Preoperative Cardiac Evaluation Prior to Noncardiac Surgery

Carmine D'Amico, D.O.

Overview

- Learning objectives
- Introduction
- Procedure risk categorization
- Preoperative estimation of cardiac risk
- Stepwise approach to preoperative evaluation
- Preoperative cardiac testing
- Procedure timing
- Summary

Preoperative Cardiac Evaluation

Abbreviations

- ACC: American College of Cardiology
- AHA: American Heart Association
- ASA : American Society of Anesthesiologists
- NICE: National Institute for Health and Care Excellence
- MACE: Major adverse cardiac event(s)

(cont.)

Preoperative Cardiac Evaluation

Abbreviations (cont.)

- RCRI: Revised Cardiac Risk Index
- ACS NSQIP: American College of Surgeons National Surgical Quality Improvement Program
- ACS: Acute coronary syndrome
- PCI: Percutaneous coronary intervention
- DAPT: Duel antiplatelet therapy

Preoperative Cardiac Evaluation

Learning Objectives

1. List patient characteristics that increase risk of perioperative MACE.
2. Categorize procedures into low-risk or elevated-risk.
3. Estimate individual patients' cardiac risk using the RCRI.
4. Estimate individual patients' cardiac risk using the ACS NSQIP online risk calculator.

(cont.)

Preoperative Cardiac Evaluation

Learning Objectives (cont.)

5. Discuss optimal timing of elective noncardiac surgery after ACS or PCI.

Preoperative Cardiac Evaluation

Introduction

- > 50 million surgeries in the US annually
- 1.4 – 3.9% of surgeries in the US are complicated by a major perioperative cardiac event
- Cardiac complications are the most common cause of postoperative morbidity and mortality
- Two major determinants of surgical outcomes:
  - Procedure type
  - Patient characteristics

Preoperative Cardiac Evaluation

Procedure risk

2014 ACC/AHA Guidelines divide procedures into only two categories:

- Low:
  - Procedure wherein the combined surgical and patient characteristics predict a risk of MACE < 1%
  - e.g. cataract surgery, plastic surgery, endoscopy
- Elevated:
  - Procedure wherein the combined surgical and patient characteristics predict a risk of MACE ≥ 1%
  - e.g. open and vascular procedures

Preoperative cardiac risk estimation

ACC/AHA recommends use of one of the following cardiac risk estimation tools:

- **Revised Cardiac Risk Index (RCRI)**
- **ACS NSQPI Surgical Risk Calculator**

Revised Cardiac Risk Index[7]

Two or more of the following risk factors make a patient "high risk."
High-risk surgery (intraperitoneal, intrathoracic, or supra-inguinal vascular procedures)
History of ischemic heart disease
History of congestive heart failure
History of cerebrovascular disease
Preoperative treatment with insulin
Preoperative serum creatinine >2.0 mg/dL

Preoperative Cardiac Evaluation

Preoperative risk estimation (cont.)

ACS NSQPI Surgical Risk Calculator:

- 22 questions (about patient (including ASA class) and planned procedure)
- Online: http://riskcalculator.facs.org/

Preoperative Cardiac Evaluation

Preoperative risk estimation (cont.)

ASA Classification:

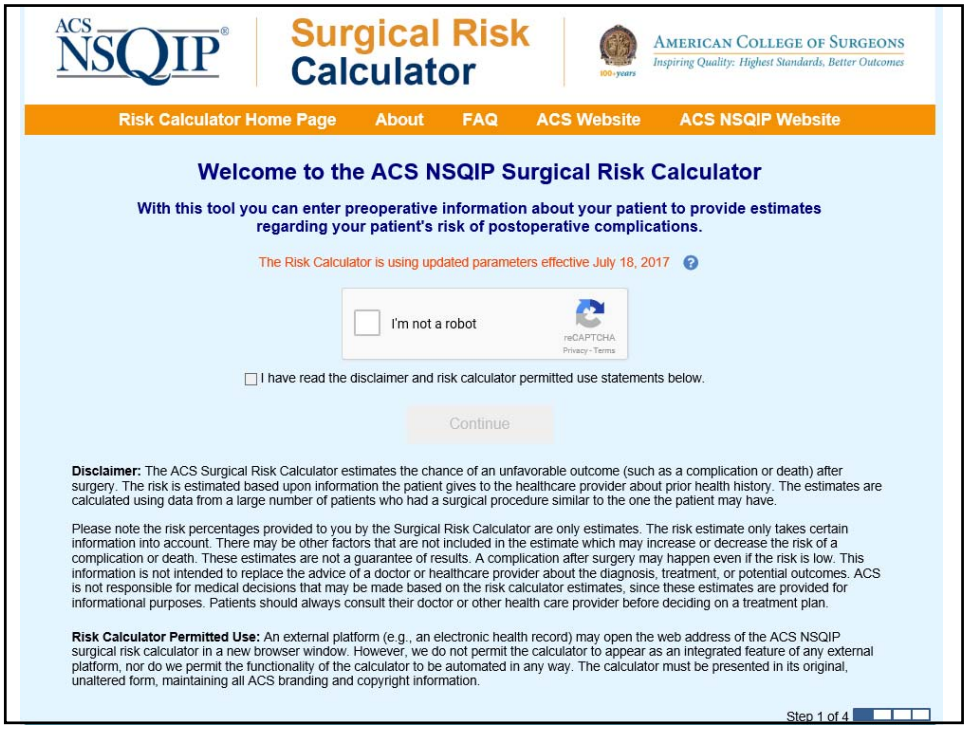
1: Healthy patient

2: Mild systemic disease

3: Severe systemic disease

4: Severe systemic disease / constant threat to life

5: Moribund / not expected to survive surgery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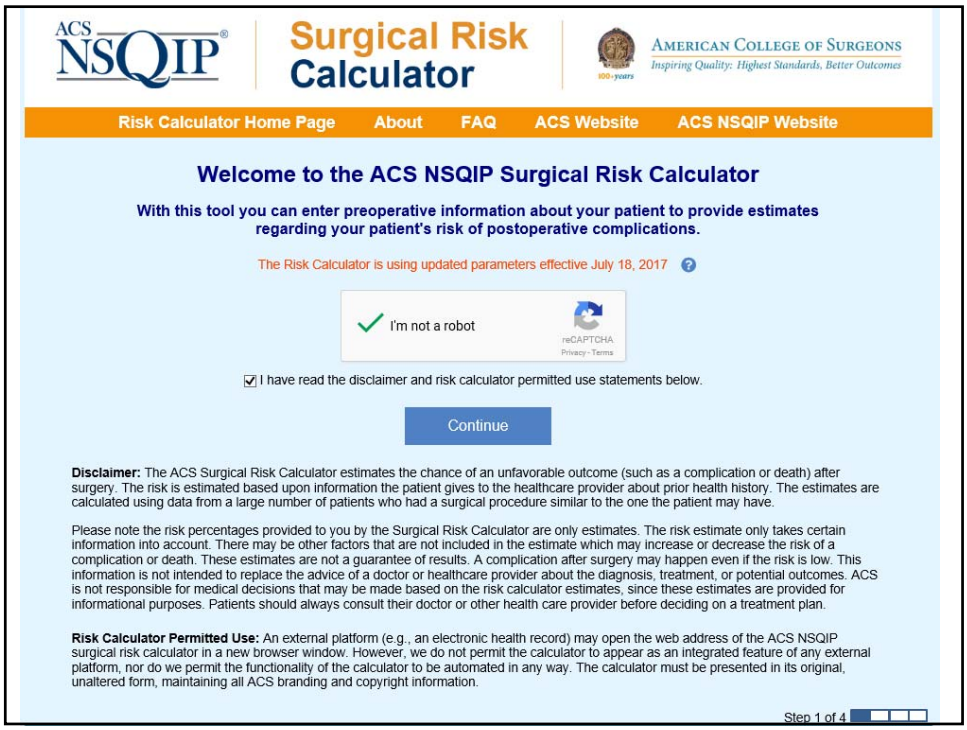
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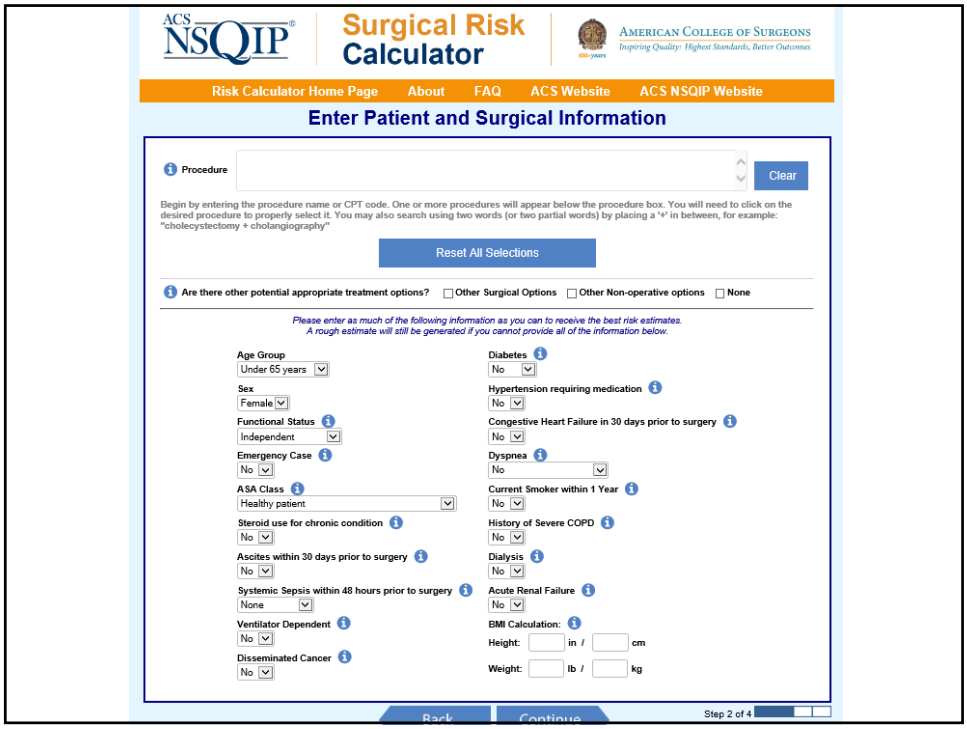
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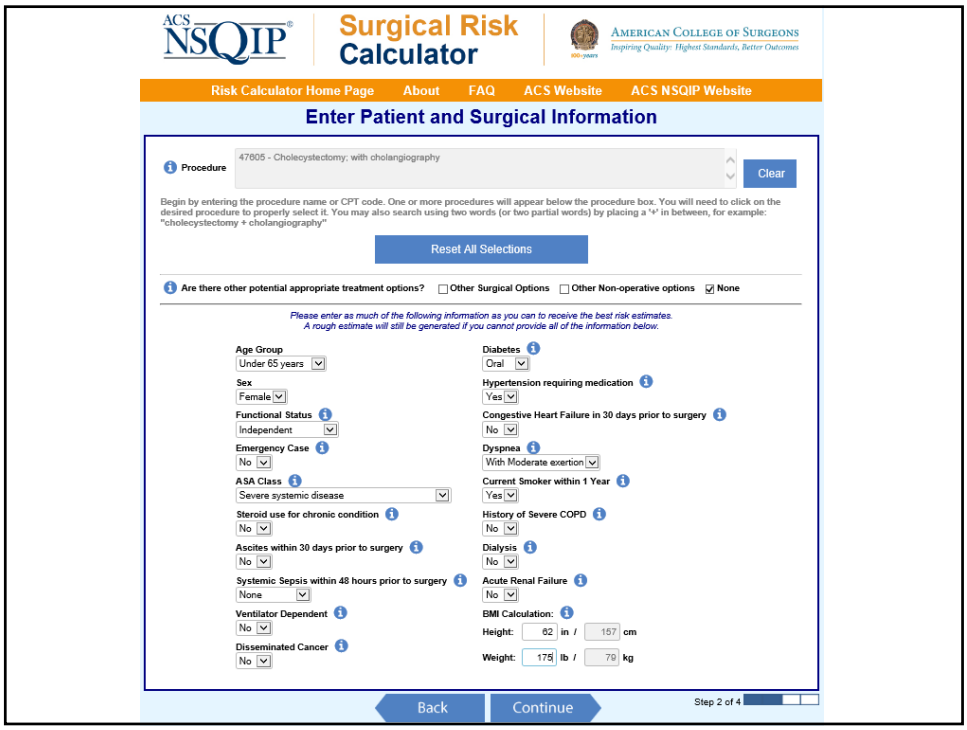
Clear
Begin by entering the procedure name or CPT code. One or more procedures will appear below the procedure box. You will need to click on the desired procedure to properly select it. You may also search using two words (or two partial words) by placing a '+' in between, for example: "cholecystectomy + 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
Healthy patient
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
No
Hypertension requiring medication
No
Congestive Heart Failure in 30 days prior to surgery
No
Dyspnea
No
Current Smoker within 1 Year
No
History of Severe COPD
No
Dialysis
No
Acute Renal Failure
No
BMI Calculation:
Height: in / cm
