



Pre-operative Optimization for the Primary Care Provider

An Integrated Care Pathway of the
Collaborative Care Network

**Subject Matter Expert:
Mike Webb, MD**

Pathway Custodian: Parabh
Gill, MD MBA

First, a Friendly Reminder...

This Integrated Care Pathway was developed by and for members of the AAMC CCN.

These materials will refer to some resources available only to CCN members and their patients.

Not a CCN Member?

We invite you to join the CCN! Please contact the CCN: aamccollaborativecarenetwork@aaahs.org

These materials reference a Toolkit

This is provided to you by the CCN Field Operations Team

It will include larger versions of the overview slides, plus screening tools, patient pamphlets, and phone numbers to call.

Learning Objectives

This CME material was designed to help you to:

- Assess patient specific risk factors
- Improve risk of the surgical patient
- Identify co-morbid disease and optimize patient's medical condition
- Evaluate need for specialists' referral preoperatively

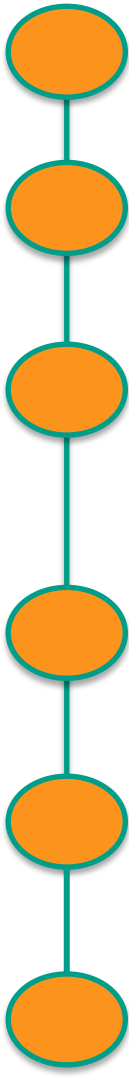
Disclaimer

No CME program, Tool Kit, algorithm, or recipe will address every scenario you encounter.

Use clinical judgment and call subject matter experts when you sense you need guidance!

We are here to help.

Agenda

- 
- Introduction
 - History & Physical
 - Evaluation of Patient Risk Factors
 - Indication for Labs & Cardiac Risk Tools
 - When to Refer
 - Conclusion & Additional Resources

Introduction



Intended Audience and Scope

- Intended Audience for this Pathway
 - Primary care clinicians and surgeons
 - Hospitalists or consultants co-managing a patient
 - Perioperative nurses and surgical schedulers
- Scope of Pathway
 - Adult non-pregnant patients being scheduled for non-cardiac surgery

Learning Objectives

- Evaluating patient specific risk factors
- Optimizing patient interview and testing to manage co-morbidities that affect peri-operative risk
- Assessing need for anesthesiology referral preoperatively
- Assessing cardiac risk and need for cardiology referral preoperatively

Goals of peri-operative assessment

- Assess patient's medical status and ability to tolerate anesthesia and planned procedure.
- Decrease risks of anesthesia and surgery.
- Prepare patient and family for procedure and recovery.
- Determine appropriateness of case in ambulatory surgical center.
- Manage medical diseases that will affect perioperative risk.
- Increase patient satisfaction.

History & Physical



Components of patient-centered care

- Patient interview
- Examine airway, lungs and heart
- Review medications and past medical history
- Order indicated preoperative tests
- Order consultations with specialists if necessary



Simple Screening Questionnaire

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Questions
1. Do you usually get chest pain or breathlessness when you climb up two flights of stairs at normal speed?
2. Do you have kidney disease?
3. Has anyone in your family (blood relatives) had a problem following an anaesthetic?
4. Have you ever had a heart attack?
5. Have you ever been diagnosed with an irregular heartbeat?
6. Have you ever had a stroke?
7. If you have been put to sleep for an operation were there any anaesthetic problems?
8. Do you suffer from epilepsy or seizures?
9. Do you have any problems with pain, stiffness or arthritis in your neck or jaw?
10. Do you have thyroid disease?
11. Do you suffer from angina?
12. Do you have liver disease?
13. Have you ever been diagnosed with heart failure?
14. Do you suffer from asthma?
15. Do you have diabetes that requires insulin?
16. Do you have diabetes that requires tablets only?
17. Do you suffer from bronchitis?

Update Medications



- Include supplements
- Substance use – nicotine, alcohol, recreational, illicit
- Prescription medication list

H&P

Cardiovascular Medications

Type of Medication	Good level of Evidence
Beta Blockers	Continue it
Alpha 2 Agonists	Continue it
Calcium Channel Blockers	Limited data shows safe to continue
ACE inhibitors	Hold on AM of surgery
Loop and Thiazide Diuretics	For HTN, hold on AM of surgery For fluid overload, individualize
Digoxin	Continue it
Statins	Continue it if undergoing vascular surgery or at high cardiovascular risk



Medications (GI, Pulm, Heme)

