	SCORE
Congestive heart failure	1
Hypertension	1
Age ≥ 75	2
Age 65-74	1
Diabetes mellitus	1
Stroke/TIA/thrombo-embolism	2
Vascular disease	1
Sex Female	1
Your score	9

view results

CHADSVASC clinical risk estimation. Adapted from Lip et al. See Van den Ham et al. below for actual risks in a larger population.

CHA_2DS_2VASc SCORE	PATIENTS (n=7329)	ADJUSTED STROKE RATE (% year)
0	1	0%
1	422	1,3%
2	1230	2,2%
3	1730	3,2%
4	1718	4,0%
5	1159	6,7%
6	679	9,8%
7	294	9,6%
8	82	6,7%
9	14	15,2%

https://www.chadsvasc.org/ (HASBLED Score)

HASBLED clinical characteristic [click on present risk factors]

CLINICAL CHARACTERISTIC	POINTS AWARDED
Hypertension	1
Abnormal liver function	1
Abnormal renal function	1
Stroke	1
Bleeding	1
Labile INRs	1
Elderly (Age >65)	1
Drugs	1
Alcohol	1
Your score	4

HASBLED clinical risk estimation. Adapted from Pisters et al.

HAS BLED SCORE	NUMBER OF PATIENTS	NUMBER OF BLEEDING	BLEEDS PER 100 PATIENT YEARS
0	798	9	1,13
1	1286	13	1,02
2	744	14	1,88
3	187	7	3,74
4	46	4	8,70
5	8	1	12,50
6	2	0	0
7	---	---	---
8	---	---	---
9	---	---	---
Total	3061	47	16.47

2017 ACC Expert Consensus Decision Pathway for Periprocedural Management of Anticoagulation in Patients With Nonvalvular Atrial Fibrillation

Thromboembolic risk category	Bleeding risk category	Recommendation
Low ($\leq$ 5%/year, CHA_2DS_2-VASc $\leq$ 4)[a]	All levels of bleeding	Interrupt vitamin K antagonists without bridging
Moderate (5%–10%/year, CHA_2DS_2-VASc 5 or 6)	High procedural bleeding risk	Interrupt vitamin K antagonists without bridging
	No significant bleeding risk *without* history of stroke, transient ischemic attack, or systemic embolism	Interrupt vitamin K antagonists without bridging
	No significant bleeding risk *with* history of stroke, transient ischemic attack, or systemic embolism	Consider bridging
High (> 10%/year, CHA_2DS_2-VASc $\geq$ 7)	All levels of bleeding risk	Should generally be considered for bridging
	High bleeding risk	Apply clinical judgment

[a] CHA_2DS_2-VASc = 1 point for congestive heart failure, hypertension, age 65 to 75, diabetes, vascular disease, or female sex; 2 points for history of either stroke or transient ischemic attack or thromboembolism, and/or age $\geq$ 75.

When to hold pre-op/ last dose?

- **Warfarin – 5 days**. Resume within 24 hours postop.
- **LMWH – 24 hours.** Resume at 12-72 hours postop.

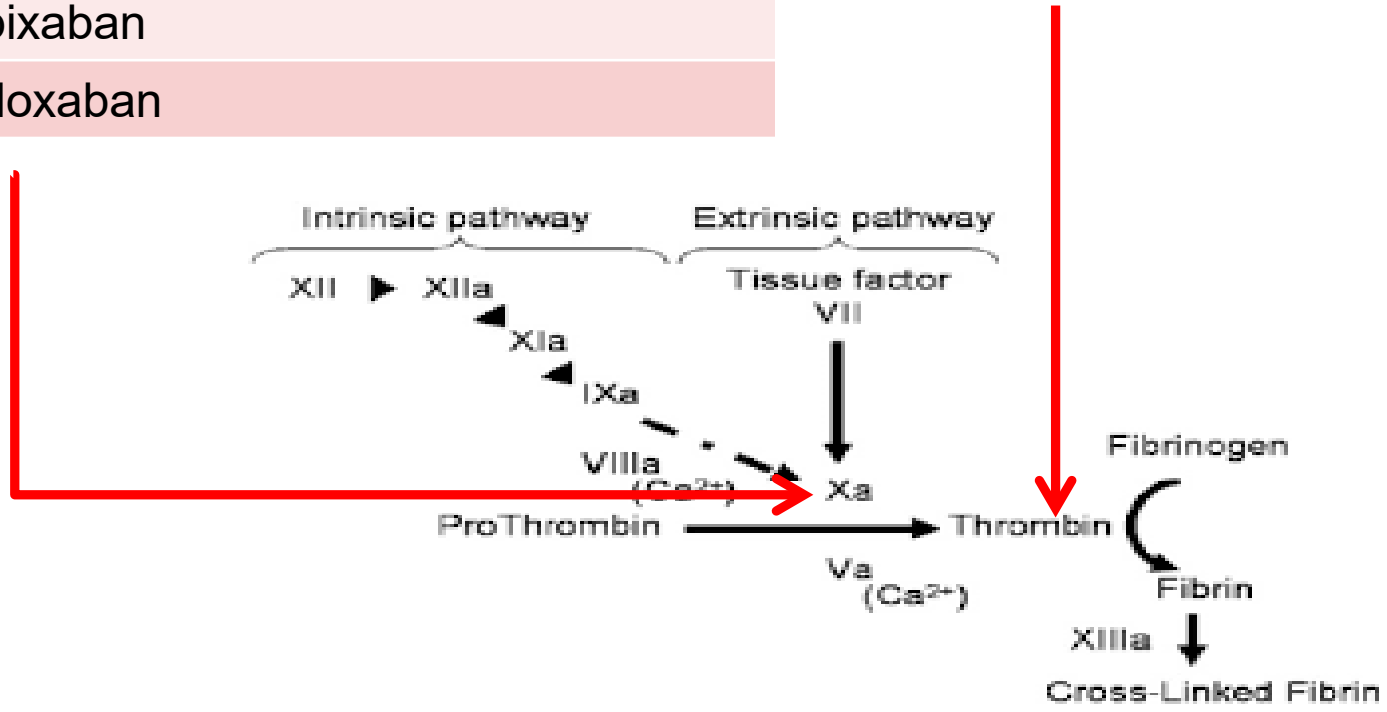
65 yr female with HTn, DM, CAD, CHF, A fib on Apixaban 5mg BID, CHADS-VASc score is 5, HASBLED 3, scheduled for colectomy for colon cancer, Sr Cr. 1.15 Cr Cl. 56 ml/min). How would you manage Apixaban?

- A. Stop Apixaban five days before surgery and bridge with low-molecular-weight heparin (LMWH) before and after surgery.
- B. Stop Apixaban two days before the procedure and resume two or three days after surgery with the lower dose (2.5 mg/BID), given the high bleeding risk associated with cancer.
- C. Continue Apixaban until the day of surgery, because of the high thromboembolic risk, and resume Apixaban 12 hours after surgery.
- D. Stop Apixaban two days before surgery and then resume two or three days after the procedure; consider bridging with LMWH after surgery if the patient is unable to take oral medications post-operatively.
- E. Stop Apixaban five days before the procedure and measure the anti-factor Xa activity level on the morning of surgery; resume apixaban two to three days post-op.

DOAC Mechanism of Action

Inhibits Factor Xa
Rivaroxaban
Apixaban
Edoxaban

Direct Thrombin Inhibitor
Dabigatran



Drug	Renal function	Low bleeding risk surgery	High bleeding risk surgery*	Resumption of therapy	
				Low bleeding risk surgery	High bleeding risk surgery
Dabigatran	CrCl > 50 mL min^{-1} CrCl 30–50 mL min^{-1}	Last dose: 2 days before procedure Last dose: 3 days before procedure	Last dose: 3 days before procedure Last dose: 4–5 days before procedure	Resume ~ 24 h after procedure	Resume 2–3 days after procedure (48–72 h postoperatively)†
Rivaroxaban	CrCl > 50 mL min^{-1} CrCl 30–50 mL min^{-1} CrCl 15–29.9 mL min^{-1}‡	Last dose: 2 days before procedure Last dose: 2 days before procedure Last dose: indivualized on the basis of patient and procedural factors for bleeding and thrombosis	Last dose: 3 days before procedure Last dose: 3 days before procedure Last dose: indivualized on the basis of patient and procedural factors for bleeding and thrombosis	Resume ~ 24 h after procedure	Resume 2–3 days after procedure (48–72 h postoperatively)†
Apixaban	CrCl > 50 mL min^{-1} CrCl 30–50 mL min^{-1} CrCl 15–29.9 mL min^{-1}	Last dose: 2 days before procedure Last dose: 2 days before procedure Last dose: indivualized on the basis of patient and procedural factors for bleeding and thrombosis	Last dose: 3 days before procedure Last dose: 3 days before procedure Last dose: indivualized on the basis of patient and procedural factors for bleeding and thrombosis	Resume ~ 24 h after procedure	Resume 2–3 days after procedure (48–72 h postoperatively)†
Edoxaban	CrCl > 50 mL min^{-1}	Last dose: 2 days before procedure	Last dose: 3 days before procedure	Resume ~ 24 h after procedure	Resume 2–3 days after procedure (48–72 h postoperatively)†

CrCl, creatinine clearance. *Includes any procedure/surgery requiring neuraxial anesthesia. †For patients at high risk for thromboembolism and with a high bleeding risk after surgery, consider administering a reduced dose of dabigatran (75 mg twice daily), rivaroxaban (10 mg once daily) or apixaban (2.5 mg twice daily) on the evening after surgery and on the following day (first postoperative day) after surgery. ‡Value for patients receiving rivaroxaban 15 mg once daily.