Weight: lb / kg
Back
Continue
Step 2 of 4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47605 - Cholecystectomy; with cholangiography
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Sex
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Functional Status
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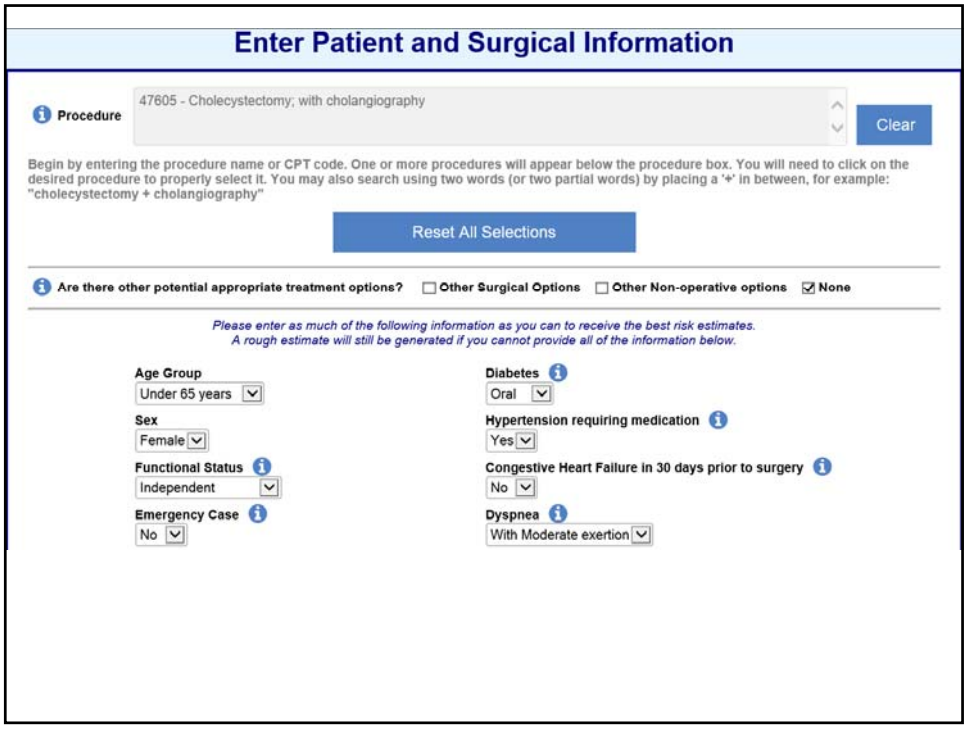
Emergency Case
No
ASA Class
Severe systemic disease
Steroid use for chronic condition
No
Ascites within 30 days prior to surgery
No
Systemic Sepsis within 48 hours prior to surgery
None
Ventilator Dependent
No
Disseminated Cancer
No
Diabetes
Oral
Hypertension requiring medication
Yes
Congestive Heart Failure in 30 days prior to surgery
No
Dyspnea
With Moderate exertion
Current Smoker within 1 Year
Yes
History of Severe COPD
No
Dialysis
No
Acute Renal Failure
No
BMI Calculation:
Height: 62 in / 157 cm
Weight: 175 lb / 79 kg
Back
Continue
Step 2 of 4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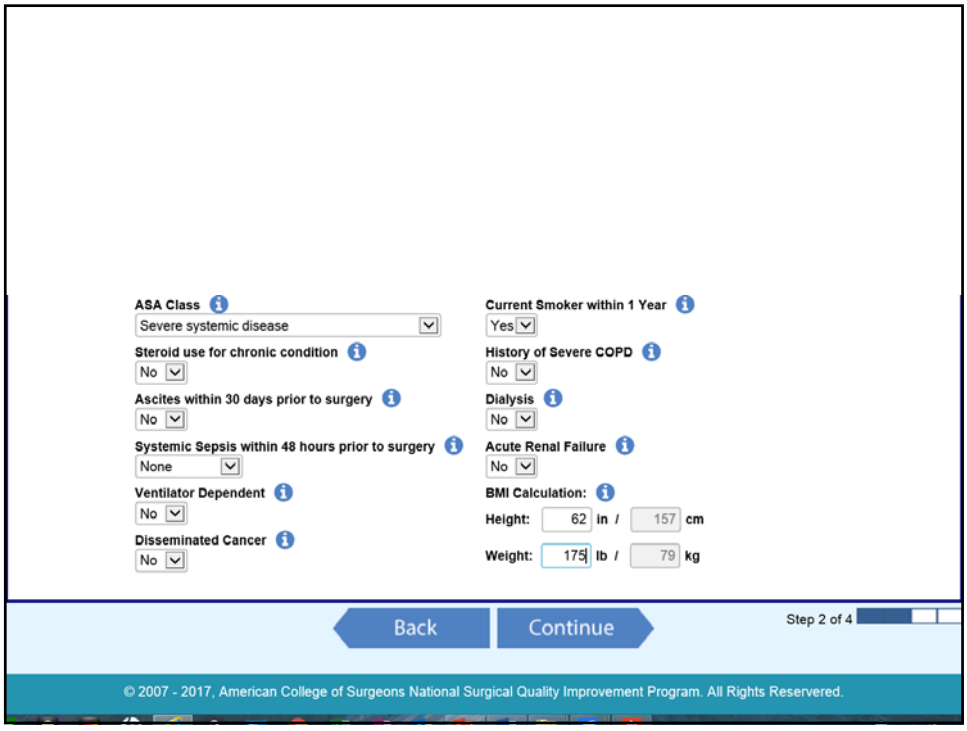
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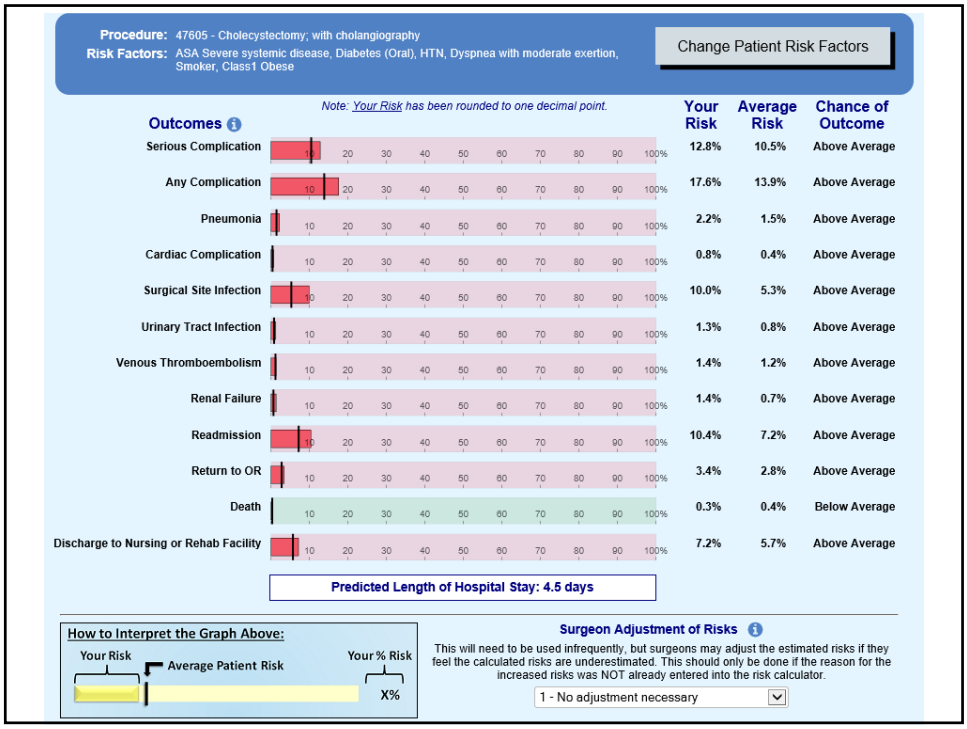
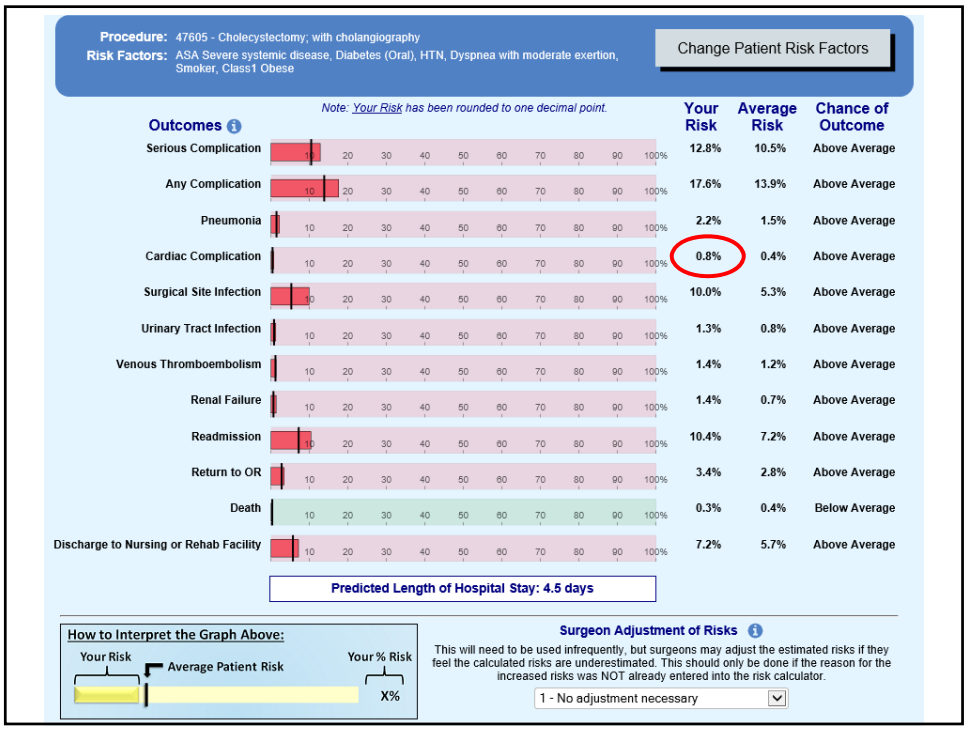