Type of Medication	Good level of Evidence
H2 blockers, PPI	Continue it
Beta agonists, Anticholinergics	Continue it
Glucocorticoids	Continue it
DOACs (apixaban, rivaroxaban, dabigatran)	Hold prior to procedures by # of doses Refer to ICP on peri-procedural mgmt. of antithrombotic agents
Aspirin and Plavix (anti-platelet agents)	Hold 5-7 days prior to non-cardiac surgery if no hx CAD or TIA
Warfarin	Discontinue 5 days prior & bridge with LMWH preop if hi risk for VTE
Heparin	Stop 4-5 hours prior to high risk bleed procedure
NSAIDS	Discontinue 5-7 days prior



Evaluation of Patient's Risk Factors



Evaluation of patient's risk factors

- Functional status
- Physical status
- Airway risk
- Type of surgery increasing blood loss and intraoperative fluid shifts
- Advanced age – frailty and cognitive dysfunction
- Chronic kidney disease



Patient Risk Factors

Evaluation of functional status

Reliable predictor of perioperative morbidity and cardiac event.
Drawback is subjective reporting by patient



Subjective Evaluation

Poor functional capacity < 4 mets Can care for self and do ADLs.
Requires non-invasive cardiac testing for non-cardiac procedures

Good functional capacity ≥ 4 mets
Can walk up two flights of stairs, do heavy housework, walk 4 miles per hour at ground level.
Usually no cardiac w/u required for low risk procedures

Excellent functional capacity > 10 mets
Engage in strenuous sport like basketball, tennis, swimming, skiing.

1 met = resting O₂ consumption of a 40 year old 70kg man.

Patient Risk Factors

ASA physical status classification system

Mortality risk in ASA 1 & 2 is 0.06-0.08% and 0.27% to 0.4% in all surgeries¹

Drawback is ASA-PS is subjective. Higher the score, higher the risk of postoperative morbidity, LOS, and admission to ICU.

¹Davenport DL, et al. NSQIP risk factors can be used to validate ASA physical status classification levels. *Annals of Surgery* 2006; 243(5):636-641.

ASA PS classification	Definition	Examples, including, but not limited to:
ASA I	A normal healthy patient.	Healthy, non-smoking, no or minimal alcohol use.
ASA II	A patient with mild systemic disease.	Mild diseases only without substantive functional limitations. Current smoker, social alcohol drinker, pregnancy, obesity (30<BMI<40), well-controlled DM/HTN, mild lung disease.
ASA III	A patient with severe systemic disease.	Substantive functional limitations; one or more moderate to severe diseases. Poorly controlled DM or HTN, COPD, morbid obesity (BMI ≥40), active hepatitis, alcohol dependence or abuse, implanted pacemaker, moderate reduction of ejection fraction, ESRD undergoing regularly scheduled dialysis, premature infant PCA<60 weeks, history (>3 months) of MI, CVA, TIA, or CAD/stents.
ASA IV	A patient with severe systemic disease that is a constant threat to life.	Recent (<3 months) MI, CVA, TIA, or CAD/stents, ongoing cardiac ischemia or severe valve dysfunction, severe reduction of ejection fraction, sepsis, DIC, ARDS, or ESRD not undergoing regularly scheduled dialysis.
ASA V	A moribund patient who is not expected to survive without the operation.	Ruptured abdominal/thoracic aneurysm, massive trauma, intracranial bleed with mass effect, ischemic bowel in the face of significant cardiac pathology or multiple organ/system dysfunction.
ASA VI	A declared brain-dead patient whose organs are being removed for donor purposes.	

Checklist for airway risk



Loose, capped or artificial teeth



History of dental injury after anesthesia or excessive sore throat after anesthesia



History of requiring "small airway tube"



Elevated serum bicarbonate to predict OSA



BMI > 40

Obstructive Sleep Apnea

Repeated closure or narrowing of upper airway reducing airflow



<http://stopbang.ca/osa/screening.php>

Look for:

- Narrow or crowded airway
- Obesity
- Large neck circumference
- Craniofacial abnormalities

Associated conditions:

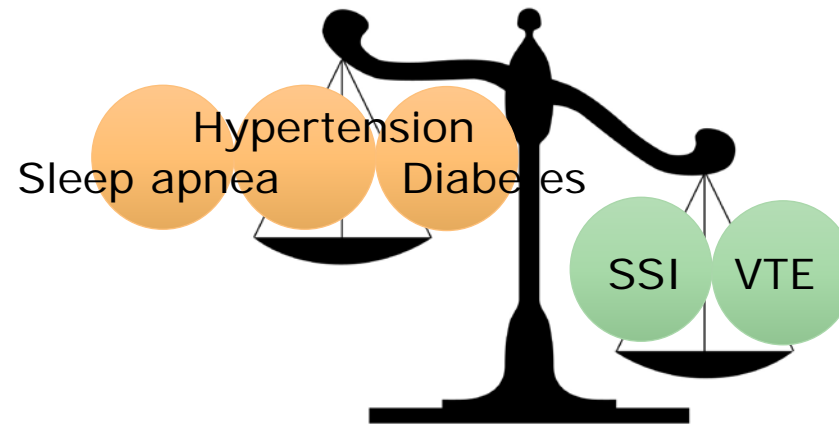
- Hypertension
- CV disease
- Cardiac arrhythmias
- Pulmonary HTN
- Type 2 DM
- Insulin resistance
- Parkinsons
- Hypothyroidism
- Pregnancy

Patient Risk Factors

How does obesity impact peri-operative risk?