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Review Article | Free Access |

Periprocedural management of patients receiving a vitamin K antagonist or a direct oral anticoagulant requiring an elective procedure or surgery

A. C. Spyropoulos, A. Al-Badri, M. W. Sherwood, J. D. Douketis

First published: 14 March 2016 | https://doi.org/10.1111/jth.13305 | Cited by: 36

- 85yr male admitted for small bowel obstruction, ESRD on dialysis, Hb = 8, surgeon and anesthesia want “medical clearance” and Hb >10 pre-op.
- A) transfuse to Hb>10
- B) transfuse to Hb>9
- C) don’t transfuse, check post-op Hb
- D) ask surgeon/ anesthesiologist to read up on latest AABB guidelines

Original Article

Liberal or Restrictive Transfusion in High-Risk Patients

Jeffrey L. Carson, M.D., Michael L. Terrin, M.D., M.P.H., Helaine Noveck, M.P.H., David W. Sanders, M.D., Bernard R. Chaitman, M.D., George G. Rhoads, M.D., M.P.H., George Nemo, Ph.D., Karen Dragert, R.N., Lauren Beaupre, P.T., Ph.D., Kevin Hildebrand, M.D., William Macaulay, M.D., Courtland Lewis, M.D., Donald Richard Cook, B.M.Sc., M.D., Gwendolyn Dobbin, C.C.R.P., Khwaja J. Zakriya, M.D., Fred S. Apple, Ph.D., Rebecca A. Horney, B.A., Jay Magaziner, Ph.D., M.S.Hyg., for the FOCUS Investigators

N Engl J Med
Volume 365(26):2453-2462
December 29, 2011

- 2011 RCT: 2000 patients undergoing hip surgery with CAD or known risk factors, +Hb <10 g/dl

- Liberal transfusion **Hb<10** v/s Conservative transfusion **Hb<8**

- **No significant difference** in death, inability to walk at 60 days, MI, unstable angina

2012 AABB Clinical Practice Guidelines: ***Ann Intern Med. 2012;157(1):49-58. doi:10.7326/0003-4819-157-1-201206190-00429***

Table 2. **Evidence Tables for Clinical Outcomes**

Studies (References)	Quality Assessment*						Patients, *n/N*		Effect		Quality	Importance
Variable	Design	Risk of Bias	Inconsistency	Indirectness	Imprecision	Other Considerations	Restrictive Transfusion Strategy	Liberal Transfusion Strategy	Relative Risk (95% CI)	Absolute Effect		
Thirty-day mortality (follow-up, 0–30 d; assessed with: Direct observation or telephone follow-up)												
11 (31, 32, 41–44, 47, 49, 50, 52, 53)	Randomized trials	No serious risk of bias	No serious inconsistency	No serious indirectness	No serious imprecision	None	171/2484 (6.9%)	199/2495 (8.0%)	0.85 (0.7 to 1.03)	Risk reduction, 12 fewer per 1000 (24 fewer to 2 more)	High	Critical
Myocardial infarction (assessed with: Systematic screening or clinical detection†)												
8 (32, 42, 43, 47, 48, 50, 51, 53)	Randomized trials	No serious risk of bias	Serious‡	No serious indirectness	Serious§	None	45/1940 (2.3%)	39/1944 (2.0%)	0.88 (0.38 to 2.04)	Risk reduction, 2 fewer per 1000 (12 fewer to 21 more)	Low	Critical
Pulmonary edema or congestive heart failure (assessed with: Clinically recognized)												
5 (32, 47, 50–52)	Randomized trials	Serious‖	Serious¶	No serious indirectness	No serious imprecision	None	59/1827 (3.2%)	78/1822 (4.3%)	0.72 (0.31 to 1.7)	Risk reduction, 12 fewer per 1000 (30 fewer to 30 more)	Low	Important
Cerebrovascular accident (stroke) (assessed with: Clinically recognized)												
5 (31, 32, 44, 47, 51)	Randomized trials	Serious‖	No serious inconsistency	No serious indirectness	No serious imprecision	None	20/1380 (1.4%)	25/1380 (1.8%)	0.84 (0.47 to 1.49)	Risk reduction, 3 fewer per 1000 (10 fewer to 9 more)	Moderate	Critical
Thromboembolism (assessed with: Objective testing)												
3 (32, 44, 47)	Randomized trials	No serious risk of bias	No serious inconsistency	No serious indirectness	Serious§	None	10/1111 (0.9%)	14/1109 (1.3%)	0.71 (0.32 to 1.59)	Risk reduction, 4 fewer per 1000 (9 fewer to 7 more)	Moderate	Important
Infection (assessed with: Clinically recognized)												
6 (31, 32, 42, 47, 52, 54)	Randomized trials	Serious‖	No serious inconsistency	No serious indirectness	No serious imprecision	None	180/2149 (8.4%)	223/2157 (10.3%)	0.81 (0.66 to 1)	Risk reduction, 20 fewer per 1000 (35 fewer to 0 more)	Moderate	Important
Inability to walk or death at 60 d (mean follow-up, 60 d; assessed with: Telephone follow-up)												
1 (32)	Randomized trials	No serious risk of bias	No serious inconsistency	No serious indirectness	Serious**	None	347/1009 (34.4%)	351/1007 (34.9%)	0.99 (0.88 to 1.11)	Risk reduction, 3 fewer per 1000 (42 fewer to 38 more)	Moderate	Important
Hospital length of stay (better indicated by lower values; assessed with: Direct observation)												
8 (32, 42–44, 47, 50, 51, 54)	Randomized trials	No serious risk of bias	No serious inconsistency	No serious indirectness	No serious imprecision	None	2110	2116	–	Mean difference, 0.11 (−0.16 to 0.38)	High	Important

* Quality assessment evaluates risk of bias, inconsistency (based on heterogeneity among trials), indirectness (based on assessment of generalizability of results), and imprecision (based on width of CIs).
† Most events were reported by Carson and colleagues (32). Participants in this study had 4 protocol-directed troponin levels and 3 electrocardiograms at specified time points, the results of which were evaluated to screen for events and central blinded classification of acute myocardial infarction.
‡ Two of the largest trials (Carson and colleagues [32] and Hébert and colleagues [49]) had inconsistent results (see text for details).
§ Low event rates with wide CIs.
‖ Clinically recognized and unblinded assessment.
¶ Significant heterogeneity (I^2 = 65%).
** Data primarily from 1 trial (Carson and colleagues [32]). The findings of a second trial involving 120 patients with hip fractures (Foss and colleagues [47]) reported function results as medians and are not included in the data. However, the findings from this study were similar to those of Carson and colleagues. The results of this outcome at 30 d are similar to 60-d results.

Review 19 trials, 1950-2011 n=6264,
No harm from restrictive transfusion

2012 American Association of Blood Bank practice guidelines: **Restrictive strategy**

- a) Stable hospitalized patients: (**7gm/dl**) (**strong recommendation, high-quality evidence**)
- b) Pre-existing CAD: transfuse if symptomatic, **or Hb <8gm/dl** (**weak recommendation, moderate evidence**)
- c) HD stable **Acute coronary syndrome**, **no recommendation**

- 55 yr. male, ETOH abuse, on dabigatran for non-valvular A-fib, with hematemesis, Hb of 6gm/dl. What do you do next?
- A) FFP + Vit. K to reverse action of NOAC
- B) Hemodialysis
- C) Transfuse to Hb >7 and perform emergent EGD
- D) Give Activated charcoal

Consensus for Management of Bleeding on Oral Anticoagulants

Dec 01, 2017 | Geoffrey D. Barnes, MD, MSc, FACC

Authors: Tomaselli GF, Mahaffey KW, Cuker A, et al.

Citation: 2017 ACC Expert Consensus Decision Pathway on Management of Bleeding in Patients on Oral Anticoagulants: A Report of the American College of Cardiology Task Force on Expert Consensus Decision Pathways. *J Am Coll Cardiol* 2017;Dec 1:[Epub ahead of print].

- **Severity of bleeding**

- 1. Critical site?
- 2. Hemodynamically unstable
- 3. Hb drop ≥2 g/dl or need for 2+ Unit RBC

- **If any 3 is yes- Stop DOAC**

- **Charcoal** if ingested <2 hours, CKD/ ESRD: HD may be indicated

Reversal agent:

- Life-threatening bleed or a major bleed in a critical site.
- **IV Vitamin K:** Warfarin: Major bleed- 5-10 mg, non-major bleed (2-5mg)
- **4 factor Prothrombin Complex Concentrate (PCC) Kcentra: 50 units/kg** for Factor Xa inhibitors / Warfarin:
- **Idarucizumab (Praxbind):** 5 g IV

When to restart anticoagulation?

