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Comparison Of Surgeon Perception Of Preoperative Patient Risk With The Acs Nsqip® Surgical Risk Calculator

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Doctor of Nursing Practice

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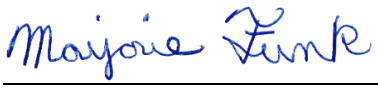

Marjorie Funk, PhD, RN, FAHA, FAAN

Date January 22, 2019

Signed: 

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Comparison of Surgeon Perception of Preoperative Patient Risk with the ACS NSQIP® Surgical Risk Calculator

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Abstract

Introduction

Surgeon perception of surgical risk varies. The American College of Surgeons (ACS) National Surgical Quality Improvement Program (NSQIP®) Surgical Risk Calculator (SRC) estimates risk of postoperative outcomes and can assist with communicating risks to patients preoperatively. We compared surgeon risk estimates with calculations of risk from the SRC.

Methods

In this project in 2 medical centers, 10 surgeons completed a tool in which they estimated the risk of complications for patients undergoing elective surgical procedures. A NSQIP-trained reviewer determined SRC estimates for the same patients. Agreement was determined using Bland-Altman and Lin's concordance statistics.

Results

In the evaluation of 74 patients, agreement was present between surgeons and the SRC for only "serious complication". For the remaining outcomes, surgeons tended to estimate higher risk than the SRC.

Conclusions

For general surgical procedures, use of the SRC may add value to the surgeon-patient shared decision-making processes.

Keywords

NSQIP, Risk, Postoperative complication, Perception

Research Highlights

- First prospective comparison of surgeon perception and SRC in clinic settings
- Surgeons tend to overestimate postoperative risks compared with SRC estimates
- The only agreement between surgeons and the SRC was for “serious complication”

Summary

Surgeons tend to overestimate postoperative risks and complications versus the ACS NSQIP® SRC. Use of the ACS NSIP® SRC may benefit the surgeon-patient shared decision-making process for surgery.

Introduction

For many patients, the decision to have surgery is challenging. The consent process is often complicated when examined from a legal and ethical perspective and is dependent on the surgeon and patient having a shared understanding of the risks and benefits of both operative and non-operative interventions. As Birkmeyer et al. state "Many decisions about surgery reside within a large grey area of clinical discretion, bounded by comparatively small 'tails' of clearly appropriate and inappropriate indications for intervention".[1] Because decision-making can be nebulous at the individual patient level, it is helpful to understand the perceptions of surgeons compared with a validated risk calculator.

Beginning with the 1985 Congressional mandate for the Veterans Administration (VA) to compare surgical outcomes to national averages, a series of collaborations and studies led to the American College of Surgeons (ACS) National Surgical Quality Improvement Program (NSQIP®) and more recently the development of the ACS NSQIP Surgical Risk Calculator (SRC).[2-4] The inter-rater reliability of the NSQIP data is high and continues to improve every year, and the prediction models used in the ACS NSQIP SRC have shown strong validity.[5-10] Variables for the SRC are easily obtained during the preoperative evaluation history and physical examination to provide patient-specific operative risk estimates.[6] Evidence supports the use of calculated preoperative risk-adjusted models, such as the SRC, to assist surgeons in estimating the likelihood of the occurrence of postoperative complications and to provide individualized perioperative patient risk estimates.[11-13]

The goal of this project was to examine surgeon perception of risk of postoperative outcomes for individual patients compared with that of patient-specific risk calculations from the ACS NSQIP SRC.