Studies show obesity increases risk of SSI (surgical site infection) and VTE.

However co-morbidities can increase cardiac and pulmonary risk. Screen for blood glucose, BP and OSA.



Additional Evaluation

Smoking as a Risk Factor

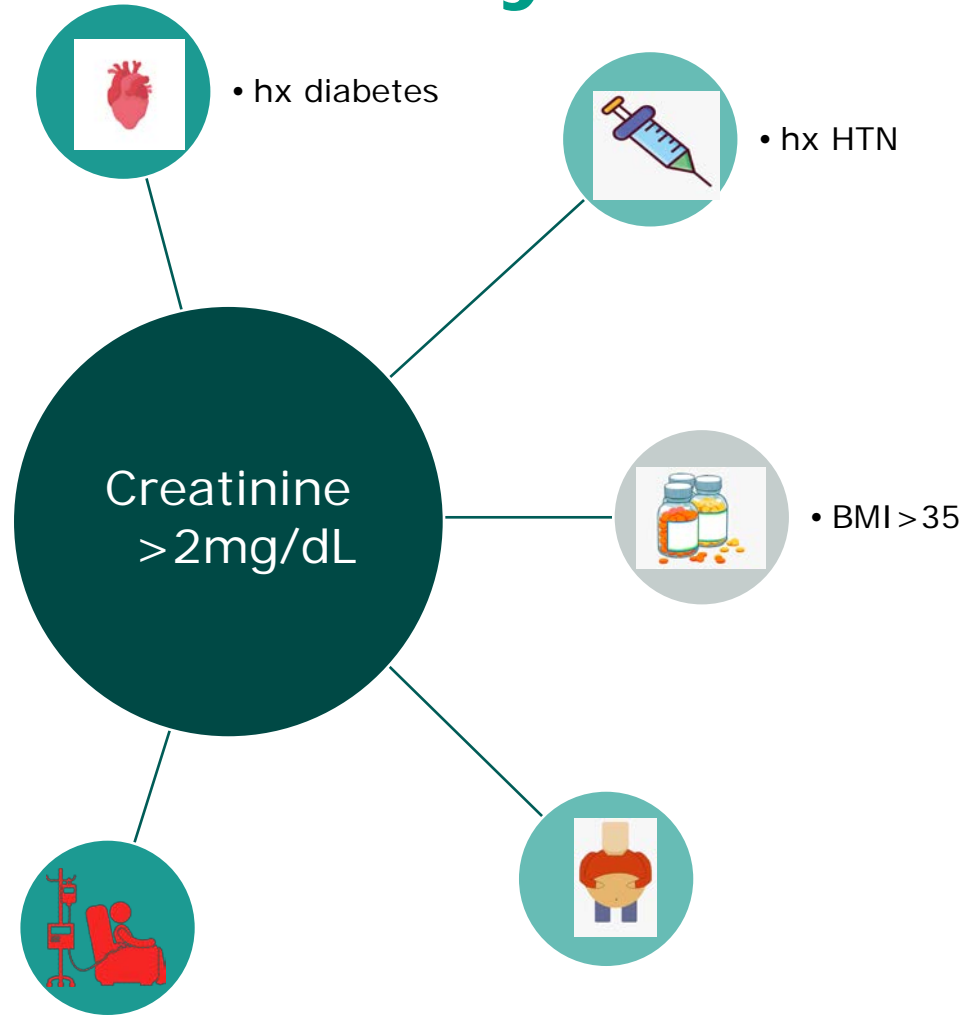
- Increases risk of postoperative pulmonary complications such as pneumonia and prolonged mechanical ventilation
- Increases risk of cardiovascular complications such as CVA and MI
- Smoking at time of surgery increases postoperative costs by \$10 billion annually in US within first year after surgery¹
- In comparing smokers to nonsmokers, 17% more likely to die and 50% more likely to have CV or Pulm complications²

ASSIST PATIENT TO QUIT!
Refer to ICP Nicotine Use Cessation
AAMC Tobacco Cessation Program 443-481-5366

¹Warner DO, Borah BJ, Moriarty J, Schroeder DR, Shi Y, Shah ND. Smoking status and health care costs in the perioperative period: a population based study. JAMA Surg. 2014; 149: 259-266.