- **Shared decision making**: to determine if/ when restarted.

(delay start if critical site, high risk of rebleeding or death, unidentified source, or pending surgical interventions.

- **GI bleed** start DOAC after **7+ days**
- **Intracranial hemorrhage** start after **4+ weeks**.


WELL, WELL - IT SEEMS YOUR WEIGHT IS PERFECT. YOU JUST HAPPEN TO BE ELEVEN FEET TOO SHORT.

- 65yr. morbid obese, hypertensive male, says that “wife complains that I snore too much”, unable to see post pharyngeal wall
- A) Tell respiratory therapist to assess for nocturnal oximetry
- B) Pulmonary consult
- C) Assess for STOP-BANG
- D) Tell his wife to “stop complaining and leave the man alone”

STOP-BANG

- S= Snoring
- T= Tiredness
- O= Observed stoppage of breathing
- P= BP elevated
- B= BMI>35
- A= Age >50
- N= Neck circumference >40 cm
- G= Gender- Male

- High risk OSA: score $\geq$ 3
- **92% sensitive** and >63% specific for detecting OSA

- ***Chung F et.al**. Br. J Anaesth. 2012; 108 (5): 768-75*

Suspected OSA management

- A) Inform Anesthesia
- B) Prolonged post-op observation in recovery room or ICU
- C) BIPAP use as needed esp. sleep time
- D) Aggressive pulmonary hygiene
- E) Out-pt sleep testing

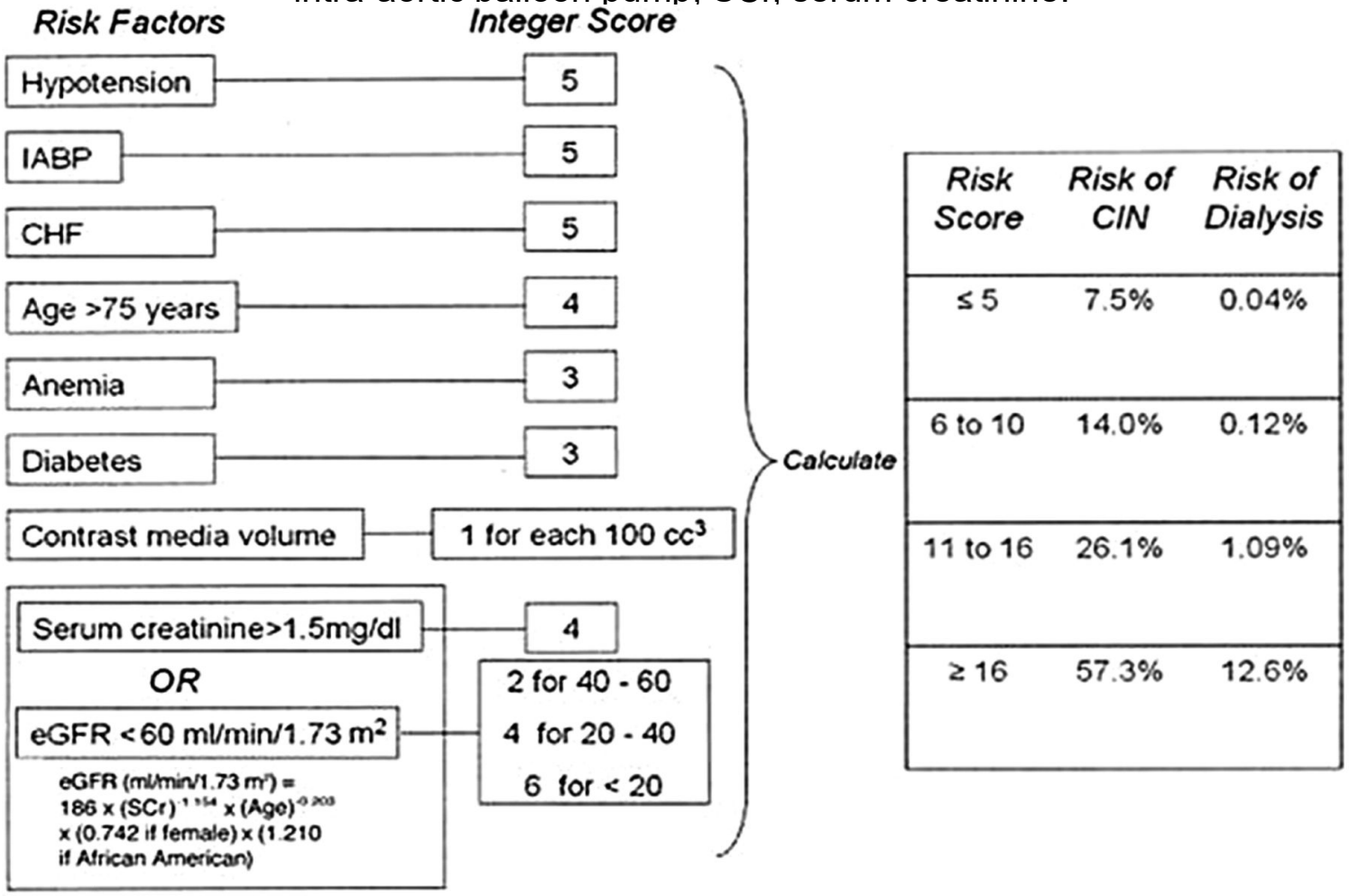
- 82yr diabetic lady, 3 days post-op colon resection + primary anastomosis, now has abdominal pain, distention, minimal bowel sounds, loose BM, guarding, WBC 25K with >90% neutrophils, received 5 day levofloxacin for UTI pre-op, Cr. 1.6, next step
- A) stat CT scan abdomen pelvis rule out bowel perforation or abscess
- B) X-ray abdomen r/o obstruction
- C) stool for C-diff
- D) inform surgery, since it could be a post-op complication

- Surgeon requests a CT abdomen with IV contrast to rule our abscess, what would be your reno-protective strategy?

- A) n-Acetyl cysteine 1200mg, 2 and 12 hours before CT?
- B) NS at 150 ml/ hour for next 24 hours
- C) Nephrology consult
- D) Bicarbonate drip

Mehran risk score for prediction of contrast-induced nephropathy (CIN) s/p PCI

8 Abbreviations: CHF, congestive heart failure; eGFR, estimated glomerular filtration rate; IABP, intra-aortic balloon pump; SCr, serum creatinine.



Trang H. Au et al. Ann Pharmacother 2014;48:1332-1342

http://www.qxmd.com/calculate-online/nephrology/contrast-nephropathy-post-pci

Summary of Guidelines for Prevention of Contrast-Induced Nephropathy

Table 1. Summary of Guidelines for Prevention of Contrast-Induced Nephropathy.[3,4,13]

	ACCF/AHA/SCAI	ACR	KDIGO
Recommended	• Preprocedural risk assessment • Hydration with isotonic fluid (IV infusion) • Minimal contrast volume for CrCl <60 mL/min	• Procedure with noncontrast • Lowest dose of contrast dye • LOCM/IOCM • IV NS or sodium bicarbonate • Addition of N-AC for patients with high risk for CIN	• Individual risk-benefit assessment • Procedure with noncontrast • Isotonic fluid • LOCM
Not Recommended	• N-AC	• Theophylline • Fenoldopam • Prophylaxis with HD/ hemofiltration	• Mannitol • Furosemide • Theophylline, endothelin-1, fenoldopam
No recommendations	• Versus IOCM		• Sodium bicarbonate • N-AC

Abbreviations: ACCF, American College of Cardiology Foundation; AHA, American Heart Association; SCAI, Society for Cardiovascular Angiography and Interventions; ACR, American College of Radiology; KDIGO, Kidney Disease Improving Global Outcomes; IV, intravenous; CrCl, creatinine clearance; LOCM, low-osmolar contrast media; IOCM, iso-osmolar contrast media; NS, normal saline; N-AC, N-acetylcysteine; HD, hemodialysis.

Trang H. Au et al. Ann Pharmacother 2014;48:1332-1342

85yr obese male with HTn, Dm ,CAD, prior CABG, Atrial fibrillation, Chr CHF EF 35%, comes with 3rd episode of small bowel obstruction this year and acute CHF.

BP is 160-180's systolic at home- patient on Metoprolol 12.5 BID and Lasix 40 daily (? compliance)

Afib with basal HR is 120-140's

Hb is 7 with ferritin of 15ng/ml with no source of GI bleed

Wife says he snores and stops breathing at night

How would you optimize this patient for elective adhesiolysis in 2 months?