Material and methods

Setting and sample

The setting for this project consisted of 2 non-cardiac general surgery clinics that evaluate patients for surgery at 2 urban academic hospitals. These hospitals function as one setting and the surgeons practice at both hospitals. Between August and November of 2018 all 10 attending surgeons and surgical fellows in the 2 clinics were invited to participate and complete a tool in which they estimated the risk of surgical complications (Figure 1) as they evaluated patients for potential surgery. If more than 1 surgeon evaluated the same patient, the surgeons were asked to independently complete the paper survey tool before discussing the case. Each surgeon was limited to a maximum of 2 cases from each of the following 3 procedures; inguinal herniorrhaphies, breast lumpectomies, and laparoscopic cholecystectomies to broaden the types of surgical procedures studied. Patients were excluded if they were younger than 18 years of age or were being evaluated for a second procedure within 30 days of first surgery.

Variables

Independent variables were the patient demographics and clinical characteristics included in the SRC as well as the current procedures terminology (CPT) codes for principal procedures for which patients were being evaluated. A NSQIP-trained Surgical Clinical Reviewer identified demographic and clinical characteristics of the patients through chart review. The surgeon evaluating the patient identified the CPT codes. The dependent variables were the surgeon and SRC estimates of risk of each individual complication.

Surgeons in the non-cardiac general surgery clinics that participated in this project provided their number of years in practice. The primary outcome of this project was the level of agreement between surgeon and SRC prediction of potential postoperative risks.

Instrument and procedure

This project was designed to capture surgeon perception of postoperative risks and complications compared with the SRC. The design and content of the tool used to determine surgeon estimates of the risks of surgical complications (Figure 1) was intentionally laid out in a format similar to the SRC complications estimates. The only exception was the inclusion of clarifying definitions derived directly from the ACS NSQIP SRC that were placed alongside outcomes to facilitate surgeon understanding of each outcome. Designated space was allocated on the survey tool for the placement of unique patient identification stickers and for surgeons to write the procedure name or the CPT code for the anticipated surgical procedure for which patients were being evaluated.

Surgeons were invited to participate and provided with brief statements regarding the purpose, population, inclusion and exclusion criteria, and a copy of the tool used to capture their risk estimates. Upon agreement to participate, surgeons chose their dates for education in coordination with the project leader (JSC). During the surgeon education, the project leader emphasized that their best clinical estimate for each of the individual complications be used to complete the survey tool without use of any risk calculation tool or consultation with other surgeons.

The project leader collected the survey tools as they were completed and securely e-mailed them to a research associate for transcription into the secure, web-based Research Electronic Data Capture (REDCap) database hosted at Atrium Health.[14] The clinical analyst, a Certified ACS NSQIP Surgical Clinical Reviewer, abstracted patient-specific demographic and clinical characteristics from the electronic medical record. This information was entered into the SRC to obtain patient-specific risk percentages associated with each of the primary

complications. Once all data entry was complete the senior clinical data manager (ARC) conducted the statistical analysis.

Statistical analysis

Statistical analysis was performed using Stata v.13 (StataCorp. 2013. Stata Statistical Software: Release 13. College Station, TX: StataCorp LP). Sample characteristics were reported as count, percentage, mean, and standard deviation as appropriate to the data. The mean percentage of estimated risk for each postoperative complication were determined. Bland-Altman statistics and Lin's concordance were used to assess agreement of preoperative patient risk of surgeon perceptions with the calculated estimates of the SRC.[15-18] Estimates of bias (mean difference), limits of agreement, and correlation (rho_c) were reported. Statistical significance was set at $p < .05$, with non-significance implying agreement.

This project was approved and deemed quality improvement by the Institutional Review Board at Atrium Health.

Results

Ten surgeons evaluated a sample of 74 patients and completed the survey tool. The patients were predominately under age 65, male, white, and non-Hispanic (Table 1), with at mean body mass index of 28.3 kg/m^2. Almost all patients were functionally independent and most had mild or severe systemic disease (American Society of Anesthesiologists [ASA] classification 2 or 3; Table 2). The most common comorbidities were hypertension requiring medication, smoking, cancer, and dyspnea. There were no patients with ASA classification 5: moribund/not expected to survive surgery, emergency cases, systemic sepsis within 48 hours, ventilator dependent, acute renal failure, or receiving dialysis. A range of procedure types were evaluated (Table 3). Surgeons were in practice from 2 to 20 years with a mean of 13.1 years.