Procedure: 47605 - Cholecystectomy; with cholangiography
Risk Factors: ASA Severe systemic disease, Diabetes (Oral), HTN, Dyspnea with moderate exertion, Smoker, Class1 Obese
Change Patient Risk Factors
Note: Your Risk has been rounded to one decimal point.
Outcomes
Your Risk
Average Risk
Chance of Outcome
Serious Complication 12.8% 10.5% Above Average
Any Complication 17.6% 13.9% Above Average
Pneumonia 2.2% 1.5% Above Average
Cardiac Complication 0.8% 0.4% Above Average
Surgical Site Infection 10.0% 5.3% Above Average
Urinary Tract Infection 1.3% 0.8% Above Average
Venous Thromboembolism 1.4% 1.2% Above Average
Renal Failure 1.4% 0.7% Above Average
Readmission 10.4% 7.2% Above Average
Return to OR 3.4% 2.8% Above Average
Death 0.3% 0.4% Below Average
Discharge to Nursing or Rehab Facility 7.2% 5.7% Above Average
Predicted Length of Hospital Stay: 4.5 days
How to Interpret the Graph Above:
Your Risk
Average Patient Risk
Your % Risk
X%
Surgeon Adjustment of Risks
This will need to be used infrequently, but surgeons may adjust the estimated risks if they feel the calculated risks are underestimated. This should only be done if the reason for the increased risks was NOT already entered into the risk calculator.
1 - No adjustment necessary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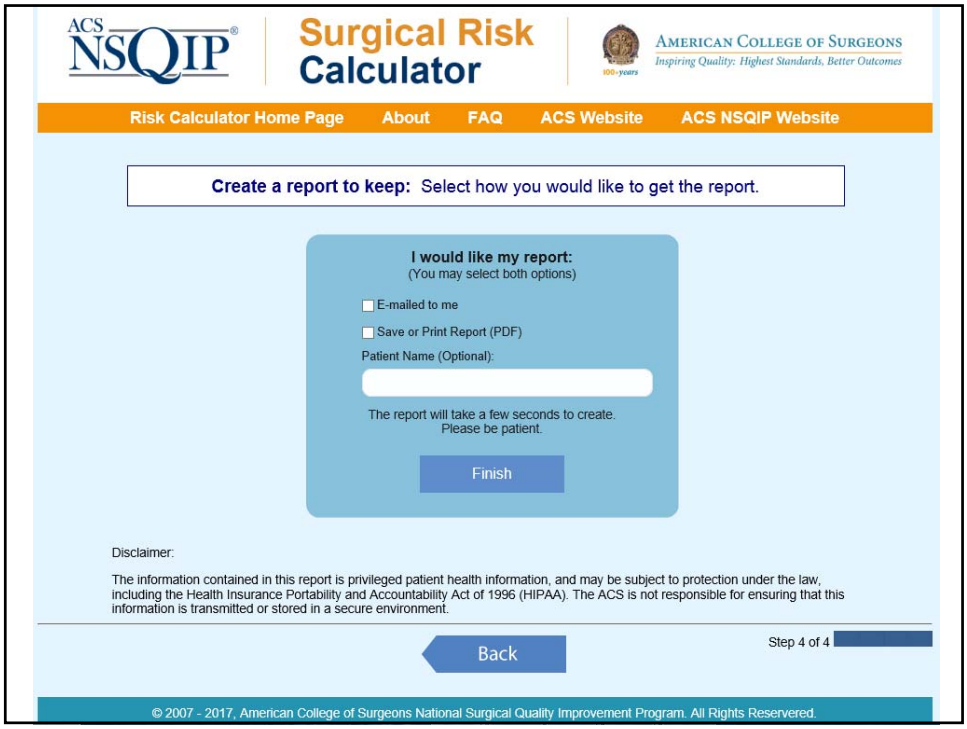