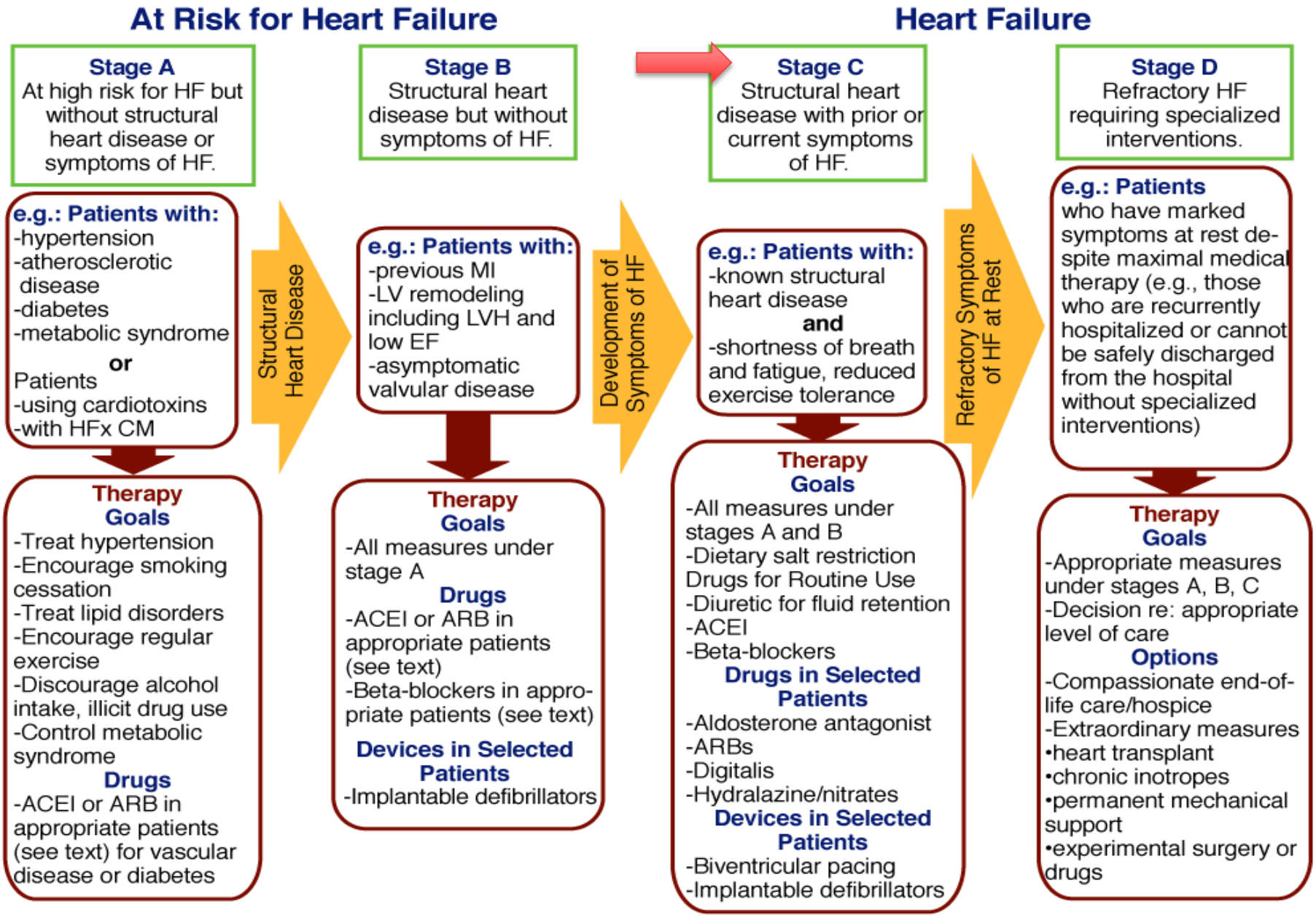
2017 ACC/AHA/HFSA Focused Update of the 2013 ACCF/AHA Guideline for the Management of Heart Failure

Developed in Collaboration With the American Academy of Family Physicians, American College of Chest Physicians, and International Society for Heart and Lung Transplantation

Citation

This slide set is adapted from the 2014 AHA/ACC/HRS Guideline for the Management of Patients With Atrial Fibrillation. Published on March 22, 2014, available at: *Journal of the American College of Cardiology* (http://content.onlinejacc.org/article.aspx?articleid=1854231) and *Circulation* (http://circ.ahajournals.org/content/early/2014/04/10/CIR.0000000000000041)

The full-text guidelines are also available on the following Web sites: ACC (www.cardiosource.org) and AHA (my.americanheart.org)


At Risk for Heart Failure
Heart Failure
Stage A
At high risk for HF but without structural heart disease or symptoms of HF.
Stage B
Structural heart disease but without symptoms of HF.
Stage C
Structural heart disease with prior or current symptoms of HF.
Stage D
Refractory HF requiring specialized interventions.
e.g.: Patients with:
-hypertension
-atherosclerotic disease
-diabetes
-metabolic syndrome
or
Patients
-using cardiotoxins
-with HFx CM
Structural Heart Disease
e.g.: Patients with:
-previous MI
-LV remodeling including LVH and low EF
-asymptomatic valvular disease
Development of Symptoms of HF
e.g.: Patients with:
-known structural heart disease
and
-shortness of breath and fatigue, reduced exercise tolerance
Refractory Symptoms of HF at Rest
e.g.: Patients
who have marked symptoms at rest despite maximal medical therapy (e.g., those who are recurrently hospitalized or cannot be safely discharged from the hospital without specialized interventions)
Therapy Goals
-Treat hypertension
-Encourage smoking cessation
-Treat lipid disorders
-Encourage regular exercise
-Discourage alcohol intake, illicit drug use
-Control metabolic syndrome
Drugs
-ACEI or ARB in appropriate patients (see text) for vascular disease or diabetes
Therapy Goals
-All measures under stage A
Drugs
-ACEI or ARB in appropriate patients (see text)
-Beta-blockers in appropriate patients (see text)
Devices in Selected Patients
-Implantable defibrillators
Therapy Goals
-All measures under stages A and B
-Dietary salt restriction
Drugs for Routine Use
-Diuretic for fluid retention
-ACEI
-Beta-blockers
Drugs in Selected Patients
-Aldosterone antagonist
-ARBs
-Digitalis
-Hydralazine/nitrates
Devices in Selected Patients
-Biventricular pacing
-Implantable defibrillators
Therapy Goals
-Appropriate measures under stages A, B, C
-Decision re: appropriate level of care
Options
-Compassionate end-of-life care/hospice
-Extraordinary measures
•heart transplant
•chronic inotropes
•permanent mechanical support
•experimental surgery or drugs

Hypertension

Treating Hypertension to Reduce the Incidence of HF

COR	LOE	Recommendations	Comment/ Rationale
I	B-R	Stage A HF, **goal <130/80 mm Hg**.	NEW: Recommendation reflects new RCT data.

Sleep Disorders

COR	LOE	Recommendations	Comment/ Rationale
IIa	**C-LD**	NYHA class II–IV HF and suspicion of sleep disordered breathing or excessive daytime sleepiness, a **formal sleep assessment** is reasonable.	NEW: Recommendation reflects clinical necessity to distinguish obstructive versus central sleep apnea.
IIb	**B-R**	cardiovascular disease and obstructive sleep apnea, **CPAP** may be reasonable to improve sleep quality and daytime sleepiness.	NEW: New data demonstrate the limited scope of benefit expected from CPAP for obstructive sleep apnea.
III: Harm	**B-R**	In patients with NYHA class II–IV HF*r*EF and central sleep apnea, **adaptive servo-ventilation (ASV)** causes harm.	NEW: New data demonstrate a signal of harm when adaptive servo-ventilation is used for central sleep apnea.

Anemia

COR	LOE	Recommendations	Comment/ Rationale
IIb	**B-R**	In patients with **NYHA class II and III HF and iron deficiency (ferritin <100 ng/mL or 100 to 300 ng/mL if** transferrin saturation is <20%), **intravenous iron** replacement might be reasonable to improve functional status and QoL.	NEW: New evidence consistent with therapeutic benefit.
III: No Benefit	**B-R**	In patients with HF and anemia, **erythropoietin-stimulating agents** should not be used to improve morbidity and mortality.	NEW: Current recommendation reflects new evidence demonstrating absence of therapeutic benefit.

Recommendations for Treatment of Stage B HF

Recommendations	COR	LOE
MI and reduced EF --- **ACE inhibitors or ARBs**	I	A
MI and reduced EF---**Beta blockers**	I	B
MI--- Statins	I	A
Blood pressure should be controlled	I	A
ICD- asymptomatic ischemic cardiomyopathy, >40 days post-MI, **LVEF ≤30%, and on GDMT**	IIa	B
Nondihydropyridine calcium channel blockers may be harmful in patients with **low LVEF**	III: Harm	C

Stage C HF*p*EF

Recommendations	COR	LOE
Systolic and diastolic blood pressure should be controlled	I	B
Diuretics - symptoms due to **volume overload**	I	C
Coronary revascularization for patients with CAD in whom angina or **demonstrable myocardial ischemia** is present despite GDMT	IIa	C
Management of AF according to published clinical practice guidelines for HFpEF to improve symptomatic HF	IIa	C
Use of **beta-blocking agents, ACE inhibitors, and ARBs** for hypertension	IIa	C
ARBs might be considered to decrease hospitalizations in HFpEF	IIb	B
Nutritional supplementation is not recommended in HFpEF	III: No Benefit	C

Stage C HF*r*EF

Recommendations	COR	LOE
Diuretics --- fluid retention	I	C
Beta blockers--- reduce mortality for all stable patients	I	A
ACE inhibitors	I	A
ARBs--- ACE inhibitor intolerance	I	A
ARB as alternative to ACE inhibitor as first line therapy	IIa	A
The combination of **hydralazine and isosorbide dinitrate** is recommended for African-Americans, with NYHA class III–IV HFrEF on GDMT	I	A
A combination of hydralazine and isosorbide dinitrate can be useful in patients with HFrEF who cannot be given ACE inhibitors or ARBs	IIa	B
Aldosterone receptor antagonists are recommended in patients with NYHA class II-IV HF who have **LVEF ≤35%**	I	A
Routine combined use of ACE, ARB and Aldosterone receptor antagonist is potentially harmful	III Harm	C

Pharmacologic Therapy for Management of Stage C HF*r*EF (cont.)