Except for “any complication” estimates of the risk of each outcome was < 10% (Table 4). The estimated risk of postoperative complications by surgeons agreed with the SRC calculation only for “serious complication” (rho_c p > .05). The Bland-Altman analysis for “serious complication” revealed a mean difference of -0.58, with lower and upper limits of agreement of -14.07 and 12.92. For the remainder of specific postoperative events, surgeons estimated a higher risk than the SRC.

Three surveys were excluded due to the procedure/CPT not existing as eligible for calculation within the SRC (e.g., surgical placement of a Port-A-Cath for chemotherapy). Based on the selected procedure/CPT, results from the SRC were conditionally displayed for ileus and anastomotic leak and appeared only 5 times in the cohort. Therefore, because of the extremely low volume we removed them from results reported.

Discussion

This project is the first to prospectively analyze surgeon perception of risk for patients being seen in the preoperative clinical setting, before outcomes were known, and compared results with the SRC. The only outcome that demonstrated agreement between the surgeons and the SRC was the broad term “serious complication.” The wide limits of agreement for “serious complication”, however, raise concern that this degree of agreement would be insufficient in clinical practice.

The risk models in the SRC are well validated and reliable.[6-10] For example, during validation of a cardiac risk model for myocardial infarction and cardiac arrest, the SRC demonstrated better predictive performance than the commonly used Revised Cardiac Risk Index.[10] The ACS NSQIP Universal SRC has been shown to be applicable in a wide range of surgical procedures.[6] Noteworthy in our project is the patient sample of elective surgical cases

with lower acuity, higher functional status, and fewer co-morbid conditions than the overall NSQIP data population used to construct the SRC. This is not unexpected given the outpatient clinic setting in which this project was conducted.

Other studies have compared surgeon risk estimation to the SRC. Sacks et al. presented surgeons with online hypothetical clinical vignettes and surveys and found that surgeon use of the SRC demonstrated less variability and increased accuracy of operative risks and the perception of the risks and benefits are predictive of a surgeons' decisions to operate.[20,21] Healy et al. and Pei et al. presented surgeons with complex clinical scenarios and asked them through online surveys to make their best guess of postoperative complications and concluded that these surgeons overestimated these complications compared with estimates from the SRC.[12,19] In the context of surgical education, Leeds et al. used an audience response system during 4 weekly Morbidity and Mortality conferences.[22] The clinical characteristics were entered into the SRC for the cases with "any complication" and found surgeon overestimation of complication rates compared with the SRC.[22] In contrast to the studies described above, surgeons in our project completed surveys after seeing and examining patients in person. We found that surgeons tended to overestimate postoperative risks and complications versus the ACS NSQIP SRC, which is consistent with previous studies.[12, 19-21] The underlying causes for this overestimation are not well understood.

Surgeons may overestimate postoperative risks and complications for several reasons. First may be related to the unexpected finding by Leeds et al. that faculty had a tendency to overestimate surgical complications at a higher rate that novice trainees.[22] They posited that faculty members may be unable to separate their tacit knowledge of potential postoperative complication from an estimate based solely on preoperative risk factors.[22] Second, as physicians

reach retirement age (65 years), their chance of being sued ranges from 75% to 99%.[23] Among all physicians, general surgeons have one of the highest annual risks (15.3%) of litigation.[23] Perhaps this high risk of litigation causes surgeons to overestimate surgical risks in their conversations with patients in an effort to ensure that patients understand that the risks are real. The ideal informed consent process ensures that patients understand the surgical procedure, potential outcomes, risks, and complications by asking the patient to repeat this information back to the surgeon. When possible, using easily understood terms and minimizing the use of medical terminology can improve patient understanding. Barriers in communication contribute to a lack of patient comprehension of the potential risks and benefits of surgery.[24]