²Khaled M, Frits R, Zaatari G. Smoking and the risk of mortality and vascular and respiratory events in patients undergoing major surgery. Jama Surg. 2013; 148: 755-762.

Chronic Kidney Disease (CKD)



RISK FACTORS:

- Cardiac disease
- DM
- HTN
- BMI >40
- Dialysis patient
- RCRI flags Cr>2
- NSQIP flags Cr>3

Patient Risk Factors

Additional Evaluation – Indication for Labs and Cardiac Risk Tools



What benefit is routine pre-operative testing?

- Not necessary in low risk elective procedures
- Clinicians ignore 30-60% of abnormal preop labs which create additional medicolegal risk¹
- Lab test abnormalities led to a change in management ranged from 0.1 to 2.6%²
- Direct costs: \$18 billion in labs ordered peri-operatively³
- Indirect costs: patient anxiety, lost wages to follow up on additionally ordered tests
- Should be based on history, co-morbid conditions, physical examination and planned surgical procedure.

¹Houchens, Nathan. One Minute Consult. Cleveland Clinic Journal of Medicine October 2015; 82(10): 664-667.

^{2,3}Smetana GW, Macpherson DS. The case against routine preoperative laboratory testing. Med Clin North Am 2003; 87: 7-40.



Indication for Labs

When to order labs?

Order...	When...
CBC	Anticipate hi EBL or fluid shifts, Hx bleeding diathesis, or Hx liver disease
CMP	Hx Chronic kidney disease, hx CHF, or anticipate fluid shifts
PT/PTT	Hx bleeding diathesis, warfarin or heparin use, long term antibiotic use
Chest Xray	Smoker, active pulmonary disease
EKG	Known CAD, hx uncontrolled htn, hx CKD, and/or hx DM
Fasting glucose	Hx DM, Obesity
LFTs	Hx Cirrhosis



Indication for Labs

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www.martybucella.com



"You can stop now. The results show your insurance doesn't cover this test."

Models to predict cardiac risk

1. RCRI = Revised Cardiac Risk Index

- Risk is based on 6 independent variables, 1 is type of surgery and 5 are based on patient's history.
- HI risk surgery is intraperitoneal, intrathoracic, vascular, or suprainguinal
- 5 patient factors are hx of ischemic disease, hx of CHF, hx prior TIA/CVA, insulin use, Creatinine >2mg/dL
- Externally validated

2. NSQIP (National Surgical Quality Improvement Program) Surgical Risk Calculator

- Online tool with 20 questions which includes type of surgery, BMI, age, sex, smoker, hx COPD, hx HTN, steroid use, renal function, dialysis, ascites, urgency of case, ASA assessment of physical status, and subjective functional status. This tool is more procedure specific.
- Used by American College of Surgeons
- Free online tool

	RCRI	NSQIP
Age	✓	✓
Ischemic Heart Disease	✓	✓
Renal Function	Cr > 2 ✓	ARD ✓
Heart Failure		✓
Diabetes	Insulin Only* ✓	✓
Functional status		✓
Type of Surgery	✓	By CPT code ✓

Perioperative risk of complication based on surgery

Low risk <1%	Medium risk 1-5%	High risk >5%
Breast	Intrathoracic	Aortic, major vascular or peripheral vascular
Dental	Intraperitoneal	Major abdominal with large fluid shifts or blood loss (duodenopancreatic, liver resection, perforated bowel)
Eye, cataract	Carotid (CEA)	Esophagectomy
Endoscopic	Endovascular aneurysm repair	Pneumonectomy
Thyroid	Head & neck surgery	Lung, liver, or pancreas transplantation
Ortho, minor	Ortho, major (spine and hip)	
Urologic, minor (TURP)	Urologic and Gyn, major	