Recommendations	COR	LOE
Digoxin	IIa	B
Anticoagulation--- permanent/persistent/paroxysmal AF **and an** additional risk factor for cardioembolic stroke	I	A
Anticoagulation--- permanent/persistent/paroxysmal AF **without an** additional risk factor for cardioembolic stroke	IIa	B
Anticoagulation is not recommended in patients with chronic HFrEF without AF, prior thromboembolic event, or a cardioembolic source	III: No Benefit	B
Statins		
Statins --- prescribed solely for HF	III: No Benefit	A

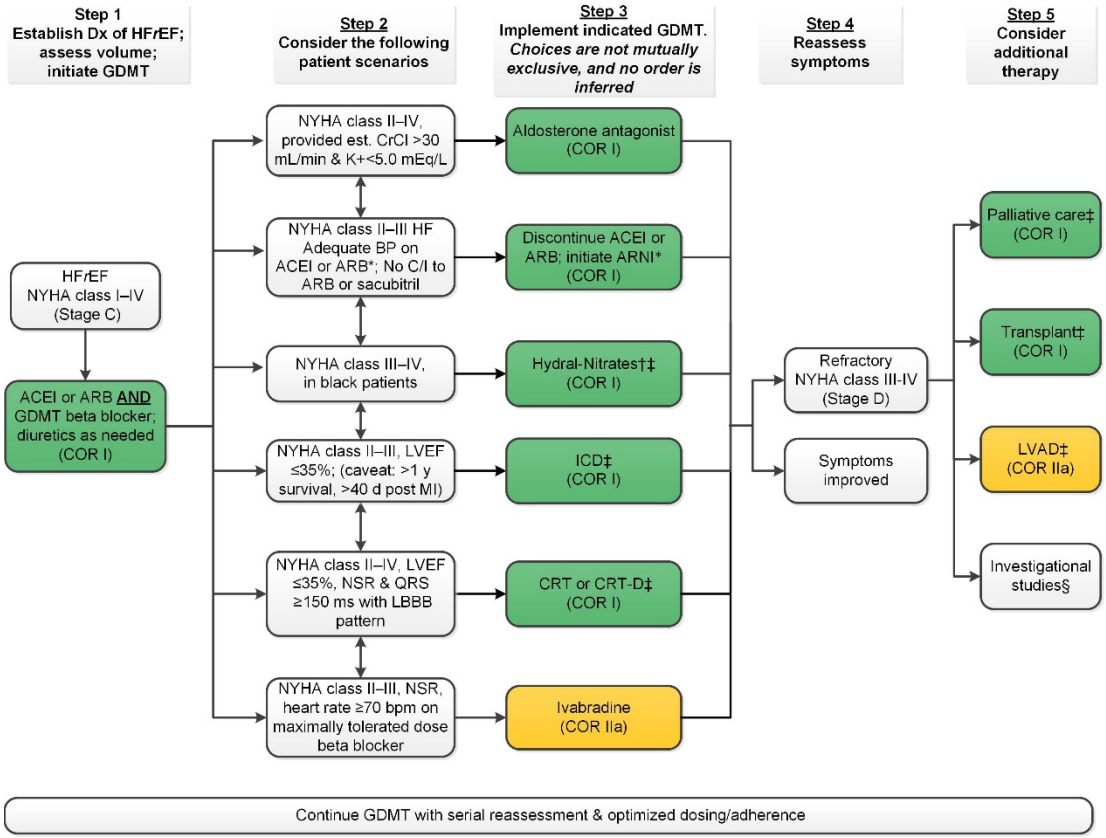
Pharmacological Therapy for Management of Stage C HF*r*EF (cont.)

Recommendations	COR	LOE
Other Drugs		
Nutritional supplements	III: No Benefit	B
Hormonal therapies other than to replete deficiencies are not recommended in HFrEF	III: No Benefit	C
Long-term use of an infusion of a positive inotropic drug is not recommended and may be harmful except as palliation	III: Harm	C
Calcium channel blocking drugs are not recommended as routine in HFrEF	III: No Benefit	A

Hospital Discharge

Recommendation or Indication	COR	LOE
Performance improvement systems in the hospital and early post discharge outpatient setting to **identify HF for GDMT**	I	B
Before hospital discharge, at the first post discharge visit, and in subsequent follow-up visits, the following should be addressed: a) initiation of GDMT if not done or contraindicated; b) causes of HF, barriers to care, and limitations in support; c) assessment of volume status and blood pressure with adjustment of HF therapy; d) optimization of chronic oral HF therapy; e) renal function and electrolytes; f) management of comorbid conditions; g) HF education, self-care, emergency plans, and adherence; and h) palliative or hospice care.	I	B
Multidisciplinary HF disease-management programs for patients at high risk for hospital readmission are recommended	I	B
A follow-up visit within 7 to 14 days and/or a telephone follow-up within 3 days of hospital discharge is reasonable	IIa	B
Use of **clinical risk-prediction tools and/or biomarkers** to identify higher-risk patients is reasonable	IIa	B

Treatment of HFrEF Stage C and D



†Hydral-Nitrates green box: The combination of ISDN/HYD with ARNI has not been robustly tested. BP response should be carefully monitored.
‡See 2013 HF guideline.
§ Participation in investigational studies is also appropriate for stage C, NYHA class II and III HF.
ACEI indicates angiotensin-converting enzyme inhibitor; ARB, angiotensin receptor-blocker; ARNI, angiotensin receptor-neprilysin inhibitor; BP, blood pressure; bpm, beats per minute; C/I, contraindication; COR, Class of Recommendation; CrCl, creatinine clearance; CRT-D, cardiac resynchronization therapy–device; Dx, diagnosis; GDMT, guideline-directed management and therapy; HF, heart failure; HFrEF, heart failure with reduced ejection fraction; ICD, implantable cardioverter-defibrillator; ISDN/HYD, isosorbide dinitrate hydral-nitrates; K+, potassium; LBBB, left bundle-branch block; LVAD, left ventricular assist device; LVEF, left ventricular ejection fraction; MI, myocardial infarction; NSR, normal sinus rhythm; and NYHA, New York Heart Association.

A busy orthopedic consultant requires you to “medically clear” 4 patients for OR, luckily they have only 1 cardiovascular condition. Which condition carries the highest risk of post-op mortality?

A) A-fib
B) Ischemic CHF
C) non-ischemic CHF
D) stable CAD

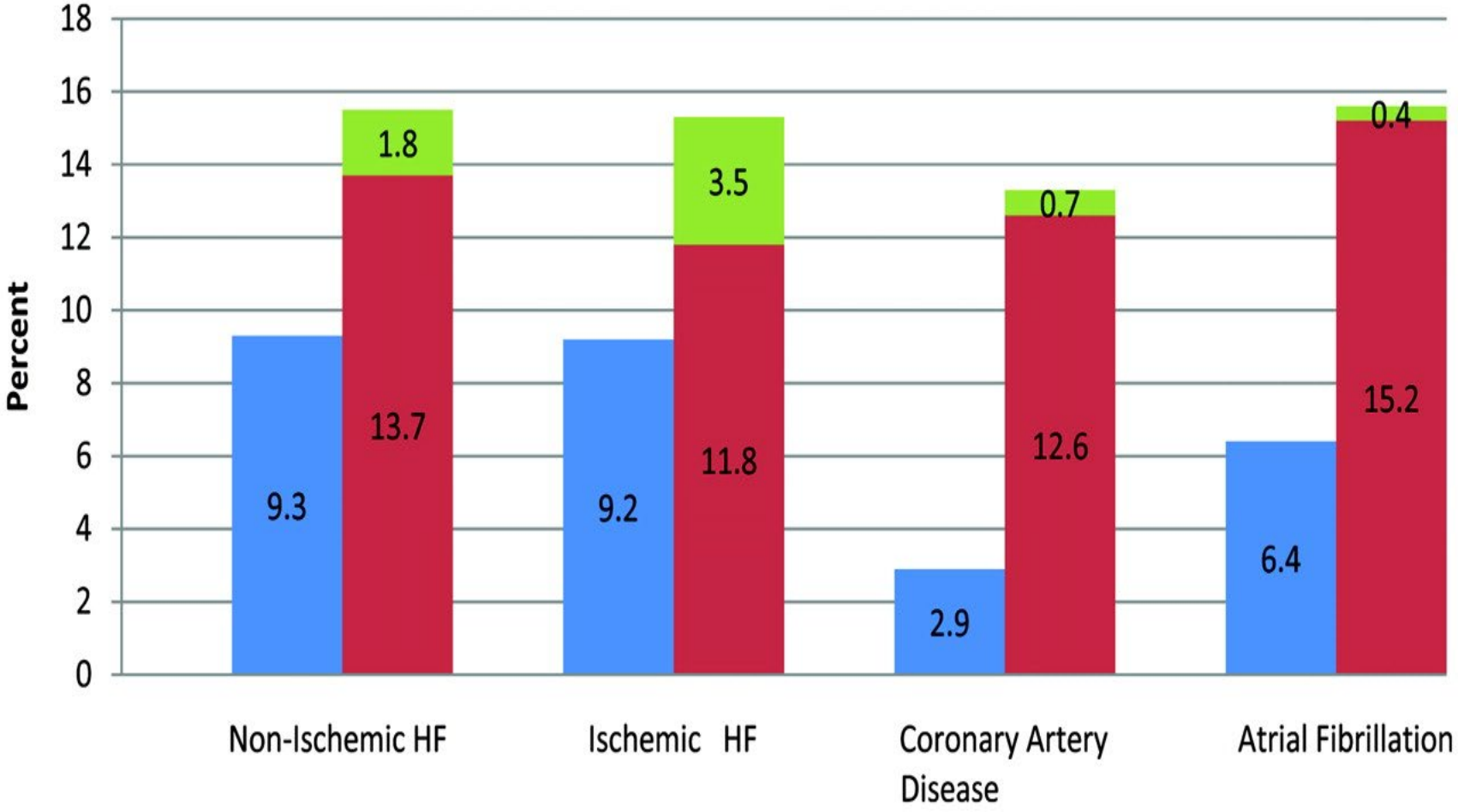
Mortality and Readmission of Patients With Heart Failure, Atrial Fibrillation, or Coronary Artery Disease Undergoing Noncardiac Surgery Clinical Perspective