Risk calculators are a quality metric that can be used for the Merit-Based Incentive Payment System through the Center for Medicaid and Medicare Services (CMS). Surgeons participating in registries may now select a metric that focuses on patient-centered surgical risk assessments (Quality ID #358).[25] The risk assessment metric requirement can be met through the use of a validated risk calculator that includes documenting experiential personal patient risk based on clinical characteristics and communication of these risks to the patient.[25] This metric requirement is not prescriptive as to which risk calculators are acceptable. It does point out that the ACS NSQIP now offers the SRC, which can be used for operations in many surgical subspecialties. The metric is clear about the availability and acceptability of additional risk calculators, including the risk calculator from the Society of Thoracic Surgeons.[25]

The rationale of the CMS Merit-Based Incentive Payment System is that preoperative risk assessments and communication between surgeons and patients are an essential component of informed consent and shared decision-making in patient-centered surgical care.[25] Evidence suggests that gaps exist with communication and using a risk calculator may improve the quality

of the informed consent/shared decision-making process.[25] To increase surgeon awareness of the potential benefits of incorporating the SRC into the shared decision-making process, comparison data from this project will be communicated with surgeons.

Limitations

The samples of surgeons and patients included in this project may not be representative of the entire population of surgeons and patients undergoing general surgery across this healthcare setting. The convenience sample of 10 surgeons who saw patients in the 2 clinics may not be representative of the 58 attending surgeons and 11 fellows evaluating patients in the department of general surgery clinics serving these hospitals. Further, the survey contained written definitions of each complication; it is possible that surgeon evaluators did not interpret these definitions in the same way. Bias may occur in the types of cases the surgeons selected when performing their evaluations.

The sample of 74 patients contained a larger proportion of white people than the population of Charlotte, North Carolina (65.7% vs. 51.9%).[26] In addition, the patients had relatively low acuity, high functional status, and few co-morbid conditions and were to undergo elective surgery.

Conclusion

This project revealed that surgeons tend to overestimate risks compared with estimates from the ACS NSQIP SRC. A dilemma arises when patients and families do not have a realistic understanding of the surgical risks, postoperative complications, or chance of a prolonged recovery and may refuse to consent to surgery based on overestimation of risks and complications. Surgeons of all experience levels may find that the use of the individualized

estimates of postoperative complications from the SRC adds value to conversations within the surgeon-patient shared decision-making processes.

Further study of possible causes of this variability and studies that include short and long-term outcomes could provide further clarification.

