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Surgeons overestimate postoperative complications and death when compared with the National Surgical Quality Improvement Project risk calculator



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ABSTRACT

Background: The assessment of postoperative morbidity and mortality is difficult particularly for complex patients. We hypothesize that surgeons overestimate the risk for complications and death after surgery in complex surgical patients.

Materials and methods: General surgery residents and attending surgeons estimated the likelihood of any morbidity, mortality, surgical site infection, pneumonia, and cardiac complications for seven complex scenarios. Responses were compared with the American College of Surgeons National Surgical Quality Improvement Project Surgical Risk Calculator.

Results: From 101 residents and 48 attending surgeons, overall response rate was 61.7%. For all seven clinical scenarios, there was no difference between resident and attending predictions of morbidity or mortality, with significant variation in estimates among participants. Mean percentages of the estimates were 25.8%-30% over the National Surgical Quality Improvement Project estimates for morbidity and mortality.

Conclusions: General surgery residents and attending surgeons overestimated risks in complex surgical patients. These results demonstrate broad variance in and near universal overestimation of predicted surgical risk when compared with national, risk-adjusted models.

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Introduction

Surgeons regularly evaluate complex patients for both elective and urgent cases. Providers have the obligation to distill complex information consisting of medical and surgical history, clinical status, and patient preference into clear

risk–benefit analyses for patients. As an evidence-based practice paradigm replaces the traditional paternalistic physician–patient relationship, surgeons have access to vast amounts of literature and data, which can further complicate the decision process. The greatest difficulty lies in the fact that very few clinical problems have strong evidence-based

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guidelines, especially in risk prediction.¹ Even when the evidence is strong, a significant portion of surgeons do not follow the evidence-based guidelines in their daily practice.² Surgeons are entrusted to predict surgical outcomes in their daily practice, yet no one has assessed whether providers are truly equipped to do so.

According to the National Center for Health Statistics, more than six million gastrointestinal tract surgeries were performed in 2010 in the United States. Exact procedural figures are difficult to ascertain, but one study estimated that 1000 surgeons accounted for over 240,000 operations in 2014.³ The surgical burden is vast, and although Americans are living longer due to modern medicine, patients are also increasingly obese, complex, and carry significant comorbidities.⁴ Medicare recipients are a special high-risk population, not only due to their age but also because of significant pre-existing conditions.⁵

The prediction of risk is often more art than science and is constantly evolving. Indeed, even defining complexity can be difficult and subjective, yet these are the parameters that guide clinical decisions on a daily basis.⁶ The surgical consent process varies significantly in scope and effectiveness.⁷ Clinicians associate surgical risk with well-supported preoperative cardiac risk assessment, yet cardiac risk assessment is only a single outcome measure and may not be sufficient to account for other comorbidities that may impact the development of complications. Across the country, surgery departments evaluate surgical complications at weekly quality improvement conferences, where a common point of discussion is the appropriateness of offering surgery to complex patients, particularly those in extremis.

There is no well-documented evidence that surgeons are equipped to assess risk. In fact, as early as 1986, researchers recognized that surgeons are only able to correctly identify a small portion of patients deemed high risk for surgery based on a “global assessment.”⁸ Not surprisingly, these authors also recognized that surgeon-predicted risks affect management decisions. The question remains: “how good are surgeons at predicting risk?”

The American College of Surgeons National Surgical Quality Improvement Project (ACS NSQIP) Surgical Risk Calculator (<https://riskcalculator.facs.org/RiskCalculator/>) is a model accounting for multiple preoperative comorbidities. It affords the ability to calculate risk-adjusted outcomes based on a multitude of preoperative factors.

The objective of this study was to assess surgeons’ ability in predicting morbidity and mortality in complex patients. We hypothesize that surgeons overestimate complications and death after surgery for complex surgical patients.

Materials and methods

The Institutional Human Investigations Committee approved this study. General surgery residents and attending surgeons at an urban, tertiary, and academic medical center were invited to participate in an online assessment. The study team developed seven complex, real clinical scenarios that were presented to participants via anonymous, online modules. These scenarios were based on real clinical scenarios

encountered on surgery service at the study institution. Scenarios were chosen for their complexity in both the surgical disease as well as patient comorbidities. For each scenario, participants estimated the likelihood of any morbidity, mortality, surgical site infection, pneumonia, and cardiac complications on a 0%-100% scale. Scenarios were representative of a diverse general surgery practice including colectomy, duodenal ulcer repair, inguinal hernia repair, exploration for perforated viscus, small bowel resection, cholecystectomy, and mastectomy (Table 1—Scenarios). The ACS NSQIP online calculator (2016 version) allowed comparison of participant responses to risk-adjusted outcome measures. All necessary information for risk calculation was provided, and comorbidities not included in the scenario were deemed as not present.

All data and statistical analysis were performed using SPSS, version 22.0 software (IBM SPSS software, Armonk, NY). Figures were created using GraphPad Prism, version 7.0 (GraphPad Software, Inc, La Jolla, CA). Normality of continuous variables was assessed by the Kolmogorov–Smirnov test to determine if parametric or nonparametric statistical tests should be utilized. To determine if residents and attendings had statistically significant differences between their assessments of risk for the individual questions, independent samples t-tests or Mann–Whitney U nonparametric tests were used as indicated. Because residents and attending surgeons had similar estimates across nearly all questions, the mean and 95% confidence interval results were combined for comparison to the NSQIP risk calculator. Differences in participant responses and NSQIP estimates were reported as absolute percentage differences of the mean. To assess the correlations between the estimated risk of morbidity, mortality, surgical site infection (SSI), pneumonia, or cardiac events and the decision to offer an operation, we calculated multiple Pearson point-biserial tests, with reporting of the correlation coefficients if the result was statistically significant. A binomial logistic regression was also performed for each question to determine if certain risk factors were more significant than others in anticipating the decision to perform surgery.

Table 1 – Participant demographics.

Characteristic	n = 92	%
Attending	21	22.8
Colorectal	1	4.8
Endocrine surgery	2	9.5
General surgery and/or trauma	13	61.9
Minimally invasive surgery	2	9.5
Surgical oncology	3	14.3
Trainee	71	77.2
PGY1	19	26.8
PGY2	28	39.4
PGY3	9	12.7
PGY4	9	12.7
PGY5	6	8.5

PGY = post graduate year.

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