***by Sean van Diepen**, Jeffrey A. Bakal, Finlay A. McAlister, and Justin A. Ezekowitz*

Circulation
Volume 124(3):289-296
July 19, 2011

- Population-based cohort study
- **>38000 patients** with 4CV conditions: A-fib, isch. CHF, non-isch CHF, CAD
- Primary outcomes: **30-day mortality & rehospitalization** (all cause and cardiac-related)

Unadjusted 30-day peri-operative mortality (blue), rehospitalization (red), and cardiac rehospitalization (green).



Sean van Diepen et al. Circulation. 2011;124:289-296

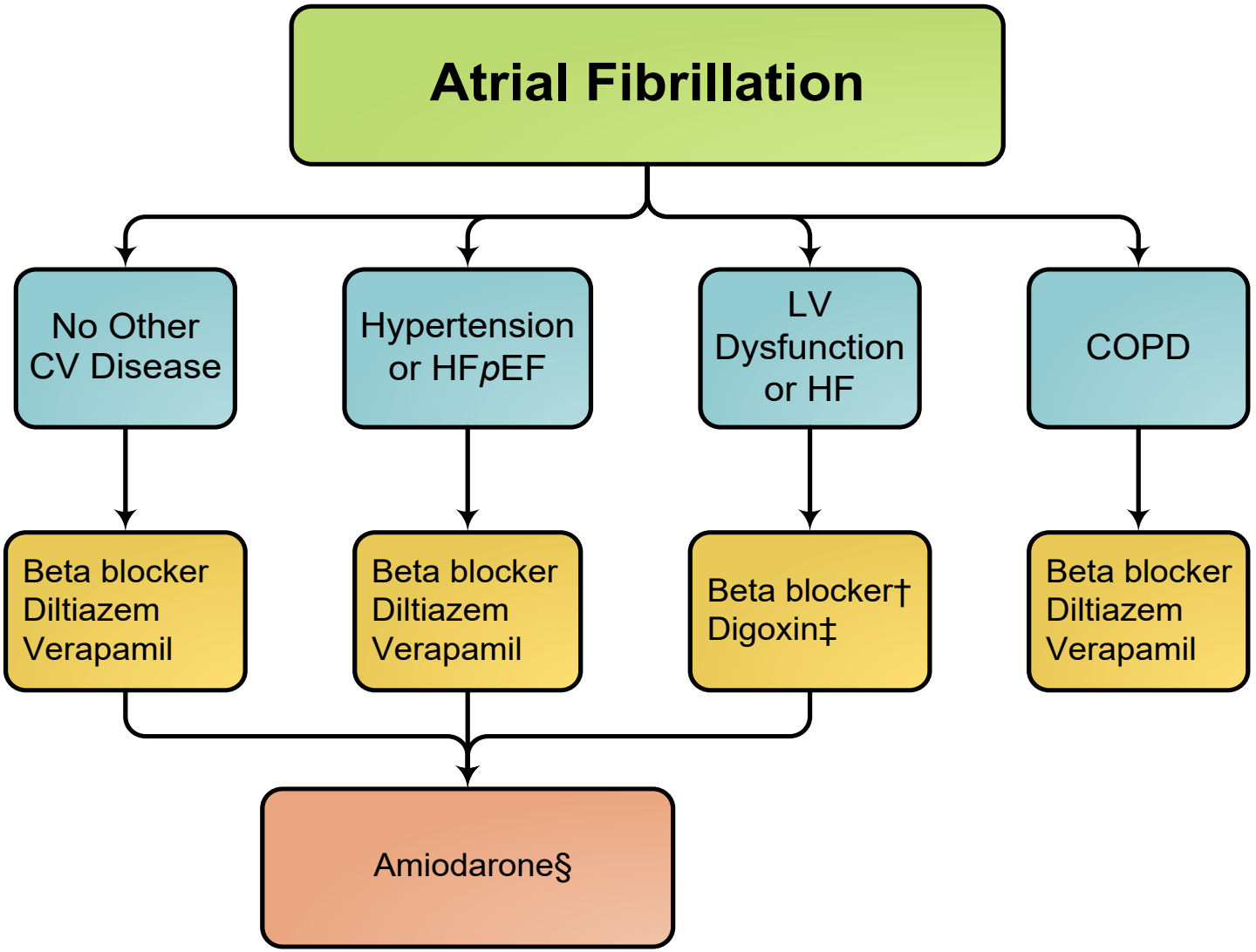
- After multivariable adjustment, **postoperative mortality** remained higher in NIHF, IHF, and AF patients than in those with CAD
- **NIHF** versus CAD: odds ratio **2.92**
- **IHF** versus CAD: odds ratio **1.98**
- **AF** versus CAD: odds ratio **1.69**

- **Minor and out-patient surgeries: high 30-day mortality**
- **CHF- 4.5%, Afib- 2.2%,** CAD- 0.8%
- **Risk**: highest if CV event was **<4 weeks pre-op**

Pearl:

- History of CHF & A-fib is a predictor of post-op all-cause mortality.
- **Avoid surgery <4 weeks** after a cardiovascular event

Approach to Selecting Drug Therapy for Ventricular Rate Control*



Rate Control

Recommendations	COR	LOE
Ventricular rate control---beta blocker, nondihydropyridine CCB for paroxysmal, persistent, or permanent AF.	I	B
IV Beta blocker or nondihydropyridine CCB in **acute setting** in patients without pre-excitation (HD stable)	I	B
In patients who experience AF-related symptoms during activity, the adequacy of heart rate control should be assessed during exertion, adjusting pharmacological treatment as necessary to keep the ventricular rate within the physiological range.	I	C

Rate Control (cont'd)

Recommendations	COR	LOE
Resting heart rate <80 bpm strategy **symptomatic** management of AF.	IIa	B
Intravenous amiodarone for **critically ill** patients without pre-excitation.	IIa	B
AV nodal ablation with permanent ventricular pacing when pharmacological therapy is inadequate and rhythm control is not achievable.	IIa	B
Lenient rate-control strategy (resting heart rate <110 bpm) as long as patients remain **asymptomatic** and LV systolic function is preserved.	IIb	B
Oral Amiodarone when other measures are unsuccessful or contraindicated.	IIb	C
AV nodal ablation with permanent ventricular pacing without prior attempts to achieve rate control with medications.	III: Harm	C

Rate Control (cont'd)

Recommendations	COR	LOE
Nondihydropyridine CCB--- in decompensated HF (Lead to further hemodynamic compromise)	III: Harm	C
Pre-excitation and AF--- Digoxin, nondihydropyridine CCB, or intravenous amiodarone (Increase the ventricular response and may result in ventricular fibrillation)	III: Harm	B
Dronedarone--- Permanent AF (Increases the risk of the combined endpoint of stroke, MI, systemic embolism, or cardiovascular death)	III: Harm	B

- 84yr old active male is scheduled for left upper lobectomy for localized lung Ca. PMH: Htn, DM, CKD II, MI with drug-eluting stent 4months ago.
- Meds include: atenolol, pravastatin, metformin, lisinopril, aspirin, plavix

Peri-op antiplatelet management includes:

a) Stop ASA and plavix 7 days pre-op
b) Continue ASA and plavix uninterrupted
c) Stop plavix 5-7 days pre-op, continue ASA
d) Delay surgery for another 8 months
e) Call Cardiologist, since they placed the stent