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- ☐ E-mailed to me
- ☐ Save or Print Report (PDF)

Patient Name (Optional):

The report will take a few seconds to create.
Please be patient.

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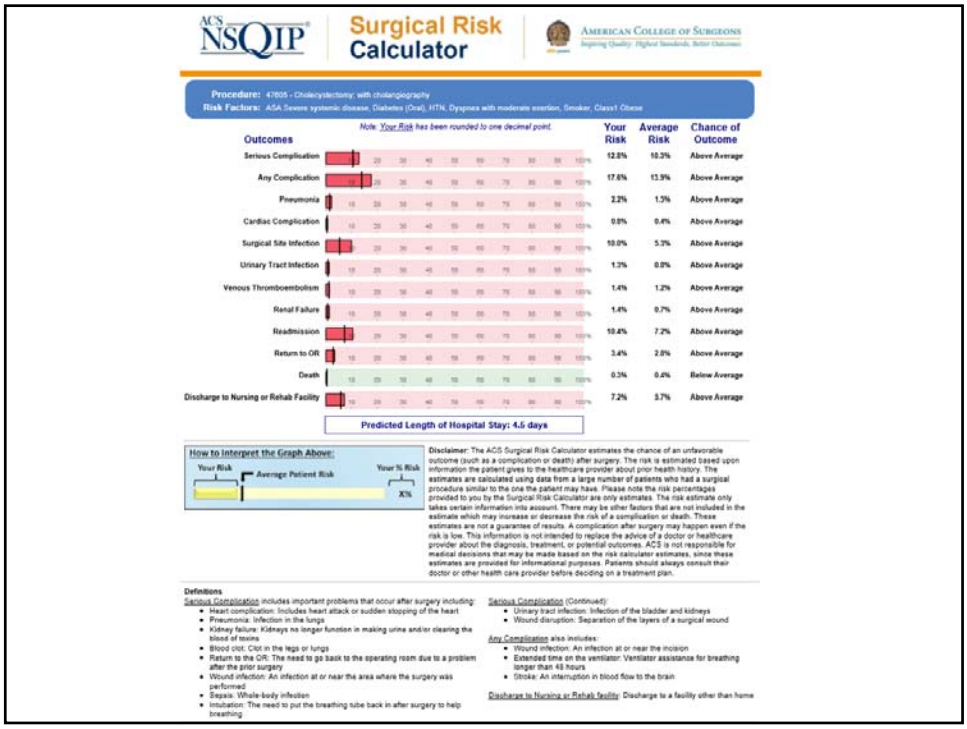

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Predicted Length of Hospital Stay: 4.5 days

How to Interpret the Graph Above:
Your Risk | Average Patient Risk | Your % Risk | X%

