ANESTHESIOLOGY

A Calculated Risk: Comparing Perioperative Assessment Tools

Glance[1] *et al.* examined the scores for 10,000 patients across 3 models, evaluating model concordance and performance (calibration and discrimination).

Revised Cardiac Risk Index

- Published in 1999
- N=4,135 patients
- Simple to use
- Poor agreement *vs.* other two models
- Not a continuous prediction
- Calibration: Poor
- Discrimination: Poor (area under the curve (AUC) 0.68)

RCRI: CAD, CHF, CVA, Insulin, High risk, CKD

Myocardial Infarction or Cardiac Arrest

- Published in 2011
- N=211,410 patients
- Simple to use
- Only predicts MI or cardiac arrest
- Continuous prediction
- Calibration: Poor
- Discrimination: Fair (AUC 0.73)

MICA: Age, Renal fx, ASA Class, Function, Type of surgery

ICC 0.26

29% *disagreement on low risk patients*

ICC 0.37

ICC 0.68

American College of Surgeons National Surgical Quality Improvement Program Surgical Risk Calculator

- Periodically updated
- N=1.4 million patients
- Difficult to use[2]
- No EHR integration
- Proprietary, unpublished algorithm
- Continuous prediction
- Calibration: Acceptable
- Discrimination: Good (AUC 0.81)

ACS NSQIP: Age, Steroids, Diabetes, COPD, Sex, Ascites, HTN Meds, Dialysis, Function, Sepsis, CHF, ARF, Emergency, Ventilator, Dyspnea, BMI, ASA Class, Cancer, Smoker, CPT

Interclass correlation (ICC) agreement:

- <0.4: Poor
- 0.4 to 0.59: Fair
- 0.6 to 0.75: Good
- >0.75: Excellent

Before recommending that a specific risk calculator be used, evidence is needed demonstrating that its usage improves outcomes.

ACS, American College of Surgeons; ARF, acute renal failure; ASA, American Society of Anesthesiologists; Ascites, ascites within 30 days prior to surgery; BMI, body mass index; CAD, coronary artery disease; Cancer, disseminated cancer; CHF, congestive heart failure in 30 days prior to surgery; CKD, chronic kidney disease; COPD, chronic obstructive pulmonary disease, severe; CPT, Current Procedural Terminology, specific code; CVA, cardiovascular accident; EHR, electronic health record; Function, functional status; High risk, high-risk surgical procedure; HTN meds, hypertension requiring medication; Insulin, diabetes requiring the usage of insulin; MI, myocardial infarction; MICA, Myocardial Infarction or Cardiac Arrest; NSQIP, National Surgical Quality Improvement Program; RCRI, Revised Cardiac Risk Index; Renal fx, renal function; Sepsis, sepsis within 48 hr prior to surgery; Smoker, current smoker within 1 yr; Ventilator, ventilator dependent.

Infographic created by Jonathan P. Wanderer, Vanderbilt University Medical Center, and James P. Rathmell, Brigham and Women's Health Care/Harvard Medical School. Illustration by Annemarie Johnson, Vivo Visuals. Address correspondence to Dr. Wanderer: jonathan.p.wanderer@vanderbilt.edu.

1. Glance LG, Faden E, Dutton RP, Lustik SJ, Li Y, Eaton MP, Dick AW. Impact of the choice of risk model for identifying low-risk patients using the 2014 American College of Cardiology/American Heart Association perioperative guidelines. Anesthesiology 2018; 129:889–900

2. Fleisher LA. Preoperative cardiac evaluation before noncardiac surgery: Reverend Bayes's risk indices and optimal variables. Anesthesiology 2018; 129:867–8