Perioperative Therapy

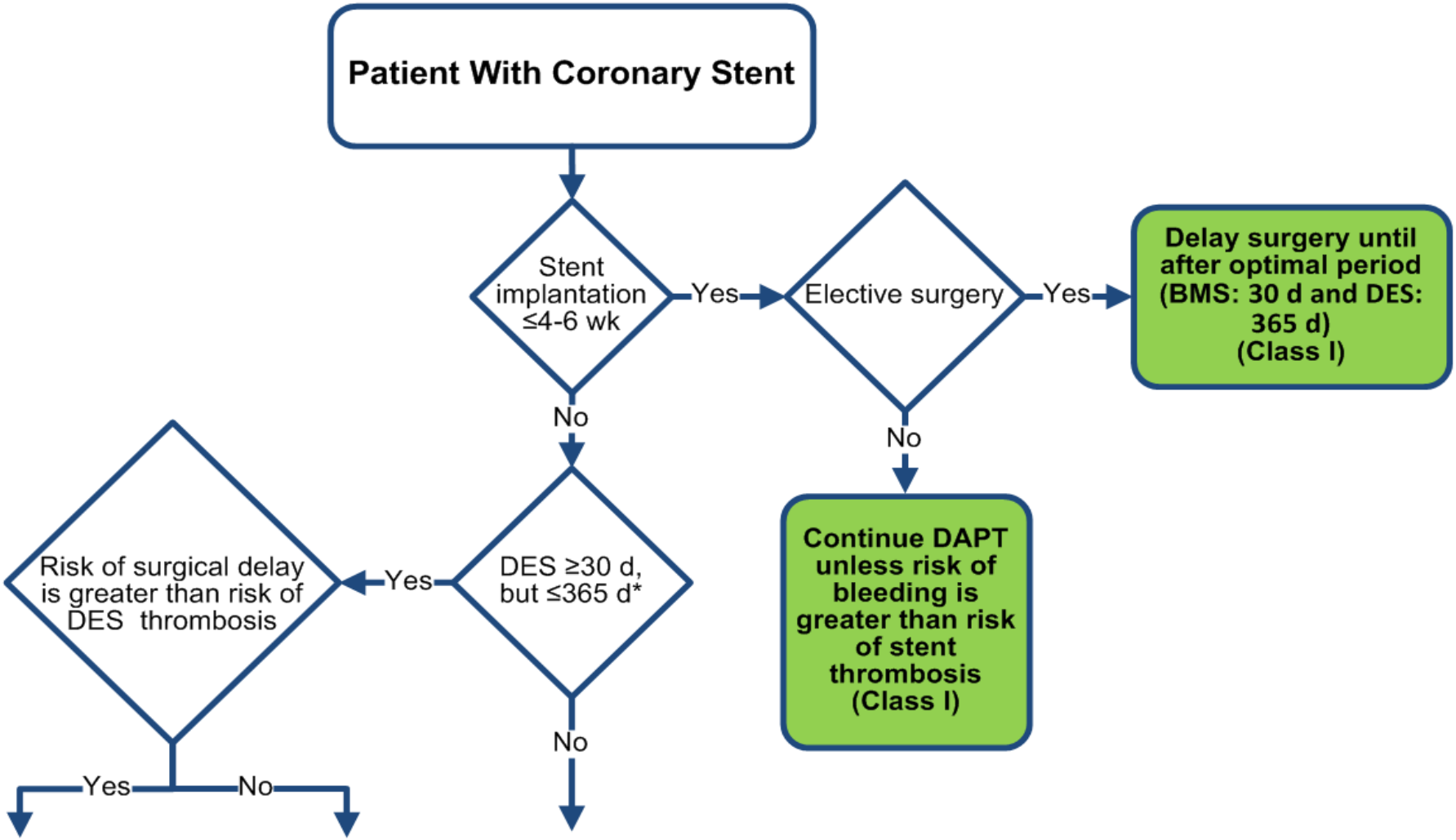
Antiplatelet Agents

Recommendations	COR	LOE
Urgent noncardiac surgery in first 4 to 6 weeks after BMS or DES, DAPT should be continued	I	C
Surgery **mandates the discontinuation** of $P2Y_{12}$ platelet receptor–inhibitor therapy, **continue aspirin, restart $P2Y_{12}$ platelet receptor–inhibitor ASAP** after surgery.	I	C
consensus of the surgeon, anesthesiologist, cardiologist, and patient, weighing relative risk of bleeding versus prevention of stent thrombosis.	I	C

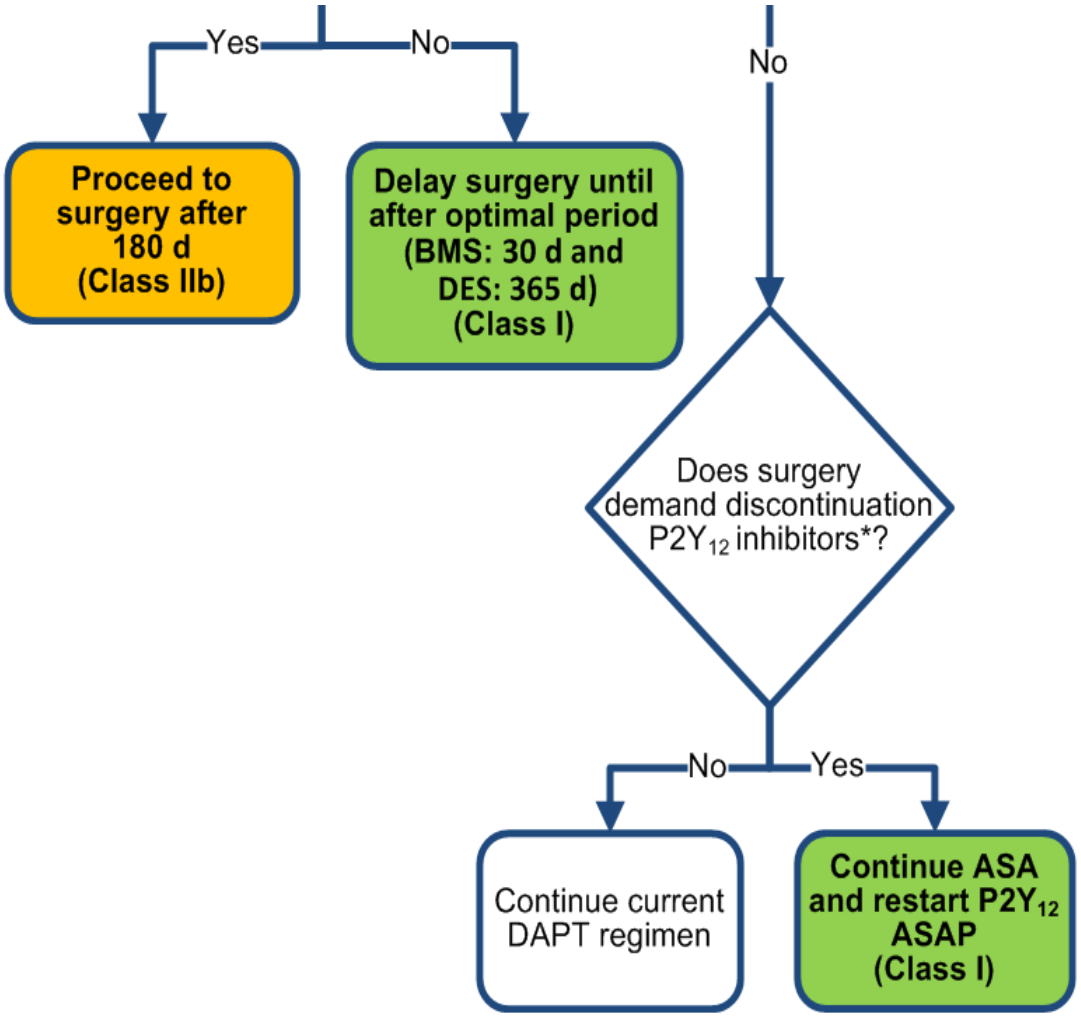
Antiplatelet Agents (cont'd)

Recommendations	COR	LOE
no prior coronary stent, **reasonable to continue aspirin** when the **risk of potential increased cardiac events** outweighs the risk of increased bleeding.	IIb	B
elective non-cardiac, non-carotid surgery, no prior stent, initiation or continuation of aspirin is not beneficial……	III: No Benefit	B
…unless the risk of ischemic events outweighs the risk of surgical bleeding.		C

Proposed Algorithm for Anti-platelet Management in Patients with PCI and Non-cardiac Surgery



Proposed Algorithm for Antiplatelet Management in Patients with PCI and Noncardiac Surgery (cont'd)



Pearls: anti-platelet agents s/p coronary stent

No elective surgery:

- for 14 days after PCI without stenting
- 6 weeks after BMS
- 6months -1 year after DES
- Discuss with surgeon benefits/ risks of continuing chronic dual anti-platelet agents
- Continue ASA unless bleeding risk is very high

- 62yr male with DM, CAD,TIA, PAD, admitted for elective femoro-popliteal bypass, attending surgeon Dr. Cut Emall, asks you to start B-blocker pre-op.