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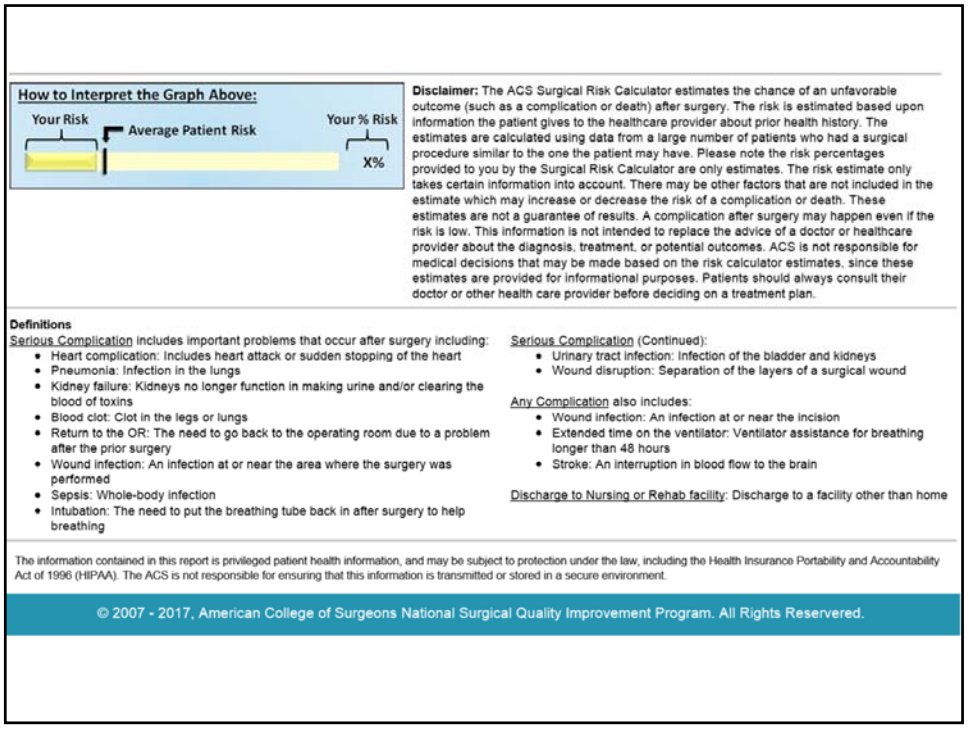
Definitions

Serious Complication includes important problems that occur after surgery including:
- Heart complication: Includes heart attack or sudden stopping of the heart
- Pneumonia: Infection in the lungs
- Kidney failure: Kidneys no longer function in making urine and/or clearing the blood of toxins
- Blood clot: Clot in the legs or lungs
- Return to the OR: The need to go back to the operating room due to a problem after the prior surgery
- Wound infection: An infection at or near the area where the surgery was performed
- Sepsis: Whole-body infection
- Intubation: The need to put the breathing tube back in after surgery to help breathing

Serious Complication (Continued):
- Urinary tract infection: Infection of the bladder and kidneys
- Wound disruption: Separation of the layers of a surgical wound

Any Complication also includes:
- Wound infection: An infection at or near the incision
- Extended time on the ventilator: Ventilator assistance for breathing longer than 48 hours
- Stroke: An interruption in blood flow to the brain

Discharge to Nursing or Rehab facility: Discharge to a facility other than home



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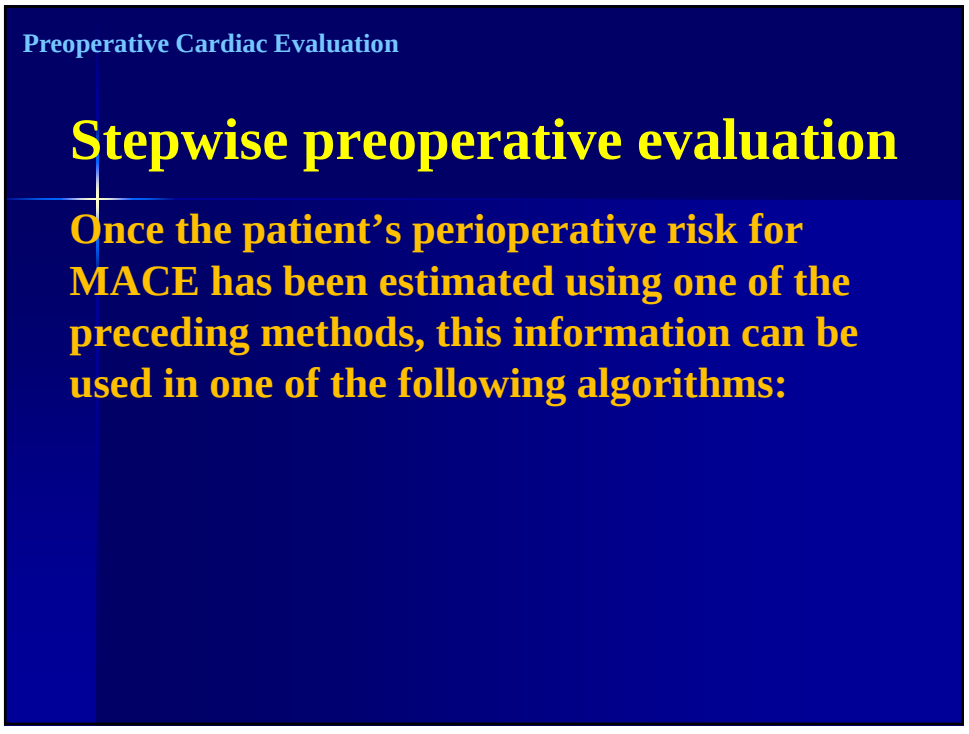
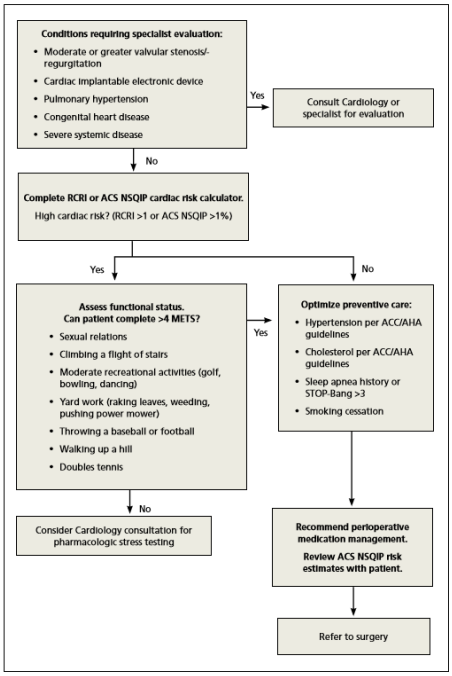
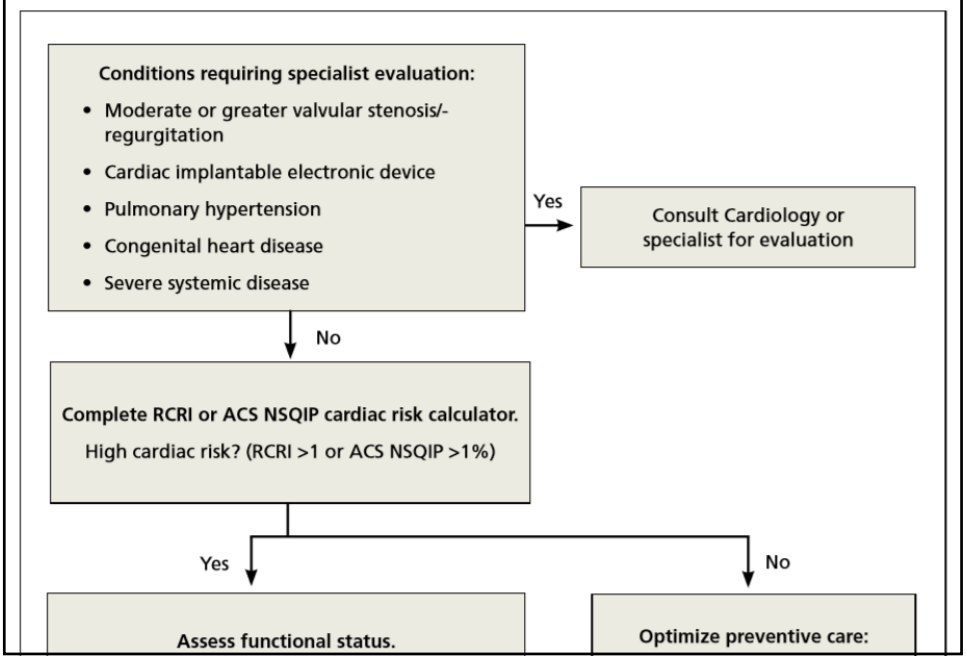