When to Refer



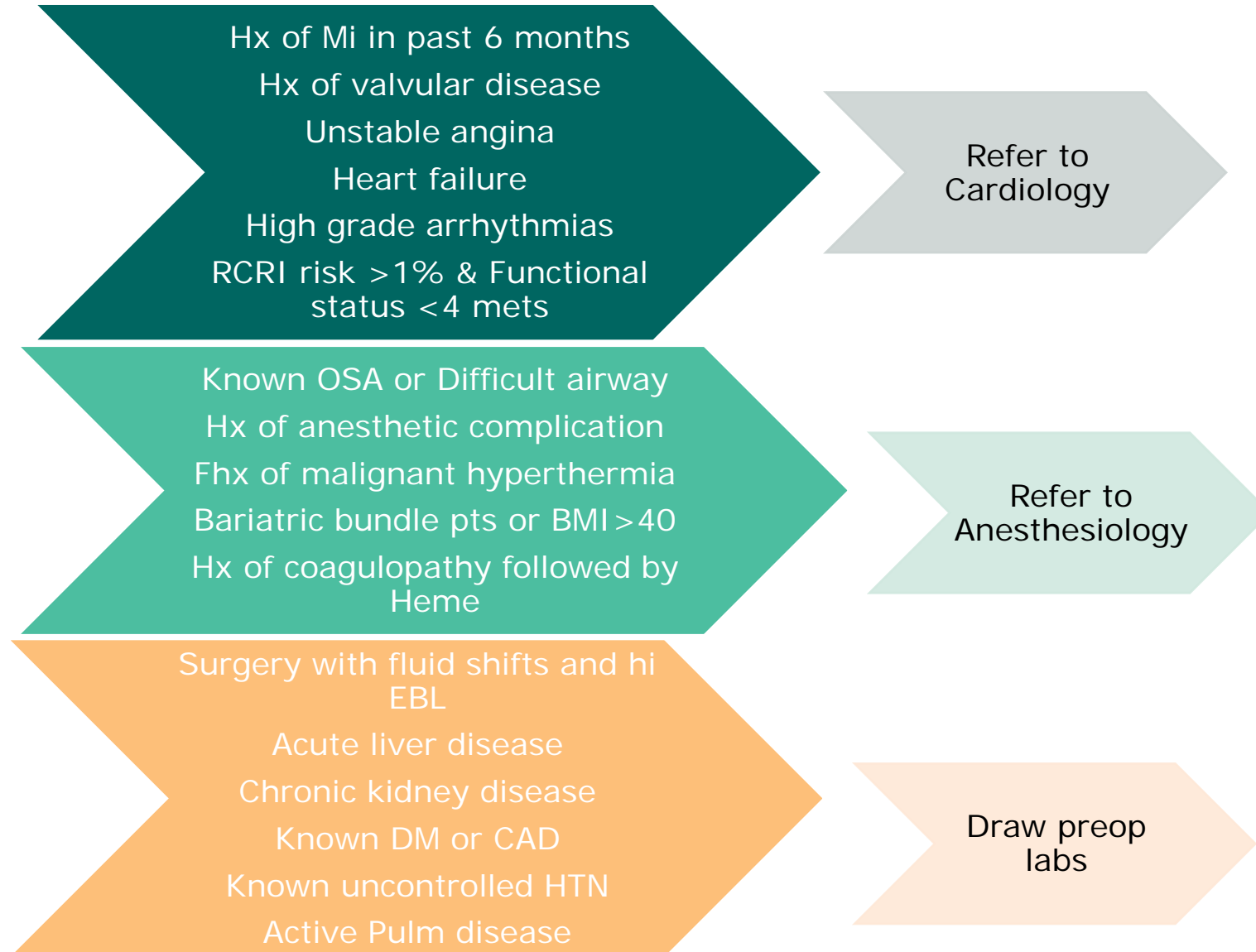
When to obtain pre-operative Anesthesia consult

- Difficult airway
- Known Obstructive Sleep Apnea
- History of any anesthetic complications
- Family history of malignant hyperthermia- ask about history of severe postoperative fever
- Bariatric bundle patients
- History of coagulopathy followed by hematology
- BMI >40
- If patient is followed by a specialist, pls refer to specialist for recommendations prior to anes referral for efficient multidisciplinary coordination of care



Additional Evaluation

Optimizing referrals and perioperative testing



Conclusion with additional resources



Additional Resources for Peri-operative Optimization Tool Kit

- Patient Information

- www.clevelandclinicmeded.com/medicalpubs/diseasemanagement/preventive-medicine/perioperative-evaluation/

Useful information for physicians and patients from the Cleveland Clinic.

- http://anesthesiology.queensu.ca/education/undergraduate/preoperative_patient_assessment_and_care

Detailed explanation of all tests provided by the Queen's University Department of Anesthesiology.

- Clinical Guidelines

- <http://annals.org/aim/article/722250>

A guideline from the American College of Physicians on risk assessment for prevention of perioperative pulmonary complications.

- www.nice.org.uk/guidance/ng45/chapter/recommendations

2016 guidelines from the National Institute for Health and Care Excellence.

- www.aafp.org/afp/2013/0315/p414.html

Guidelines from the American Academy of Family Physicians.

- <http://circ.ahajournals.org/content/130/24/2246.long>

A systematic review for the 2014 guidelines on perioperative cardiovascular evaluation and management in patients undergoing noncardiac surgery from the American College of Cardiology and the American Heart Association Task Force on Practice.



Additional Resources

Putting it all together. . .

