

ANESTHESIOLOGY



A CALCULATED RISK Comparing Perioperative Assessment Tools

Glance¹ *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 use²
- No EHR integration
- Proprietary, unpublished algorithm
- Continuous prediction
- Calibration: Acceptable
- Discrimination: Good (AUC 0.81)

ACS NSQIP			
Age	Steroids	Diabetes	COPD
Sex	Ascities	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