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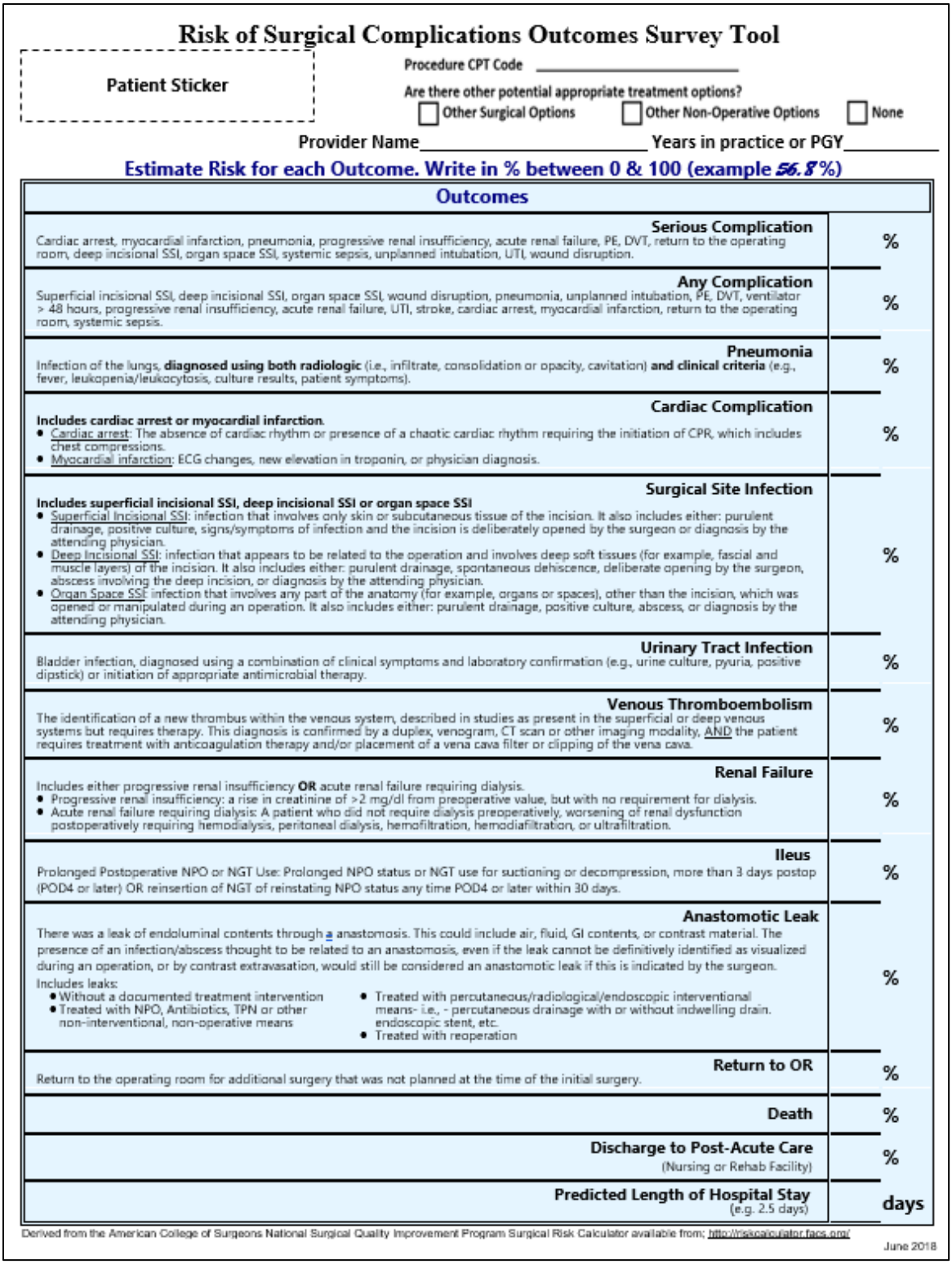
Figure 1. Risk of Surgical Complications Outcomes Survey Tool



Risk of Surgical Complications Outcomes Survey Tool

Patient Sticker

Procedure CPT Code _____

Are there other potential appropriate treatment options?

☐ Other Surgical Options ☐ Other Non-Operative Options ☐ None

Provider Name_____ Years in practice or PGY_____

Estimate Risk for each Outcome. Write in % between 0 & 100 (example *56.8*%)