See next four slides for additional resources & algorithms for Pre-operative Optimization for the Primary Care Provider

- When to refer to cardiology or obtain anesthesia consult
- When to draw labs
- Patient handout on preoperative evaluation
- New guidelines reflecting oral intake aligned with enhanced recovery after surgery (ERAS)



OPTIMIZING CO-MORBID CONDITIONS

REFER TO CARDIOLOGY

- HISTORY OF MI IN PAST 6 MONTHS
- HISTORY OF VALVULAR DISEASE, AORTIC STENOSIS
- UNSTABLE ANGINA
- HEART FAILURE
- HIGH GRADE ARRHYTHMIA
- RCRI RISK >1% AND FUNCTIONAL STATUS <=4 METS

REFER TO ANESTHESIA/PAIN 443-481-3624

- KNOWN OSA WITH DIFFICULT AIRWAY
- HX OF ANY ANESTHETIC COMPLICATION
- FHx OF MALIGNANT HYPERTHERMIA
- BARIATRIC BUNDLE PTS OR BMI>40
- HISTORY OF COAGULOPATHY FOLLOWED BY HEME

DRAW PRE-OPERATIVE LABS

- SURGERY WITH FLUID SHIFTS AND HI EBL
- ACUTE LIVER DISEASE
- CHRONIC KIDNEY DISEASE
- KNOWN DIABETES
- KNOWN CORONARY ARTERY DISEASE
- KNOWN UNCONTROLLED HTN
- ACTIVE PULMONARY DISEASE



Additional Resources

Lab test	Indication
Hemoglobin	Anticipate major EBL or fluid shifts, or sx's of anemia
Leukocyte count	Sxs suggesting infection or myeloproliferative disorder
Platelet count	Hx of bleeding diathesis, myeloproliferative disorder, liver disease
Prothrombin time	Hx of bleeding diathesis, liver disease, recent or long term antibiotic use, warfarin use
Partial thromboplastin time	Hx of bleeding diathesis, heparin use
Electrolytes	Known renal insufficiency, CHF, medications that affect electrolytes, anticipate fluid shifts
Creatinine, BUN	Chronic kidney disease, HTN, DM, cardiac disease, major surgery, medications that may affect renal function
Glucose	Known diabetes, obesity
LFTs	Cirrhosis
EKG	Known coronary artery disease, DM, uncontrolled HTN, Chronic kidney disease
CXR	Sxs or exam suggestive of active pulmonary disease

Additional Resources



1. WHAT IS PREOP EVALUATION?



Most people are at low risk for complications during surgery. Today, your doctor will ask you questions about your age, medicines, health condition, past surgeries, use of alcohol and drugs, and activity level.

2. WHAT INCREASES MY RISK FOR SURGERY?

- heart disease
- diabetes
- kidney disease
- liver disease
- uncontrolled blood pressure
- bleeding disorders
- difficulty climbing a flight of stairs or walking
- obesity

3. WHAT CAN I DO TO LOWER MY RISK?



- Quit smoking
- Stop drinking alcohol
- Be sure to tell your doctor if you use drugs
- Be sure to tell your doctor about your medicines, including over the counter ones and supplements
- Stay active

4. QUESTIONS FOR MY DOCTOR

- Do I need any tests or labs before surgery?
- Should I stop any medications?
- Should I stop any over the counter medicines?
- What medicines do I continue after surgery?



5. ANY OTHER CONCERNS?

Getting ready for surgery can be stressful. As you get ready for your procedure, you may have more questions. Do not be afraid to discuss any concerns or questions beforehand with your doctor and surgeon.

PATIENT HANDOUT FOR PREOPERATIVE EVALUATION
AAMC COLLABORATIVE CARE NETWORK



Additional Resources

Oral intake per ERAS protocol

Pre-Surgery Fasting Guidelines

It is extremely important to follow the below instructions before surgery. If you do not follow these instructions, your surgery may be delayed or cancelled.



- **STOP EATING AT MIDNIGHT** prior to your surgery
 - NO food chewing gum, mints, candy or alcohol are allowed after midnight.



- You may **DRINK 20 OUNCES OF CLEAR LIQUIDS** between midnight and 2 hours before leaving your house for the hospital.*
 - The only liquids you can drink during this time are:
 - Sport/electrolyte drinks (ex. Gatorade, Powerade)
 - Clear Ensure or Boost
 - Apple Juice
 - Water
 - Tea (without milk or cream)

Note: If you are diabetic, you may have Gatorade zero or clear liquids without sugar.

*EXCEPTIONS

- Always follow specific instructions from your surgeon.
- If you have End Stage Kidney Disease (ESRD), Achalasia (difficulty swallowing), Gastroparesis (slow stomach emptying), Severe GERD (acid reflux), or History of Gastric Bypass Surgery, DO NOT eat or drink anything by mouth after midnight prior to your surgery.