- A) start low-dose B-blocker pre-op
- B) start low-dose B-blocker post-op
- C) don't start B-blocker
- D) start B-blocker, postpone surgery for 2 weeks

https://www.google.com/search?q=lance+armstrong&biw=1680&bih=893&source=lnms&tbm=isch&sa=X&ei=q4KVVfbaE9OCyQSal57QCQ&sqi=2&ved=0CAcQ_AUoAg#tbm=isch&q=lance+armstrong+needles&imgrc=mCVm0aywle7GqM%3A

Peri-op B-blockade

- DECREASE trials published by Don Poldermans, influenced guidelines for peri-op B-blockade

- Heart. 2014 Mar;100(6):456-64. **Bouri et. al. Meta-analysis of secure randomized controlled trials of β-blockade to prevent perioperative death in non-cardiac surgery.**

  - **B-blockers reduced MI but increased stroke and mortality!**

Circulation. 2014 Dec 9;130(24):2246-64. doi: 10.1161/CIR.0000000000000104. Epub 2014 Aug 1.
Perioperative beta blockade in noncardiac surgery: a systematic review for the 2014 ACC/AHA guideline on perioperative cardiovascular evaluation and management of patients undergoing noncardiac surgery: a report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines.
Wijeysundera DN, Duncan D, Nkonde-Price C, Virani SS, Washam JB, Fleischmann KE, Fleisher LA; ACC/AHA Task Force Members.
Collaborators (15)

- Peri-operative beta blockade started **within 1 day or less** before non-cardiac surgery prevents nonfatal MI but increases risks of stroke, death, hypotension, and bradycardia.
- Without the controversial DECREASE studies, there is **insufficient data** on beta blockade started 2 or more days prior to surgery.

Perioperative Beta-Blocker Therapy

Recommendations	COR	LOE
Patients on long-term beta blockers- **continue**	I	B^{SR}
Post-op beta blockers : reasonable to be **guided by clinical circumstances**	IIa	B^{SR}
Patients with **intermediate- or high-risk myocardial ischemia: reasonable to begin** peri-operative beta blockers.	IIb	C^{SR}
In patients with **3 or more RCRI risk factors** (e.g., diabetes mellitus, HF, CAD, renal insufficiency, cerebrovascular accident): **reasonable to begin** beta blockers before surgery.	IIb	B^{SR}

These recommendations have been designated with a SR to emphasize the rigor of support from the ERC's systematic review. See the ERC systematic review report, "Perioperative beta blockade in noncardiac surgery: a systematic review for the 2014 ACC/AHA guideline on perioperative cardiovascular evaluation and management of patients undergoing noncardiac surgery" for the complete evidence review on perioperative beta-blocker therapy.

Perioperative Therapy

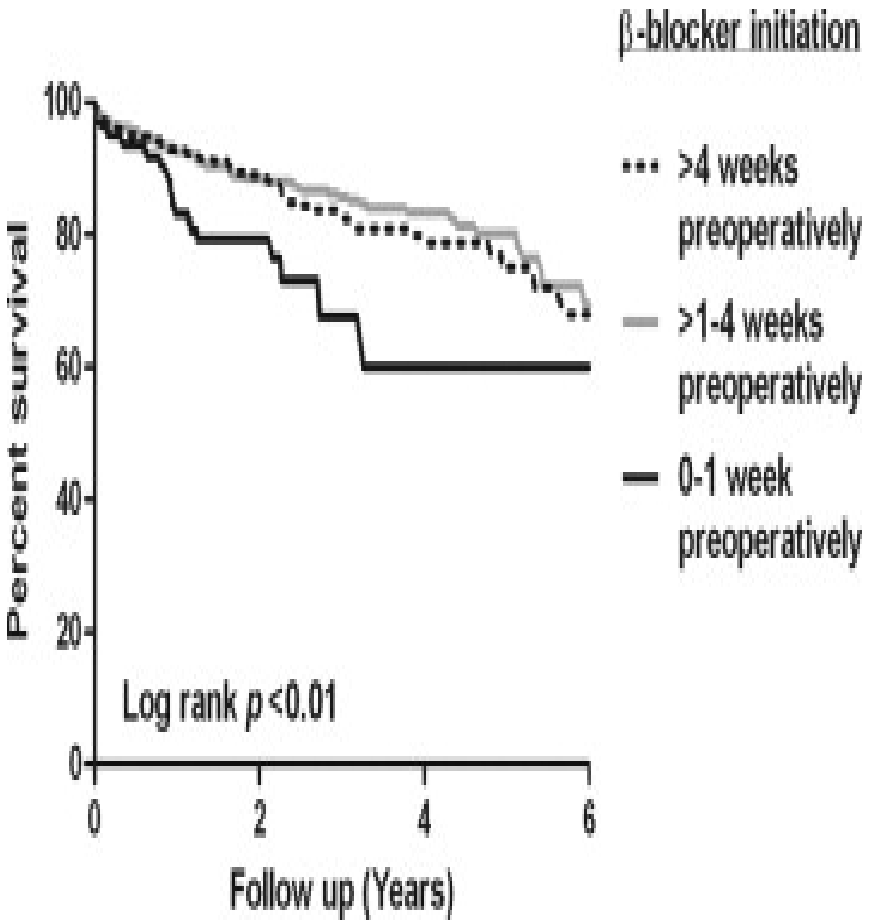
Peri-operative Beta-Blocker Therapy (cont'd)

Recommendations	COR	LOE
no RCRI risk factors, initiating beta blockers is of **uncertain benefit**.	IIb	B^{SR}
Beta-blocker therapy should **not be started on the day of surgery**.	III: Harm	B^{SR}

These recommendations have been designated with a SR to emphasize the rigor of support from the ERC's systematic review. See the ERC systematic review report, "Perioperative beta blockade in noncardiac surgery: a systematic review for the 2014 ACC/AHA guideline on perioperative cardiovascular evaluation and management of patients undergoing noncardiac surgery" for the complete evidence review on perioperative beta-blocker therapy.

Timing of B-Blocker initiation pre-op?

J Am Coll Cardiol. 2010 Nov 30;56(23):1922-9. doi: 10.1016/j.jacc.2010.05.056.
Timing of pre-operative Beta-blocker treatment in vascular surgery patients: influence on post-operative outcome.
Flu WJ e.t al.



Timing	**0-1wk (n=158)**	**1-4 wks (n=393)**	**>4wks (n=389)**	**P value**
Median HR (day of surgery)	74	70	66	<0.001
30-d CV events (trop.mort /CVA)	27%	15%	16%	<0.001
Long-term mortality	19%	14%	15%	0.039

Pearls: B-Blockers

- For patients **on B-blockers, keep on B-blockers** even when NPO

- For patients with long-term indication for B-blockers, **start at least a week or so** before surgery

What about other meds?

- ACE inhibitors
- Metformin
- Pravastatin
- Herbal meds

Perioperative Statin Therapy

Recommendations	COR	LOE
continue in patients **currently taking statins**	I	B
Peri-operative initiation of statin **reasonable in vascular surgery**	IIa	B
may be considered in patients with clinical indications according to GDMT who are undergoing **elevated-risk procedures**	IIb	C

Perioperative Therapy

Angiotensin-Converting Enzyme Inhibitors

Recommendations	COR	LOE
continuation of ACE inhibitors/ ARB **is reasonable**	IIa	B
If held before surgery, **reasonable to restart** as soon as clinically feasible	IIa	C

Metformin/ Oral Anti-diabetic agents

Hold on **night before surgery to 24-48 hours post-op** to prevent Lactic Acidosis

Diuretics

Hold on day of surgery

Herbal meds

Garlic, Ginkgo may increase bleeding risk

Ginseng- low sugars, increasing bleeding risk

St John's wort- induced Cyt P-450

Stop at least 5-7 days before surgery

- 72 yr. lady DM, RA, severe PAD, severe COPD on chronic prednisone 20mg a day, for Aorto-femoral bypass, how do you manage steroids peri-op?
- A) no need for stress dosing since vitals are stable
- B) perform a ACTH stim. test post-op, give IV steroids if no response
- C) 150 mg hydrocort/ day, taper in 24-48 hours post-op and start home dose prednisone
- D) 25-50mg hydrocort/ day, taper in 24 hours and start home dose prednisone

Peri-op steroids

- Stress dose: if >10mg prednisone equivalent used >3 weeks
- Minor surg: 25mg hydrocort/day
- Major surg: 150mg/ day with taper over 24-48 hours post-op

- 85 yr old morbid obese male (BMI >40), smoker (1PPD), scheduled for R Hip arthroplasty, what do you advise him about smoking cessation?

- A) continue smoking
- B) stop smoking if surgery is > 2months away
- C) stop smoking if surgery is <2 months away
- D) consult pulmonary

Smoking and Peri-op Pulmonary complications

- Stopping smoking <2 months pre-op increases peri-op pulm complications
- Stopping >2months pre-op is recommended

Final Pearls

- Always support your clinical practice with the best available level of evidence (**what they say!**)
- Most Guidelines have Level II evidence, with <10% Level I
- Guidelines are to be adapted to individual patients as required clinically

Questions & Discussion

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