Outcomes	
Serious Complication Cardiac arrest, myocardial infarction, pneumonia, progressive renal insufficiency, acute renal failure, PE, DVT, return to the operating room, deep incisional SSI, organ space SSI, systemic sepsis, unplanned intubation, UTI, wound disruption.	%
Any Complication Superficial incisional SSI, deep incisional SSI, organ space SSI, wound disruption, pneumonia, unplanned intubation, PE, DVT, ventilator > 48 hours, progressive renal insufficiency, acute renal failure, UTI, stroke, cardiac arrest, myocardial infarction, return to the operating room, systemic sepsis.	%
Pneumonia Infection of the lungs, **diagnosed using both radiologic** (i.e., infiltrate, consolidation or opacity, cavitation) **and clinical criteria** (e.g., fever, leukopenia/leukocytosis, culture results, patient symptoms).	%
Cardiac Complication **Includes cardiac arrest or myocardial infarction.** • Cardiac arrest: The absence of cardiac rhythm or presence of a chaotic cardiac rhythm requiring the initiation of CPR, which includes chest compressions. • Myocardial infarction: ECG changes, new elevation in troponin, or physician diagnosis.	%
Surgical Site Infection **Includes superficial incisional SSI, deep incisional SSI or organ space SSI** • Superficial Incisional SSI: infection that involves only skin or subcutaneous tissue of the incision. It also includes either: purulent drainage, positive culture, signs/symptoms of infection and the incision is deliberately opened by the surgeon or diagnosis by the attending physician. • Deep Incisional SSI: infection that appears to be related to the operation and involves deep soft tissues (for example, fascial and muscle layers) of the incision. It also includes either: purulent drainage, spontaneous dehiscence, deliberate opening by the surgeon, abscess involving the deep incision, or diagnosis by the attending physician. • Organ Space SSI: infection that involves any part of the anatomy (for example, organs or spaces), other than the incision, which was opened or manipulated during an operation. It also includes either: purulent drainage, positive culture, abscess, or diagnosis by the attending physician.	%
Urinary Tract Infection Bladder infection, diagnosed using a combination of clinical symptoms and laboratory confirmation (e.g., urine culture, pyuria, positive dipstick) or initiation of appropriate antimicrobial therapy.	%
Venous Thromboembolism The identification of a new thrombus within the venous system, described in studies as present in the superficial or deep venous systems but requires therapy. This diagnosis is confirmed by a duplex, venogram, CT scan or other imaging modality, AND the patient requires treatment with anticoagulation therapy and/or placement of a vena cava filter or clipping of the vena cava.	%
Renal Failure Includes either progressive renal insufficiency **OR** acute renal failure requiring dialysis. • Progressive renal insufficiency: a rise in creatinine of >2 mg/dl from preoperative value, but with no requirement for dialysis. • Acute renal failure requiring dialysis: A patient who did not require dialysis preoperatively, worsening of renal dysfunction postoperatively requiring hemodialysis, peritoneal dialysis, hemofiltration, hemodiafiltration, or ultrafiltration.	%
Ileus Prolonged Postoperative NPO or NGT Use: Prolonged NPO status or NGT use for suctioning or decompression, more than 3 days postop (POD4 or later) OR reinsertion of NGT of reinstating NPO status any time POD4 or later within 30 days.	%
Anastomotic Leak There was a leak of endoluminal contents through a anastomosis. This could include air, fluid, GI contents, or contrast material. The presence of an infection/abscess thought to be related to an anastomosis, even if the leak cannot be definitively identified as visualized during an operation, or by contrast extravasation, would still be considered an anastomotic leak if this is indicated by the surgeon. Includes leaks: • Without a documented treatment intervention • Treated with NPO, Antibiotics, TPN or other non-interventional, non-operative means • Treated with percutaneous/radiological/endoscopic interventional means- i.e., - percutaneous drainage with or without indwelling drain. endoscopic stent, etc. • Treated with reoperation	%
Return to OR Return to the operating room for additional surgery that was not planned at the time of the initial surgery.	%
Death	%
Discharge to Post-Acute Care (Nursing or Rehab Facility)	%
Predicted Length of Hospital Stay (e.g. 2.5 days)	**days**

Derived from the American College of Surgeons National Surgical Quality Improvement Program Surgical Risk Calculator available from: http://riskcalculator.facs.org/

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Table 1

Demographic Characteristics of Patients (N = 74)

Characteristic	%
Age in Years	
<65	71.6
65-74	17.6
75-84	5.4
≥85	5.4
Sex	
Male	53.4
Female	46.6
Race	
White	65.7
Black or African American	20.6
Unknown	8.2
Not Reported	4.1
Asian	1.4
Ethnicity	
Not Hispanic	84.9
Hispanic or Latino	12.3
Unknown	1.4
Not Reported	1.4