If you have questions, please call the AAMC Prep team 443-481-3920. If your surgery is at the Edwards Surgical Pavilion, please call 443-481-5700.



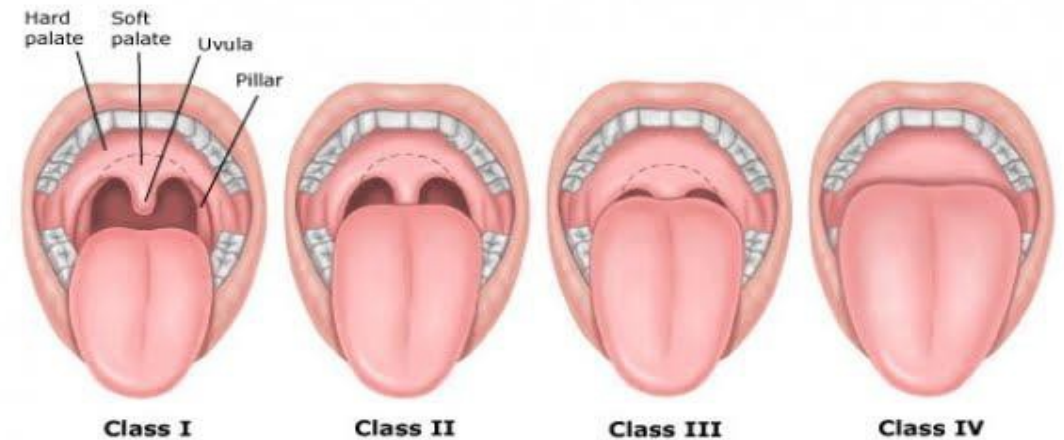
Additional Resources

APPENDIX



Mallampati Score

- Estimate of tongue size to oral cavity
- Used to predict the ease of intubation
- Used to predict obstructive sleep apnea



Additional Evaluation

RCRI (Revised Cardiac Risk Index)

Six independent predictors of major cardiac complications^[1]
High-risk type of surgery (examples include vascular surgery and any open intraperitoneal or intrathoracic procedures)
History of ischemic heart disease (history of myocardial infarction or a positive exercise test, current complaint of chest pain considered to be secondary to myocardial ischemia, use of nitrate therapy, or ECG with pathological Q waves; do not count prior coronary revascularization procedure unless one of the other criteria for ischemic heart disease is present)
History of heart failure
History of cerebrovascular disease
Diabetes mellitus requiring treatment with insulin
Preoperative serum creatinine >2.0 mg/dL (177 micromol/L)
Rate of cardiac death, nonfatal myocardial infarction, and nonfatal cardiac arrest according to the number of predictors^[2]
No risk factors – 0.4% (95% CI: 0.1-0.8)
One risk factor – 1.0% (95% CI: 0.5-1.4)
Two risk factors – 2.4% (95% CI: 1.3-3.5)
Three or more risk factors – 5.4% (95% CI: 2.8-7.9)
Rate of myocardial infarction, pulmonary edema, ventricular fibrillation, primary cardiac arrest, and complete heart block^[1]
No risk factors – 0.5% (95% CI: 0.2-1.1)
One risk factor – 1.3% (95% CI: 0.7-2.1)
Two risk factors – 3.6% (95% CI: 2.1-5.6)
Three or more risk factors – 9.1% (95% CI: 5.5-13.8)

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RCRI Model of preoperative risk assessment

- Has 6 independent predictors:
 - Location of surgery deemed as HI RISK: intraperitoneal, intrathoracic, vascular, suprainguinal
 - History of Ischemic heart disease (Hx MI, Hx of +exercise test, current chest pain, use of nitrates, EKG with pathologic Q waves)
 - History of CHF
 - Hx of prior TIA or stroke
 - Pre-op treatment with insulin
 - Preop Creatinine >2 mg/dL
- Does not take into account age or functional status (which NSQIP does)
- Does not assess risk of stroke, major bleeding, prolonged hospitalization or ICU admission
- Overestimates risk in pts having low risk procedures and Underestimates risk in pts having major vascular surgery
- Calculation method: single point per risk factor. If >1% and poor functional status, refer to cardiology



Cardiac Risk Tools

NSQIP Surgical Risk Calculator

Procedure 58152 - Total abdominal hysterectomy (corpus and cervix), with or without removal of tube(s), with or without removal of ovary(s); with colpo-urethrocytopexy (eg, Marshall-Marchetti-Krantz, Burch) Clear