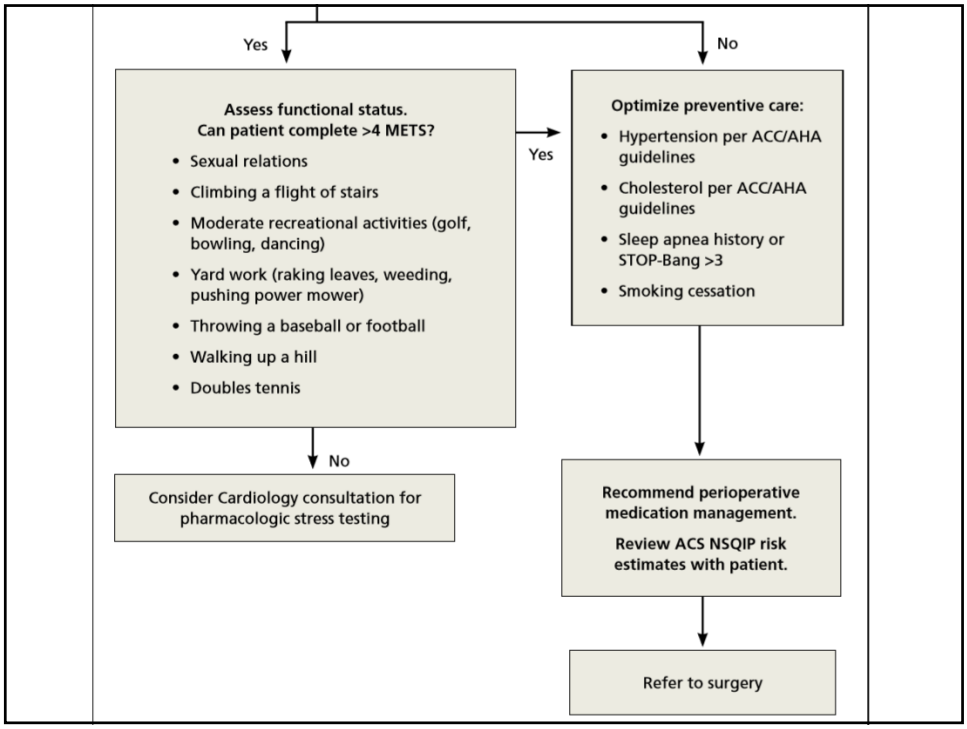
Preoperative evaluation algorithm[2-6]



ACC/AHA, American College of Cardiology/American Heart Association; ACS NSQIP, American College of Surgeons National Surgical Quality Improvement Program; METS, metabolic equivalents; RCRI, Revised Cardiac Risk Index