Table 2

Clinical Characteristics of Patients (N = 74)

Characteristic	%
Functional Status	
Independent:	
Does not require assistance from another person for any activities of daily living. Includes functioning independently with prosthetics, equipment, or devices	97.2
Partially Dependent:	
Requires some assistance from another person for activities of daily living	2.8
American Society of Anesthesiologists (ASA) Class	
ASA 1: Healthy	9.5
ASA 2: Mild systemic disease	35.1
ASA 3: Severe systemic disease	51.4
ASA 4: Severe systemic disease/constant threat to life	4.0
ASA 5: Moribund/not expected to survive surgery	0
Clinical Condition	
Hypertension requiring medication	31.1
Current smoker within 1 Year	14.9
Disseminated cancer	8.1
Dyspnea with moderate exertion	8.1
Diabetes: Oral treatment	6.8
Diabetes: Insulin treatment	5.5
History of severe COPD	5.4
Steroid use for chronic condition	2.7
Ascites within 30 days prior to surgery	1.4
Congestive heart failure in 30 days prior to surgery	1.4
Dyspnea at rest	1.4

0% of patients were totally dependent, emergency cases, had systemic sepsis within 48 hours prior to surgery, were ventilator dependent, were on dialysis or in acute renal failure

Table 3

Current Procedures Terminology (CPT) codes with Descriptions and Volumes

# of Cases	% of Total Cases	CPT Code for Expected Procedure	Procedure Description as they appear in the ACS NSQIP Calculator (http://riskcalculator.facs.org/)
9	12%	49650	Laparoscopy, surgical; repair initial inguinal hernia
9	12%	47562	Laparoscopy, surgical; cholecystectomy
4	5%	47122	Hepatectomy, resection of liver; trisegmentectomy
4	5%	44204	Laparoscopy, surgical; colectomy, partial, with anastomosis
4	5%	43279	Laparoscopy, surgical, esophagomyotomy (Heller type), with fundoplasty, when performed
3	4%	47370	Laparoscopy, surgical, ablation of 1 or more liver tumor(s); radiofrequency
3	4%	46940	Curettage or cautery of anal fissure, including dilation of anal sphincter (separate procedure); initial
3	4%	49585	Repair umbilical hernia, age 5 years or older; reducible
2	3%	50548	Laparoscopy, surgical; nephrectomy with total ureterectomy
2	3%	47130	Hepatectomy, resection of liver; total right lobectomy
2	3%	47120	Hepatectomy, resection of liver; partial lobectomy
2	3%	44620	Closure of enterostomy, large or small intestine;
2	3%	43282	Laparoscopy, surgical, repair of paraesophageal hernia, includes fundoplasty, when performed; with implantation of mesh
2	3%	15830	Excision, excessive skin and subcutaneous tissue (includes lipectomy); abdomen, infraumbilical panniculectomy
1	1%	60650	Laparoscopy, surgical, with adrenalectomy, partial or complete, or exploration of adrenal gland with or without biopsy, transabdominal, lumbar or dorsal
1	1%	60540	Adrenalectomy, partial or complete, or exploration of adrenal gland with or without biopsy, transabdominal, lumbar or dorsal (separate procedure);
1	1%	49659	Unlisted laparoscopy procedure, hernioplasty, herniorrhaphy, herniotomy
1	1%	49655	Laparoscopy, surgical, repair, incisional hernia (includes mesh insertion, when performed); incarcerated or strangulated
1	1%	49651	Laparoscopy, surgical; repair recurrent inguinal hernia
1	1%	49565	Repair recurrent incisional or ventral hernia; reducible
1	1%	49560	Repair initial incisional or ventral hernia; reducible
1	1%	49418	Insertion of tunneled intraperitoneal catheter (e.g., dialysis, intraperitoneal chemotherapy instillation, management of ascites), complete procedure, including imaging guidance, catheter placement, contrast injection when performed, and radiological supervision and interpretation, percutaneous
1	1%	48150	Pancreatectomy, proximal subtotal with total duodenectomy, partial gastrectomy, choledochoenterostomy and gastrojejunostomy (Whipple-type procedure); with pancreatojejunostomy
1	1%	47564	Laparoscopy, surgical; cholecystectomy with exploration of common duct
1	1%	47380	Ablation, open, of 1 or more liver tumor(s); radiofrequency
1	1%	47300	Marsupialization of cyst or abscess of liver
1	1%	47125	Hepatectomy, resection of liver; total left lobectomy
1	1%	45402	Laparoscopy, surgical; proctopexy (for prolapse), with sigmoid resection
1	1%	45130	Excision of rectal procidentia, with anastomosis; perineal approach
1	1%	44625	Closure of enterostomy, large or small intestine; with resection and anastomosis other than colorectal
1	1%	49568	Implantation of mesh or other prosthesis for open incisional or ventral hernia repair or mesh for closure of debridement for necrotizing soft tissue infection (List separately in addition to code for the incisional or ventral hernia repair)
1	1%	44210	Closure of enterostomy, large or small intestine;
1	1%	44202	Laparoscopy, surgical; enterectomy, resection of small intestine, single resection and anastomosis
1	1%	44155	Colectomy, total, abdominal, with proctectomy; with ileostomy
1	1%	43840	Gastrorrhaphy, suture of perforated duodenal or gastric ulcer, wound, or injury
1	1%	43333	Repair, paraesophageal hiatal hernia (including fundoplication), via laparotomy, except neonatal; with implantation of mesh or other prosthesis
1	1%	43281	Laparoscopy, surgical, repair of paraesophageal hernia, includes fundoplasty, when performed; without implantation of mesh