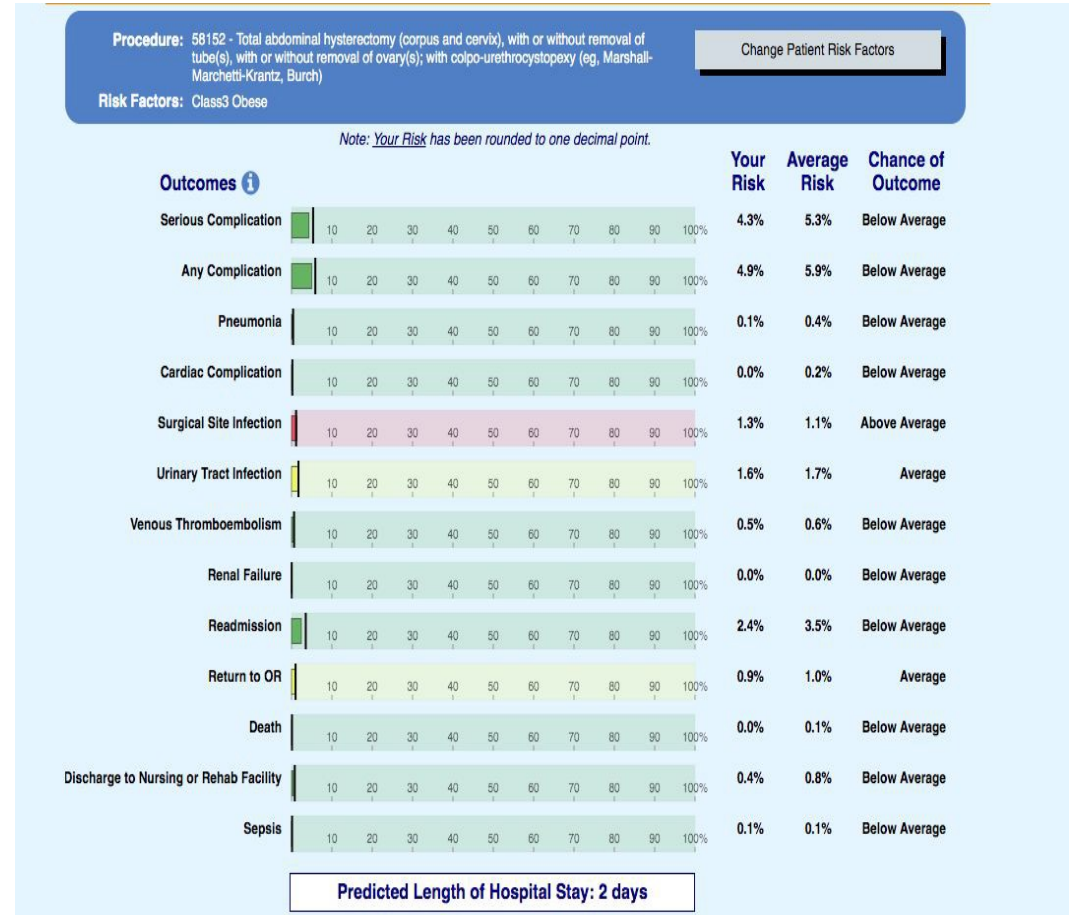
Begin by entering the procedure name or CPT code. One or more procedures will appear below the procedure box. You will need to click on the desired procedure to properly select it. You may also search using two words (or two partial words) by placing a '+' in between, for example: "cholecystectomy + 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 <input type="text" value="Under 65 years"/>	Diabetes <input type="text" value="No"/>
Sex <input type="text" value="Female"/>	Hypertension requiring medication <input type="text" value="No"/>
Functional Status <input type="text" value="Independent"/>	Congestive Heart Failure in 30 days prior to surgery <input type="text" value="No"/>
Emergency Case <input type="text" value="No"/>	Dyspnea <input type="text" value="No"/>
ASA Class <input type="text" value="Healthy patient"/>	Current Smoker within 1 Year <input type="text" value="No"/>
Steroid use for chronic condition <input type="text" value="No"/>	History of Severe COPD <input type="text" value="No"/>
Ascites within 30 days prior to surgery <input type="text" value="No"/>	Dialysis <input type="text" value="No"/>
Systemic Sepsis within 48 hours prior to surgery <input type="text" value="None"/>	Acute Renal Failure <input type="text" value="No"/>
Ventilator Dependent <input type="text" value="No"/>	BMI Calculation: Height: <input type="text" value="66"/> in / <input type="text" value="168"/> cm Weight: <input type="text" value="280"/> lb / <input type="text" value="126"/> kg
Disseminated Cancer <input type="text" value="No"/>	



Cardiac Risk Tools

How Did We Do in Helping You Achieve These Learning Objectives?

- This CME material will help you to:
 - Streamline screening for and addressing behavioral health issues commonly encountered in ambulatory practice
 - Engage CCN people, processes, and tools to enhance patient safety and health outcomes

Let us know by taking the post-test, which will allow you to receive free CME credit.

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