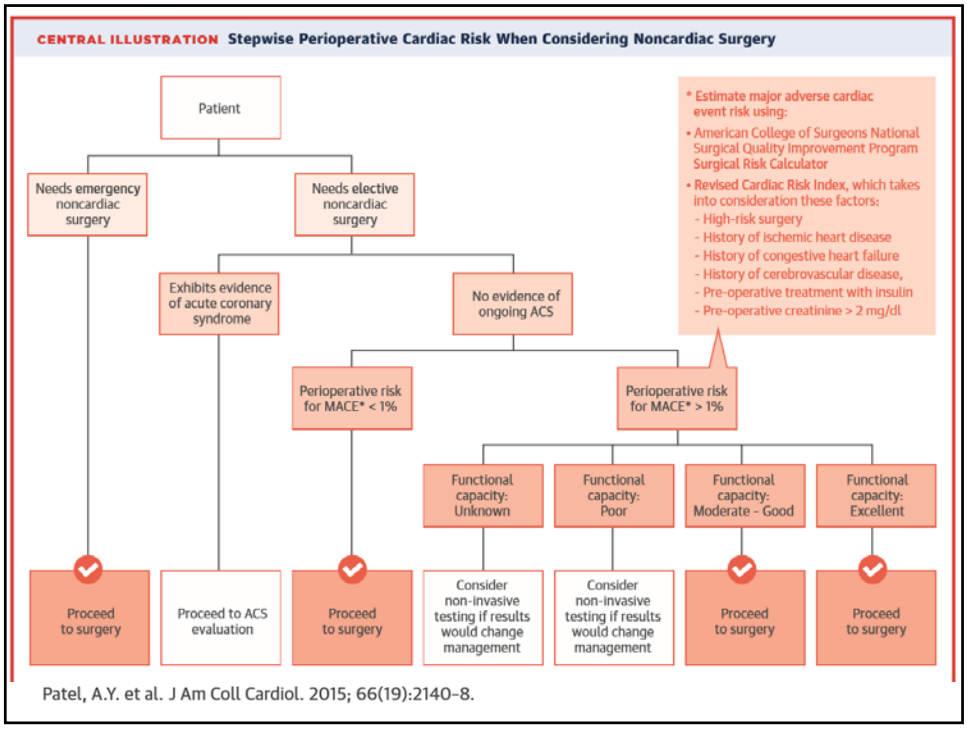
Preoperative evaluation algorithm[2-6]





STOP-Bang screening tool for obstructive sleep apnea[4]

S	Snoring	
T	Tiredness	
O	Observed apnea	
P	High blood pressure	
B	Body mass index >35 kg/m^2	
A	Age >50 years	
N	Neck circumference >40 cm	
G	Male gender	
Scoring:	0-3	Low risk
	4+	High risk



Patel, A.Y. et al. J Am Coll Cardiol. 2015; 66(19):2140–8.

Assess functional status.
Can patient complete >4 METS?

- Sexual relations
- Climbing a flight of stairs
- Moderate recreational activities (golf, bowling, dancing)
- Yard work (raking leaves, weeding, pushing power mower)
- Throwing a baseball or football
- Walking up a hill
- Doubles tennis

https://www.youtube.com/watch?v=07LFBydGjaM

Preoperative cardiac testing

ACC/AHA recommends *against* using the following cardiac tests in the following situations (class III):

- **12-lead EKG**
  - **Routine preoperative EKG is *not* useful for asymptomatic patients undergoing low risk procedures.**
- **Assessment of left ventricular (LV) function**
  - **Routine preoperative evaluation of LV function is *not* recommended.**

(cont.)

Preoperative Cardiac Evaluation

Preoperative cardiac testing (cont.)

ACC/AHA recommends *against* using the following cardiac tests in the following situations (class III):

- **Exercise or pharmacologic stress testing**
  - **Routine stress testing is *not* useful for patients at low perioperative risk for MACE**
  - **Routine stress testing is *not* useful for patients undergoing low-risk procedures**
- **Preoperative coronary angiography**
  - **Routine preoperative coronary angiography is *not* recommended**

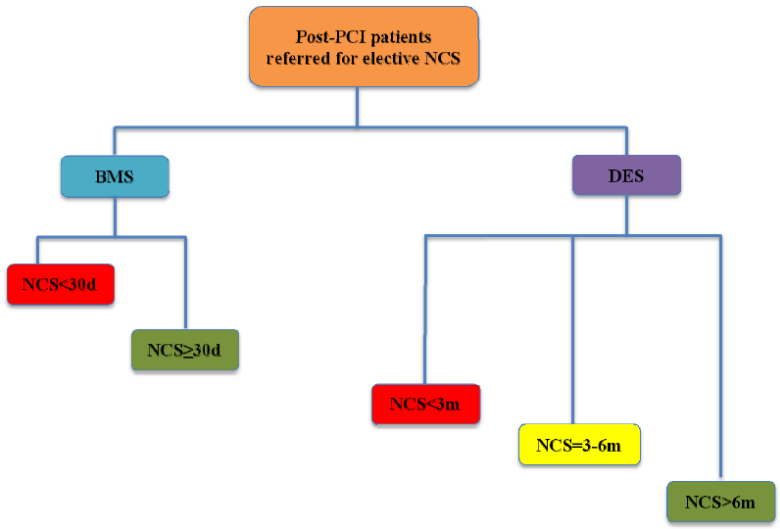
Preoperative Cardiac Evaluation

Procedure timing

Elective noncardiac surgery should be delayed following:

- **ACS**
  - **2014 ACC/AHA Guidelines: minimum 60 day interval between ACS and elective noncardiac surgery.**
- **PCI**
  - **Recommended time delay depends on presence and type of stent implanted.**

Supplemental Figure 1: Guideline Recommendations On Timing of Non-cardiac Surgery Post-PCI



PCI: percutaneous coronary intervention; NCS: non-cardiac surgery and procedures; BMS: bare-metal stents; DES: drug-eluting stents; d: days; m: months. Figure adapted from 2016 ACC/AHA Guideline Focused Update on Duration of Dual Antiplatelet Therapy in Patients With Coronary Artery Disease. Green color box indicates class III guideline recommendation or harm, yellow indicates IIb and green indicates class I recommendation.

Preoperative Cardiac Evaluation

Summary

- **Estimation of patients' cardiac risk is a key component of preoperative evaluation prior to elective noncardiac surgery.**
- **Patients undergoing low-risk procedures usually do not require preoperative cardiac testing.**
- **Patients at low-risk for MACE (as determined by the RCRI or the ACS NSQIP Surgical Risk Calculator) may proceed with surgery without further cardiac testing.**
- **Elective noncardiac surgery should be delayed following ACS and/or PCI.**

Preoperative Cardiac Evaluation

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