Table 4

Surgeon Perceived Risk vs. ACS NSQIP Surgical Risk Calculator

Surgeon Perceived Risk vs. ACS NSQIP Surgical Risk Calculator									
Outcome		Surgeon Perceived Risk		ACS NSQIP Risk Calculator		Bland-Altman		Lin's Concordance Coefficient (rho_c)	p Value*
	n	Mean	SD	Mean	SD	Mean Difference	Upper and Lower limits of agreement		
Serious Complication	74	7.4	7.5	8.0	8.1	-0.58	(-14.07 / 12.92)	0.606	0.554
Any Complication	74	15.8	14.2	9.4	9.3	6.4	(-15.17 / 27.98)	0.506	0.000
Pneumonia	74	4.2	4.5	1.2	1.8	2.96	(-4.83 / 10.75)	0.237	0.000
Cardiac Complication	74	2.8	1.9	0.5	0.8	2.29	(-1.23 / 5.80)	0.093	0.000
Surgical Site Infection	74	6.2	5.6	4.2	5.3	1.94	(-9.00 / 12.88)	0.443	0.014
Urinary Tract Infection	74	2.8	2.1	1.1	1.0	1.72	(-2.13 / 5.55)	0.208	0.000
Venous Thromboembolism	73	3.1	2.8	1.0	1.2	2.11	(-3.44 / 7.67)	0.085	0.000
Renal Failure	74	2.2	1.9	0.6	0.8	1.67	(-1.72 / 5.06)	0.193	0.000
Return to OR	74	3.1	5.8	2.1	1.8	0.92	(-10.85 / 12.69)	0.032	0.000
Death	74	1.7	1.8	0.6	1.2	1.15	(-1.46 / 3.75)	0.490	0.000
Discharge to Post-Acute Care	74	5.0	7.4	2.8	6.2	2.21	(-11.97 / 16.37)	0.418	0.009
Predicted Length of Hospital Stay	74	3.1	3.4	2.9	2.7	0.21	(-4.08 / 4.50)	0.742	0.009

*Non-significance ($p > .05$) implies agreement